Section 2: Parts A-G *(Help and Journal Answers)*

Using and Understanding Afterglow Access - an Image Processing Software

Part A - Introduction

After the goal of the section is stated, the idea of changing brightness is discussed using the following teacher resource: (also on SJS portal under resources):

Guide for "Changing Brightness"

The questions the students should discuss:

1. List as many ideas as you can about why an object might vary or change brightness - no idea is too wild!
2. List some objects in space that you think vary in brightness.
3. List as many ways, including accessible ways, in which the varying light can be quantitatively measured (which means "using numbers").

The first two questions are open- ended questions. Just get a good discussion going!

The third question is designed to bring out the accessibility issue as a way of thinking. Encourage it!

Part B - Models

The first part asks the students to construct a model - mental, physical, drawing, etc. The teacher resource helps to guide this discussion on Models:

A Guide for "Discussing Models"

1. Describe the model you created in Part A to show how an object can vary or change brightness.
2. Define the word model (or scientific model).
3. Identify some examples of scientific models that were used in the IDATA project.
4. List any inaccuracies these models had.
5. How can a model be useful even if it's not perfect?

1. ***Just one of the examples they came up with is fine.***
2. ***Scientific modeling, the generation of a physical, conceptual, or mathematical representation of a real phenomenon that is difficult to***

observe directly. ... a representation of a particular phenomena in the world.

3. *EM spectrum, CCD camera, Celestial sphere, etc*
4. *Scale was wrong, used material things to represent energy, etc.*
5. *A model is not meant to be a statement of truth, it is a mental conception, or a framework, within which to organize ideas.*

Part C - Potato Model

A. ASTEROID PRIMER (Review)

***All of Part C will take some time - probably 2 or more meetings?*

The first is a link to Tyler's Asteroid Day presentation

Asteroid Day Presentation (slides)

The "Asteroid Primer" is available as a printout with the same questions as the SJS site (it is for the group's purposes only, no need to enter the answers in the journal).

Asteroid Primer Questions (Blank)

The answers to the questions are available here:

Asteroid Primer with Answers

B. POTATO MODEL

This resource shows pictures and gives a few tips:

Potato Model Tips and Photos

Remember, the light curve is an important step.

These next two Journal questions are the only ones that need to go in the Journal Box, and they refer to the potato model. Each student should put in their own answer to the rotation period.

How could the information from the curve be communicated in another, non-visual manner?

Use the Journal box below to record the period of rotation of your asteroid. Also, record your group's ideas for #6.

Any feasible ideas should be recorded. The rotation period should include units!

Part D - A "Real" Asteroid?

This part contains two things - a brainstorming session and an image request.

Answer these two questions in the Journal Box, and then read below the Box to make another image request.

a.) Review: Why can we see some asteroids?

b.) What data do you think Tyler gave to Chris to make the light curve in the video?

1. ***Asteroids do not emit their own light. We see them by reflected sunlight. Some asteroids are not in a position to reflect sunlight to our telescopes.***
2. ***Try to brainstorm as many things as the group can think of - here are some ideas: position, general direction of movement, how much light is reflected to our telescope, the number of observations requested, the time of each observation, do all observations in one night or more?***

The last part of this section is another image request. Please have the students record the information in their Observation Journal.

Part E - Introduction to Afterglow Access

The instructions for opening sample images are on the SJS portal in this section. Once they have opened at least one image they can answer the questions. As you

Journal Work:

As you are looking at the sample images, BRIEFLY tour through the Display Settings, which open up automatically when you open an image. Then answer the questions.

1. Describe what you experience.

2. What do you find interesting?

3. What questions come to mind? Write at least two

4. Now try clicking on a different group of settings(right side column). Don't spend too long on this, it should be a QUICK TOUR. We will address the tools in the next sections.

5. Again, what questions come to mind? Write several in the journal.

1. ***Open ended - are they overwhelmed? Curious, excited, etc.***
2. ***Open ended -***
3. ***Open ended -***
4. ***TOUR BRIEFLY!***
5. ***Get group responses!***

Part F - A Sonification Tool

The part of the TED radio podcast that contains Wanda's story is very well done - it is less than 9 minutes long. You can find it by following the instructions on the SJS site to find the July with, 2018 podcast, "The Five Senses".

NPR TED Podcasts

Non-computer Activities:

Computer Activities

The teacher resource:

Sonification Activities

has the information for the non-computer activities and the computer activities. Encourage exploration and play, especially by using the "Custom" region mode, and also by changing the "Duration" and "Tones".

Part G - Display Tools

***** Note: This part assumes you have requested images, checked their status in Skynet and Afterglow Access, and have imported and opened the images in Afterglow Access. This part also assumes you have done most of the exercises with the Quorum programming language.***

This should be a group discussion.

JOURNAL WORK:

1. Make a list of the settings (tools) examined.
2. Write down a few words for each tool as to how, if at all, it changes the image.
3. Before moving on to the next tool or setting, spend a few minutes discussing how it could be explained to a BVI person. Enter a brief description into the journal.

ACTIVITY: The Histogram

The resource for this activity includes information about the cameras and number of pixels the IDATA Prompt6 telescope in Chile uses:

Histogram Activity

JOURNAL WORK for the Histogram:

1. The histogram on Afterglow Access and your egg crate histogram use the same variable (think about the "unit" used) for the x-axis. What is this variable? Carefully look at Afterglow Access for the scale it shows. Now look at the y-axis. What is the variable on the y-axis?

2. For your egg crate histogram, what is the highest POSSIBLE "y" value? What number does this correspond to on the Afterglow Access histogram?

3. For your egg crate histogram, what is the highest POSSIBLE "x" value? What number does this correspond to on the Afterglow Access histogram?

4. What, if anything, happens to the histogram on AgA when you change the settings labeled "Background Level Percentile" and "Saturation Level Percentile"?

-Do the changes affect the image in the middle viewer panel?

5. The graph has two red vertical lines. Which settings change where the red vertical lines are? Do you have a guess as to what the meaning is?

6. Which of the settings gives the largest number of pixels with the lowest number of counts?

1. ***X axis: The number of <u>counts</u> (glass gems) in individual pixels (or egg pockets). Y axis: The number of <u>pixels</u> (or egg pockets) with that count. Note the x-axis values are multiplied by 10,000(10k).***
2. ***This would be the maximum number of egg pockets. In AgA, this is the maximum number of pixels of the CCD camera.***
3. ***The highest number of counts is the highest number of glass gems. In AgA, this is the highest number of counts the CCD camera detected in any one pixel.***
4. ***The red vertical lines move when you change the background and saturation levels. It affects the image's brightness range. Make sure and examine what is displayed in the viewer panel.***
5. ***The settings examined in #4 change where these lines are on the graph.***
6. ***That is the background level.***

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