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Inquiry-Style Planetarium Activities

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Master of Science

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ABSTRACT

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Introductory astronomy students often face challenges in exploring their own ideas and investigating astronomical phenomena due to the limitations of nighttime observation and weather conditions. Planetariums overcome these barriers by simulating the night sky, making it accessible during class sessions regardless of external conditions. This provides an opportunity to engage students in inquiry-based activities, where they are presented with a scenario and encouraged to use their own reasoning to reach conclusions. In this study, we implemented inquiry-based activities in PHSCS 127 using the planetarium as an investigative tool. We developed four activities designed to help students explore their ideas and understanding of astronomical concepts. To assess the impact of these activities on student learning and engagement, students complete a worksheet related to the activity topic and later participate in a survey evaluating their overall classroom experience. Additionally, student and instructor interviews were conducted. The finding from these data are discussed.

Keywords: [planetarium, constructivist, inquiry, astronomy education, physics education]

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Contents

List of Figures

List of Tables

Chapter 1

Introduction

Astronomy education research is a growing field within science education, evolving with technological advances that shape both the discipline and the tools used to teach it. Professors need to stay current not only with advancements in astronomical knowledge but also with the latest teaching technologies. A particularly promising tool in this area is the planetarium, which allows educators to simulate astronomical phenomena as they would appear in the night sky, moving beyond the limitations of a flat screen. Over the past decade, research on planetarium-based learning has largely centered on surveys and established teaching techniques [3–6]. However, less attention has been given to planetarium research grounded in constructivist learning principles. Because active learning has been shown to enhance student comprehension and retention, my project aims to apply these principles in a planetarium setting.

Constructivist principles are now integral to many science teaching practices and are reflected in the American Association of Physics Teachers (AAPT) guidelines [7]. However, implementing these ideas in astronomy can be challenging. For instance, inquiry-based demonstrations are limited by the fact that stars are only visible at night, yet astronomy classes are typically held during the day. In addition, astronomical instruments are often costly and require extensive training and access. Planetariums, however, offer a way to overcome these barriers by enabling the visualization and manipulation of celestial objects. Although operating a planetarium still requires some training, it is generally more accessible to universities and requires less specialized expertise [6]. Inquiry-based activities can create such environments by encouraging students to be active participants in their learning process; they are prompted to ask questions and independently navigate challenges. In the learning environments of my study, students were given a problem related to key concepts of the lesson. They then had the opportunity to hypothesize, discuss, experiment, analyze, and refine their hypotheses. My goal was to investigate the use of scientific modeling, reasoning, and problem solving skills by students in the unique environment of the planetarium. I aimed to do this by investigating three key questions:

1. What misconceptions do students exhibit before and after being engaged in the inquiry-based planetarium activities?
2. What modeling characteristics do students exhibit before and after participating in inquiry-based planetarium activities?
3. How do inquiry-based activities affect students' own perception of their engagement and learning outcome?

One main objective of this project is to explore what reasoning and modeling skills undergraduate students demonstrate during inquiry-based planetarium activities. Adopting a constructivist approach, we will design a series of inquiry activities that encourage students to apply and question their understanding of targeted astronomical principles. Through these activities, the aim is to analyze students' problem-solving methods and scientific modeling skills, observing changes in their understanding before and after the activity. A 2014 study revealed that university-level astronomy students often retain fundamental misconceptions about astronomy topics even after formal instruction [8]. A goal of this research is to help students address these misconceptions by developing skills that support reasoning and visualization. This is assessed by monitoring submitted student models.

In addition to examining student reasoning, I also aim to assess students' emotional responses to the activities. Students often anticipate a passive experience in the planetarium, but these activities are designed to actively engage them. By posing challenging questions, I hope to stimulate curiosity without leading to frustration, as high levels of frustration have been shown to hinder information retention [9]. Students' affective responses to ensure that any confusion experienced during the activities does not lead to excessive frustration will be closely monitored.

In the following chapters, the background, methods, and findings of this study will be presented. I aimed to answer the aforementioned research questions and goals by developing inquiry-based planetarium activities to be conducted in the course PHSCS 127: Introduction to Astronomy at Brigham Young University (BYU). The reader will find the methods used to develop these activities as well as the reasoning behind them. Furthermore, a detailed review of the data analysis is given. Finally, findings and a discussion regarding them are presented. It is my hope that this work is used in the future to adjust learning in a planetarium environment not only at BYU, but at other universities and public planetariums.

Chapter 2

Literature Review

2.1 Scientific Modeling in Astronomy Education

Scientific modeling is a topic from which many studies and experiments have arisen. The term "modeling" can be defined as a sense-making tool that helps predict and explain the world [10]. In this study, modeling acts as a process by which students use written or drawn representations or ideas to explain phenomena occurring in the natural world. In a 2014 study, Kominski stressed the importance of modeling, claiming that it is an integral skill in helping students understand real-world systems in an abstract way [7]. In astronomy education, we typically see modeling used to help students cognitively develop the "why" behind astronomical processes such as orbits, star formation, and different classifications. This is demonstrated in a study done by Van Joolingen et. al. where they assess the competence of elementary-aged students on modeling solar systems to demonstrate when eclipses will occur [11]. This modeling can "function as a bridge between scientific theory and the world-as-experienced" [12]. This is especially applicable to astronomy, where direct observation is generally impossible due to the large scales and distances involved.

Modeling, therefore, allows students to manipulate these large-scale processes, which helps promote critical thinking skills and conceptual learning [13].

There are many different methods with which to make effective models for different settings. A brief overview of Frigg, 2006 summarizes many of these model types; my analysis narrows it down to models most relevant to the present study. Commonly seen are analogical models, where a learner finds a relationship between what they are learning and something else. This "something else" can relate to what they are learning through physical properties, conditions of existence, or any sort of resemblance that a learner may find. Idealized models deliberately simplify a phenomenon for the purpose of making it more understandable for the learner. An example of this would be the Bohr's model of the atom. The model is often illustrated by electrons orbiting in perfect circles, when reality is much more complicated. Another type of model is an exploratory model, which is created with the purpose of being modified and refined. A student might create an initial model before all information is gathered. Then, as the learning process continues, they test their model with new intelligence and modify it as needed. There are also scale models, which is basically a smaller representation of a bigger system, for example, drawing the solar system on your paper to represent the planets' orbits in space. A final type of model is the mathematical model. These models can explain a phenomenon through equations or numerical data. In our analysis, we synthesize these models into three main groups as shown in Table 2.1. [14]

In astronomy education - specifically in planetariums- a common model type are simulations and computer-based models. Plummer discusses a study in which they employed the use of Stellarium software to allow students to observe and simulate astronomical occurrences. They reported that the simulation models seemed to help students specifically in understanding processes that are time-dependent, such as the changing of the sky over the course of one night. [15]. When creating these activities for the planetarium, we used these types of models. The goal is that by using these

Table 2.1 Model types in analysis compared with literature model types.

Modeling Type	**Literature Model**	**Brief Description**
Analogy/Representative	Analogical, Exploratory	Uses an example or analogy to explain the physical phenomenon. Can also include models that represent the process but express the need for changes.
Pictorial/Diagram	Scale, Idealized	An illustration that is a scaled-down version of the physical phenomenon. Can also be a type of drawing that shows a small part or simplification of the process.
Graphical/Mathematical	Mathematical	Uses numerical data, graphs, or equations to explain the physical phenomenon.

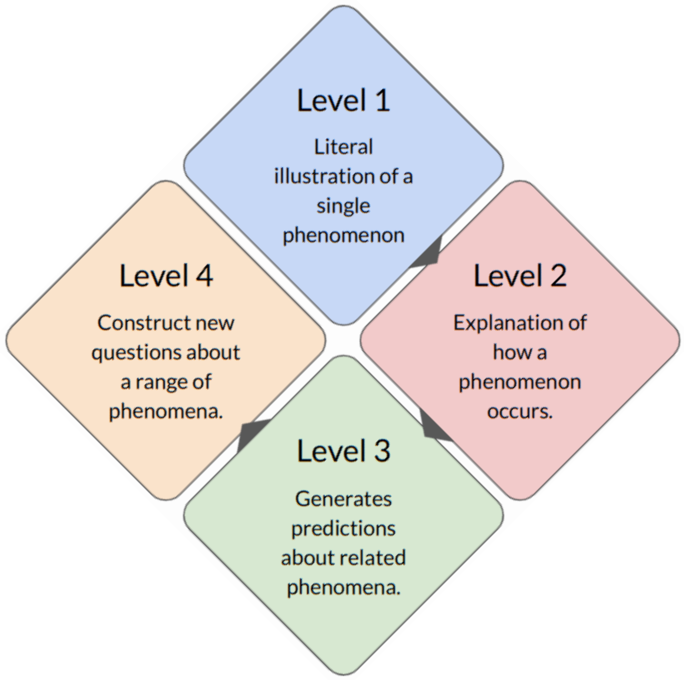


Figure 2.1 Modeling Level Progression as defined by Scwartz 2009 [1].

simulation models, we can allow students to see the physical processes unfolding on the dome, and be able to ultimately use them to strengthen their conceptual understanding.

As the modeling types are addressed, it is also important to assess the modeling levels. Schwartz explains the modeling levels in a discussion regarding modeling progression. She offers four main levels which increase with model complexity. The basic breakdown is as shown in Figure 2.1.

As defined by Schwartz, the original levels indicate that a Level 3 model consists of any model that offers multiple Level 2 ideas. For this study, I chose to categorize any models with more than one idea as the highest model existing in their response. For example, if a student presents both a Level 2 and a Level 3 model, I would categorize their response as a Level 3 model. If they were to present two Level 2 models, they would receive the Level 2 categorization. Furthermore, for Level 3 models, I wanted to more specifically define what "related phenomena" were. Because of this, I chose to use an adaptation of Schwartz's levels in this study. My modeling levels are as follows; a more detailed account is given in the methods section:

- Level 1: Literal illustration of phenomenon
- Level 2: Explanation of how phenomenon occurs
- Level 3: Predictions and questions related to activity content
- Level 4: Predictions and questions related to course content, but outside of activity material

As these modeling levels are meant to be a progression, we hope to see modeling levels increasing throughout individual activities as well as throughout the overall course.

Applying these modeling methods in a planetarium has promising potential, as planetariums are a unique and powerful environment that offer luxuries a traditional classroom cannot. Students are able to see realistic representations of the night sky and astronomical phenomena that they would not be able to see otherwise. A significant advantage of a planetarium over a traditional learning setting is the ability to view phenomena from different points in time and from different physical points of view. Yu et. al. did a study to compare the learning gains between students immersed in a planetarium environment versus students in a classroom. Their findings show that the students in the immersive planetarium environment showed higher scores on assessments immediately afterwards and a better rate of long-term retention [16].

2.2 Planetarium Use in Education

Planetariums were first introduced in 1923 by the Carl Zeiss company. Their main purpose was to help teach naked-eye astronomy by using a star ball to recreate the night sky. After Sputnik was launched in 1957, planetarium education was one educational project that was claimed to emerge during President Eisenhower's term. Digital Planetariums did not come about until 1983 with

Evan's and Sutherland, which began the progression from fixed star fields and lenses to computer graphics. [17]

Since then, planetariums have made huge advances as we improve upon software, projector graphics, and digital rendering. Today, there are over 820 fulldome theaters. As planetariums become more accessible to universities and communities, demonstrations are given to the general public regarding black holes, simulated sky, altering time variables, star formation, and planetary systems. Audiences are able to be immersed in these experiences and in some cases, can become active participants. [16]

A study done by Trump et. al. gathered data from 85 university planetariums across the United States to document how they were being used [6]. It was found that planetariums are primarily used to teach the night sky- a step behind the entertainment industry, which has expanded into many other topics. While some might use unscripted shows to teach other topics, they are not the primary source of teaching, being used less than half of the time to teach learning objectives. Furthermore, it was found that instructors had a slight preference to using the planetariums for 10-30 minute teaching segments. In the initial stage of this study, these findings were implemented by creating activities aimed at taking about 30 minutes of lecture time. Further details are explained in the methods section of this paper.

In universities, planetariums are very powerful useful tools, but traditionally can come with limitations. Schultz conducts an investigation of methods of learning in planetariums. Their findings indicate that a common goal among planetarium instructors was to inspire and amaze audiences. While a worthy goal to promote enthusiasm for the field, this approach does not always foster an environment for lasting conceptual knowledge. The study also found that many instructors used “interactivity” and “active learning” interchangeably. When the actual methods were investigated, it seemed that many planetariums used interactivity with the audience, but not active learning methods [18]. Without an active learning aspect to planetarium instruction, students may leave with reinforced misconceptions. Bell and Trundle discuss the benefits of active learning on helping students understand deeper concepts of a topic and helps them make further predictions and relations [19].

2.3 Misconceptions in Astronomy

There are many persistent misconceptions in astronomy that affect learners of varying ages and educational settings. These misconceptions generally arise from students' personal experiences and the interpretation of scientific concepts in their light. Perhaps two of the most popular misconceptions involve moon phases and the reason for the seasons. The former is generally attributed to Earth's shadow on the moon rather than from the angle at which sunlight hits the moon relative to Earth [20]. LoPresto discusses that many students believe that the seasons are due to Earth's distance from the Sun at different points in its orbit rather than due to Earth's tilt [21]. This is further supported by Favia whose students generally associated cold weather with winter and warm with summer, leading to a similar distance-based conclusion [22]. There are also many misconceptions found relating to the age of the universe among public audiences [23].

These misconceptions are found in all sorts of audiences ranging from elementary classes to general public planetarium audiences, but the focus in this study will be on introductory college courses. Favia (2014) documented different misconceptions among entry level college students [8]. They concluded that in areas where students are not able to have a direct observation opportunity, misconceptions persist. One example of this is relative sizes of the Earth, Moon, and Sun. In such classes, there are shown to be many misconceptions, and these misinterpretations may follow the students for the entirety of their college career. Azizah et. al. also finds misconceptions specifically in introductory college courses. Using a 4-tier test, they categorize misconception levels of students on certain topics [20]. They found high misconception levels relating to moon phases. Many assume that a solar eclipse occurs when the moon is in its full phase rather than its new phase. They also often confuse the order of celestial bodies in eclipses. Furthermore, they found a moderate misconception level relating to stars- primarily star color-temperature relations and star mass-age relations. An additional study finds misconceptions about the brightest star in the sky being Polaris, stars lasting forever, and stars being the same color white [21]. From these misconceptions and based on needed topics for the course, we developed our 4 initial activity topics aimed to address them: Coordinates, Eclipses, Magnitudes, and Color Measurement Bias. More on this justification can be found in the Methods section of this paper.

A study carried out in a public planetarium surveyed audience astronomy beliefs [23]. The results indicate that even after the planetarium shows, audiences can retain incorrect assumptions on the deeper concepts behind astronomical phenomena. This indicates a need for a more targeted approach to address such misconceptions. Siantuba explores a controlled teaching environment versus a targeted environment as a method to reduce misconceptions [24]. They found that the targeted environment was much more effective at addressing and resolving misconceptions than the control. One possible explanation for this is that students may rely on intuitive reasoning for concepts that they cannot experience, which is more resistant to correction.

Applying this to an astronomy setting, there are many concepts which cannot be directly observed and require mental visualization. When students facilitate this on their own, they may unwittingly develop misconceptions that can stay with them until directly challenged. Favia claims that traditional teaching methods generally focused on memorization over understanding can inadvertently solidify misconceptions [22]. In order to prevent this, the students' initial beliefs must be actively challenged. Sinatuba offers a method to target these beliefs through an inquiry-based approach. This approach encourages students to question their assumptions and do further exploration of concepts through a more hands-on approach [24]. We used these findings to contribute to the justification of our study methods, which are founded on a constructivist approach and aim to apply inquiry-based learning via authentic learning environments.

2.4 Theoretical Framework

Our activities aim to follow a constructivist learning approach. An overview of Zualkernan 2006 and Friesen et al. 2013 gives a sufficient foundation for the framework of this study [25, 26]. Constructivism was founded on the perspective that learning takes place through active participation rather than passive transmission. This "active participation" can take many forms, but most relevant to my study comes in the form of inquiry-based learning. This encourages students to be the driving force of their own learning by asking questions and conducting experiments. As students carry out this process, it is important to constructivism that they are able to use their own lived experiences to apply prior knowledge in the learning process.

We aim to accomplish this effectively by implementing authentic learning environments. These environments generally provide students with the opportunity to apply their unique strengths, perspectives, and experiences to the situation at hand. Planetariums offer great potential in paving the way for authentic learning environments. They are able to simulate scientific phenomena, which allows for an immersive experience. They also allow the possibility of manipulating variables in real time, which can allow the testing of student ideas.

The framework for our activities was inspired by attributes of a constructivist classroom presented in Haney et al [2]. This framework emphasizes the dynamic roles of both instructors and learners in the inquiry-based learning process, as illustrated in Figure 2.2. Instructors facilitate the activities by guiding students through the scientific process— encouraging them to explore their own questions, develop hypotheses, and test them through observation and experimentation. The goal is to actively engage students in constructing their own understanding, a core tenet of constructivist

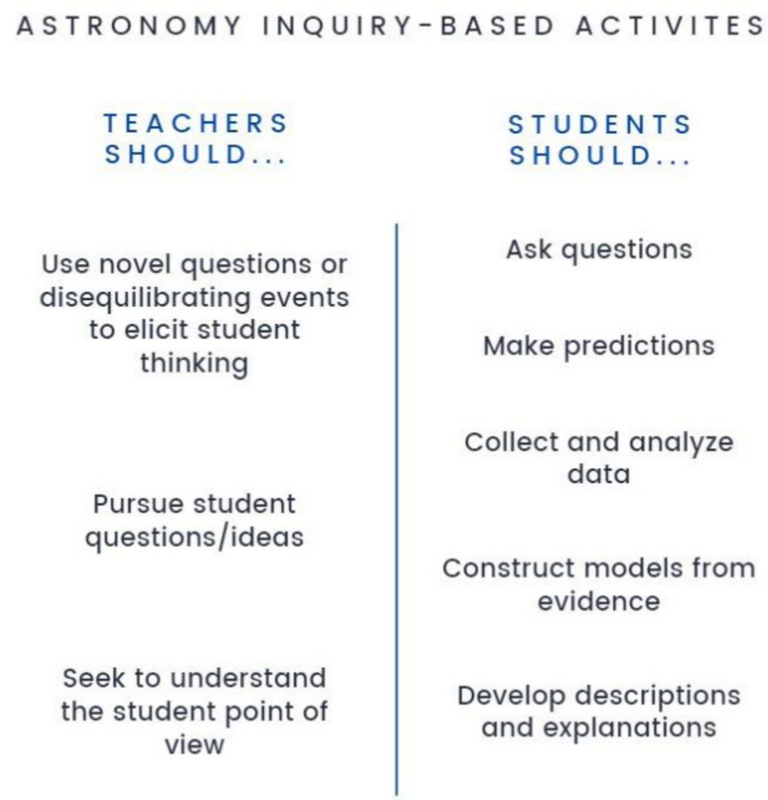


Figure 2.2 Activity Framework [2].

learning theory. This approach fosters deeper conceptual comprehension, as students are not merely passive recipients of information, but rather active participants in the learning process.

Chapter 3

Methods

In this study, I worked with the planetarium director and course teaching assistants (TAs) to create, run, and analyze feedback from inquiry-based planetarium activities. Data was collected in three forms: student worksheets, interviews, and survey feedback. Qualitative analysis was done on the worksheets and interviews using a combination of a priori and open coding. Survey feedback was analyzed using a combination of quantitative and qualitative methods (e.g. averaging, open coding, and a priori coding). As the project was conducted, answering the research questions was the priority. As a reminder to the reader, the research questions for my study are as follows.

1. What misconceptions do students exhibit before and after being engaged in the inquiry-based planetarium activities?

2. What modeling characteristics do students exhibit before and after participating in inquiry-based planetarium activities?

3. How do inquiry-based activities affect students' own perception of their engagement and learning outcome?

3.1 Context of the Study

Participants of this study were students from sections of Introduction to Astronomy (PHSCS 127) at Brigham Young University(BYU). This course was selected for the study because it is generally taught in the planetarium at BYU. Additionally, many of the misconceptions found in the literature corresponded with topics taught in the course. A goal of our study was that by targeting these misconceptions in the introductory course, we would be able to better help continuing astronomy students prepare for further astronomy courses.

3.1.1 Participants and Course Context

The participants in this study were students enrolled in PHSCS 127 at BYU during the Fall 2023, Winter 2024, and Spring 2024 semesters. There were a total of 267 participant reached over the course of the three semesters. Students in this course had primarily declared majors in the physical sciences and fine arts fields, which are visualized in Figure 3.1, and ranged from freshmen to seniors.

PHSCS 127 is a 3 credit hour, semester-long course aimed at introducing students to astronomical objects and concepts. There are no prerequisites; however it is not uncommon for students to come with some prior knowledge of astronomy. Learning objectives for the course include understanding and using astronomical terminology and perspectives, identifying naked-eye objects in the night sky, demonstrating skills through observation and communication of results, and gaining an appreciation for our Creator's universe.

For the duration of this study, the course was taught by BYU faculty members and was held in the planetarium. The planetarium contains a 4k system that uses two 4k projectors in a 39' dome. There is unidirectional seating for 119 people. The chairs recline, but also have tablet arms as it was intended to be used to teach astronomy courses. The planetarium uses Digistar7 software.

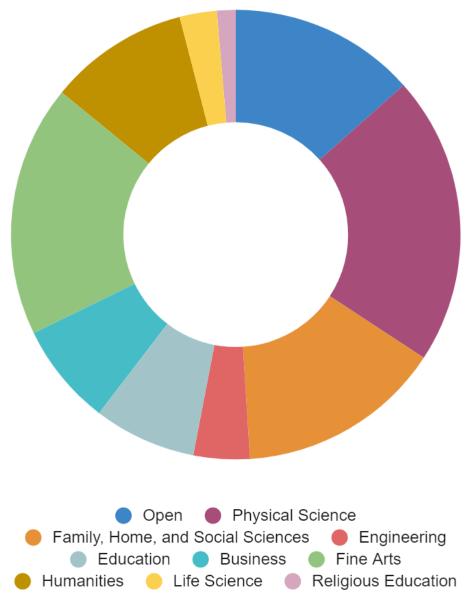


Figure 3.1 Major Overview for Students in PHSCS 127

This software developed by Evans and Sutherland contains libraries of pre-programmed animations for a variety of different astronomical phenomena. Operators are also able to program their own simulations in the software. Groups of simulations can by organized on a GUI page called a "control panel", which was what this study used. Planetariums conducting these activities in different system would need to adapt the control panel pages for their own software.

3.1.2 Development and Implementation

There were three main phases of the study: activity development, activity implementation, and data analysis. Activity development took place from Summer 2023 to Fall 2023. While these were the main development periods, small adjustments were made to the activities semester-to-semester. Topics for each activity were chosen based on three main criteria:

1. Topic was such that the unique capabilities of the planetarium would allow students to explore common misconceptions.

2. Topics would encompass material relating to misconceptions found in the literature, which would allow us to target them via inquiry.

3. Topics were already incorporated into the course curriculum, which would allow for activities to be naturally inserted into lectures.

Using these three criteria, I chose four activity topics which are described in Table 3.1.

The activities were developed by myself and the planetarium director. The initial outlines and worksheets were created to ensure proper organization, modeling opportunities, and targeting of misconceptions. We then created control panel pages in the Digistar7 environment to correspond to each activity. The code for these is found in Appendix C. Additionally, we created instructor guides, which were meant to guide instructors through effectively presenting the activities. These are found in Appendix B. I also developed a student feedback survey to gauge affect on students' perceived experiences.

As each activity was created, the implementation phase of that activity began. Students completed the worksheet during the activity, and afterwards were asked to fill our the feedback survey. For the Fall 2023 semester, students participated on a voluntary basis. I ran the activities during the class lecture, generally taking about 25 minutes of the 50 minute class. Starting Winter 2024, the activities were part of student grades, but mixed into a pool of optional assignments. For example, a student could have the choice of tracking moon phases, writing about different moons in the solar system, or participating in the eclipses planetarium activity. The activity they chose then became part of their grade. This change did result in less student participation, but it ensured that there would be ample time to effectively implement the activities (about 35 minutes). This format continued into the Spring 2024 semester. For these semesters, I worked with the TAs for PHSCS

Table 3.1 Activity Topics and Their Targeted Misconceptions

Activity Topic	Targeted Misconceptions	Brief Description
Coordinates	Stars lasting forever, incorrect star movement	Demonstrates altitude/azimuth coordinates and celestial coordinates. Emphasizes why we need both and use them in different contexts.
Eclipses	Full moon for solar eclipse, order of celestial bodies during eclipses	Teaches students about solar, lunar, total, and annular eclipses. Particular emphasis on solar eclipses.
Magnitudes	Polaris is the brightest star in the sky, incorrect mass-age relations	Shows students the difference between absolute and apparent magnitudes and why both are useful. Also touches on H-R diagrams.
Color Measurement Bias	Incorrect color temperature relations, all stars are same color white	Explores why we do not see as many low-mass red stars as we would expect. Touches on H-R diagrams and implications of star color.

127 to run the activities. I trained them before each activity became available to the students, and then they ran the activities for me. I also conducted student interviews after the Fall 2023 semester and an instructor interview after the Winter 2024 semester.

The analysis phase for each activity began in Summer 2024. I worked on coding the data with research assistants in the physics education program. Together, we developed a priori coding guidelines, then went through the data to apply open coding principles to our guide. Once that was developed, we then went on to code all of the student worksheet data. A research assistant then transcribed the interviews and I coded them through using a combination of a priori and open coding techniques. I analyzed the student survey responses with open coding and quantitative analysis, primarily averaging.

3.2 Role of the Researcher

During the implementation phase of this project, I had both a role as a researcher and in activity development. Researching consisted of looking into misconceptions in astronomy education as well as into effective implementation of inquiry-based learning and authentic learning environments. With the help of the planetarium director, I also created Digistar7 control panel pages and student worksheets for each activity. I also developed the student survey and instructor guides. Additionally, I put together interview protocol for both instructors and students.

I was primarily a presenter and trainer in the second phase of this study. I ran the activities at first, and eventually trained course TAs to run them for me. Running the activities involve collaboration with the course instructors to decide when I would come in, how long I would present for, and when they needed training to take place. Outside of presenting, I would make small adjustments to the control panel pages and worksheets based on if there were any hiccups during the activities.

"Hiccups" consisted of bugs in the Digistar7 code and 1 student being confused by typos or ill wording on the worksheets.

In the third phase of my study, I shifted to the role of a data analyst. Working with other physics education research assistants, I developed coding techniques for student worksheets, interview transcriptions, and written feedback responses. I also took on mild quantitative analysis roles by looking at survey feedback averages and percentages for worksheets and survey response counts.

3.3 Data Collection

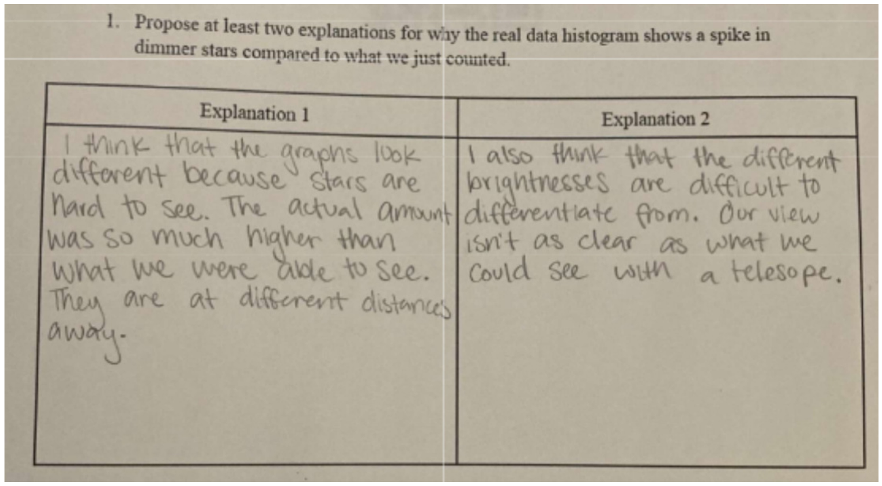
Data was collected during the second phase of this study. Data types are shown in Table 3.2. Further explanations of each can be found in the subsequent sections.

3.3.1 Activity Worksheets

At the beginning of each activity, all students were given an activity worksheet. Each worksheet was designed to go along with the corresponding activity and keep track of student reasoning before and after participating. Each worksheet can be seen in Appendix A. Worksheets collected personal data such as student names and the course section, the first of which was blinded before analysis began. They also kept record of student reasoning. Generally in these questions, students were asked to provide both written and drawn feedback. If not specifically asked for both, students were basing their explanation off of a picture. An example of this can be seen in Table 3.2, which shows a question on the Magnitudes activity worksheet. The students were not specifically asked for a drawn explanation because their models were already based off of a chart.

Table 3.2 Data Collection Types

Data Source	**Amount of Data Collected**	**Brief Description**
Research Questions 1 and 2: What misconceptions do students exhibit before and after being engaged in the inquiry-based planetarium activities? What modeling characteristics do students exhibit before and after participating in inquiry-based planetarium activities?		
Activity Worksheets	264	Student worksheets filled out during the planetarium activities used to keep record of student explanations.
Research Question 3: How do inquiry-based activities affect students' own perception of their engagement and learning outcome?		
Feedback Surveys	183	Responses to questions intended to assess affect on students' own perception of their learning.
Student Interviews	3	Transcriptions of interviews with students who participated in the planetarium activities.
Instructor Interview	1	Transcription of an interview with a TA that ran the planetarium activities.



1. Propose at least two explanations for why the real data histogram shows a spike in dimmer stars compared to what we just counted.

Explanation 1	Explanation 2
I think that the graphs look different because stars are hard to see. The actual amount was so much higher than what we were able to see. They are at different distances away.	I also think that the different brightnesses are difficult to differentiate from. Our view isn't as clear as what we could see with a telesope.

Figure 3.2 Example of a question that does not specifically ask for a written and drawn explanation.

3.3.2 Feedback Surveys

Each worksheet contained a QR code that lead to the feedback survey. This Google Forms survey contains three questions relating to categorizing data, six ranking questions and one free response. The ranking questions asked students to indicate how much they agreed with the given statement on a scale of one to five- one being strongly disagree and five being strongly agree. All questions are shown in Table 3.3.

3.3.3 Student Interviews

After the Fall 2023 semester, I conducted interviews with students in the course who participated in at least one of the planetarium activities. These interviews were designed to supplement the student feedback surveys in helping answer my third research question. Additionally, they were designed to collect feedback for modifications in future iterations of these activities. Four students were interviewed on a volunteer basis, and were accommodated with $10 Cougar Cash- BYU's dining services currency. Each interview was about 15 minutes long and asked students questions relating

Table 3.3 Feedback Survey Ranking Questions

Question Statement	**Type**
Please indicate your instructor.	Multiple Choice
Please write in your class day/time.	Short Answer
What was the topic of this activity?	Multiple Choice
The science activity encouraged me to think critically and problem-solve.	Ranking (1-5)
The science activity helped me develop a deeper understanding of the subject matter.	Ranking (1-5)
I felt confident in my ability to actively participate in the inquiry-based process.	Ranking (1-5)
I was able to ask questions and explore my own ideas during the activity.	Ranking (1-5)
I would be interested in participating in similar inquiry-based science activities in the future.	Ranking (1-5)
Overall, I found the science activity to be a positive and enriching learning experience.	Ranking (1-5)
What parts of this activity had the biggest impact impact your understanding and how did it help you?	Free Response

to the topics, effectiveness, and likes and dislikes of the activities. The full interview protocol can be found in Appendix D.

3.3.4 Instructor Interview

I conducted interviews of those, besides myself, who ran the activities in the planetarium. Instructors were offered $10 Cougar Cash to complete the interview. Out of the four possible individuals, only one participated in the interview process. The protocol for this interview can be found in Appendix D below the student interview protocol. This feedback did not directly answer any of the research questions posed in this study, but did indirectly help us gauge student opinions on the activities. Additionally, it helped us know how to improve the instructor guides and activities themselves for those running them.

3.4 Data Analysis

In this section, I will discuss the analysis methods used in this study. The primary focus of each data type collected was on the rubric used for open and a priori coding methods, which are explained in detail presently.

3.4.1 Activity Worksheets

Activity worksheets filled out by students were collected immediately after the planetarium activity was completed. Student worksheets were analyzed to answer the first two research questions:

1. What misconceptions do students exhibit before and after being engaged in the inquiry-based planetarium activities?

2. What modeling characteristics do students exhibit before and after participating in inquiry-based planetarium activities?

After collection, the student worksheets were digitally scanned and blinded. In correspondence with the questions, analysis for the student worksheets was broken down into two main parts- modeling and misconceptions. The undergraduate research assistants and I used a mixture of a priori and open coding methods to create the rubrics for each.

Modeling

The modeling analysis began with creating the rubrics for coding the types, levels, and aspects of each student response. For the modeling types, we used a synthesis of types presented by Frigg, 2006 as presented in Table 2.1 [14]. The modeling types from the literature were found before doing an initial review of the worksheets, but the synthesis and official type categories were created using an open coding approach. The intention of assigning each model a type was to monitor the modeling skills used by the students, but also to keep track of how those methods might have changes by the students throughout the activity. For example, many students at the beginning of the Coordinates activity may use an Analogy/Representative model to initially give ideas of how to locate a specific star in the sky. By the end when they have been presented with the celestial coordinate system, those methods may generally change to a Graphical/Mathematical approach.

For the modeling levels, a priori coding methods were utilized. Using an adaptation of the modeling levels dictated by Schwartz, we developed four main categories in which to separate student response levels [1]. The first level of modeling remains consistent with Schwartz's definition: a literal illustration of a single phenomenon. This can include a simple drawing or statement meant to describe the phenomenon or a combination of the two. In her definition of Levels 2 and 3, Schwartz uses Level 2 as something that explains how a phenomenon occurs and Level 3 as adding complexity in multiple aspects of the model. This is where my definitions change. For this study, Level 2 did include any model that attempts to explain to some degree how the phenomenon occurs; but where Schwartz included any response with multiple models to be Level 3, I included that in the Level 2 category if both models only include the description and explanation. Our Level 3 is defined as any model that attempts to ask questions or make predictions about activity-related

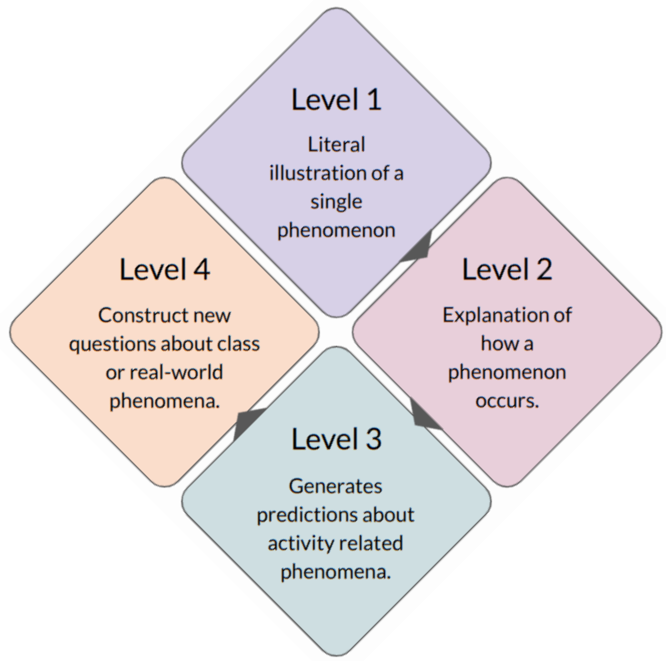


Figure 3.3 Adapted modeling level progression of those defined by Schwartz 2009 used in this study [1].

content, which is adapted from the original only in narrowing down "related phenomenon" to topics that are within the scope of the activity. Level 4 for this study is characterized by a students attempt to ask questions or make predictions that are course or real-world related topics, but outside the activity's scope. A visual of the modified levels used in this study can be seen in Figure 3.3, and can be compared with the visual of Schwartz's original levels shown in 2.1.

The final modeling analysis performed on the worksheets was to record aspects of the models. This was all done in an open coding approach and used no literature background. After an initial review of the completed worksheets, we categorized the aspects of the models into different categories for each activity. The different aspects can be shown in the following tables.

Table 3.4 Coordinates model aspects

Aspect	**Brief Description**
Reference	Used a constellation, or general direction as a reference point.
Coordinate no Origin	Used some sort of grid system, but defined no origin.
Coordinate with Origin	Used a grid system with a defined origin.
Horizon	Correctly used or described the altitude/azimuth coordinate system.
Celestial	Correctly used or described the celestial coordinate system.

Table 3.5 Eclipses model aspects

Aspect	**Brief Description**
Top/Side View	Shows the bodies in the eclipse from the top or side view.
No Shadow	Did not draw or otherwise indicate any sort of shadow.
Straight Shadow	Drew or indicated the shadow as being a uniform thickness from body to body.
Umbra	Correctly defined some sort of umbra in the drawing or description.
Penumbra	Correctly defined some sort of penumbra in the drawing or description.
Scale Note	Makes a note of objects or distances not being to scale.
Orbit Tilt	Draws or otherwise indicated that the orbit of the moon around the Earth is not perfectly flat.
Earth View	Shows the eclipse from Earth's perspective.

Misconceptions

In analyzing the worksheets to answer research question 2, we used a combination of open coding and a priori methods. A synthesis of misconceptions found in the subject literature was used in the

Table 3.6 Magnitudes model aspects

Aspect	**Brief Description**
Apparent Brightness	Indicates the distinction of stars' apparent magnitudes.
Actual Brightness	Indicates the distinction of stars' apparent magnitudes.
Lifespan	Mentions stellar lifetimes.
Scale or Distance	Makes note of scale or distance discrepancies.
Plot or Graph	Uses some sort of plot or graph in their model.
Drawing	Uses some sort of drawing besides a plot or graph in their model.

Table 3.7 Color Measurement Bias model aspects

Aspect	**Brief Description**
Star Formation	Uses aspects of the effects of star formations on the phenomenon.
Doppler Effect	Uses the Doppler effect to explain phenomenon.
Main Sequence or Lifespan	Mentions main sequence role or stellar lifetime.
Temperature	Indicates star temperature in the model.
Plot or Graph	Uses some sort of plot or graph in their model.
Drawing	Uses some sort of drawing besides a plot or graph in their model.

a priori coding portion of this analysis [8, 20–24]. From those we created initial rubrics for each activity topic. Our first intention was to use only these rubrics to categorize misconceptions, but as we began coding the worksheets, we noticed many false statements or assumptions that did not fit. Adjustments were made to include aspects of open coding. We then added to our rubric as we went along to include misconceptions seen in our worksheets, but not found by our initial literature searches. Additionally, there were some categories from the literature that were initially in our rubric, but then were never actually found in any worksheets. Those were taken out of the rubric entirely. The final rubrics for each of the misconception categories can be found in the tables below.

Table 3.8 Coordinates Misconceptions

Misconceptions	**Source**	**Brief Description**
Stars Move in Constellations	Course Data	Stars do not just appear to move in constellations to us, but actually move together through space.
Unchanging Universe	Literature	Stars do not move over time, the Earth does not wobble.
We See Current Stars	Course Data	We see the light from stars as they look today.
Fixed Stars	Course Data	Stars are actually fixed on the celestial sphere and do not ever move.
Earth's Axis Not Tilted	Literature	Earth's axis is perfectly vertical.
Sky Constant w/Seasons	Course Data	Stars appear in the same location in the sky every day at the same time, no matter the time of year.
Location/Time Dependence	Course Data	There is no consideration of the time of year of location on Earth when looking for stars.

Table 3.9 Eclipses Misconceptions

Misconceptions	**Source**	**Brief Description**
Shadow Fully Covers Object	Course Data	The shadow from one celestial body covers the entire other celestial body in every eclipse.
Incorrect Planar Alignment	Course Data	Alignment of celestial bodies is perfectly horizontal or dramatically askew.
Scale Misunderstanding	Literature	Celestial bodies or distances are all similar.
Wrong Order of Objects	Literature	Correctly defined some sort of umbra in the drawing or description.

Table 3.10 Magnitudes Misconceptions

Misconceptions	**Source**	**Brief Description**
Star Lifetime Misunderstanding	Literature	Incorrect assumptions about how long stars live in general or relative to each other.
Human Eye Error	Course Data	All discrepancies are due to the eye's ability to detect differences in magnitude.
Dim=Far, Bright=Close	Course Data	Stars that are bright must be closer and stars that are dim must be farther away.

Table 3.11 Color Measurement Bias Misconceptions

Misconceptions	**Source**	**Brief Description**
Red Stars are Rare	Course Data	There are not many red stars in the universe, especially compared to blue stars.
Physical Location to Us	Course Data	Stars are much, much closer or farther from us than they actually are.
Star Formation/ Lifespan Error	Literature	Incorrect assumption about star formation of star lifespans.
Eye Determines Spectral Class	Course Data	Spectral Class of stars is determined only by how their color looks to us from here on Earth.
Doppler Effect Skews Results	Course Data	The Doppler effect from stars' motion compared to us makes them look noticeably redder or bluer to our eyes.
Color/Size Misunderstanding	Literature	Incorrect assumption about the association of star color and size.
Stars Emit One Wavelength	Literature	Stars are all one color, or each star only emits one wavelength of color.
Color Determines Age	Literature	We can tell a star's age based on color alone.

Inter-Rater Reliability

To support the reliability of the coding categorizations, we did two inter-rater reliability (IRR) tests. The first was done with myself and two research assistants. We coded the first three worksheets from each section together, then separately coded the next seven. After completing the latter, we came together to assess the fidelity of our coding results and discuss them until we were in agreement.

The second round of IRR occurred after myself and one of the research assistants coded all the remaining worksheets separately. Once this coding process was complete, I went through the data and flagged worksheets for which our coding categorizations did not agree. Our third coder then analyzed these worksheets and her results were used in the final data set.

3.4.2 Affect Survey Responses

Affect survey responses were analyzed to contribute to our third research question: How do inquiry-based activities affect students' own perception of their engagement and learning outcome? The first three survey questions asked for course information. No analysis was done on answers to these questions, they were only used for sorting purposes in the data organization. Most of the prompts were answered on a scale of 1 to 5, and simple numerical methods were used to extract the information. For each prompt, I used averages and standard deviations to provide descriptive statistics of the results.

The final survey question was open ended, asking students what parts of the activity had the biggest impact and how it helped them. The analysis for these responses was the same analysis used for the interview transcripts, which is introduced in the next section.

3.4.3 Interviews

Student and instructor interviews were analyzed to help answer our third research question. Both student and instructor interviews were evaluated using a priori methods. Each interview transcript was reviewed with four specific prompts in mind. When that prompt was addressed in the interview, that portion of the transcript was highlighted with the corresponding color. These prompts and colors can be seen in Table 3.12.

In the student interviews, the positive and negative feedback prompts were specifically intended to contribute to our affect analysis. With these responses, we received feedback that contributed to student perception of the activities. The improvement and topic suggestion prompts did in some cases contribute as well, but their intention was to help gather data for future activities and iterations of this project.

Table 3.12 Interview Coding Rubric

Prompt	**Color Code**
Positive Feedback	Green
Negative Feedback	Red
Improvement Suggestions	Blue
Topic Suggestions	Yellow

3.4.4 Limitations of Findings

As analysis was conducted, measures were taken to ensure trustworthiness; however, some limitations still must be addressed. Two main limitations were the quantities of student and instructor surveys. For the instructors, we only had one interview. Granted, with a population of 5 instructors it was a 20% rate, but basing all instructor feedback off of one interview is not in best practice. To mitigate this concern, the analysis for instructor feedback was synthesized with student interview analysis. Furthermore, the feedback from instructor interviews regarding solely suggestions for instructing were not used to answer any research questions and were only used in small tweaks of the instructor guides and activity flow. There were also only 4 student interviews conducted, which was only .01% of student participants in the study. While the numbers for those were small, conclusions drawn from these interviews were synthesized with open ended responses from the student feedback survey. This analysis generally showed consistent results, which are introduced in the next section of this paper.

An additional limitation arises from the initial stages of this project. When I first did the activities during the lecture, they were not for a grade and there was no assurance that students actually completed the worksheets. Furthermore, many student either came late to or left early from class. Because of these factors, there are many worksheets that are half completed. To account for these inconsistencies, there is a section in each worksheet analysis section named "No Model". Some worksheets were left completely blank throughout the activity, any of these were taken out of the data set and not counted in the number of participants.

Initially, I was running all of the activities, but I eventually trained five course TAs to instruct them. There is a possibility that differences in activity instructors lead to slightly different student results. To help mitigate this concern, I trained all the TAs together. During the training, I ran through the activity and discussed different tactics that I used throughout. The intention was that because we all did the activity together during training, the implementation would be more consistent. Additionally, I provided them with the instructor guides, which give timing instructions, prompts to ask questions and spark discussions, and general activity flow.

Another limitation was regarding the student feedback survey in that the rankings were self reported. To help limit inconsistencies, students were given brief instructions on the ranking system, but there may be cases where students used the scale inconsistently.

Chapter 4

Results and Discussion

The results in this section are presented in the same order in which they were introduced in the Data Analysis chapter. All analysis results are presented according to the research questions they best contribute to. Consequently, some data types are broken up across different sections- primarily the interviews. The discussion section at the end of this chapter will provide a review of the following results synthesized with the research questions and the literature review. The findings will be presented by research question.

4.1 Research Question 1 Results

In addition to modeling techniques, blinded student worksheets were analyzed to assess student misconceptions before and after completing each activity. Misconceptions for each worksheet were categorized as previously presented. Additionally, there was a "Sparse or None" category, which represented models that had no apparent misconceptions in their drawings or explanations. Results are seen in the following tables, which show misconception counts before and after each activity. In almost every case, it can be seen that the recorded frequency of each misconception decreased throughout the course of the activity. In the cases where they did not increase, the misconception did not manifest itself pre-activity, and was gained along the way, a further exploration of this is reviewed in the discussion. Some misconceptions from the literature did not appear with frequency, while others were readily apparent. Furthermore, some added in during the open coding process were not as relevant as initially believed.

Misconception	Before	After
Stars Move in Constellations	6	0
Unchanging Universe	13	12
We See Current Stars	1	0
Fixed Stars	11	0
Earth’s Axis Not Tilted	7	2
Sky Constant w/Seasons	9	5
Location/Time Dependence	30	2
Sparse or None	19	53
No Model	12	34
Total	108	108

Table 4.1 Misconceptions about Constellations

Misconception	Before	After
Shadow Fully Covers Object	30	29
Incorrect Planar Alignment	1	0
Scale Misunderstanding	10	3
Wrong Order of Objects	2	1
Sparse or None	72	66
No Model	1	17
Total	116	116

Table 4.2 Misconceptions about Eclipses

Misconception	Before	After
Star Lifetime Misunderstanding	2	0
Human Eye Error	14	8
Dim=Far, Bright=Close	12	3
Differences Due to Plotting Scale	5	1
Sparse or None	41	65
No Model	3	0
Total	77	77

Table 4.3 Misconceptions about Magnitudes

Misconception	Before	After
Red Stars are Rare	7	1
Physical Location to Us	5	0
Star Formation/Lifespan Error	6	2
Eye Determines Spectral Class	0	2
Doppler Effect Skews Results	2	1
Color/Size Misunderstanding	4	2
Stars Emit One Wavelength	0	1
Color Determines Age	5	2
Sparse or None	35	45
No Model	0	8
Total	64	64

Table 4.4 Misconceptions about Color Bias

We gain additional insight into misconceptions from an instructor point of view from an instructor interview. To protect their privacy, each student and instructor has been given a pseudonym. In an interview with Catherine, a course TA who instructed all four of the activities over the course of a semester, she stated: *"...discussion with the students, I think that helped them ... Whereas I think there may be... one activity or something where pretty much like... their participation was, like, just on their paper and so they were like participating, but it was not necessarily directly with like the instructor ... And they would like talk as students, but I think that it was helpful whenever we did like big class ones to maybe correct any misconceptions that were there."*.

4.2 Research Question 2 Results

Modeling characteristics for each student response were analyzed by myself and two research assistants.

Modeling levels for all four activity worksheets can be seen in Table 4.5. Barring the magnitudes activity, there was an increase in "No Model" numbers, meaning that for one reason of another, students did not answer the worksheet question. Examples of each model level are shown in the following figures. Compared to the other model numbers, there is a huge lack in Level 4 models, having only 1 throughout the entire data set. For Coordinates, Magnitudes, and Color Bias activities, we see a general soft upward trend in modeling levels over the course of the activity. The opposite trend is seen in the Eclipse activity, which is addressed in the discussion portion of this chapter.

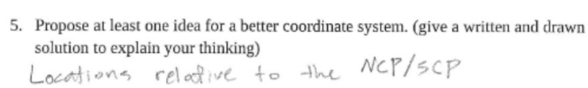

5. Propose at least one idea for a better coordinate system. (give a written and drawn solution to explain your thinking)
Locations relative to the NCP/SCP

Figure 4.1 Example of a Level 1 Model

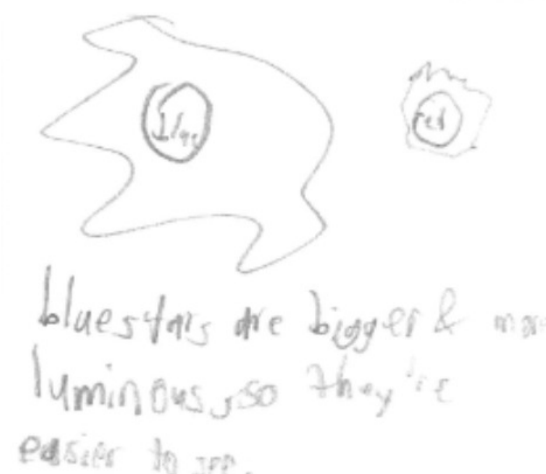


Figure 4.2 Example of a Level 2 Model

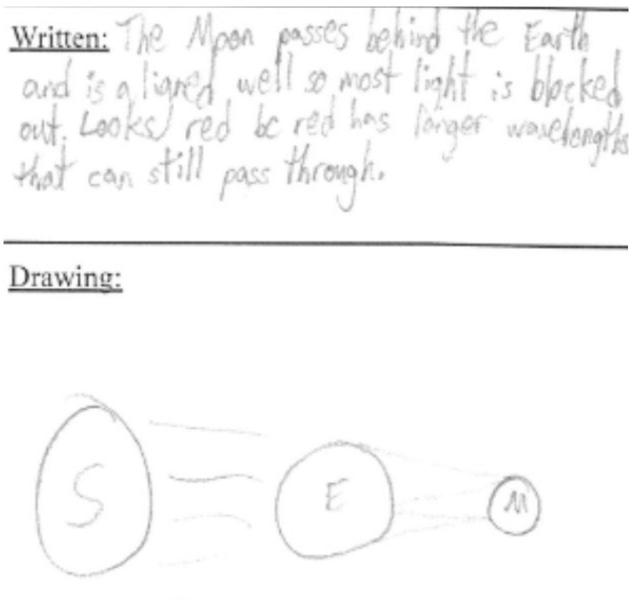


Figure 4.3 Example of a Level 3 Model

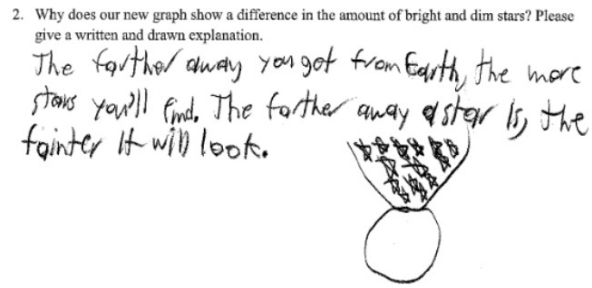


Figure 4.4 Example of a Level 4 Model

Table 4.5 Comparison of model levels before and after implementation.

Model Level	Coordinates		Eclipses		Magnitude		Color Bias	
	Before	After	Before	After	Before	After	Before	After
Level 1	71	41	5	22	52	26	33	22
Level 2	23	26	94	67	21	43	26	25
Level 3	2	7	16	10	1	7	5	9
Level 4	0	0	0	0	0	1	0	0
No Model	12	34	1	17	3	0	0	8
Total	108	108	116	116	77	77	64	64

Table 4.6 shows the results for the change in modeling types throughout each activity. Figures 4.5-4.7 show examples of each model type. Across the board, we see a definite preference towards Pictorial/Diagram models as compared to Graphical/Mathematical models, which is not surprising

considering the nature of the activities and their topics. The only significant areas in which modeling habits seemed to change seem to be due to increasing numbers of "No Model" candidates rather than a change in the modeling types.

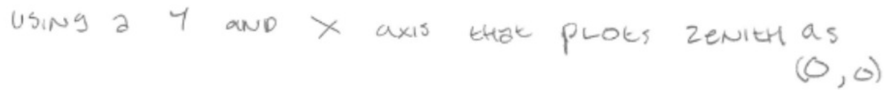


Figure 4.5 Example of a Graphical/Mathematical Model

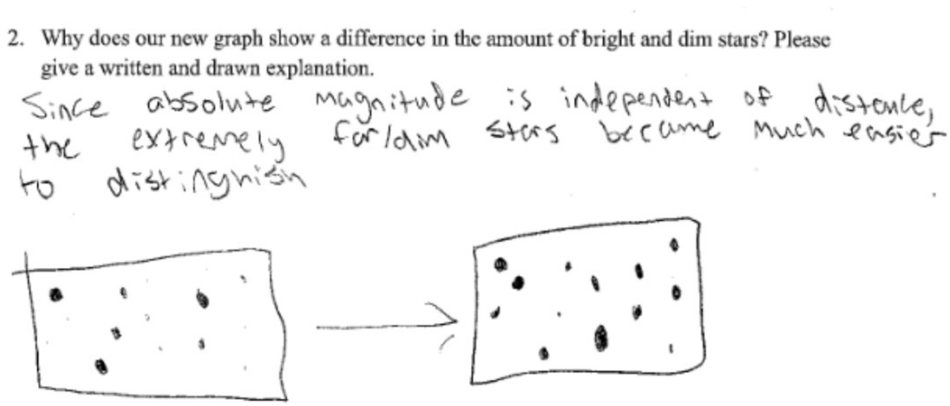

2. Why does our new graph show a difference in the amount of bright and dim stars? Please give a written and drawn explanation.

Figure 4.6 Example of a Pictorial/Diagram Model

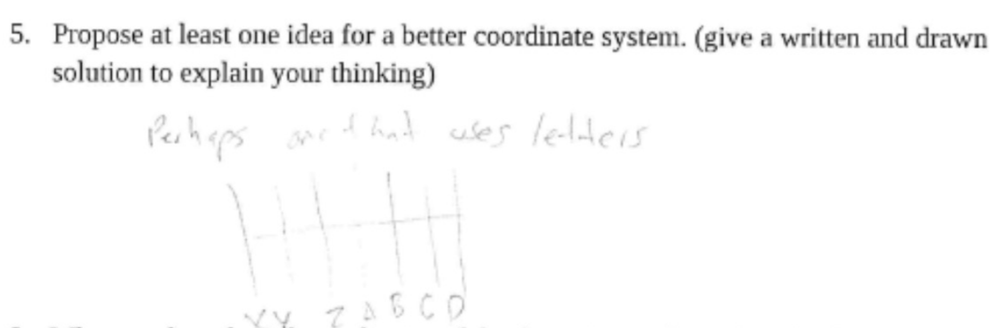

5. Propose at least one idea for a better coordinate system. (give a written and drawn solution to explain your thinking)

Figure 4.7 Example of an Analogy/Representative Model

Table 4.6 Comparison of model types before and after implementation.

Model Type	Coordinates		Eclipses		Magnitude		Color Bias	
	Before	After	Before	After	Before	After	Before	After
Pictorial/Diagram	14	20	114	90	6	22	2	0
Analogy/Representative	78	51	1	9	63	47	61	55
Graphical/Mathematical	4	3	0	0	5	8	1	1
No Model	12	34	1	17	3	0	0	8
Total	108	108	116	116	77	77	64	64

The following tables in this section show counts for different modeling aspects in student responses. It is important to note that for the Coordinate worksheets, only one of the aspects applied to each model by design. In all other activities, multiple aspects could apply to each model. For this reason, no totals are given in the Eclipse, Magnitude, and Color Measurement Bias tables, as it would not have the same meaning as in previous tables.

Table 4.7 Coordinates Model Aspects

Aspect	**Before**	**After**
Reference	21	7
Coordinate no Origin	23	4
Coordinate with Origin	3	22
Horizon	39	0
Celestial	2	36
Other	8	5
No Model	12	34
Total	64	64

Table 4.8 Eclipses model aspects

Aspect	Before	After
Correct Order	112	97
Top/Side View	103	64
No Shadow	36	11
Straight Shadow	27	20
Umbra	39	45
Penumbra	23	25
Scale Note	4	2
Orbit Tilt	7	9
Earth View	22	15
No Model	1	17

Table 4.9 Magnitudes model aspects

Aspect	Before	After
Written	75	76
Apparent Brightness	4	11
Actual Brightness	2	4
Lifespan	16	11
Scale or Distance	38	29
Plot or Graph	4	6
Drawing	6	4
No Model	3	0

Table 4.10 Color Measurement Bias model aspects

Aspect	Before	After
Written	64	56
Star Formation	12	11
Doppler Effect	2	1
Main Sequence or Lifespan	26	24
Temperature	4	7
Plot or Graph	0	0
Drawing	2	3
No Model	0	8

4.3 Research Question 3 Results

The numerical aspects of the affect survey underwent simple statistical analysis, which can be seen in the following figures . Students were asked to indicate how much they agreed with a statement on a scale of one to five, one meaning "Strongly Disagree" and five meaning "Strongly Agree". In general, responses favored the "Agree" side, with few disagreeing responses. Each figure shows data for groups 1-6. Each group number corresponds to one of the affect survey questions. As a reminder to the reader, the questions and corresponding group numbers are:

- Group 1: The science activity encouraged me to think critically and problem-solve.
- Group 2: The science activity helped me develop a deeper understanding of the subject matter.
- Group 3: I felt confident in my ability to actively participate in the inquiry-based process.
- Group 4: I was able to ask questions and explore my own ideas during the activity.

- Group 5: I would be interested in participating in similar inquiry-based science activities in the future.
- Group 6: Overall, I found the science activity to be a positive and enriching learning experience.

There were two main sections that the data relating to this research question were divided into - learning and engagement. Groups 1 and 3-5 targeted the engagement portion, while Groups 2 and 6 targeted the learning aspect.

Data Summary

Groups	N	Min	Q_1	Median	Q_3	Max	Mean	SD
Group 1	37	1	4	4	5	5	4	0.9129
Group 2	37	2	4	4	5	5	4.2973	0.7403
Group 3	37	2	4	4	5	5	4.0541	1.0527
Group 4	37	1	3	4	4	5	3.4054	1.3008
Group 5	37	1	3	4	5	5	3.973	1.0926
Group 6	37	2	4	4	5	5	4.1351	1.0045

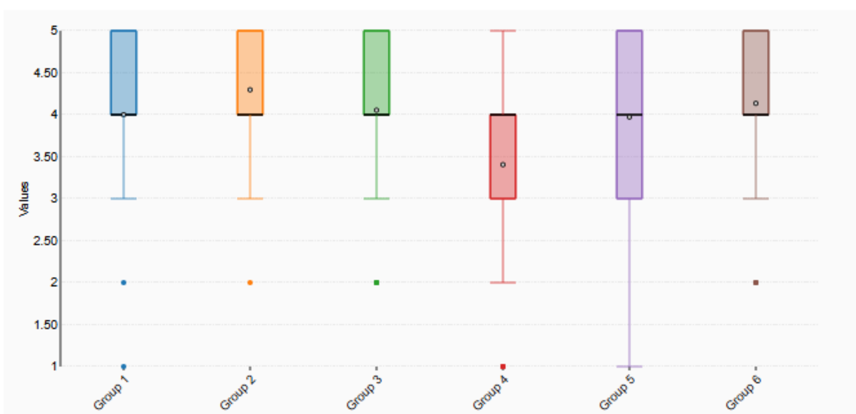


Figure 4.8 Coordinate Affect Survey Results

Data Summary								
Groups	N	Min	Q_1	Median	Q_3	Max	Mean	SD
Group 1	62	2	3	4	5	5	3.9516	0.8382
Group 2	62	2	4	4	5	5	4.3387	0.767
Group 3	62	1	4	4.5	5	5	4.2581	0.9221
Group 4	62	2	3	4	5	5	3.8548	1.0378
Group 5	62	2	4	4	5	5	4.0645	0.9729
Group 6	62	3	4	4	5	5	4.3226	0.7416

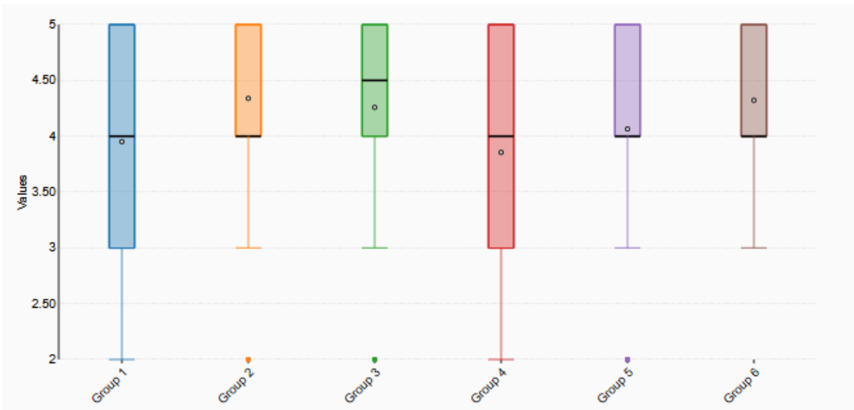


Figure 4.9 Eclipse Affect Survey Results

Data Summary								
Groups	N	Min	Q_1	Median	Q_3	Max	Mean	SD
Group 1	38	1	4	4	5	5	4.1579	0.9452
Group 2	38	2	4	4	5	5	4.2632	0.8601
Group 3	38	2	4	4	5	5	4.2368	0.8198
Group 4	38	1	4	4	5	5	4.1053	1.0853
Group 5	38	1	3	5	5	5	4.1316	1.143
Group 6	38	2	4	4.5	5	5	4.2632	0.9208

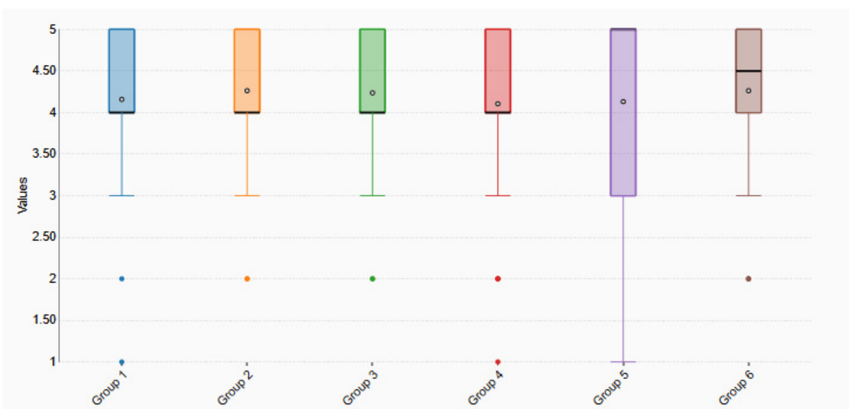


Figure 4.10 Magnitude Affect Survey Results

Data Summary								
Groups	N	Min	Q_1	Median	Q_3	Max	Mean	SD
Group 1	24	3	4	4	5	5	4.2917	0.6903
Group 2	24	2	3.75	4	5	5	4.1667	0.9168
Group 3	24	2	3.75	4	5	5	3.9583	0.9991
Group 4	24	1	4	4	5	5	4.125	0.9918
Group 5	24	2	3.75	4	5	5	4.0833	0.8805
Group 6	24	2	4	4	5	5	4.0833	0.9286

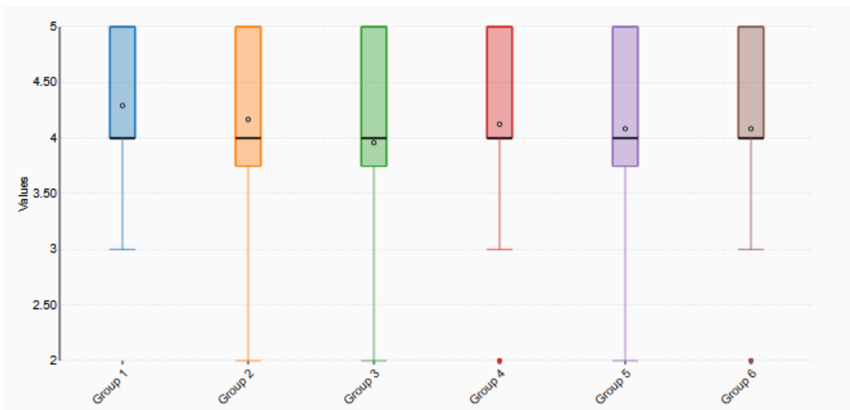


Figure 4.11 Color Measurement Bias Affect Survey Results

Engagement

The affect survey also asked the question: What parts of this activity had the biggest impact impact your understanding and how did it help you? Replys were free response, and student feedback was analyzed by highlighting the positive comments, negative comments, topic suggestions, and suggestions for improvement. At the beginning of the activities, prevailing comments consisted of negative feedback and suggestions regarding not having enough time to think through the activity and answer the questions. One student said, *"Too much just working on the worksheet, it did not feel like I was doing much thinking, just doing listening to the teacher and pausing every minute to write stuff. Also, there was not enough time to finish the worksheet."* This and similar responses were common in earlier stages, but dwindled after more iterations of the activity and moving the activities into a lab format rather than an in-lecture format. There was a significant amount of feedback supporting the use of visuals and inquiry-based methods. One student claimed, *"I liked* *getting to use the planetarium in a fun way in a smaller group setting because it helped me think critically and ask questions without hesitation of getting it wrong."*

Student also gave valuable insights on learning perception in the student interviews. Roger was present for each of the four planetarium activities. He particularly liked the inquiry nature of the activities, stating *"Yeah, I like the questions that were posed in it. They, they brought up some thought process, like you had to think about it and to use information we're learning in class to, ... we, to like kind of deduce what we thought was happening. ...I think that really helped."* Most of Rogers suggestions were about the timing of the activities with the course material, saying that sometimes they did not seem to line up with the in-class lessons at the time. He also suggested making an activity about galaxy classifications. Most of Roger's negative comment were about the course rather than the activities themselves. Specifically, he stated *"There were some equations we would learn in the homework, and then on the test it would be expected to use them on the test, but we didn't really go over it in class too much."*. Despite these critiques, he seemed to have a positive outlook on both the activity and course engagement.

The activities Theresa was present for were not specifically stated in the interview, but she did refer to the Coordinate, Magnitude, and Color Measurement Bias activities. Her experience with the Coordinate activity was positive. She stated *"Yeah, yeah, I thought that was really, like, cool because I got to understand more of how it works and why we had to come up with that system. .. I thought it was cool to, to be able to explore that."*. The Magnitude and Color Measurement Bias activities were met with less enthusiasm, *"I thought the ones where like you had to like count all the stars was like a little... interesting just because, like, I don't know, I couldn't see all the stars... It was just so like, not arbitrary, but a little"*. She suggested an activity that somehow allows student to visualize nuclear fusion processes in stars.

Learning

There were general trends for different activities relating to student perception of learning. In the eclipses activity over the course of the three semesters it was ran, many students had similar sentiments about seeing the eclipse visuals. Most students professed the helpfulness of the demonstrations and step-by-step instruction. Additionally, many mentioned that it was very helpful to have the TA be knowledgeable on the subject and able to answer any questions as they came along. In the Magnitude and Color Measurement Bias Activities, students generally expressed a positive learning experience, and enjoyed comparing their data to real galaxy data. Common responses were similar to feedback such as *"I really liked that we got to compare the data we came up with to real data and see the difference, also the visual of moving all the stars closer was really cool and helped a lot with my understanding."*.

From the student interviews, Warren give additional insight into the learning aspect of the third research question. He participated in all four activities over the course of the Fall 2023 semester. He expressed an increased knowledge from the Coordinate, Eclipse, and Magnitude activities, referring to them as *"helpful"* and *"made it much easier to understand"*. There was less enthusiasm for the Color Measurement Bias activity. He stated, *"...It didn't have anything, like, because we didn't talk a whole lot about the model that we were using, or like, where it came from..."*. His suggestions for this one were to better relate what students saw on the dome to the presented real-life data, and also to have a better explanation for the "why" at the end of the activity. Additionally, he suggested doing an activity that focuses on the H-R Diagram and how to interpret one.

The course TA, Catherine, discussed how students seemed to learn more effectively when she was able to explain to them what was happening and was able to answer all of their questions clearly. One suggestion she made that went along with this comment was to include more information about the physical phenomenon in the Instructor's Guides.

4.4 Discussion

Research Question 1: What misconceptions do students exhibit before and after being engaged in the inquiry-based planetarium activities?

Feedback on the misconceptions portion of the modeling analysis showed promising results in the activities' ability to reduce misconceptions. From the numbers, we can see that barring two misconceptions, there was a decrease in each count, with an increase in the "Sparse or None" categories. This supports Siantuba's claims that a targeted approach may help students confront and diminish fundamental misconceptions [24]. Additionally, the proposed inquiry-based methods to help reduce misconceptions are supported and justified. The planetarium seems to offer an effective authentic learning environment, and the data supports using it to enact our framework.

Interestingly, the Color Bias activity data shows that some misconceptions were gained during the activity. In both cases, the initial count for these misconceptions was zero, but manifested itself after the completion of the activity. The first was that eyes determine spectral class. The activity requires student to approximate spectral classes of stars solely by looking at their color with the naked eye, which would reasonably support an existing belief that spectral class is based only on the color we see. In an attempt to mitigate this misconception for future audiences, the instructor's guide has been modified to include a prompt explaining how spectral classes are scientifically determined. The second budding misconception was that stars only emit one wavelength. This misconception was included in our coding rubric based on claims from a study finding it a common belief among students [21]. At the end of the data analysis, only one student seemed to manifest evidence of having this belief. Because of this, no changes were made to any aspect of the activity itself, but instructors were encouraged to complete the activity only after a lesson on blackbody radiation was taught.

Some misconceptions from the literature did not seem to be prevalent in this study's data. Favia claims many misconceptions regarding phases of the moon and eclipses, which were not recorded in our analysis [8]. One explanation of this is the timing in which the activity took place. When presented, the students had already once been exposed to the basics of moon phases and eclipses' by the time they participated in the planetarium activity, they already had a basic understanding of the eclipse process. Additionally, Kolevanko finds common misconceptions about using the Doppler effect as an explanation for observed star color [23]. While there were a couple of recorded instances in our data, this did not seem to be a pressing issue. This could perhaps be due to lack of student exposure. At the point in the course when the activity was presented, the students had not yet discussed the Doppler effect. The lack of misconceptions could be due to overwhelming student comprehension, but it could also be due to ignorance of the effect itself.

Paired with topics needed to be instructed in the course and the feasibility of using the planetarium to explore misconceptions, the activity emphases were chosen based on these misconceptions from the literature. Findings from the Coordinate, Magnitude, and Color Measurement Bias activities seem to justify these choices, but the Eclipse activity has less support. At the beginning of the activity, 37.4% of students with present models had recorded misconceptions. By the end, 33% of completed models still indicated misconceptions. While this does still show the need for the presence of this activity, it does strongly encourage the need to make modifications that better target any incorrect assumptions. The most common misconception by a significant amount was that the shadow from one object fully covers the shadow on another. At the beginning, this had a count of 30 and at the end a count of 29. A number of factors could explain this occurrence, but I hypothesize that it was most likely due to insufficient emphasis on the misconception. Having an effective disequilibrating question is important for inquiry-based methods through problem based learning. The activity was originally designed to address the expected misconception of ordering of celestial objects and moon phases with eclipses. None of the initial aspects of the activity were removed, but a visual was added into the program which shows an eclipse from space and clearly indicates the shadow of the moon on the Earth. While the data for this improvement is outside of this study, I have high hopes that it will effectively address the issue.

Research Question 2: What modeling characteristics do students exhibit before and after participating in inquiry-based planetarium activities?

Schwartz's modeling levels applied well to the modeling strategies used by students when completing the worksheets [1]. Students showed strong Level 1 and 2 modeling skills, which manifested across the board in final modeling level results. Most promising was seeing a general increase in modeling levels as the individual activities were completed and even chronologically as the course was completed. While the activities were aimed to better help students understand and explain course material, the lack of level 3 and level 4 models could indicate that the activities lack an aspect of further learning.

The increase in modeling levels was present in most of the results, however the Eclipse activity showed a general decrease in modeling levels. The decline in numbers of completed models could partially contribute to this occurrence, but does not account for it completely. The prevailing theory is that the dis equilibrating question for the student was not dis equilibrating enough; this is very important to rectify in order to effectively use our inquiry-based methods. Many students in initial runs of the eclipses activity did not fill out the "After" question and instead wrote "Same", indicating that there was no change in their models. Since finding this, the initial question posed to the students was changed from "Why do we not have an eclipse every month?" to "If there is a new moon every month, why do we not see a solar eclipse each cycle". There is not yet official data from this change of wording, but initial runs with the new phrasing have been promising based off of perceived student engagement.

Another theory for the decline in modeling levels and for the lack of changes in misconceptions as earlier discussed is that out of every activity, the Eclipse is the most visual and least active. While there are many opportunities for students to give their own ideas and interact with the instructor, the bulk of the activity relies on showing students simulations. This attempt at deeper learning pushes against Bell and Trundle's suggestions to implement active learning methods [19]. Although this point arises, the goal of these activities was to use the unique planetarium capabilities to explore misconceptions. The Eclipse activity used the dome environment to provide opportunities for students to give ideas and have them directly explored. The adjustment of confounding question in this activity may provide the changes necessary to see improvements in modeling levels and misconceptions, which would not show strong support in making changes related to more active learning.

Modeling aspects seemed to shift without pattern as the activities went on. While no claims are being made on the implications of these aspects, I did want to keep record of how they evolved throughout the activities. The most apparent change in modeling aspects was seen in the Coordinate Activity. At the beginning, many students used reference, coordinate with no origin systems, or a horizon model. By the end of the activity, most students demonstrated the use of a celestial model or coordinate system with an origin. This shows a promising progression in the development of celestial coordinates knowledge. This does not imply anything regarding the research questions, but is a good indication of the activities still meeting the needs of teaching important concepts in PHSCS 127.

A lack of apparent patterns in the modeling aspects changes is further supported by a lack of pattern in modeling types. The most general trend is that there were significantly less Graphical/Mathematical models for every activity. This is not unexpected, as the nature of most activities is to represent or visualize some sort of physical phenomenon. The hightest amounts of Graphical/Mathematical model types were seen in the Magnitude activity, which could be because that activity specifically ties the magnitudes to H-R Diagrams, a graphical model.

Research Question 3: How do inquiry-based activities affect students' own perception of their engagement and learning outcome?

Overall, students seemed to have a positive outlook on the activities- both with engagement perception and how their learning was affected. Interestingly, many survey responses showed high averages on the Eclipse activity for questions 2 and 6, which target learning perception. According to modeling and misconceptions data, it had the least impact, but students did not seem to feel that way. As found in the literature, when using authentic learning environments, it is important that students have the opportunity to apply their knowledge to the situation [26]. The presentation of a problem to solve does throw students off balance, but through the process of figuring it out, they are able to learn more deeply. While ideally students enjoy the learning process, it is not important that students like the activity, but rather that they learn. Based on the modeling and misconceptions outcomes and student responses, students greatly felt like they were gaining knowledge, but it did not lead to impactful learning.

In the student feedback responses survey, students expressed the helpfulness of the counting activities, which are the Magnitude and Color Measurement Bias activities. Interestingly, one student interview and the instructor interview claim the opposite, finding them mundane and confusing. There was a small amount of written feedback for the survey claiming that students were more confused after the activities, but the numbers from the rankings do not seem to support this claim.

The activity with the least engagement based on the student feedback survey was the Coordinate activity. The primary complaint given on written feedback and in the interviews was that there was not sufficient time to complete the activity. As more activities were conducted over the course of the semester, this complaint came to a halt. This is likely due to two main reasons. Firstly, after the initial round of feedback from the Coordinate activity- which was the first conducted- we decided to make subsequent activities shorter and cut down the number of questions on the activity worksheets. The goal of this was to take less lecture time while still giving students sufficient time to create their models. Additionally, we aimed to help students be able to put more focus into creating questions, hypothesis, and ideas instead of honing efforts into completing a worksheet. Secondly, the first activity required many logistic explanations in how these activities would work and such. As the semester went on, student got used to me and the activities and knew the procedures quite well. Over the three semesters, we changed the activity presentation format from an in-lecture presentation to an outside of lecture lab. This also allowed student more time to complete the worksheets and still be engaged in the activity itself.

Chapter 5

Conclusion

In this section, contributions to the field from this study will be introduced. Additionally, ideas for future work relating to the study's goals will be discussed.

5.1 Contributions

The results of this study provide two main contributions to existing research in constructivist principles in planetarium education. Firstly, it begins to fill in the gap between planetarium education and inquiry-based activities. While some planetariums claim to use active learning principles, most use the planetarium for demonstrative purposes [6]. This study provides research and activities that use problem-based learning in a planetarium setting, which is scarce in the field's literature. Furthermore, the findings from this study support that a planetarium environment can be effective for inquiry-based learning methods.

Additionally, the study provides additional insights on misconceptions prevalent in an introductory college course. While all topics in the course were outside the scope of this study, it was able to identify common beliefs relating to the activity topics. Some of the identified misconceptions were consistent with the literature review finding, but others were less prevalent in initial searches. The finding of this study can contribute new results of misconceptions surveys in introductory college courses and ideally provide insights into possible remedy tactics for them.

5.2 Future Work

Continuations of this study could take many forms, but perhaps the most impactful to student success would be iterations that address the lack of change seen in the Eclipse Activity. While students did have an overall positive experience with the activity, there did not seem to be a huge change in their misconceptions or learning. Future iterations of this study could investigate further into the misconceptions and collect data on the improved activities that attempt to address them.

Additionally, there were three topics suggested by students to create planetarium activities for- nuclear fusion, H-R Diagrams, and galaxy classification. Future projects could develop these activities and explore student misconceptions relating to them. A galaxy classification activity has already been developed by the planetarium instructor and a collaborator at Utah Valley University. We do have initial data on this activity, however more is needed for a full study on its findings.

Bibliography

[1] C. V. Schwarz, B. J. Reiser, E. A. Davis, L. Kenyon, A. Achér, D. Fortus, Y. Shwartz, B. Hug, and J. Krajcik, "Developing a learning progression for scientific modeling: Making scientific modeling accessible and meaningful for learners," Journal of Research in Science Teaching **46,** 632–654 (2009).

[2] J. J. Haney and J. McArthur, "Four case studies of prospective science teachers' beliefs concerning constructivist teaching practices," Science Education **86,** 783–802 (2002).

[3] D. J. Everding and J. M. Keller, "Survey of the academic use of planetariums for undergraduate education," Physical Review Physics Education Research **16,** 020128 (2020).

[4] S. Gülen, "Determination of the Effect of the Planetarium Activities on the Students,", https://eric.ed.gov/?id=ED593860, 2018.

[5] N. Kovalenko, "Basic astronomy: Common misconceptions and public beliefs according to the audience survey at Kyiv Planetarium," EPJ Web of Conferences **200,** 01023 (2019).

[6] J. Trump and M. J. Lawler, "Planetarium use in introductory astronomy courses," Journal of Astronomy Earth Sciences Education 9 (2022).

[7] Kozminski, "AAPT Recommendations for the Undergraduate Physics Laboratory Curriculum,", 2014.

[8] A. Favia, N. F. Comins, G. L. Thorpe, and D. J. Batuski, "A direct examination of college student misconceptions in astronomy: A new instrument," J. Rev. Astron. Educ. Outreach **1,** A21–A39 (2014).

[9] N. Chitrakar and P. M. Nisanth, "Frustration and its influences on Student Motivation and Academic Performance," International Journal of Scientific Research in Modern Science and Technology **2,** 01–09 (2023).

[10] C. Passmore, C. V. Schwarz, and J. Mankowski, in *Helping students make sense of the world using next generation science and engineering practices* (2017), pp. 109–134.

[11] W. R. Van Joolingen, A. V. A. Aukes, H. Gijlers, and L. Bollen, "Understanding elementary astronomy by making drawing-based models," Journal of Science Education and Technology **24,** 256–264 (2015).

[12] J. K. Gilbert, "Models and modelling: Routes to more authentic science education," International Journal of Science and Mathematics Education **2,** 115–130 (2004).

[13] Y. Zorlu, K. D. University, F. Sezek, and A. University, "An investigation of the effect of students' academic achievement and science process skills application together with cooperative learning model and the modeling based teaching method in teaching science courses," International Journal of Progressive Education **16,** 135–157 (2020).

[14] R. Frigg and S. Hartmann, "Models in Science,", https://plato.sydney.edu.au/entries/models-science/, 2006.

[15] J. Plummer, S. Schmoll, K. Yu, and C. Ghent, "A guide to conducting educational research in the planetarium,", https://www.researchgate.net/profile/Ka-Yu-5/publication/380398082_A_Guide_to_Conducting_

Educational_Research_in_the_Planetarium/links/663ab5f008aa54017ae42419/
A-Guide-to-Conducting-Educational-Research-in-the-Planetarium.pdf, 2015.

[16] K. C. Yu, K. Sahami, G. Denn, V. Sahami, and L. C. Sessions, "Immersive planetarium visualizations for teaching Solar System moon concepts to undergraduates," Journal of Astronomy Earth Sciences Education **3,** 93 (2016).

[17] E. Lantz, "Planetarium of the future: Planetarium of the future," Curator: A Quarterly Publication of the American Museum of Natural History **54,** 293–312 (2011).

[18] S. K. Schultz, "Nature of Formative Assessment-Based Active Learning in the Interactive Planetarium," University of Wyoming (2020).

[19] R. L. Bell and K. C. Trundle, "The use of a computer simulation to promote scientific conceptions of moon phases," Journal of Research in Science Teaching **45,** 346–372 (2008).

[20] S. N. Azizah, H. Akhsan, M. Muslim, and M. Ariska, "Analysis of college students misconceptions in astronomy using four-tier test," Journal of Physics. Conference Series **2165,** 012004 (2022).

[21] M. C. LoPresto and S. R. Murrell, "An Astronomical Misconceptions Survey," Journal of College Science Teaching **40,** 14–22 (2011).

[22] A. Favia, N. F. Comins, and G. L. Thorpe, "A direct examination of college student misconceptions in astronomy II: validity of the astronomy beliefs inventory," J. Rev. Astron. Educ. Outr. **1,** A3–30 (2015).

[23] N. Kovalenko, "Astronomy: learning theories applicable for education in planetarium environment," EPJ Web of Conferences **200,** 01014 (2019).

[24] J. Siantuba, L. Nkhata, and T. de Jong, “The impact of an online inquiry-based learning environment addressing misconceptions on students’ performance,” Smart Learning Environments **10,** 22 (2023).

[25] I. Zualkernan, “A framework and a methodology for developing authentic constructivist e-Learning environments,” J. Educ. Technol. Soc. **9,** 198–212 (2006).

[26] . S. D. Friesen, S., “Inquiry-based learning: A review of the research literature.,” Alberta Ministry of Education **32,** 1–32 (2013).

Appendix A

Activity Worksheets

Coordinate Systems Worksheet

Name____________________ Date____________TA_____________

Who is your professor and on what days/times do you meet?

Professor: ______________________
Class days/time: __________________

1. *Imagine you saw a star in the sky that looked really cool. You want to discuss this star with your professor. How can you tell him what star you're interested in? What information do you need to give in order to uniquely identify a star?*
   Activity: Pick one star that is interesting to you. Write directions telling your neighbor how to find the star. You cannot point or use "room furniture" as reference points.

2. **After exploring different possibilities using the planetarium, propose at least one idea for a better directions that would make it easier for your professor/neighbor to figure out what star you're talking about (give directions to find your star using this new system)**

3. *It turns out that your professor reads your email while on vacation in Hawaii and looks at the sky at a completely different time of night than when you noticed your star. Use the planetarium to explore what happens when you change position and time. Will your directions work if your professor is looking at the sky at a different time or from a different location on the Earth? Try out some ideas that would allow you to provide written directions that uniquely identify a star to someone at a different time and place.* **Propose at least one idea for a coordinate system that will let your professor/neighbor identify the correct star from any location at any time. (give a written and drawn solution to explain how you would use this system to identify this star.)**

Post Activity Survey:

Eclipses Worksheet

Name_____________________ Date_____________TA______________

Who is your professor and on what days/times do you meet?

Professor: _______________________
Class days/time: __________________

Complete the following questions:

1. How do solar eclipses work? Please give a written and drawn solution to explain your thinking.

Annular Eclipse	Total Eclipse
Written:	Written:
Drawing:	Drawing:

2. Why don't we have both a solar and lunar eclipse every month?

3. Now that you have completed the activity, re-explain how solar eclipses work. Please give a written and drawn solution to explain your thinking.

Annular	Total
Written:	Written:
Drawing:	Drawing:

Post Activity Survey:

Stellar Magnitudes Worksheet

Name____________________ Date____________TA_____________

Who is your professor and on what days/times do you meet?

Professor: ________________________
Class days/time: ___________________

Complete the following questions:

1. Propose at least two explanations for why the real data histogram shows a spike in dimmer stars compared to what we just counted.

Explanation 1	Explanation 2

2. Why does the new graph show a difference in the amount of bright and dim stars? Please give a written and drawn explanation.

Post Activity Survey:

Color Measurement Bias Worksheet

Name____________________ Date____________TA_____________

Who is your professor and on what days/times do you meet?

Professor: ______________________
Class days/time: __________________

Complete the following questions:

1. Propose at least two explanations for why our histogram looks the way it does and not like the theoretical diagram. Give a written and drawn explanation.

Explanation 1	Explanation 2

2. Propose a test or experiment that will allow you to check if your explanation was correct. Explain how/why it will work.

3. Give at least 2 reasons for why the two histograms differ. Give a written and drawn explanation.

Reason 1	Reason 2

Post Activity Survey:

Appendix B

Instructor Guides

Coordinate Systems Instructor's Guide

Use with the "Coordinates Activity" control panel page and the Coordinate Systems Worksheet.

Part 1- Alt/Az

sky on, evening
Have students pair off, tell them to pick one partner to pick a specific star, then have them try to explain to their partner which star they chose

Can you find the star? How confident are you that you are actually looking at the correct star?
Is there anything that would help you explain?
grid
Does this help? How confident are you? What would help even more?
coordinate grid
How about now? How were you able to locate/explain where it is?
Explain need for a coordinate system in the sky

Coordinate grid *Coordinate Grid*
Show cardinal directions *Cardinal Directions, Rotate Grid*
Zenith *Zenith*
Meridian *Meridian*

Have students note the position of 3 different stars using Alt-Az coordinate
- Start with Arcturus *Arcturus*
- then Vega *Vega*
- then Altair *Altair*

Check back an hour later, *+1 hour*
- What happened? Why?
- Have students note new star position

Move to a different location on the Earth. *Hawaii*
- What happened? Why?
- Have students note the new star position

Part 2-Celestial Coordinates

Show latitude and longitude *Latitude and Longitude*
- Choice of zero

Project into space *Celestial Grid*
Dec in degrees

RA in hours

Why?

Choice of zero, ecliptic

Have students note the position of 3 different stars using Alt-Az coordinate

Start with Arcturus *Arcturus*

then Vega *Vega*

then Altair *Altair*

Check back an hour later, *+1 hour*

What happened? Why?

Have students note star position

Move to a different location on the Earth. *Santiago, Chile*

What happened? Why?

Have students note star position

Change time by a few 1000 years *Proper Motion*

What happens? Why?

Eclipses Instructor's Guide

Use with the "Eclipses Worksheet" and the "Eclipse2023-2024" Control Panel Page.

Part 1- Introduction

Ask the student what they know about the moon cycle/solar and lunar eclipses. Start with just their responses. After responses die down, have them fill out question number 1 on their worksheet.

After they are done filling that out, ask and get answers for some of the following questions:

- What are the different moon phases?
- What causes eclipses?
- How often do you think eclipses happen?
- What phase is the moon in for a solar/lunar eclipse?
- How long is the lunar cycle?
- So if you need a new moon and a full moon for a solar and lunar eclipse, and we have those every month, then why don't we have an eclipse every month?

Let them think about that. Take responses to see what they say. Then start the next part.

Part 2- Solar Eclipses

For this first part, you are using the buttons outlined in the blue rectangle.

Start the orbital plane clip . *** Orbital Plane*** Then change the moon scale just to make it easier to see ***Moon Scale***.

Point out the moon to the students, you can turn on the moon label if you want just to make it easier for them to find ***Moon Label***. If you want it off, hit that same button again.

Now mention that the moon's orbit around the Earth is about 5 degrees off from Earth's orbit with the Sun. The moon's orbit is shown by the red circle, and the Sun's orbit is shown by the blue disk. They are just a little bit off from each other. After pointing that out, turn down the intensity of the blue disk *** Orbit Plane Intensity Slider, move to about ¼ of the way from the left side***

Turn on the moon's shadow, this will help them see if the shadow actually hits the Earth or not. *** Shadow 80***. If you want it off, hit the little x box on the corner of it.

Now make the scene move to demonstrate how the moon moves in comparison to the Earth's plane with the Sun. Click the scene move button to start the script. ***Scene Move*** The first time the moon goes by, it will not make an eclipse, you will see the shadow miss Earth. The second time around (you will have to wait a bit), you will see the shadow hit Earth, which means an eclipse happened. After that, stop the scene ***Scene Stop***.

Ask for any questions or anything like that.

Have them fill out question 2 on the survey.

Part 3- Lunar Eclipses

In this part, we are talking about lunar eclipses. Ask the students what they know about lunar eclipses. If they didn't already say these answers, ask them the following questions:

- Why do lunar eclipses have to happen on a full moon?
- What color do lunar eclipses look?
- Why do they usually look red?

Explain that lunar eclipses generally look red because the light illuminating it is going through the Earth's atmosphere. The atmosphere scatters blue light, which makes the moon look super red. Also explain that lunar eclipses work similar to solar eclipses, but instead of the moon blocking the Sun, it is the Earth casting its shadow on the moon.

- Often a lunar eclipse is two weeks before or after a solar eclipse. Why is that?

Ask for any questions they have on solar or lunar eclipses. Answer those if any.

Part 4- Annular vs. Total Eclipses

Now we will look at the difference between partial/annular and total eclipses. Hit the Eclipsopedia Setup button at the top of the page ***Eclipsopedia Setup***

Start by asking the students some of the following questions:

- What is an annular eclipse?
- How is it different from a total eclipse?

Now you will show them what an annular eclipse looks like. For this, you will be using the buttons just to the right of the Oct. 14, 2024 box. Set the date and time ***Set Date/Time***

Then show them what the eclipse looks like from space ***Greatest Eclipse from Space*** You will need to hit the green double arrows that point right to get it to go. When the shadow has passed over Earth, hit the red square to stop it.

Now you will show them that same eclipse from the Earth's perspective ***View Eclipse from Max Totality*** Once it all looks setup, zoom in on the sun and moon ***Eclipse Zoom Toggle***. Hit the green arrows again to make it go, and hit the red square to stop it once it's over.

Now we will show them the total eclipse. You will be using the buttons just to the right of the April 8, 2024 box. Set the date and time ***Set Date/Time*** Then show them what the eclipse looks like from space ***Greatest Eclipse from Space*** You will need to hit the green double arrows that point right to get it to go. When the shadow has passed over Earth, hit the red square to stop it.

Now you will show them that same eclipse from the Earth's perspective ***View Eclipse from Max Totality*** Once it all looks setup, zoom in on the sun and moon ***Eclipse Zoom Toggle***. Hit the green arrows again to make it go, and hit the red square to stop it once it's over.

Ask the students if they have any questions/comments.

Have them fill out question 3 on their worksheet.

When they are done, have them fill out the post-activity survey (QR code on the worksheet).

Make sure to collect all worksheets.

Stellar Magnitudes Instructor Guide

Use in tandem with "Magnitudes Worksheet" and "Abs vs Apparent Magnitudes" control panel page.

Before you get started:

Open the downloads folder on your computer.

Also go to the file where the control panel page is and click on the media file. Keep that open too. ***Right click on the digistar tab that shows the file name, and then click the "Open in windows Explorer" button***

Have the google drive survey response open: https://docs.google.com/spreadsheets/d/1kCvzs7XkyFSgqMU4256u6j32hn11oQYz7fJVOb7ThkI/edit?usp=sharing

Part 1- Looking at Apparent magnitude

Split students into 5 groups, number them 1-5 and make sure they remember their number.

Put up the sky ***Sky on, Evening*** and turn off the Milky Way ***Milky Way***

Use the drawing tool on Digistar to outline a rectangle of sky for them on the bottom half of the dome. ***Go to the dome view. Above the dome, it will show a toolbar. Click on the tool that looks like a pen drawing, then draw the box on the dome, it should appear***

Explain that they will be counting stars of a certain brightness.

Put up the legend, ***Stars Legend*** and show each group the brightness of the stars they are looking for.

Have them scan the QR code and enter in their data. Only one student from each group should enter the data. They only need to fill out the question that corresponds to their group (ex: group two only has to fill out the "mag two" question on the survey)

Create a histogram of their data and project onto the dome. *** One the google drive survey, enter the data from the students into the five boxes that alter the histogram data. Then click on the three dots on the top right of the chart. Click download, download as png. Copy that file from your open downloads window into the media file window. Then, you can just click and drag the image from the media file window right onto the dome view. To get rid of it, just right click and hit the delete option.***

Show the real data. ***Click the histogram icon on the bottom left*** What is different about it? Take responses. Why is it different? Fill out question 1 on the worksheet.

While they are filling out the worksheet, turn off the stars legend. ***Legend Off***

Have them propose their ideas. At some point, a student might mention that it could be because some stars might be bright, but be far away, so they look dim to us. Use that to go to the next task.

Explain that what we are seeing now is the stars' apparent magnitude, or how bright they look to us. If we want to see how bright the stars actually are, we need to put them all at the same distance away.

Part 2- Looking at Absolute magnitude

Move the stars on the dome to all the same distance. ***Luminosity***

Put up the new legend and have them redo the counting/graphing activity. ***Star Labels 2*** This time, they can count using whatever method they'd like (estimating based on small patches, counting, etc…)

Put up their new graph using the same steps as before and compare it to the real data one, it should be much closer. Why is this graph a better approximation of the real data than what we did before? Have them fill out question 2.

Explain that a star's brightness assuming they are all at the same distance is the absolute magnitude, and that is what we have to use when we make HR Diagrams because that shows a star's intrinsic brightness.

Color Measurement Bias Instructor's Guide

Use in tandem with "Color Measurement Bias Worksheet" and "Abs vs Apparent Magnitudes" control panel page.

<u>Before you get started:</u>

Open the downloads folder on your computer.

Also go to the file where the control panel page is and click on the media file. Keep that open too. ***Right click on the digistar tab that shows the file name, and then click the "Open in windows Explorer" button***

Have the google drive survey response open:
https://docs.google.com/spreadsheets/d/1d2y0G4ncHl2dCh9rnvlAbqasaF3W-KETYz5c3EtVbsY/edit?usp=sharing

<u>Part 1- Looking at Apparent Star Color</u>

Split students into 5 groups, number them 1-5 and make sure they remember their number.

Put up the sky ***Sky on, Evening*** and turn off the Milky Way ***Milky Way*** and exaggerate the color of the stars ***Color Stars***

Explain that when we put all the stars at the same distance, we get a sky that shows the absolute magnitude of all the stars.

Move the stars on the dome to all the same distance. ***Luminosity***

Use the drawing tool on Digistar to outline a rectangle of sky for them on the bottom half of the dome. ***Go to the dome view. Above the dome, it will show a toolbar. Click on the tool that looks like a pen drawing, then draw the box on the dome, it should appear***

Explain that they will be counting stars of certain colors.

Put up the legend, ***Color Legend*** and show each group the color of the stars they are looking for.

Have them scan the QR code and enter in their data. Only one student from each group should enter the data. They only need to fill out the question that corresponds to their group (ex: group two only has to fill out the "color two" question on the survey)

Create a histogram of their data and project onto the dome. *** One the google drive survey, enter the data from the students into the five boxes that alter the histogram data. Then click on the three dots on the top right of the chart. Click download, download as png. Copy that file from your open downloads window into the media file window. Then, you can just click and drag the image from the media file window right onto the dome view. To get rid of it, just right click and hit the delete option.***

Show the real data. ***Click the histogram icon second up from the bottom left*** What is different about it? Take responses. Why is it different? Fill out question 1 on the worksheet.

After they fill out question 1, take responses and get their ideas. Ask them to think about a test they could implement to see if their responses are correct. Take ideas and maybe briefly list a few. Have them fill out question 2 on the survey.

After they answer question 2, have them share their responses.

Now explain to them why there is a difference between their data and theoretical data. Explain why our graph is wrong (hard to detect dim stars) and also why there are so many dim stars in theory (we can't see them, plus they are low mass so in theory, tons of them are created in relation to big stars, which don't happen as often).

Now, have them fill out question 3 on their survey.

Tell them to scan the QR code on the back of their worksheet and fill out the survey response questions.

Appendix C

Digistar Codes

Coordinate Activity: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      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>blank_grid_model intensity 0</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controlpanel:CommandBindingReference.Source>
  </controlpanel:CommandBindingReference>
  <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_030748873c2344e1b3756a4f99f
2c2cb" TargetElementProperty="Click">
    <controlpanel:CommandBindingReference.Source>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>grid off</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controlpanel:CommandBindingReference.Source>
  </controlpanel:CommandBindingReference>
  <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_fd14206c604b477a83929d4482c
228b1" TargetElementProperty="Click">
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        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String"
xml:space="preserve"><s:String>blank_grid_model is
solidModelClass</s:String><s:String>blank_grid is
imageClass</s:String><s:String>blank_grid path
.\grid.tif</s:String><s:String>blank_grid_model intensity
0</s:String><s:String>blank_grid_model model
$Content\Library\Models\Misc\image_hemisphere_dense.x</s:String><s
:String>blank_grid_model modelTexture  baseColor0
blank_grid</s:String><s:String>scene add blank_grid_model
```

```
near</s:String><s:String>blank_grid_model intensity
50</s:String></x:Array>
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        </controlpanel:ExecuteHostStringCommand>
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    </controlpanel:CommandBindingReference>
    <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_95008b3e6e7a406b9ef11da0175
6cab4" TargetElementProperty="Click">
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        <controlpanel:ExecuteHostStringCommand>
          <controlpanel:ExecuteHostStringCommand.StringCommands>
            <x:Array Type="s:String">
              <s:String>grid on intensity 60 color red</s:String>
            </x:Array>
          </controlpanel:ExecuteHostStringCommand.StringCommands>
        </controlpanel:ExecuteHostStringCommand>
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    </controlpanel:CommandBindingReference>
    <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_7c88cc86b656431bb2b4c548dfc
f0ba6" TargetElementProperty="Click">
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        <controlpanel:ExecuteHostStringCommand>
          <controlpanel:ExecuteHostStringCommand.StringCommands>
            <x:Array Type="s:String">
              <s:String>starrigelLabel on text "1"</s:String>
            </x:Array>
          </controlpanel:ExecuteHostStringCommand.StringCommands>
        </controlpanel:ExecuteHostStringCommand>
      </controlpanel:CommandBindingReference.Source>
    </controlpanel:CommandBindingReference>
    <controlpanel:CommandBindingReference
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e540a" TargetElementProperty="Click">
      <controlpanel:CommandBindingReference.Source>
        <controlpanel:ExecuteHostStringCommand>
          <controlpanel:ExecuteHostStringCommand.StringCommands>
            <x:Array Type="s:String">
              <s:String>starSiriusLabel on text "2"</s:String>
            </x:Array>
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        </controlpanel:ExecuteHostStringCommand>
      </controlpanel:CommandBindingReference.Source>
    </controlpanel:CommandBindingReference>
    <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_b883df085a894676a0be7bef9fab
ce0e" TargetElementProperty="Click">
      <controlpanel:CommandBindingReference.Source>
        <controlpanel:ExecuteHostStringCommand>
          <controlpanel:ExecuteHostStringCommand.StringCommands>
            <x:Array Type="s:String">
              <s:String>starCapellaLabel on text "3"</s:String>
            </x:Array>
          </controlpanel:ExecuteHostStringCommand.StringCommands>
        </controlpanel:ExecuteHostStringCommand>
      </controlpanel:CommandBindingReference.Source>
    </controlpanel:CommandBindingReference>
    <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_432e8c16ee33420ab2681ec11a4
cc7b3" TargetElementProperty="Click">
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        <controlpanel:ExecuteHostStringCommand>
          <controlpanel:ExecuteHostStringCommand.StringCommands>
            <x:Array Type="s:String">
              <s:String>starArcturusLabel off</s:String>
              <s:String>starVegaLabel off</s:String>
              <s:String>starAltairLabel off</s:String>
              <s:String>starrigelLabel off</s:String>
              <s:String>starsiriusLabel off</s:String>
              <s:String>starcapellaLabel off</s:String>
            </x:Array>
          </controlpanel:ExecuteHostStringCommand.StringCommands>
        </controlpanel:ExecuteHostStringCommand>
      </controlpanel:CommandBindingReference.Source>
    </controlpanel:CommandBindingReference>
  </controlpanel:CommandBindingReferenceCollection>
  <controlpanel:DsAttributeBindingReferenceCollection Capacity="0"
x:Key="___DSATTRIBUTEBINDINGREFERENCES___" />
 </Canvas.Resources>
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CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_9a4f26d1776f40b68e1d312c41346dac"
Width="150" MaxWidth="956" Height="30" MaxHeight="1300"
ToolTip="Turns cardinal points on &amp; off" Canvas.Left="50"
Canvas.Top="120">
   <controls:ExtendedButton.Tag>
    <controlpanel:ObjectToggleOnOffCommand
ObjectReference="cardinal" ForceOnOff="{x:Null}"
UseButtonPress="False" />
   </controls:ExtendedButton.Tag>Cardinal
Directions</controls:ExtendedButton>
 <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_365cc1ea0dff4e30a18ea019e3286707"
Width="70" MaxWidth="859" Height="30" MaxHeight="784"
Canvas.Left="20" Canvas.Top="20">
   <controls:ExtendedButton.Tag>
    <controlpanel:ExecuteHostStringCommand>
     <controlpanel:ExecuteHostStringCommand.StringCommands>
      <x:Array Type="s:String">
       <s:String>sky on</s:String>
      </x:Array>
     </controlpanel:ExecuteHostStringCommand.StringCommands>
    </controlpanel:ExecuteHostStringCommand>
   </controls:ExtendedButton.Tag>Sky on</controls:ExtendedButton>
 <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_d97bab90ba6e40e4aed7035419e1800e"
Width="70" MaxWidth="859" Height="30" MaxHeight="784"
Canvas.Left="180" Canvas.Top="20">
   <controls:ExtendedButton.Tag>
    <controlpanel:ExecuteHostStringCommand>
     <controlpanel:ExecuteHostStringCommand.StringCommands>
      <x:Array Type="s:String">
       <s:String>sky on evening</s:String>
      </x:Array>
     </controlpanel:ExecuteHostStringCommand.StringCommands>
    </controlpanel:ExecuteHostStringCommand>
   </controls:ExtendedButton.Tag>Evening</controls:ExtendedButton>
 <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_8915f3d2232f4a6ebe16ee1e887bcf92"
Width="70" MaxWidth="859" Height="30" MaxHeight="784"
Canvas.Left="100" Canvas.Top="20">
   <controls:ExtendedButton.Tag>
    <controlpanel:ExecuteHostStringCommand>
     <controlpanel:ExecuteHostStringCommand.StringCommands>
      <x:Array Type="s:String">
       <s:String>sky on morning</s:String>
      </x:Array>
     </controlpanel:ExecuteHostStringCommand.StringCommands>
    </controlpanel:ExecuteHostStringCommand>
   </controls:ExtendedButton.Tag>Morning</controls:ExtendedButton>
 <TextBox TextWrapping="NoWrap" TextAlignment="Center"
AcceptsReturn="False" BorderThickness="1,1,1,1" FontSize="36"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="TextBox_e9f0e427fcbc48a1ab25ff4b1d66296e" Width="150"
MaxWidth="956" Height="50" MaxHeight="1300" Canvas.Left="50"
Canvas.Top="60">Alt-Az</TextBox>
 <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_b11eddfd306e426da9fce46a0128c485"
Width="150" MaxWidth="956" Height="30" MaxHeight="1300"
ToolTip="Turns localPoles (zenith) on &amp; off" Canvas.Left="50"
Canvas.Top="170">
   <controls:ExtendedButton.Tag>
    <controlpanel:ObjectToggleOnOffCommand
ObjectReference="localPoles on" ForceOnOff="{x:Null}"
UseButtonPress="False" />
   </controls:ExtendedButton.Tag>Zenith</controls:ExtendedButton>
 <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_459a57fa86b74271b70f37c0e9bc6fec"
Width="150" MaxWidth="956" Height="30" MaxHeight="1300"
ToolTip="Turns meridian on &amp; off" Canvas.Left="50"
Canvas.Top="220">
   <controls:ExtendedButton.Tag>
    <controlpanel:ObjectToggleOnOffCommand
ObjectReference="meridian" ForceOnOff="{x:Null}"
UseButtonPress="False" />
   </controls:ExtendedButton.Tag>Meridian</controls:ExtendedButton>
 <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" Foreground2="#FFFFFFFF"
Background2="#FF000000" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_95008b3e6e7a406b9ef11da01756cab4"
Width="150" MaxWidth="956" Height="30" MaxHeight="1300"
ToolTip="Turns coordinate grid on &amp; off" Canvas.Left="50"
Canvas.Top="270">
   <controls:ExtendedButton.Tag>
    <controlpanel:ExecuteHostStringCommand>
     <controlpanel:ExecuteHostStringCommand.StringCommands>
      <x:Array Type="s:String">
       <s:String>grid on intensity 60 color red</s:String>
      </x:Array>
     </controlpanel:ExecuteHostStringCommand.StringCommands>
    </controlpanel:ExecuteHostStringCommand>
   </controls:ExtendedButton.Tag>Coordinate
Grid</controls:ExtendedButton>
 <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_4e8b48adb78441a4ae67493e3d7af689"
Width="0" MaxWidth="956" Height="0" MaxHeight="1300"
Canvas.Left="140"
Canvas.Top="180">Button</controls:ExtendedButton>
 <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_9916a9f59ebc4803ac47eefc2f0ab815"
Width="0" MaxWidth="859" Height="0" MaxHeight="784"
Canvas.Left="420" Canvas.Top="50">Sky
on/off</controls:ExtendedButton>
 <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_3ff20c4585f64dacb019eaa37bd57835"
Width="60" MaxWidth="859" Height="30" MaxHeight="784"
ToolTip="system fadeStopReset" Canvas.Left="260" Canvas.Top="20">
   <controls:ExtendedButton.Tag>
    <controlpanel:ExecuteHostStringCommand>
     <controlpanel:ExecuteHostStringCommand.StringCommands>
      <x:Array Type="s:String">
       <s:String>system fadeStopReset</s:String>
      </x:Array>
     </controlpanel:ExecuteHostStringCommand.StringCommands>
    </controlpanel:ExecuteHostStringCommand>
   </controls:ExtendedButton.Tag>Reset</controls:ExtendedButton>
 <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_b9b889fd69cf4b82bf3739f2ceb538bc"
Width="0" MaxWidth="859" Height="0" MaxHeight="784"
Canvas.Left="300" Canvas.Top="40">
   <controls:ExtendedButton.Tag>
    <controlpanel:ExecuteHostStringCommand>
     <controlpanel:ExecuteHostStringCommand.StringCommands>
      <x:Array Type="s:String">
       <s:String>system fadeStopReset</s:String>
      </x:Array>
     </controlpanel:ExecuteHostStringCommand.StringCommands>
    </controlpanel:ExecuteHostStringCommand>
   </controls:ExtendedButton.Tag>Reset</controls:ExtendedButton>
 <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_9c6b14de57964ec4855e8bc990b09765"
Width="90" MaxWidth="859" Height="30" MaxHeight="784"
ToolTip="Clouds must die" Canvas.Left="330" Canvas.Top="20">
   <controls:ExtendedButton.Tag>
    <controlpanel:ExecuteHostStringCommand>
     <controlpanel:ExecuteHostStringCommand.StringCommands>
      <x:Array Type="s:String">
       <s:String>Earth cloudIntensity 0 duration 3</s:String>
      </x:Array>
     </controlpanel:ExecuteHostStringCommand.StringCommands>
    </controlpanel:ExecuteHostStringCommand>
```

```
    </controls:ExtendedButton.Tag>Clouds
off</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_c30053ac352549709835b65a2d66e684"
Width="0" MaxWidth="859" Height="0" MaxHeight="784"
Canvas.Left="350"
Canvas.Top="40">Button</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_e82c4b203c074cf88ca5c95efa9b1019"
Width="130" MaxWidth="859" Height="30" MaxHeight="784"
Canvas.Left="570" Canvas.Top="20">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>Earth AtmosphereIntensity 0 duration 3</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Atmosphere
off</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_5202c49cb1024ecea16b179fc6369934"
Width="130" MaxWidth="859" Height="30" MaxHeight="784"
Canvas.Left="430" Canvas.Top="20">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>Earth AtmosphereIntensity 100 duration 3</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Atmosphere
on</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_d64f501b7f104eb293b53faaf1efbdde"
Width="0" MaxWidth="859" Height="0" MaxHeight="784"
Canvas.Left="470"
Canvas.Top="30">Button</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_c03fccb63ca643c8ba210737f9782ac1"
Width="0" MaxWidth="956" Height="0" MaxHeight="1300"
Canvas.Left="490" Canvas.Top="100">Sky
on/off</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_2343cb76877c4d3d908fb9a680042c7e"
Width="0" MaxWidth="985" Height="0" MaxHeight="926"
Canvas.Left="180" Canvas.Top="90">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>system fadeStopReset</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Reset</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_046c4d3c5cc84451a3fae4989192e3bb"
Width="0" MaxWidth="985" Height="0" MaxHeight="926"
Canvas.Left="230"
Canvas.Top="90">Button</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_036e5c8848c24d16ae0f99ef27c02510"
Width="0" MaxWidth="956" Height="0" MaxHeight="1300"
Canvas.Left="540"
Canvas.Top="80">Button</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_0748da23ba0e4b24b6648524e116649c"
Width="150" MaxWidth="956" Height="30" MaxHeight="1300"
ToolTip="Moves time forward about an hour" Canvas.Left="50"
Canvas.Top="370">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>scene date rate .4 hours dur 2.475 2.475</s:String>
            <s:String>+2.5</s:String>
            <s:String>scene date rate 0 seconds dur 2.475 2.475</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>+1 hour</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_0df258c75e844742a99e3de6622bdad0"
Width="70" MaxWidth="956" Height="60" MaxHeight="1300"
Canvas.Left="130" Canvas.Top="470"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ex
ecuteHostStringCommand><controlpanel:ExecuteHostStringCommand.
StringCommands><x:Array Type="s:String"><s:String>js stop
"TerrainView"</s:String><s:String>js stop
"SkyView"</s:String><s:String>js stop
"SkyTarget"</s:String><s:String>js play
$Software\Apps\Digistar\Config\UI\Scripts\Location.js |
Location("",90,0,20,NaN,0,0,"",false,'xbox0')</s:String></x:Array></co
ntrolpanel:ExecuteHostStringCommand.StringCommands></controlpane
l:ExecuteHostStringCommand></controls:ExtendedButton.Tag>North
Pole</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_99bfcfc201ea4c1397c45bc4a6cc0206"
Width="70" MaxWidth="956" Height="60" MaxHeight="1300"
Canvas.Left="130" Canvas.Top="540"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ex
ecuteHostStringCommand><controlpanel:ExecuteHostStringCommand.
StringCommands><x:Array Type="s:String"><s:String>js stop
"TerrainView"</s:String><s:String>js stop
"SkyView"</s:String><s:String>js stop
"SkyTarget"</s:String><s:String>js play
$Software\Apps\Digistar\Config\UI\Scripts\Location.js |
Location("",-90,0,2793,NaN,0,0,"",false,'xbox0')</s:String></x:Array></
controlpanel:ExecuteHostStringCommand.StringCommands></controlpa
nel:ExecuteHostStringCommand></controls:ExtendedButton.Tag>South
Pole</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_0e843ea3a8b1467e907a3c37c8a8ac02"
Width="70" MaxWidth="956" Height="60" MaxHeight="1300"
ToolTip="Provo" Canvas.Left="50" Canvas.Top="540">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>navigation location here duration 10</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Home</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_e0267c291ddc4d5786541981f3206260"
Width="0" MaxWidth="956" Height="0" MaxHeight="1300"
Canvas.Left="70"
Canvas.Top="600">Button</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_49830dd5b68d4e34b51fa984b44765e2"
Width="70" MaxWidth="956" Height="60" MaxHeight="1300"
ToolTip="Similar latitude to Provo, but south" Canvas.Left="130"
Canvas.Top="610"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ex
ecuteHostStringCommand><controlpanel:ExecuteHostStringCommand.
StringCommands><x:Array Type="s:String"><s:String>js stop
"TerrainView"</s:String><s:String>js stop
"SkyView"</s:String><s:String>js stop
"SkyTarget"</s:String><s:String>js play
$Software\Apps\Digistar\Config\UI\Scripts\Location.js |
Location("",-33.4262838490987,-70.5665588378906,684,NaN,-3,-3,"",f
alse,'xbox0')</s:String></x:Array></controlpanel:ExecuteHostStringCo
mmand.StringCommands></controlpanel:ExecuteHostStringCommand>
</controls:ExtendedButton.Tag>Santiago
Chile</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_6e14f15b516241abb56ed84883f473e9"
Width="40" MaxWidth="956" Height="0" MaxHeight="1300"
Canvas.Left="100"
Canvas.Top="520">Button</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_0a2150aadcff48eb91a6b229d51ac876"
Width="70" MaxWidth="956" Height="60" MaxHeight="1300"
ToolTip="Similar latitude to Provo" Canvas.Left="50"
Canvas.Top="610"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ex
ecuteHostStringCommand><controlpanel:ExecuteHostStringCommand.
StringCommands><x:Array Type="s:String"><s:String>js stop
"TerrainView"</s:String><s:String>js stop
"SkyView"</s:String><s:String>js stop
"SkyTarget"</s:String><s:String>earth atmosphereIntensity
0</s:String><s:String>earth terrainIntensity 0</s:String><s:String>Sun
off</s:String><s:String>js play
$Software\Apps\Digistar\Config\UI\Scripts\Location.js |
Location("",39.9074977414405,116.397228240967,70,NaN,8,8,"",false,'
xbox0')</s:String></x:Array></controlpanel:ExecuteHostStringComman
d.StringCommands></controlpanel:ExecuteHostStringCommand></cont
rols:ExtendedButton.Tag>Beijing
China</controls:ExtendedButton>
  <TextBox TextWrapping="NoWrap" TextAlignment="Left"
AcceptsReturn="False" BorderThickness="1,1,1,1" FontSize="20"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="TextBox_fab5bc0bc73b480692caad6382feb8d7" Width="150"
MaxWidth="956" Height="110" MaxHeight="1300" Canvas.Left="50"
Canvas.Top="700" xml:space="preserve">Otherwise, go to
location-&gt;places,
select a place,
press "Sky View"</TextBox>
  <TextBox TextWrapping="NoWrap" TextAlignment="Center"
AcceptsReturn="False" BorderThickness="1,1,1,1" FontSize="36"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="TextBox_c6ed8405d2ca4093aee7477ed344ba71" Width="150"
MaxWidth="956" Height="50" MaxHeight="1300" Canvas.Left="450"
Canvas.Top="60">Earth</TextBox>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_b515126e7fc3449eb843b6a7d3f6894e"
Width="150" MaxWidth="956" Height="30" MaxHeight="1300"
ToolTip="Opens Digistar's &quot;Latitude and Longitude&quot; page"
Canvas.Left="450" Canvas.Top="120">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>system controlsPreview
$Software\Apps\Digistar\Config\UI\ControlPanel\Latitude and
Longitude.dscp</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Latitude &amp;
Longitude</controls:ExtendedButton>
```

```
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_4dae052d9d1b4bda84d411ed9bd0b08f"
Width="130" MaxWidth="956" Height="30" MaxHeight="1300"
Canvas.Left="650" Canvas.Top="230">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>starAltairLabel on text "3"</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Altair</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_8614e742076d42de96c521f689461c92"
Width="130" MaxWidth="956" Height="30" MaxHeight="1300"
Canvas.Left="650" Canvas.Top="130">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>starArcturusLabel on text "1"</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Arcturus</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_ed9ef8b637f640a096050418b3b7d8b1"
Width="130" MaxWidth="956" Height="30" MaxHeight="1300"
Canvas.Left="650" Canvas.Top="180">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>starVegaLabel on text "2"</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Vega</controls:ExtendedButton>
  <TextBox TextWrapping="NoWrap" TextAlignment="Center"
AcceptsReturn="False" BorderThickness="1,1,1,1" FontSize="36"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="TextBox_09640091061a4061ba7a6f6435aa0667" Width="150"
MaxWidth="956" Height="50" MaxHeight="1300" Canvas.Left="650"
Canvas.Top="60">Stars</TextBox>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_832c9dda4aea40898252269be23a3944"
Width="150" MaxWidth="956" Height="30" MaxHeight="1300"
ToolTip="Moves time forward about an hour" Canvas.Left="50"
Canvas.Top="420">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>scene date rate -.4 hours dur 2.475 2.475</s:String>
            <s:String>+2.5</s:String>
            <s:String>scene date rate 0 seconds dur 2.475 2.475</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>-1 hour</controls:ExtendedButton>
  <TextBox TextWrapping="NoWrap" TextAlignment="Center"
AcceptsReturn="False" BorderThickness="1,1,1,1" FontSize="36"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="TextBox_60cf5b8ed013488fb45f28f3fb66156e" Width="150"
MaxWidth="956" Height="50" MaxHeight="1300" Canvas.Left="250"
Canvas.Top="60">RA-DEC</TextBox>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_8bf978e9995544e0968d044c148b13fb"
Width="150" MaxWidth="956" Height="30" MaxHeight="1300"
Canvas.Left="50" Canvas.Top="320">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String" xml:space="preserve"><s:String>grid
attitude 90 0 0 </s:String></x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Rotate
Grid</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_c8f6ce36cff142458dd9cd641bdaf7e1"
Width="70" MaxWidth="956" Height="60" MaxHeight="1300"
Canvas.Left="650" Canvas.Top="330"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ex
ecuteHostStringCommand><controlpanel:ExecuteHostStringCommand.
StringCommands><x:Array Type="s:String"><s:String>eye color black
duration 1</s:String><s:String>+1</s:String><s:String>scene date
2023/09/21 sunset +2 </s:String><s:String>sky on
</s:String><s:String>eye color white duration
1</s:String></x:Array></controlpanel:ExecuteHostStringCommand.Stri
ngCommands></controlpanel:ExecuteHostStringCommand></controls:E
xtendedButton.Tag>Fall
Sky</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_64094018efe446d6ace5fa8ffe172a56"
Width="70" MaxWidth="956" Height="60" MaxHeight="1300"
Canvas.Left="730" Canvas.Top="330"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ex
ecuteHostStringCommand><controlpanel:ExecuteHostStringCommand.
StringCommands><x:Array Type="s:String"><s:String>eye color black
duration 1</s:String><s:String>+1</s:String><s:String>scene date
2023/12/21 sunset +2 </s:String><s:String>sky on
</s:String><s:String>eye color white duration
1</s:String></x:Array></controlpanel:ExecuteHostStringCommand.Stri
ngCommands></controlpanel:ExecuteHostStringCommand></controls:E
xtendedButton.Tag>Winter
Sky</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_d56ed9fb6e0b466d8824639bd6fa6421"
Width="150" MaxWidth="956" Height="30" MaxHeight="1300"
Canvas.Left="650" Canvas.Top="480">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>scene properMotion on</s:String>
            <s:String>UI dateProper on</s:String>
            <s:String>+2</s:String>
            <s:String>Earth precessAxis off</s:String>
            <s:String>earth atmosphereIntensity 0</s:String>
            <s:String>earth terrainIntensity 0</s:String>
            <s:String>Sun off</s:String>
            <s:String>Mercury off</s:String>
            <s:String>Venus off</s:String>
            <s:String>Mars off</s:String>
            <s:String>Jupiter off</s:String>
            <s:String>Saturn off</s:String>
            <s:String>Moon off</s:String>
            <s:String>Earth annual on</s:String>
            <s:String>+2</s:String>
            <s:String>scene date rate 30000 years</s:String>
            <s:String>localdate on</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Proper
Motion</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_3f1c9b78170b49a0be2e66e5ea8d50ef"
Width="70" MaxWidth="956" Height="60" MaxHeight="1300"
Canvas.Left="650" Canvas.Top="400"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ex
ecuteHostStringCommand><controlpanel:ExecuteHostStringCommand.
StringCommands><x:Array Type="s:String"><s:String>eye color black
duration 1</s:String><s:String>+1</s:String><s:String>scene date
2023/03/21 sunset +2 </s:String><s:String>sky on
</s:String><s:String>eye color white duration
1</s:String></x:Array></controlpanel:ExecuteHostStringCommand.Stri
ngCommands></controlpanel:ExecuteHostStringCommand></controls:E
xtendedButton.Tag>Spring
Sky</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_2a28728bb0fe4b0a8b51f897d0359a7b"
Width="70" MaxWidth="956" Height="60" MaxHeight="1300"
Canvas.Left="730" Canvas.Top="400"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ex
ecuteHostStringCommand><controlpanel:ExecuteHostStringCommand.
StringCommands><x:Array Type="s:String"><s:String>eye color black
duration 1</s:String><s:String>+1</s:String><s:String>scene date
2023/06/21 sunset +2 </s:String><s:String>sky on
</s:String><s:String>eye color white duration
1</s:String></x:Array></controlpanel:ExecuteHostStringCommand.Stri
ngCommands></controlpanel:ExecuteHostStringCommand></controls:E
xtendedButton.Tag>Summer
Sky</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_091e625d75254bd5be4576e4984795c5"
Width="150" MaxWidth="956" Height="30" MaxHeight="1300"
Canvas.Left="250" Canvas.Top="120">
    <controls:ExtendedButton.Tag>
      <controlpanel:ObjectToggleOnOffCommand
ObjectReference="celestial" ForceOnOff="{x:Null}"
UseButtonPress="False" />
    </controls:ExtendedButton.Tag>Celestial
Grid</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_fd14206c604b477a83929d4482c228b1"
Width="150" MaxWidth="956" Height="30" MaxHeight="1300"
ToolTip="Turns coordinate grid on &amp; off" Canvas.Left="450"
Canvas.Top="170">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String"
xml:space="preserve"><s:String>blank_grid_model is
solidModelClass</s:String><s:String>blank_grid is
imageClass</s:String><s:String>blank_grid path
.\grid.tif</s:String><s:String>blank_grid_model intensity
0</s:String><s:String>blank_grid_model model
$Content\Library\Models\Misc\image_hemisphere_dense.x</s:String><s
:String>blank_grid_model modelTexture  baseColor0
blank_grid</s:String><s:String>scene add blank_grid_model
near</s:String><s:String>blank_grid_model intensity
50</s:String></x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Grid</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_b806193160ce4d1cb5a6c964cfaa3b47"
Width="70" MaxWidth="956" Height="60" MaxHeight="1300"
ToolTip="{x:Null}" Canvas.Left="50" Canvas.Top="470">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>js stop "TerrainView"</s:String>
            <s:String>js stop "SkyView"</s:String>
            <s:String>js stop "SkyTarget"</s:String>
            <s:String>earth atmosphereIntensity 0</s:String>
            <s:String>earth terrainIntensity 0</s:String>
            <s:String>Sun off</s:String>
            <s:String>js play
$Software\Apps\Digistar\Config\UI\Scripts\Location.js |
Location("",19.741755,-155.844437,684,NaN,-3,-3,"",false,'xbox0')</s:S
tring>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
```

```
    </controls:ExtendedButton.Tag>Hawaii</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_432e8c16ee33420ab2681ec11a4cc7b3"
Width="150" MaxWidth="956" Height="30" MaxHeight="1300"
Canvas.Left="650" Canvas.Top="280"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ex
ecuteHostStringCommand><controlpanel:ExecuteHostStringCommand.
StringCommands><x:Array
Type="s:String"><s:String>starArcturusLabel
off</s:String><s:String>starVegaLabel
off</s:String><s:String>starAltairLabel
off</s:String><s:String>starrigelLabel
off</s:String><s:String>starsiriusLabel
off</s:String><s:String>starcapellaLabel
off</s:String></x:Array></controlpanel:ExecuteHostStringCommand.Str
ingCommands></controlpanel:ExecuteHostStringCommand></controls:
ExtendedButton.Tag>Star Labels Off </controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_684f4b40d024435bae5f3437b9b0fab0"
Width="150" MaxWidth="956" Height="30" MaxHeight="1300"
ToolTip="Turns coordinate grid on &amp; off" Canvas.Left="450"
Canvas.Top="220">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>blank_grid_model intensity 0</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Grid Off</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_030748873c2344e1b3756a4f99f2c2cb"
Width="150" MaxWidth="956" Height="30" MaxHeight="1300"
ToolTip="Turns coordinate grid on &amp; off" Canvas.Left="450"
Canvas.Top="270">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>grid off</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Coordinate Grid
Off</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_b883df085a894676a0be7bef9fabce0e"
Width="130" MaxWidth="956" Height="30" MaxHeight="1300"
Canvas.Left="810" Canvas.Top="230">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>starCapellaLabel on text "3"</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Capella</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_7c88cc86b656431bb2b4c548dfcf0ba6"
Width="130" MaxWidth="956" Height="30" MaxHeight="1300"
Canvas.Left="810" Canvas.Top="130">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>starrigelLabel on text "1"</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Rigel</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_396b1cf002ee45efb1676c24b4be540a"
Width="130" MaxWidth="956" Height="30" MaxHeight="1300"
Canvas.Left="810" Canvas.Top="180">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>starSiriusLabel on text "2"</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Sirius</controls:ExtendedButton>
  <GroupBox Header="fall" FontSize="16" FontStretch="Normal"
FontStyle="Normal" FontWeight="Light" Width="150"
MaxWidth="956" Height="160" MaxHeight="1300" Canvas.Left="640"
Canvas.Top="110" />
  <GroupBox Header="Winter" FontSize="16" FontStretch="Normal"
FontStyle="Normal" FontWeight="Light" Width="150"
MaxWidth="956" Height="160" MaxHeight="1300" Canvas.Left="800"
Canvas.Top="110" />
</Canvas>
```


Eclipse:


```
<Canvas Tag="Eclipses Activity" Width="1500"
Height="1000.33333333333"
xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"
xmlns:controls="http://cosm.com/ui/controls"
xmlns:controlpanel="http://cosm.com/ui/controlpanel"
xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
xmlns:s="clr-namespace:System;assembly=mscorlib">
  <Canvas.Resources>
    <controlpanel:CommandBindingReferenceCollection Capacity="4"
x:Key="___COMMANDBINDINGREFERENCES___">
      <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_31374ed51c264ba69b8f16a68f2
99785" TargetElementProperty="Click">
        <controlpanel:CommandBindingReference.Source>
          <controlpanel:ExecuteHostStringCommand>
            <controlpanel:ExecuteHostStringCommand.StringCommands>
              <x:Array Type="s:String" xml:space="preserve"><s:String>#
{[6.16.09]}</s:String><s:String>+2          </s:String><s:String>
                scene date 2016-7-17 17:00:00 </s:String><s:String>
                sun on</s:String><s:String>  Moon
on</s:String><s:String>       stars on</s:String><s:String> milkyway
on</s:String><s:String>       planets on</s:String><s:String>
                dtpotm is textClass</s:String><s:String>      dtpotm
position spherical 0 65 1 m</s:String><s:String>             dtpotm origin
"center"</s:String><s:String>               dtpotm font "@Arial
Unicode MS"</s:String><s:String>            dtpotm textScale 2
2</s:String><s:String>        dtpotm color 100 100 100
</s:String><s:String>         dtpotm resolution
"high"</s:String><s:String>  dtpotm text "          Phases of The
Moon|By:         Science Centre Singapore"</s:String><s:String>+0.1
                scene add dtpotm near</s:String><s:String>
</s:String><s:String>         </s:String><s:String>+5       eye goto
Moon</s:String><s:String>  eye offset 0 -8 0 rMoon duration
5</s:String><s:String>        Scene att 0 -45 0 duration 3 #pitch the
csmera up</s:String><s:String>             eye face earth axis
-y</s:String><s:String>       Moon ambientColor 18.8235301971436
17.6470584869385 17.6470584869385 duration 10 # Make the far side
of the moon brighter</s:String><s:String>  dtpotm intensity 0 duration
8</s:String><s:String>+1      scene date rate 1 days</s:String><s:String>
                </s:String><s:String>+20      scene date 2016-8-17
16:40:39 duration 10          </s:String><s:String>
</s:String><s:String>+10      Moon radius 3470 km duration
3</s:String><s:String>        dtpotm intensity 0 duration
3</s:String><s:String>+3      scene attitude cartesian 0 -45 0 dur 5 1.5
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2</s:String><s:String>+2      system reset</s:String><s:String>+0.1
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2013-04-25 16:00</s:String><s:String>      eye goto
moon</s:String><s:String>  eye offset 0 0 -60
rearth</s:String><s:String>  eye attitude cartesian -121 -104
0</s:String><s:String>+0.1   sun on scale 1</s:String><s:String>
                earth on</s:String><s:String>               moon on
scale 1</s:String><s:String>  stars on</s:String><s:String> EarthShadow
on</s:String><s:String>+1     eye attitude cartesian -123 -104 0 dur
2</s:String><s:String>+2      eye offset 0 0 -4 rmoon dur
6</s:String><s:String>+8      scene date 2013-04-26 0:00 dur
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sort off</s:String><s:String> script modeldir
$Content\Library\Models\SolarSystem\</s:String><s:String>
                scene attitude 0 45 0</s:String><s:String>   scene date
2012-11-13 20:00</s:String><s:String>      eye goto
earth</s:String><s:String>  eye offset -1.3 0.38 -1.8
rEarth</s:String><s:String>  eye att 0 -65 0</s:String><s:String>
                sun on scale 1</s:String><s:String>         earth
on</s:String><s:String>       moon on scale 1</s:String><s:String>
                stars on</s:String><s:String>+1             umbrapos is
emptyClass</s:String><s:String>+0.1     umbrapos goto
moon</s:String><s:String>  umbrapos face sun axis
+z</s:String><s:String>       scene add
umbrapos</s:String><s:String>+0.1       umbra is
solidModelClass</s:String><s:String>    umbra model
umbra.x</s:String><s:String>+1          umbra int
0</s:String><s:String>        umbrapos add umbra</s:String><s:String>
                umbra ambientColor white</s:String><s:String>
                umbra color black</s:String><s:String>      umbra
cullmode back</s:String><s:String>      umbra int 36 dur
2</s:String><s:String>        umbra blend off</s:String><s:String>+0.1
                umbra pos 0 0 -0.00461241682225 rmoon
                              # x = (Rsun -
Rearth)/distance</s:String><s:String>   umbra scale 1.004 1.004
216.806077711 rmoon                     # y = 1.005*sqrt(1-x*x), L =
1/x </s:String><s:String>+0.1           penumbra is
solidModelClass</s:String><s:String>    penumbra model
penumbra.x</s:String><s:String>+1       penumbra int
0</s:String><s:String>        umbrapos add
penumbra</s:String><s:String>           penumbra ambientColor
white</s:String><s:String>   penumbra color
red</s:String><s:String>+0.1 penumbra int 14 dur
2</s:String><s:String>        penumbra blend on</s:String><s:String>
                penumbra cullmode back</s:String><s:String>+0.1
                penumbra pos 0 0 0.00463549674447 rmoon
                              # x = (Rsun +
Rearth)/distance</s:String><s:String>   penumbra scale 1.004 1.004
215.726610356 rmoon                     # y = 1.005*sqrt(1-x*x), L =
1/x</s:String><s:String>#    Show the Earth as it traverses the moon's
shadow</s:String><s:String>#            Penumbral and umbral
cones touch the Earth</s:String><s:String>+6            scene date
2012-11-13 21:40 dur 8</s:String><s:String>#            Highlight the
outline of partial eclipses on the Earth</s:String><s:String>+2
                penumbra int 70 dur 2</s:String><s:String>+2
                penumbra int 14 dur 2</s:String><s:String>#
                Advance to position highlighting the umbral cone, then
```

```
just shadow on Earth</s:String><s:String>+2 scene date
2012-11-13 22:16 dur 8</s:String><s:String># Continue to
show the earth emerging from the moon's
shadow</s:String><s:String>+1 scene date 2012-11-14
02:32 dur 30</s:String><s:String>+1 script
end</s:String></x:Array>
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$Content\Library\Models\SolarSystem\</s:String><s:String>
 scene attitude 0 45 0</s:String><s:String> scene date
2012-11-13 20:00</s:String><s:String> eye goto
earth</s:String><s:String> eye offset -1.3 0.38 -1.8
rEarth</s:String><s:String> eye att 0 -65 0</s:String><s:String>
 sun on scale 1</s:String><s:String> earth
on</s:String><s:String> moon on scale 1</s:String><s:String>
 stars on</s:String><s:String>+1 umbrapos is
emptyClass</s:String><s:String>+0.1 umbrapos goto
moon</s:String><s:String> umbrapos face sun axis
+z</s:String><s:String> scene add
umbrapos</s:String><s:String>+0.1 umbra is
solidModelClass</s:String><s:String> umbra model
umbra.x</s:String><s:String>+1 umbra int
0</s:String><s:String> umbrapos add umbra</s:String><s:String>
 umbra ambientColor white</s:String><s:String>
 umbra color black</s:String><s:String> umbra
cullmode back</s:String><s:String> umbra int 36 dur
2</s:String><s:String> umbra blend off</s:String><s:String>+0.1
 umbra pos 0 0 -0.00461241682225 rmoon
 # x = (Rsun -
Rearth)/distance</s:String><s:String> umbra scale 1.004 1.004
216.806077711 rmoon # y = 1.005*sqrt(1-x*x), L =
1/x </s:String><s:String>+0.1 penumbra is
solidModelClass</s:String><s:String> penumbra model
penumbra.x</s:String><s:String>+1 penumbra int
0</s:String><s:String> umbrapos add
penumbra</s:String><s:String> penumbra ambientColor
white</s:String><s:String> penumbra color
red</s:String><s:String>+0.1 penumbra int 14 dur
2</s:String><s:String> penumbra blend on</s:String><s:String>
 penumbra cullmode back</s:String><s:String>+0.1
 penumbra pos 0 0 0.00463549674447 rmoon
 # x = (Rsun +
Rearth)/distance</s:String><s:String> penumbra scale 1.004 1.004
215.726610356 rmoon # y = 1.005*sqrt(1-x*x), L =
1/x</s:String><s:String># Show the Earth as it traverses the moon's
shadow</s:String><s:String># Penumbral and umbral
cones touch the Earth</s:String><s:String>+6 scene date
2012-11-13 21:40 dur 8</s:String><s:String># Highlight the
outline of partial eclipses on the Earth</s:String><s:String>+2
 penumbra int 70 dur 2</s:String><s:String>+2
 penumbra int 14 dur 2</s:String><s:String>#
 Advance to position highlighting the umbral cone, then
just shadow on Earth</s:String><s:String>+2 scene date
2012-11-13 22:16 dur 8</s:String><s:String># Continue to
show the earth emerging from the moon's
shadow</s:String><s:String>+1 scene date 2012-11-14
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0 45 0</s:String><s:String> scene date 2013-04-25
16:00</s:String><s:String> eye goto moon</s:String><s:String>
 eye offset 0 0 -60 rearth</s:String><s:String>
 eye attitude cartesian -121 -104
0</s:String><s:String>+0.1 sun on scale 1</s:String><s:String>
 earth on</s:String><s:String> moon on
scale 1</s:String><s:String> stars on</s:String><s:String> EarthShadow
on</s:String><s:String>+1 eye attitude cartesian -123 -104 0 dur
2</s:String><s:String>+2 eye offset 0 0 -4 rmoon dur
6</s:String><s:String>+8 scene date 2013-04-26 0:00 dur
20</s:String><s:String>+21 script end</s:String><s:String>+0.1
 system reset</s:String></x:Array>
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FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Width="180" MaxWidth="1500" Height="40"
MaxHeight="1000.33333333333" Canvas.Left="370"
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FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Width="180" MaxWidth="1500" Height="40"
MaxHeight="1000.33333333333" Canvas.Left="370"
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FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Width="180" MaxWidth="1500" Height="40"
MaxHeight="1000.33333333333" Canvas.Left="370"
Canvas.Top="280">Atmosphere</controls:ExtendedButton>
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 sun on</s:String><s:String> Moon
on</s:String><s:String> stars on</s:String><s:String> milkyway
on</s:String><s:String> planets on</s:String><s:String>
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Moon|By: Science Centre Singapore"</s:String><s:String>+0.1
 scene add dtpotm near</s:String><s:String>
</s:String><s:String> </s:String><s:String>+5 eye goto
Moon</s:String><s:String> eye offset 0 -8 0 rMoon duration
5</s:String><s:String> Scene att 0 -45 0 duration 3 #pitch the
csmera up</s:String><s:String> eye face earth axis
-y</s:String><s:String> Moon ambientColor 18.8235301971436
17.6470584869385 17.6470584869385 duration 10 # Make the far side
of the moon brighter</s:String><s:String> dtpotm intensity 0 duration
8</s:String><s:String>+1 scene date rate 1 days</s:String><s:String>
 </s:String><s:String>+20 scene date 2016-8-17
16:40:39 duration 10 </s:String><s:String>
</s:String><s:String>+10 Moon radius 3470 km duration
3</s:String><s:String> dtpotm intensity 0 duration
3</s:String><s:String>+3 scene attitude cartesian 0 -45 0 dur 5 1.5
1.5</s:String><s:String> eye offset 0 -1.0422e+007 0 dur 10 4 4
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0</s:String><s:String>	navigation land 25:17.4 -104:08.3 ground 0
180 duration 0</s:String><s:String>	navigation pointAtZenith
duration 0</s:String><s:String>	TSE2024Toggle
off</s:String><s:String>	earth terrainIntensity 0 duration
0</s:String><s:String>	MoonUmbra intensity 0 duration
0</s:String><s:String>+1.0	eye color white duration
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scene date 2024-04-08 18:17:17.9 duration
0</s:String><s:String>	navigation viewLocation here azimuth 180
offsetDistance 0 m duration 0</s:String><s:String>	navigation
pointAtZenith duration 0</s:String><s:String>
TSE2024Toggle off</s:String><s:String>	earth terrainIntensity 0
duration 0</s:String><s:String>	MoonUmbra intensity 0
duration 0</s:String><s:String>+1.0	eye color white duration
2</s:String><s:String>+2.0	Earth terrainIntensity 100 duration
3</s:String><s:String>+2.0	script end</s:String></x:Array>
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"https://solarsystem.nasa.gov/eclipses/2024/apr-8-total/where-when/"</s:
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3</s:String><s:String>#EclipseInfo text
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      <s:String>script play
$Content\User\Downloads\E&amp;S\EclipseopediaAbridgedEdition(202
3-2024)\Scripts\Eclipseopedia Abridged - 2024 Scriptable
Buttons.ds</s:String>
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180 duration 0</s:String><s:String>            navigation pointAtZenith
duration 0</s:String><s:String>            TSE2024Toggle
off</s:String><s:String>       earth terrainIntensity 0 duration
0</s:String><s:String>         MoonUmbra intensity 0 duration
0</s:String><s:String>+1.0     eye color white duration
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3</s:String><s:String>+2.0     script
end</s:String></x:Array></controlpanel:ExecuteHostStringCommand.St
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ExtendedButton.Tag>View Eclipse from
Max Totality</controls:ExtendedButton>
 <TextBlock Text="Text" FontStyle="Normal" FontWeight="Light"
FontStretch="Normal" FontSize="16" TextAlignment="Left"
TextWrapping="NoWrap"
Name="TextBlock_822c1e4094d043e5aaed73326437c990" Width="0"
MaxWidth="1950" Height="0" MaxHeight="1500" Canvas.Left="430"
Canvas.Top="1490" />
 <controls:ExtendedButton BackgroundImageRelativeUri="{x:Null}"
BackgroundImageStretch="Uniform" CornerRadius="0,0,0,0"
BackgroundImageRelativeUri2="{x:Null}" Foreground2="#FF000000"
Background2="#FFD3D3D3" BorderBrush2="#FFA9A9A9"
TextAlignment="Center" TextWrapping="NoWrap"
BorderBrush="#FFD9D3D0" BorderThickness="1,1,1,1"
Background="#FF000000" Foreground="#FFD9D3D0"
FontFamily="Century Gothic" FontSize="20" FontStretch="Normal"
FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_ffb99accbfeb4082b7343678c3385a7e"
Width="200" MaxWidth="1800" Height="70" MaxHeight="1450"
ToolTip="View greatest eclipse location from 0.6 rEarth."
Canvas.Left="450" Canvas.Top="320"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ex
ecuteHostStringCommand><controlpanel:ExecuteHostStringCommand.
StringCommands><x:Array Type="s:String"><s:String>navigation
viewlocation Earth 38:22.1 -112:06.1 0.6 rEarth 0 duration 10 1
3</s:String><s:String>#EclipseInfo text
"https://solarsystem.nasa.gov/eclipses/2023/oct-14-annular/where-when/"
</s:String></x:Array></controlpanel:ExecuteHostStringCommand.Strin
gCommands></controlpanel:ExecuteHostStringCommand></controls:Ex
tendedButton.Tag>Greatest Eclipse
from Space</controls:ExtendedButton>
 <controls:ExtendedButton
BackgroundImageRelativeUri="$Content\User\Downloads\E&amp;S\Ec
lipseopediaAbridgedEdition(2023-2024)\ControlPanel\Media\SE2023Oc
t14A.png" BackgroundImageStretch="Uniform" CornerRadius="0,0,0,0"
BackgroundImageRelativeUri2="$Content\User\Downloads\E&amp;S\E
clipseopediaAbridgedEdition(2023-2024)\ControlPanel\Media\SE2023O
ct14A.png" BorderBrush2="#FF006400" TextAlignment="Center"
TextWrapping="NoWrap" BorderBrush="#FF640000"
BorderThickness="5,5,5,5" FontSize="16" FontStretch="Normal"
FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_5e62e21426f146c2b77225f40beabe76"
Width="300" MaxWidth="1550" Height="300" MaxHeight="1450"
ToolTip="Toggle eclipse path on (green) and off (red)"
Canvas.Left="100" Canvas.Top="250">
  <controls:ExtendedButton.Tag>
   <controlpanel:ObjectToggleOnOffCommand
ObjectReference="ASE2023Toggle" ForceOnOff="{x:Null}"
UseButtonPress="False" />
  </controls:ExtendedButton.Tag>
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 <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="2,2,2,2" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="1,1,1,1"
FontFamily="Century Gothic" FontSize="20" FontStretch="Normal"
FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_010bc07e8fa8496ea41944d773d37b1d"
Width="200" MaxWidth="1800" Height="70" MaxHeight="1450"
ToolTip="Set date and time for greatest eclipse" Canvas.Left="450"
Canvas.Top="250">
  <controls:ExtendedButton.Tag>
   <controlpanel:ExecuteHostStringCommand>
    <controlpanel:ExecuteHostStringCommand.StringCommands>
     <x:Array Type="s:String">
      <s:String>scene date 2023-10-14 9:00 local duration 0</s:String>
      <s:String>script play
$Content\User\Downloads\E&amp;S\EclipseopediaAbridgedEdition(202
3-2024)\Scripts\Eclipseopedia Abridged - 2023 Scriptable
Buttons.ds</s:String>
     </x:Array>
    </controlpanel:ExecuteHostStringCommand.StringCommands>
   </controlpanel:ExecuteHostStringCommand>
  </controls:ExtendedButton.Tag>Set
Date/Time</controls:ExtendedButton>
 <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="2,2,2,2" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="1,1,1,1"
Background="#FF000064" FontFamily="Century Gothic"
FontSize="20" FontStretch="Normal" FontStyle="Normal"
FontWeight="Light"
Name="ExtendedButton_6285805e1adb4c32b4a7727ebfc5d5d4"
Width="200" MaxWidth="1800" Height="70" MaxHeight="1450"
ToolTip="View eclipse at moment of greatest eclipse in sky view, facing
south" Canvas.Left="450" Canvas.Top="410"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ex
ecuteHostStringCommand><controlpanel:ExecuteHostStringCommand.
StringCommands><x:Array Type="s:String"><s:String>0.0
                    eye color black duration 0.5</s:String><s:String>+0.5
                    scene date 2023-10-14 9:26 local duration
0</s:String><s:String>         navigation land 38:40.1 -112:06.1 ground 0
180 duration 0</s:String><s:String>            navigation pointAtZenith
duration 0</s:String><s:String>            ASE2023Toggle
off</s:String><s:String>       earth terrainIntensity 0 duration
0</s:String><s:String>         MoonUmbra intensity 0 duration
0</s:String><s:String>+1.0     eye color white duration
2</s:String><s:String>+2.0     earth terrainIntensity 100 duration
3</s:String><s:String>+2.0     script
end</s:String></x:Array></controlpanel:ExecuteHostStringCommand.St
ringCommands></controlpanel:ExecuteHostStringCommand></controls:
ExtendedButton.Tag>View Eclipse from
Max Totality</controls:ExtendedButton>
 <TextBlock Text="Text" FontStyle="Normal" FontWeight="Light"
FontStretch="Normal" FontSize="16" TextAlignment="Left"
TextWrapping="NoWrap"
Name="TextBlock_02338e5cc71c4df8b604dab2092ef835" Width="0"
MaxWidth="1550" Height="0" MaxHeight="1500" Canvas.Left="610"
Canvas.Top="410" />
 <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="1,1,1,1" Foreground2="#FFFFFFFF"
Background2="#FF000000" BorderBrush2="#FF006400"
TextAlignment="Center" TextWrapping="NoWrap"
BorderBrush="#FF000000" BorderThickness="2,2,2,2"
FontFamily="Century Gothic" FontSize="24" FontStretch="Normal"
FontStyle="Normal" FontWeight="Bold"
Name="ExtendedButton_ccb8dd317efb438db3b8c28e2b156e15"
Width="300" MaxWidth="1550" Height="50" MaxHeight="1450"
ToolTip="Press here to toggle label visibility (green border indicates on)"
Canvas.Left="100" Canvas.Top="950">
  <controls:ExtendedButton.Tag>
   <controlpanel:ObjectToggleOnOffCommand
ObjectReference="TSE2024TextToggle" ForceOnOff="{x:Null}"
UseButtonPress="False" />
```

```
    </controls:ExtendedButton.Tag>Apr. 8,
2024</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageRelativeUri="{x:Null}"
BackgroundImageStretch="Uniform" CornerRadius="1,1,1,1"
BackgroundImageRelativeUri2="{x:Null}" Foreground2="#FFFFFFFF"
Background2="#FF000000" BorderBrush2="#FF006400"
TextAlignment="Center" TextWrapping="NoWrap"
BorderBrush="#FF000000" BorderThickness="2,2,2,2"
Background="#FF000000" Foreground="#FFD9D3D0"
FontFamily="Century Gothic" FontSize="24" FontStretch="Normal"
FontStyle="Normal" FontWeight="Bold"
Name="ExtendedButton_fb00c72b94da40dabcd371eecf7d14f9"
Width="300" MaxWidth="1550" Height="50" MaxHeight="1450"
ToolTip="Press here to toggle label visibility (green border indicates on)"
Canvas.Left="100" Canvas.Top="550">
    <controls:ExtendedButton.Tag>
      <controlpanel:ObjectToggleOnOffCommand
ObjectReference="ASE2023TextToggle" ForceOnOff="{x:Null}"
UseButtonPress="False" />
    </controls:ExtendedButton.Tag>Oct. 14,
2023</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="2,2,2,2" Foreground2="#FFFFFFFF"
Background2="#FF000000" BorderBrush2="#FF006400"
TextAlignment="Center" TextWrapping="NoWrap"
BorderThickness="3,3,3,3" FontFamily="Century Gothic"
FontSize="16" FontStretch="Normal" FontStyle="Normal"
FontWeight="Light"
Name="ExtendedButton_fd282f8c027348c5a08ec8fd4140738b"
Width="250" MaxWidth="1550" Height="50" MaxHeight="1450"
ToolTip="Fades up and down the local date and time text object."
Canvas.Left="150" Canvas.Top="1320"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ob
jectToggleOnOffCommand ObjectReference="DateTimeToggle"
ForceOnOff="{x:Null}" UseButtonPress="False"
/></controls:ExtendedButton.Tag>Local Date &amp; Time
Toggle</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_6582a5f873d74c3cb9aad2f70dd3e34d"
Width="0" MaxWidth="1800" Height="0" MaxHeight="1450"
Canvas.Left="1110"
Canvas.Top="160">Button</controls:ExtendedButton>
  <GroupBox Header="Moon Umbral Shadow Control"
BorderBrush="#80FFFFFF" FontFamily="Century Gothic"
FontSize="20" FontStretch="Normal" FontStyle="Normal"
FontWeight="Light"
Name="GroupBox_4004524ccc9042d2ac4c02352da72c20"
Width="350" MaxWidth="1800" Height="150" MaxHeight="1450"
Canvas.Left="70" Canvas.Top="1150" />
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="50,50,50,50" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="1,1,1,1"
Background="#FF320000" FontFamily="Century Gothic"
FontSize="16" FontStretch="Normal" FontStyle="Normal"
FontWeight="Light"
Name="ExtendedButton_0e89f5da7f7546aca5866985a4057011"
Width="50" MaxWidth="1800" Height="50" MaxHeight="1450"
ToolTip="Sets MoonUmbra intensity to 0, duration 2" Canvas.Left="80"
Canvas.Top="1200">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>MoonUmbra intensity 0 duration 2</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>0</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="50,50,50,50" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="1,1,1,1"
Background="#FF003200" FontFamily="Century Gothic"
FontSize="16" FontStretch="Normal" FontStyle="Normal"
FontWeight="Light"
Name="ExtendedButton_e577784f8b5c409396d38796b78198ec"
Width="50" MaxWidth="1800" Height="50" MaxHeight="1450"
ToolTip="Sets MoonUmbra intensity to 75, duration 2"
Canvas.Left="360" Canvas.Top="1200">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>MoonUmbra intensity 75 duration 2</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>75</controls:ExtendedButton>
  <Slider Orientation="Horizontal" AutoToolTipPlacement="TopLeft"
AutoToolTipPrecision="2" Minimum="0" Maximum="100" Value="0"
Name="Slider_029d2b0b9aa9430bbc9e647200629f80" Width="210"
MaxWidth="1800" Height="10" MaxHeight="1450" ToolTip="Slider to
manually set MoonUmbra intensity, from 0 to 100." Canvas.Left="140"
Canvas.Top="1210" />
  <GroupBox Header="Eclipseopedia Dashboard     "
BorderBrush="#FFFFFFFF" FontFamily="Century Gothic"
FontSize="24" FontStretch="Normal" FontStyle="Normal"
FontWeight="Normal"
Name="GroupBox_87ae7f9dcca24264893dd5e283a66875"
Width="1210" MaxWidth="1800" Height="330" MaxHeight="1450"
Canvas.Left="50" Canvas.Top="1070" />
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="0,0,0,0" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="1,1,1,1"
Background="#FF000064" FontFamily="Century Gothic"
FontSize="20" FontStretch="Normal" FontStyle="Normal"
FontWeight="Light"
Name="ExtendedButton_d6324f87409249fdaab26dbca53739d7"
Width="200" MaxWidth="1800" Height="70" MaxHeight="1450"
ToolTip="View eclipse at moment of greatest eclipse from home location
in sky view, facing south" Canvas.Left="450" Canvas.Top="880"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ex
ecuteHostStringCommand><controlpanel:ExecuteHostStringCommand.
StringCommands><x:Array Type="s:String"><s:String>0.0
                    eye color black duration 0.5</s:String><s:String>+0.5
                    scene date 2024-04-08 18:17:17.9 duration
0</s:String><s:String>          navigation viewLocation here azimuth 180
offsetDistance 0 m duration 0</s:String><s:String>            navigation
pointAtZenith duration 0</s:String><s:String>
TSE2024Toggle off</s:String><s:String>     earth terrainIntensity 0
duration 0</s:String><s:String>                  MoonUmbra intensity 0
duration 0</s:String><s:String>+1.0              eye color white duration
2</s:String><s:String>+2.0    Earth terrainIntensity 100 duration
3</s:String><s:String>+2.0    script
end</s:String></x:Array></controlpanel:ExecuteHostStringCommand.St
ringCommands></controlpanel:ExecuteHostStringCommand></controls:
ExtendedButton.Tag>View Eclipse from
Home Location</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="115,115,115,115" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3"
Background="#FF640000" FontSize="60" FontStretch="Normal"
FontStyle="Normal" FontWeight="Black"
Name="ExtendedButton_82504ea8ea1b4e119b729c007ba36c12"
Width="200" MaxWidth="1800" Height="200" MaxHeight="1450"
ToolTip="Fade, stop, reset." Canvas.Left="1050" Canvas.Top="1150">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>system fadeStopReset</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>FSR</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="0,0,0,0" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="1,1,1,1"
Background="#FF000064" FontFamily="Century Gothic"
FontSize="20" FontStretch="Normal" FontStyle="Normal"
FontWeight="Light"
Name="ExtendedButton_febdde8edeab40858778dcc5061ea244"
Width="200" MaxWidth="1800" Height="70" MaxHeight="1450"
ToolTip="View eclipse at moment of greatest eclipse from home location
in sky view, facing south" Canvas.Left="450" Canvas.Top="480"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ex
ecuteHostStringCommand><controlpanel:ExecuteHostStringCommand.
StringCommands><x:Array Type="s:String"><s:String>0.0
                    eye color black duration 0.5</s:String><s:String>+0.5
                    scene date 2024-04-08 18:17:17.9 duration
0</s:String><s:String>          navigation viewLocation here azimuth 180
offsetDistance 0 m duration 0</s:String><s:String>            navigation
pointAtZenith duration 0</s:String><s:String>
ASE2023Toggle off</s:String><s:String>     earth terrainIntensity 0
duration 0</s:String><s:String>                  MoonUmbra intensity 0
duration 0</s:String><s:String>+1.0              eye color white duration
2</s:String><s:String>+2.0    Earth terrainIntensity 100 duration
3</s:String><s:String>+2.0    script
end</s:String></x:Array></controlpanel:ExecuteHostStringCommand.St
ringCommands></controlpanel:ExecuteHostStringCommand></controls:
ExtendedButton.Tag>View Eclipse from
Home Location</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="0,0,0,0" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="1,1,1,1" FontSize="20"
FontStretch="Normal" FontStyle="Normal" FontWeight="Normal"
Name="ExtendedButton_614cd39cb5cd4c55a89b1d63b309ff58"
Width="250" MaxWidth="1800" Height="50" MaxHeight="1450"
ToolTip="Moves time forward 30 minutes, back one hour, and forward
30 minutes (rate of 10 minutes/second)" Canvas.Left="750"
Canvas.Top="500">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String" xml:space="preserve"><s:String>0.0
                    scene date rate 10 minutes duration
1</s:String><s:String>+3.0    scene date rate -10 minutes duration
1</s:String><s:String>+6.0    scene date rate 10 minutes duration
1</s:String><s:String>+3.0    scene date rate 0 minutes duration
1</s:String></x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Â± 30 minute
animation</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="0,0,0,0" Foreground2="#FFFFFFFF"
Background2="#FF000064" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="1,1,1,1" FontSize="24"
FontStretch="Normal" FontStyle="Normal" FontWeight="Normal"
Name="ExtendedButton_41765abecfe1434cb5bdc2b8d3903003"
Width="250" MaxWidth="1800" Height="100" MaxHeight="1450"
ToolTip="Toggles a zoom-in on the eclipsed sun (10-degree FOV) and
returns to full sky view on second click." Canvas.Left="750"
Canvas.Top="550"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ob
jectToggleOnOffCommand ObjectReference="eclipseopediazoomtoggle"
ForceOnOff="{x:Null}" UseButtonPress="False"
/></controls:ExtendedButton.Tag>Eclipse Zoom
Toggle</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="0,0,0,0" Foreground2="#FFFFFFFF"
Background2="#FF000064" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="1,1,1,1" FontSize="24"
FontStretch="Normal" FontStyle="Normal" FontWeight="Normal"
Name="ExtendedButton_bbc79e2c40e74e308e1ef2d9c2ba6f59"
Width="250" MaxWidth="1800" Height="100" MaxHeight="1450"
ToolTip="Toggles on and off terrain dataset with location labels."
Canvas.Left="750" Canvas.Top="850"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ob
jectToggleOnOffCommand ObjectReference="earthterraintoggle"
ForceOnOff="{x:Null}" UseButtonPress="False"
/></controls:ExtendedButton.Tag>Terrain with Labels
Toggle</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="0,0,0,0" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="1,1,1,1" FontSize="20"
FontStretch="Normal" FontStyle="Normal" FontWeight="Normal"
Name="ExtendedButton_7b8e59451f93472fa1b1b9161d5689f3"
Width="250" MaxWidth="1800" Height="50" MaxHeight="1450"
ToolTip="Moves time forward one hour, back two hours, and forward
one hour (rate of 10 minutes/second)" Canvas.Left="750"
Canvas.Top="650">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String" xml:space="preserve"><s:String>0.0
                    scene date rate 10 minutes duration
1</s:String><s:String>+6.0    scene date rate -10 minutes duration
1</s:String><s:String>+12.0  scene date rate 10 minutes duration
1</s:String><s:String>+6.0    scene date rate 0 minutes duration
1</s:String></x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Â± 1 hour
animation</controls:ExtendedButton>
  <TextBlock Text="Sun Scale:" FontStyle="Normal"
FontWeight="Normal" FontStretch="Normal" FontSize="24"
TextAlignment="Right" TextWrapping="NoWrap"
Name="TextBlock_f4b03c37f8354953badce3ca35a89107" Width="150"
MaxWidth="1800" Height="30" MaxHeight="1450" Canvas.Left="840"
Canvas.Top="1110" />
  <TextBlock Text="Moon Scale:" FontStyle="Normal"
FontWeight="Normal" FontStretch="Normal" FontSize="24"
TextAlignment="Right" TextWrapping="NoWrap"
Name="TextBlock_2fed13575c644093bec5522aea7caa55" Width="150"
```

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MaxWidth="1800" Height="30" MaxHeight="1450" Canvas.Left="840"
Canvas.Top="1160" />
  <TextBlock Text="1" FontStyle="Normal" FontWeight="Bold"
FontStretch="Normal" FontSize="24" TextAlignment="Left"
TextWrapping="NoWrap"
Name="TextBlock_c5694c3949a74b9c882b9f092c87d100" Width="50"
MaxWidth="1800" Height="30" MaxHeight="1450"
Canvas.Left="1000" Canvas.Top="1110" />
  <TextBlock Text="1" FontStyle="Normal" FontWeight="Bold"
FontStretch="Normal" FontSize="24" TextAlignment="Left"
TextWrapping="NoWrap"
Name="TextBlock_80c4f24169de44269f3af2ad46d832a4" Width="50"
MaxWidth="1800" Height="30" MaxHeight="1450"
Canvas.Left="1000" Canvas.Top="1160" />
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="10,10,10,10" TextAlignment="Center"
TextWrapping="NoWrap" BorderBrush="#FF1E1E1E"
BorderThickness="1,1,1,1" Background="#FF1E1E1E"
FontFamily="Century Gothic" FontSize="40" FontStretch="Normal"
FontStyle="Normal" FontWeight="Bold"
Name="ExtendedButton_372667d9395f46fbba7efc2c6ca4edf7"
Width="600" MaxWidth="1800" Height="100" MaxHeight="1450"
ToolTip="Press here to set up the &quot;Eclipseopedia Abridged&quot;
control panel" Canvas.Left="250" Canvas.Top="50">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>script play
$Content\User\Downloads\E&amp;S\EclipseopediaAbridgedEdition(202
3-2024)\Scripts\Eclipseopedia Abridged Setup - D7.ds</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Eclipseopedia
Setup</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="0,0,0,0" Foreground2="#FFFFFFFF"
Background2="#FF000064" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="1,1,1,1" FontSize="24"
FontStretch="Normal" FontStyle="Normal" FontWeight="Normal"
Name="ExtendedButton_9884042731844c5e9b0bac75f85ead0e"
Width="250" MaxWidth="1800" Height="100" MaxHeight="1450"
ToolTip="Toggles on and off terrain dataset with location labels."
Canvas.Left="750" Canvas.Top="750"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ob
jectToggleOnOffCommand ObjectReference="PlanetLabelsToggle"
ForceOnOff="{x:Null}" UseButtonPress="False"
/></controls:ExtendedButton.Tag>Visible Planet Labels
Toggle</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageRelativeUri="{x:Null}"
BackgroundImageStretch="Uniform" CornerRadius="2,2,2,2"
BackgroundImageRelativeUri2="{x:Null}" Foreground2="#FF000000"
Background2="#FFD3D3D3" BorderBrush2="#FFA9A9A9"
TextAlignment="Center" TextWrapping="NoWrap"
BorderBrush="#FFD9D3D0" BorderThickness="1,1,1,1"
Background="#FF000000" Foreground="#FFD9D3D0"
FontFamily="Century Gothic" FontSize="17" FontStretch="Normal"
FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_460565c613bc46dcb256c29a689e1406"
Width="210" MaxWidth="1800" Height="80" MaxHeight="1450"
Canvas.Left="820" Canvas.Top="1300"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ex
ecuteHostStringCommand><controlpanel:ExecuteHostStringCommand.
StringCommands><x:Array Type="s:String"><s:String>sun scale 1
duration 2</s:String><s:String>moon scale 1 duration
2</s:String><s:String>earth scale 1 duration
2</s:String></x:Array></controlpanel:ExecuteHostStringCommand.Stri
ngCommands></controlpanel:ExecuteHostStringCommand></controls:E
xtendedButton.Tag>Sun/Earth/Moon
Scale Reset</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageRelativeUri="stop1.jpg"
BackgroundImageStretch="Uniform" CornerRadius="5,5,5,5"
BackgroundImageRelativeUri2="stop1.jpg" BorderThickness="3,3,3,3"
FontSize="16"
Name="ExtendedButton_c5a8ae6cf0854ed59fea1b3eb051b0b1"
Width="60" MaxWidth="1800" Height="50" MaxHeight="1450"
Canvas.Left="870" Canvas.Top="330">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>scene date rate 0 dur 1</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Diur.
Stop</controls:ExtendedButton>
  <controls:ExtendedButton
BackgroundImageRelativeUri="fastforward1.jpg"
BackgroundImageStretch="Uniform" CornerRadius="5,5,5,5"
BorderThickness="3,3,3,3" FontSize="16"
Name="ExtendedButton_4caa6b0a033b43eebb6b31688e567785"
Width="60" MaxWidth="1800" Height="50" MaxHeight="1450"
Canvas.Left="1030" Canvas.Top="330">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>scene date rate 10 minutes duration 1</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Diur. +10
min</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageRelativeUri="rev1.jpg"
BackgroundImageStretch="Uniform" CornerRadius="5,5,5,5"
BorderThickness="3,3,3,3" FontSize="16"
Name="ExtendedButton_b369ff05a4dd44e9bfc9b57e2feef312"
Width="60" MaxWidth="1800" Height="50" MaxHeight="1450"
Canvas.Left="790" Canvas.Top="330">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String" xml:space="preserve"><s:String> scene
date rate -3 minutes duration 1</s:String></x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Diur. -3
min</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageRelativeUri="play1.jpg"
BackgroundImageStretch="Uniform" CornerRadius="5,5,5,5"
BorderThickness="3,3,3,3" FontSize="16"
Name="ExtendedButton_cc58466b95e24f59a32950e08adfdb64"
Width="60" MaxWidth="1800" Height="50" MaxHeight="1450"
Canvas.Left="950" Canvas.Top="330">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>scene date rate 3 minutes duration 1</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Diur. +3
min</controls:ExtendedButton>
  <controls:ExtendedButton
BackgroundImageRelativeUri="rewind1.jpg"
BackgroundImageStretch="Uniform" CornerRadius="5,5,5,5"
BorderThickness="3,3,3,3" FontSize="16"
Name="ExtendedButton_b39ad6e9bbc24a2ca6752d0a2211f8f4"
Width="60" MaxWidth="1800" Height="50" MaxHeight="1450"
Canvas.Left="710" Canvas.Top="330">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>scene date rate -10 minutes duration 1</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Diur. -10
min</controls:ExtendedButton>
  <GroupBox Header="Diurnal Motion" BorderBrush="#FF26A90D"
FontSize="16"
Name="GroupBox_018da758523647a38c9c89ecb71d2a9a"
Width="420" MaxWidth="1800" Height="100" MaxHeight="1450"
Canvas.Left="690" Canvas.Top="300" />
  <controls:RelativeUriImage Stretch="Uniform"
BorderThickness="0,0,0,0"
Name="RelativeUriImage_f17d6b1b5dee4213b2aed785103d4850"
Width="0" MaxWidth="1800" Height="0" MaxHeight="1450"
Canvas.Left="960" Canvas.Top="360" />
  <GroupBox Header="Moon Penumbral Shadow Control"
BorderBrush="#80FFFFFF" FontFamily="Century Gothic"
FontSize="20" FontStretch="Normal" FontStyle="Normal"
FontWeight="Light"
Name="GroupBox_c74b5506294f40e7837fe2bced043c8a" Width="350"
MaxWidth="1800" Height="150" MaxHeight="1450"
Canvas.Left="450" Canvas.Top="1150" />
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="50,50,50,50" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="1,1,1,1"
Background="#FF320000" FontFamily="Century Gothic"
FontSize="16" FontStretch="Normal" FontStyle="Normal"
FontWeight="Light"
Name="ExtendedButton_bc1ed5133fab444b961369e4d33f6780"
Width="50" MaxWidth="1800" Height="50" MaxHeight="1450"
ToolTip="Sets MoonUmbra intensity to 0, duration 2"
Canvas.Left="460" Canvas.Top="1200">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>MoonpenUmbra intensity 0 duration 2</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>0</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="50,50,50,50" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="1,1,1,1"
Background="#FF003200" FontFamily="Century Gothic"
FontSize="16" FontStretch="Normal" FontStyle="Normal"
FontWeight="Light"
Name="ExtendedButton_a01c44e41fec423db2d6511df915fdd2"
Width="50" MaxWidth="1800" Height="50" MaxHeight="1450"
ToolTip="Sets MoonUmbra intensity to 75, duration 2"
Canvas.Left="740" Canvas.Top="1200">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>MoonpenUmbra intensity 75 duration 2</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>75</controls:ExtendedButton>
  <Slider Orientation="Horizontal" AutoToolTipPlacement="TopLeft"
AutoToolTipPrecision="2" Minimum="0" Maximum="100" Value="0"
Name="Slider_d852de531db64d7483de9855be668d9d" Width="210"
MaxWidth="1800" Height="10" MaxHeight="1450" ToolTip="Slider to
manually set MoonUmbra intensity, from 0 to 100." Canvas.Left="520"
Canvas.Top="1210" />
  <TextBlock Text="Text" FontStyle="Normal" FontWeight="Light"
FontStretch="Normal" FontSize="16" TextAlignment="Left"
TextWrapping="NoWrap"
Name="TextBlock_702f6b1992104322ad0e35611b5e36c9" Width="0"
MaxWidth="1550" Height="0" MaxHeight="1500" Canvas.Left="620"
Canvas.Top="420" />
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="2,2,2,2" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="1,1,1,1"
Background="#FF000064" FontFamily="Century Gothic"
FontSize="20" FontStretch="Normal" FontStyle="Normal"
FontWeight="Light"
Name="ExtendedButton_56e10280156f4aa5a9bb920dee49a187"
Width="200" MaxWidth="1800" Height="70" MaxHeight="1450"
ToolTip="View eclipse at moment of greatest eclipse in sky view, facing
south" Canvas.Left="1030" Canvas.Top="420"
xml:space="preserve"><controls:ExtendedButton.Tag><controlpanel:Ex
ecuteHostStringCommand><controlpanel:ExecuteHostStringCommand.
StringCommands><x:Array Type="s:String"><s:String>0.0
                    eye color black duration 0.5</s:String><s:String>+0.5
                    scene date 2023-10-14 9:26 local duration
0</s:String><s:String>           navigation land 40.2338Â° -111.6585Â°
ground 0 180 duration 0</s:String><s:String>                    navigation
pointAtZenith duration 0</s:String><s:String>
ASE2023Toggle off</s:String><s:String>    earth terrainIntensity 0
duration 0</s:String><s:String>              MoonUmbra intensity 0
duration 0</s:String><s:String>+1.0           eye color white duration
2</s:String><s:String>+2.0    earth terrainIntensity 100 duration
3</s:String><s:String>+2.0    script
end</s:String></x:Array></controlpanel:ExecuteHostStringCommand.St
ringCommands></controlpanel:ExecuteHostStringCommand></controls:
ExtendedButton.Tag>View Eclipse from
Max Totality</controls:ExtendedButton>
  <Rectangle Fill="#00605656" Stroke="#FFA08B8B"
StrokeThickness="3"
Name="Rectangle_e9f8627d50a14b1487aa75a2068f16d1" Width="250"
MaxWidth="1800" Height="120" MaxHeight="1450"
Canvas.Left="1400" Canvas.Top="770" />
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_180c5a7def7e4dad953797367aaf3066"
```

```
Width="180" MaxWidth="1800" Height="40" MaxHeight="1450"
Canvas.Left="1440" Canvas.Top="370">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>moon scale 5</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Moon
Scale</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_c72890ca656b4bf6a67f0715c3bf53f3"
Width="180" MaxWidth="1800" Height="40" MaxHeight="1450"
Canvas.Left="1440" Canvas.Top="670">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String" xml:space="preserve"><s:String>scene
date rate 0.0 days </s:String></x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Scene
Stop</controls:ExtendedButton>
  <TextBlock Text="Text" FontStyle="Normal" FontWeight="Light"
FontStretch="Normal" FontSize="16" TextAlignment="Left"
TextWrapping="NoWrap"
Name="TextBlock_d9a1dacfb72342d998afeb1624626100" Width="0"
MaxWidth="1800" Height="0" MaxHeight="1450" Canvas.Left="1430"
Canvas.Top="250" />
  <TextBlock Text="Orbit Plane" FontStyle="Normal"
FontWeight="Light" FontStretch="Normal" FontSize="32"
TextAlignment="Left" TextWrapping="NoWrap"
Name="TextBlock_a287733b68444ec6979b036151ad3457"
Width="170" MaxWidth="1800" Height="50" MaxHeight="1450"
Canvas.Left="1440" Canvas.Top="250" />
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_9f4d56d500a54f06ad77a4802f18bce4"
Width="180" MaxWidth="1800" Height="40" MaxHeight="1450"
Canvas.Left="1440" Canvas.Top="430">
    <controls:ExtendedButton.Tag>
      <controlpanel:ObjectToggleOnOffCommand
ObjectReference="MoonLabel" ForceOnOff="{x:Null}"
UseButtonPress="False" />
    </controls:ExtendedButton.Tag>Moon
Label</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_7017d7f291614ce181b90b6bb61e6945"
Width="0" MaxWidth="1800" Height="0" MaxHeight="1450"
Canvas.Left="1430"
Canvas.Top="310">Button</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_d6961e7917794548b61c475fa83de18e"
Width="180" MaxWidth="1800" Height="40" MaxHeight="1450"
Canvas.Left="1440" Canvas.Top="310">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>script play
$Content\User\Packages\BYU\EclipsesActivity\Scripts\earthmoonplane2
.ds</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Orbital
Plane</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_f8dbb6f109ee436c86c07768fdf62d54"
Width="180" MaxWidth="1800" Height="40" MaxHeight="1450"
Canvas.Left="1440" Canvas.Top="610">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String" xml:space="preserve"><s:String>scene
date rate 0.5 days </s:String></x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Scene
Move</controls:ExtendedButton>
  <Slider Orientation="Horizontal" AutoToolTipPlacement="TopLeft"
AutoToolTipPrecision="2" Minimum="0" Maximum="100" Value="0"
Name="Slider_f9003ce819e74aa390fa780b4734e1cf" Width="190"
MaxWidth="1800" Height="40" MaxHeight="1450" ToolTip="Plane
Intensity" Canvas.Left="1440" Canvas.Top="840" />
  <TextBlock Text="Orbit Plane Intensity" FontStyle="Normal"
FontWeight="Light" FontStretch="Normal" FontSize="20"
TextAlignment="Left" TextWrapping="NoWrap"
Name="TextBlock_1f5e73a7a23d44b4a7c8147c390f15ff" Width="180"
MaxWidth="1800" Height="40" MaxHeight="1450"
Canvas.Left="1440" Canvas.Top="790" />
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_97f47e1b967343b58a93b594dd79bd72"
Width="180" MaxWidth="1800" Height="40" MaxHeight="1450"
Canvas.Left="1440" Canvas.Top="490">
    <controls:ExtendedButton.Tag>
      <controlpanel:ObjectToggleOnOffCommand
ObjectReference="MoonShadow" ForceOnOff="{x:Null}"
UseButtonPress="False" />
    </controls:ExtendedButton.Tag>Moon
Shadow</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_417c003627a94cf4af079e98ff471854"
Width="180" MaxWidth="1800" Height="40" MaxHeight="1450"
Canvas.Left="1440" Canvas.Top="550">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>MoonPenumbra intensity 80</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Shadow
80</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="26"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_4b54c6f525a74fc3a3a970e48957c6d5"
Width="40" MaxWidth="1800" Height="40" MaxHeight="1450"
Canvas.Left="1590" Canvas.Top="560">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>MoonPenumbra intensity 15</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>x</controls:ExtendedButton>
</Canvas>
```

Abs vs. App Magnitudes and Color Measurement Bias:

```
<Canvas Tag="Abs vs Apparent Activity" Width="1088" Height="1289"
xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"
xmlns:controls="http://cosm.com/ui/controls"
xmlns:controlpanel="http://cosm.com/ui/controlpanel"
xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
xmlns:s="clr-namespace:System;assembly=mscorlib">
  <Canvas.Resources>
    <controlpanel:CommandBindingReferenceCollection Capacity="64"
x:Key="___COMMANDBINDINGREFERENCES___">
      <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_b4baa245c13b49d38dca4ee5741
00278" TargetElementProperty="Click">
        <controlpanel:CommandBindingReference.Source>
          <controlpanel:ExecuteHostStringCommand>
            <controlpanel:ExecuteHostStringCommand.StringCommands>
              <x:Array Type="s:String">
                <s:String>sky on</s:String>
              </x:Array>
            </controlpanel:ExecuteHostStringCommand.StringCommands>
          </controlpanel:ExecuteHostStringCommand>
        </controlpanel:CommandBindingReference.Source>
      </controlpanel:CommandBindingReference>
      <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_26c9036370a54e36846cde7bb95
88ea4" TargetElementProperty="Click">
        <controlpanel:CommandBindingReference.Source>
          <controlpanel:ExecuteHostStringCommand>
            <controlpanel:ExecuteHostStringCommand.StringCommands>
              <x:Array Type="s:String">
                <s:String>sky on morning</s:String>
              </x:Array>
            </controlpanel:ExecuteHostStringCommand.StringCommands>
          </controlpanel:ExecuteHostStringCommand>
        </controlpanel:CommandBindingReference.Source>
      </controlpanel:CommandBindingReference>
      <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_7b6e96fa86f441068e644230066
85db1" TargetElementProperty="Click">
        <controlpanel:CommandBindingReference.Source>
          <controlpanel:ExecuteHostStringCommand>
            <controlpanel:ExecuteHostStringCommand.StringCommands>
              <x:Array Type="s:String">
                <s:String>system fadeStopReset</s:String>
              </x:Array>
            </controlpanel:ExecuteHostStringCommand.StringCommands>
          </controlpanel:ExecuteHostStringCommand>
        </controlpanel:CommandBindingReference.Source>
      </controlpanel:CommandBindingReference>
      <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_55ff088893e9484c828ea9cd406
901cb" TargetElementProperty="Click">
        <controlpanel:CommandBindingReference.Source>
          <controlpanel:ExecuteHostStringCommand>
            <controlpanel:ExecuteHostStringCommand.StringCommands>
              <x:Array Type="s:String">
                <s:String>system fadeStopReset</s:String>
              </x:Array>
            </controlpanel:ExecuteHostStringCommand.StringCommands>
          </controlpanel:ExecuteHostStringCommand>
        </controlpanel:CommandBindingReference.Source>
      </controlpanel:CommandBindingReference>
      <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_9fe4e7200298495497e1ba0d013
47844" TargetElementProperty="Click">
        <controlpanel:CommandBindingReference.Source>
          <controlpanel:ExecuteHostStringCommand>
            <controlpanel:ExecuteHostStringCommand.StringCommands>
              <x:Array Type="s:String">
                <s:String>Earth cloudIntensity 0 duration 3</s:String>
              </x:Array>
            </controlpanel:ExecuteHostStringCommand.StringCommands>
          </controlpanel:ExecuteHostStringCommand>
        </controlpanel:CommandBindingReference.Source>
      </controlpanel:CommandBindingReference>
      <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_e3b7a5502fa1418cb4477fd2825
6a4e9" TargetElementProperty="Click">
        <controlpanel:CommandBindingReference.Source>
          <controlpanel:ExecuteHostStringCommand>
            <controlpanel:ExecuteHostStringCommand.StringCommands>
              <x:Array Type="s:String">
                <s:String>Earth AtmosphereIntensity 100 duration
3</s:String>
              </x:Array>
            </controlpanel:ExecuteHostStringCommand.StringCommands>
          </controlpanel:ExecuteHostStringCommand>
        </controlpanel:CommandBindingReference.Source>
      </controlpanel:CommandBindingReference>
      <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_70bc44ec4df148ebaa8e60f1f928
a779" TargetElementProperty="Click">
        <controlpanel:CommandBindingReference.Source>
          <controlpanel:ExecuteHostStringCommand>
            <controlpanel:ExecuteHostStringCommand.StringCommands>
              <x:Array Type="s:String">
                <s:String>stars shell 0</s:String>
              </x:Array>
            </controlpanel:ExecuteHostStringCommand.StringCommands>
```

```
          </controlpanel:ExecuteHostStringCommand>
        </controlpanel:CommandBindingReference.Source>
      </controlpanel:CommandBindingReference>
      <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_8f464eaa9fc04524b1b6fbdfdb7c
c225" TargetElementProperty="Click">
        <controlpanel:CommandBindingReference.Source>
          <controlpanel:ExecuteHostStringCommand>
            <controlpanel:ExecuteHostStringCommand.StringCommands>
              <x:Array Type="s:String">
                <s:String>slide is textureModelClass</s:String>
                <s:String>slide model
$Content/Library/Models/Misc/image.x</s:String>
                <s:String>slide modelTexture baseColor0 $Content/User/127
worksheets/studentdata.png</s:String>
                <s:String xml:space="preserve">slide position spherical 0 30
10 </s:String>
                <s:String xml:space="preserve">scene add slide near
</s:String>
                <s:String>slide intensity 100</s:String>
              </x:Array>
            </controlpanel:ExecuteHostStringCommand.StringCommands>
          </controlpanel:ExecuteHostStringCommand>
        </controlpanel:CommandBindingReference.Source>
      </controlpanel:CommandBindingReference>
      <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_dafeae0fc01847ff89335873c2f3c
ce2" TargetElementProperty="Click">
        <controlpanel:CommandBindingReference.Source>
          <controlpanel:ExecuteHostStringCommand>
            <controlpanel:ExecuteHostStringCommand.StringCommands>
              <x:Array Type="s:String">
                <s:String>slide intensity 0</s:String>
              </x:Array>
            </controlpanel:ExecuteHostStringCommand.StringCommands>
          </controlpanel:ExecuteHostStringCommand>
        </controlpanel:CommandBindingReference.Source>
      </controlpanel:CommandBindingReference>
      <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_edeb6564afdf48e9ac11b1611eb6
37ff" TargetElementProperty="Click">
        <controlpanel:CommandBindingReference.Source>
          <controlpanel:ObjectToggleOnOffCommand
ObjectReference="MilkyWay" ForceOnOff="{x:Null}"
UseButtonPress="False" />
        </controlpanel:CommandBindingReference.Source>
      </controlpanel:CommandBindingReference>
      <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_9a0c291020a04f20bcc99223ffae
4cc4" TargetElementProperty="Click">
        <controlpanel:CommandBindingReference.Source>
          <controlpanel:ExecuteHostStringCommand>
            <controlpanel:ExecuteHostStringCommand.StringCommands>
              <x:Array Type="s:String"
xml:space="preserve"><s:String>starPhicaslabel on text
"1"</s:String><s:String>starPolarisLabel on text
"3"</s:String><s:String>starhr386Label on text
"2"</s:String><s:String>starseginLabel on text
"4"</s:String><s:String>starHR4195Label on text "5"
</s:String></x:Array>
            </controlpanel:ExecuteHostStringCommand.StringCommands>
          </controlpanel:ExecuteHostStringCommand>
        </controlpanel:CommandBindingReference.Source>
      </controlpanel:CommandBindingReference>
      <controlpanel:CommandBindingReference
TargetElementName="ExtendedButton_6e65df9385e24527a8a3f4629b7
0437e" TargetElementProperty="Click">
        <controlpanel:CommandBindingReference.Source>
          <controlpanel:ExecuteHostStringCommand>
            <controlpanel:ExecuteHostStringCommand.StringCommands>
              <x:Array Type="s:String"
xml:space="preserve"><s:String>starFomalhautLabel
off</s:String><s:String>starMirfakLabel
off</s:String><s:String>starMarkabLabel
off</s:String><s:String>starAlgenibLabel
off</s:String><s:String>starHomamLabel
off</s:String><s:String>starHR386label
off</s:String><s:String>starPolarisLabel
off</s:String><s:String>starPherkadLabel
off</s:String><s:String>starLaSuperbaLabel
off</s:String><s:String>starHR4195Label
off</s:String><s:String>starAlpheratzLabel off
</s:String><s:String>starAlpheratzLabel off
</s:String><s:String>starPhicaslabel
off</s:String><s:String>starPolarisLabel
off</s:String><s:String>starhr386Label
off</s:String><s:String>starseginLabel
off</s:String><s:String>starSchedarLabel
off</s:String><s:String>starSalmLabel off
</s:String><s:String>starFujiLabel off</s:String></x:Array>
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darkgrey  </s:String><s:String>starAlpheratzLabel on text "2" color
darkgrey  </s:String><s:String>starAlgenibLabel on text "3" color
darkgrey  </s:String><s:String>starHomamLabel on text "4" color
darkgrey  </s:String><s:String>starSalmLabel on text "5" color darkgrey
</s:String></x:Array>
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                <s:String>stars saturation 4</s:String>
              </x:Array>
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grey</s:String><s:String>starHD204100Label on text "2" color
grey</s:String><s:String>star45DraLabel on text "3" color grey
</s:String><s:String>starHR8952Label on text "4" color
grey</s:String><s:String>starHD7239Label on text "5" color
grey</s:String></x:Array>
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off</s:String><s:String>starHD204100Label
off</s:String><s:String>star45DraLabel off
</s:String><s:String>starHR8952
off</s:String><s:String>starHD7239Label off</s:String></x:Array>
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8b4b2" TargetElementProperty="Click">
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                    DataReal_png model
$Content\Library\Models\Misc\image.x</s:String><s:String>+0.3
                    DataReal_png modelTexture 0 $Content\User\127
worksheets\HR diagrams\DataReal.png</s:String><s:String>
                    DataReal_png intensity 0</s:String><s:String>
                    DataReal_png scale 1.56533333333333 1
1</s:String><s:String>          DataReal_png clamp
on</s:String><s:String>          DataReal_png position spherical 0 45 10
m</s:String><s:String>          DataReal_png turnto position 0 0
0</s:String><s:String>+0.2    scenenear add
DataReal_png</s:String><s:String>+1          DataReal_png intensity 100
dur 2</s:String></x:Array>
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          </controlpanel:ExecuteHostStringCommand>
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      </controlpanel:CommandBindingReference>
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c7dd1" TargetElementProperty="Click">
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            <controlpanel:ExecuteHostStringCommand.StringCommands>
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                    DataReal_png intensity 0 dur 2</s:String><s:String>+2
                    scene remove DataReal_png</s:String><s:String>
                    DataReal_png delete</s:String></x:Array>
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            <controlpanel:ExecuteHostStringCommand.StringCommands>
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                    IdealData_png model
$Content\Library\Models\Misc\image.x</s:String><s:String>+0.3
                    IdealData_png modelTexture 0 $Content\User\127
worksheets\HR diagrams\IdealData.png</s:String><s:String>
                    IdealData_png intensity 0</s:String><s:String>
                    IdealData_png scale 1.63920454545455 1
1</s:String><s:String>          IdealData_png clamp
on</s:String><s:String>          IdealData_png position spherical 0 45 10
m</s:String><s:String>          IdealData_png turnto position 0 0
0</s:String><s:String>+0.2    scenenear add
IdealData_png</s:String><s:String>+1          IdealData_png intensity 100
dur 2</s:String></x:Array>
            </controlpanel:ExecuteHostStringCommand.StringCommands>
          </controlpanel:ExecuteHostStringCommand>
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      </controlpanel:CommandBindingReference>
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            <controlpanel:ExecuteHostStringCommand.StringCommands>
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                    IdealData_png intensity 0 dur 2</s:String><s:String>+2
                    scene remove IdealData_png</s:String><s:String>
                    IdealData_png delete</s:String></x:Array>
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            <controlpanel:ExecuteHostStringCommand.StringCommands>
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              </x:Array>
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a2abf" TargetElementProperty="Click">
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            <controlpanel:ExecuteHostStringCommand.StringCommands>
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              </x:Array>
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          </controlpanel:ExecuteHostStringCommand>
        </controlpanel:CommandBindingReference.Source>
```

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c683" TargetElementProperty="Click">
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            <controlpanel:ExecuteHostStringCommand.StringCommands>
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              </x:Array>
            </controlpanel:ExecuteHostStringCommand.StringCommands>
          </controlpanel:ExecuteHostStringCommand>
        </controlpanel:CommandBindingReference.Source>
      </controlpanel:CommandBindingReference>
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TargetElementName="ExtendedButton_896a25a1bb614f189eb6241ee49
012f7" TargetElementProperty="Click">
        <controlpanel:CommandBindingReference.Source>
          <controlpanel:ExecuteHostStringCommand>
            <controlpanel:ExecuteHostStringCommand.StringCommands>
              <x:Array Type="s:String">
                <s:String>scene date 2023-7-18 03:22:20 local</s:String>
                <s:String>sky on</s:String>
                <s:String>Earth AtmosphereIntensity 0 duration 3</s:String>
              </x:Array>
            </controlpanel:ExecuteHostStringCommand.StringCommands>
          </controlpanel:ExecuteHostStringCommand>
        </controlpanel:CommandBindingReference.Source>
      </controlpanel:CommandBindingReference>
    </controlpanel:CommandBindingReferenceCollection>
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StrokeThickness="0"
Name="Rectangle_75087a2d2c974968b4fe88b4acffd259" Width="530"
MaxWidth="1088" Height="580" MaxHeight="1289" Canvas.Left="20"
Canvas.Top="110" />
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CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_aa7a5e68a4f34d8cbdb6ecff762099ce"
Width="170" MaxWidth="1088" Height="70" MaxHeight="1289"
Canvas.Left="50" Canvas.Top="210">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>stars saturation 4</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Color
Stars</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_70bc44ec4df148ebaa8e60f1f928a779"
Width="160" MaxWidth="1088" Height="70" MaxHeight="1289"
ToolTip="This will take you back to the regular sky" Canvas.Left="310"
Canvas.Top="300">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>stars shell 0</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Apparent
Brightness</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_b4baa245c13b49d38dca4ee574100278"
Width="130" MaxWidth="1088" Height="50" MaxHeight="1289"
Canvas.Left="30" Canvas.Top="10">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>sky on</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Sky on</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
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Width="130" MaxWidth="1088" Height="50" MaxHeight="1289"
Canvas.Left="630" Canvas.Top="10">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>scene date 2023-7-18 03:22:20 local</s:String>
            <s:String>sky on</s:String>
            <s:String>Earth AtmosphereIntensity 0 duration 3</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Evening</controls:ExtendedButton>
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CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_26c9036370a54e36846cde7bb9588ea4"
Width="130" MaxWidth="1088" Height="50" MaxHeight="1289"
Canvas.Left="480" Canvas.Top="10">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>sky on morning</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Morning</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_8ed2a18098a74838a796fc143995292b"
Width="0" MaxWidth="1088" Height="0" MaxHeight="1289"
Canvas.Left="610" Canvas.Top="60">Sky
on/off</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_7b6e96fa86f441068e64423006685db1"
Width="130" MaxWidth="1088" Height="50" MaxHeight="1289"
ToolTip="system fadeStopReset" Canvas.Left="930" Canvas.Top="10">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>system fadeStopReset</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Reset</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_55ff088893e9484c828ea9cd406901cb"
Width="0" MaxWidth="1088" Height="0" MaxHeight="1289"
Canvas.Left="490" Canvas.Top="50">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>system fadeStopReset</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Reset</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_9fe4e7200298495497e1ba0d01347844"
Width="130" MaxWidth="1088" Height="50" MaxHeight="1289"
ToolTip="Clouds must die" Canvas.Left="780" Canvas.Top="10">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>Earth cloudIntensity 0 duration 3</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Clouds
off</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_66da8e4a035d41d293d4bfd24b1d0693"
Width="0" MaxWidth="1088" Height="0" MaxHeight="1289"
Canvas.Left="540"
Canvas.Top="50">Button</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_0a76a8d0c2194f8c9eaec9c5781ec683"
Width="130" MaxWidth="1088" Height="50" MaxHeight="1289"
Canvas.Left="330" Canvas.Top="10">
    <controls:ExtendedButton.Tag>
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        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>Earth AtmosphereIntensity 0 duration 3</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Atmosphere
off</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_e3b7a5502fa1418cb4477fd28256a4e9"
Width="130" MaxWidth="1088" Height="50" MaxHeight="1289"
Canvas.Left="180" Canvas.Top="10">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>Earth AtmosphereIntensity 100 duration 3</s:String>
          </x:Array>
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      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Atmosphere
on</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_e15a106d3625427f9ad04de98a945352"
Width="0" MaxWidth="1088" Height="0" MaxHeight="1289"
Canvas.Left="660"
Canvas.Top="40">Button</controls:ExtendedButton>
  <TextBox TextWrapping="Wrap" TextAlignment="Center"
AcceptsReturn="False" BorderThickness="1,1,1,1" FontSize="22"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="TextBox_20b4dac43c6c46969d69eb273dc2ff60" Width="210"
MaxWidth="1088" Height="70" MaxHeight="1289" Canvas.Left="280"
Canvas.Top="120" xml:space="preserve">Abs vs App
Magnitude</TextBox>
  <TextBox TextWrapping="Wrap" TextAlignment="Center"
AcceptsReturn="False" BorderThickness="1,1,1,1" FontSize="22"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="TextBox_e7c867730ff9440f8215124d572f25ac" Width="210"
MaxWidth="1088" Height="70" MaxHeight="1289" Canvas.Left="40"
Canvas.Top="120" xml:space="preserve">Manitude vs
Temperature</TextBox>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_5e8ac72e82a2417aa5bde97bd85a2abf"
Width="160" Height="70" ToolTip="This puts all stars at the same
distance" Canvas.Left="310" Canvas.Top="210">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>stars shell 90</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
```

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      </controlpanel:ExecuteHostStringCommand>

</controls:ExtendedButton.Tag>Luminosity</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_8f464eaa9fc04524b1b6fbdfdb7cc225"
Width="220" MaxWidth="1088" Height="80" MaxHeight="1289"
Canvas.Left="620" Canvas.Top="190">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>slide is textureModelClass</s:String>
            <s:String>slide model
$Content/Library/Models/Misc/image.x</s:String>
            <s:String>slide modelTexture baseColor0 $Content/User/127
worksheets/studentdata.png</s:String>
            <s:String xml:space="preserve">slide position spherical 0 30 10
</s:String>
            <s:String xml:space="preserve">scene add slide near </s:String>
            <s:String>slide intensity 100</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Hist
Apparent</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_dafeae0fc01847ff89335873c2f3cce2"
Width="220" MaxWidth="1088" Height="80" MaxHeight="1289"
Canvas.Left="620" Canvas.Top="280">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String">
            <s:String>slide intensity 0</s:String>
          </x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Hist off</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
Name="ExtendedButton_9f198fc91fed4c4f9e27fc61894401d0"
Width="220" MaxWidth="1088" Height="80" MaxHeight="1289"
ToolTip="legend for regular (apparent brightness) sky"
Canvas.Left="620" Canvas.Top="370">
    <controls:ExtendedButton.Tag>
      <controlpanel:ExecuteHostStringCommand>
        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String"
xml:space="preserve"><s:String>starFomalhautLabel on text "1" color
darkgrey  </s:String><s:String>starAlpheratzLabel on text "2" color
darkgrey  </s:String><s:String>starAlgenibLabel on text "3" color
darkgrey  </s:String><s:String>starHomamLabel on text "4" color
darkgrey  </s:String><s:String>starSalmLabel on text "5" color darkgrey
</s:String></x:Array>
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Legend</controls:ExtendedButton>
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ToolTip="turn legends off" Canvas.Left="620" Canvas.Top="460">
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off</s:String><s:String>starMirfakLabel
off</s:String><s:String>starMarkabLabel
off</s:String><s:String>starAlgenibLabel
off</s:String><s:String>starHomamLabel
off</s:String><s:String>starHR386label
off</s:String><s:String>starPolarisLabel
off</s:String><s:String>starPherkadLabel
off</s:String><s:String>starLaSuperbaLabel
off</s:String><s:String>starHR4195Label
off</s:String><s:String>starAlpheratzLabel off
</s:String><s:String>starAlpheratzLabel off
</s:String><s:String>starPhicaslabel
off</s:String><s:String>starPolarisLabel
off</s:String><s:String>starhr386Label
off</s:String><s:String>starseginLabel
off</s:String><s:String>starSchedarLabel
off</s:String><s:String>starSalmLabel off
</s:String><s:String>starFujiLabel off</s:String></x:Array>
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Off</controls:ExtendedButton>
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CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
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Width="220" MaxWidth="1088" Height="80" MaxHeight="1289"
ToolTip="Use this for the  luminosity sky" Canvas.Left="620"
Canvas.Top="550">
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"1"</s:String><s:String>starPolarisLabel on text
"3"</s:String><s:String>starhr386Label on text
"2"</s:String><s:String>starseginLabel on text
"4"</s:String><s:String>starHR4195Label on text "5"
</s:String></x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Star Labels
2</controls:ExtendedButton>
  <controls:ExtendedButton BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
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Width="160" MaxWidth="1088" Height="70" MaxHeight="1289"
ToolTip="Turn off milky way" Canvas.Left="310" Canvas.Top="390">
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      <controlpanel:ObjectToggleOnOffCommand
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UseButtonPress="False" />
    </controls:ExtendedButton.Tag>Milky
Way</controls:ExtendedButton>
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CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
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Width="170" MaxWidth="1088" Height="70" MaxHeight="1289"
Canvas.Left="50" Canvas.Top="300">
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        <controlpanel:ExecuteHostStringCommand.StringCommands>
          <x:Array Type="s:String"
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grey</s:String><s:String>starHD204100Label on text "2" color
grey</s:String><s:String>star45DraLabel on text "3" color grey
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grey</s:String><s:String>starHD7239Label on text "5" color
grey</s:String></x:Array>
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      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Color
Legend</controls:ExtendedButton>
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CornerRadius="5,5,5,5" TextAlignment="Center"
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FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
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Width="170" MaxWidth="1088" Height="70" MaxHeight="1289"
Canvas.Left="50" Canvas.Top="390">
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</s:String><s:String>starHR8952
off</s:String><s:String>starHD7239Label off</s:String></x:Array>
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Off</controls:ExtendedButton>
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TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
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Width="150" MaxWidth="1088" Height="150" MaxHeight="1289"
ToolTip="Survey data for absolute magnitude" Canvas.Left="60"
Canvas.Top="700">
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                  DataReal_png model
$Content\Library\Models\Misc\image.x</s:String><s:String>+0.3
                  DataReal_png modelTexture 0 $Content\User\127
worksheets\HR diagrams\DataReal.png</s:String><s:String>
                  DataReal_png intensity 0</s:String><s:String>
                  DataReal_png scale 1.56533333333333 1
1</s:String><s:String>          DataReal_png clamp
on</s:String><s:String>         DataReal_png position spherical 0 45 10
m</s:String><s:String>          DataReal_png turnto position 0 0
0</s:String><s:String>+0.2    scenenear add
DataReal_png</s:String><s:String>+1         DataReal_png intensity 100
dur 2</s:String></x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>
  </controls:ExtendedButton>
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FontStyle="Normal" FontWeight="Normal"
Name="ExtendedButton_1aa6ac8a5a0c4ba5b4111793e1bc7dd1"
Width="40" MaxWidth="1088" Height="40" MaxHeight="1289"
Canvas.Left="180" Canvas.Top="820">
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                  scene remove DataReal_png</s:String><s:String>
                  DataReal_png delete</s:String></x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Ã—</controls:ExtendedButton>
  <controls:ExtendedButton
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diagrams\IdealData_icon.jpg" BackgroundImageStretch="Uniform"
CornerRadius="5,5,5,5" TextAlignment="Center"
TextWrapping="NoWrap" BorderThickness="3,3,3,3" FontSize="16"
FontStretch="Normal" FontStyle="Normal" FontWeight="Light"
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Width="150" MaxWidth="1088" Height="150" MaxHeight="1289"
ToolTip="IdealData" Canvas.Left="60" Canvas.Top="500">
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                  IdealData_png model
$Content\Library\Models\Misc\image.x</s:String><s:String>+0.3
                  IdealData_png modelTexture 0 $Content\User\127
worksheets\HR diagrams\IdealData.png</s:String><s:String>
                  IdealData_png intensity 0</s:String><s:String>
                  IdealData_png scale 1.63920454545455 1
1</s:String><s:String>          IdealData_png clamp
on</s:String><s:String>         IdealData_png position spherical 0 45 10
m</s:String><s:String>          IdealData_png turnto position 0 0
0</s:String><s:String>+0.2    scenenear add
IdealData_png</s:String><s:String>+1         IdealData_png intensity 100
dur 2</s:String></x:Array>
        </controlpanel:ExecuteHostStringCommand.StringCommands>
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CornerRadius="40,40,40,40" Background2="#FF000000"
```

```
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Width="40" MaxWidth="1088" Height="40" MaxHeight="1289"
Canvas.Left="180" Canvas.Top="640">
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Name="ExtendedButton_e55fd29b3398435cb95717bb97ae0bf1"
Width="160" MaxWidth="1088" Height="70" MaxHeight="1289"
Canvas.Left="310" Canvas.Top="470">
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        <controlpanel:ExecuteHostStringCommand.StringCommands>
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            <s:String>stars shell 80</s:String>
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        </controlpanel:ExecuteHostStringCommand.StringCommands>
      </controlpanel:ExecuteHostStringCommand>
    </controls:ExtendedButton.Tag>Luminosity
Other</controls:ExtendedButton>
</Canvas>
```

Appendix D

Interview Protocol

Student Interview Protocol

Make sure to welcome the student, get the consent form signed. Let them know you are recording the session.

Which activities did you participate in?

What are your initial thoughts about it?

Was there anything specific that you liked or thought was helpful?

Was there anything specific that you did not like or found unhelpful?

Are there any other activity topics that you feel would be helpful to have additional activities on?

Would you like to see more activities like this during class, or do you think they are best left as a supplementary activity?

Ask if they have anything else to add.

Instructor Interview Protocol

Make sure to welcome the instructor, get the consent form signed. Let them know you are recording the session.

Which activities did you instruct?

Was there anything specific that you thought seemed helpful to the students?

Was there anything specific that you did not think was helpful to the students?

As an instructor, did you feel the instructor guides were clear and helpful?

Did you feel the control panel page was comprehensive? Is there anything you think should be added/subtracted?

What did students seem to think about the activities? Did they seem to help them?

Are there any other activity topics that you feel would be helpful to have additional activities on?

Ask if they have anything else to add.