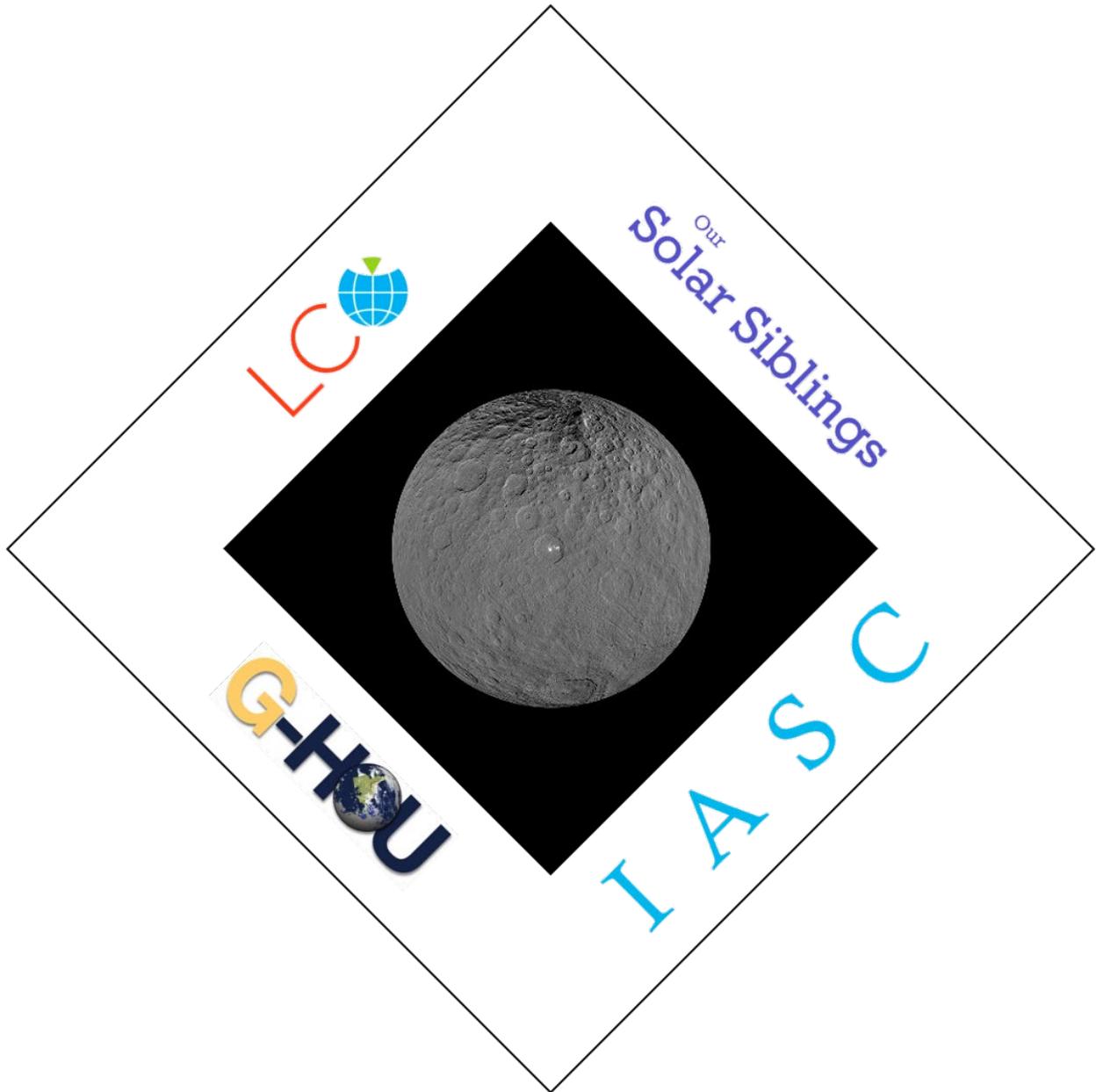
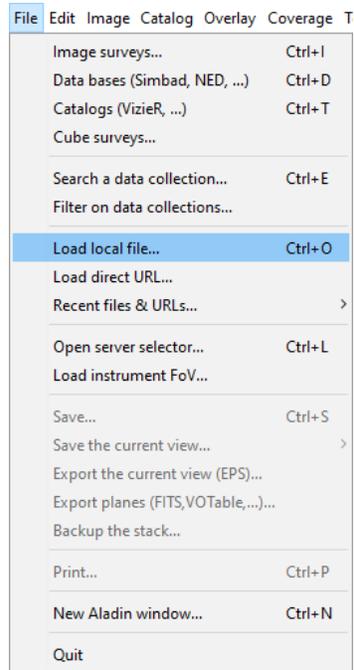


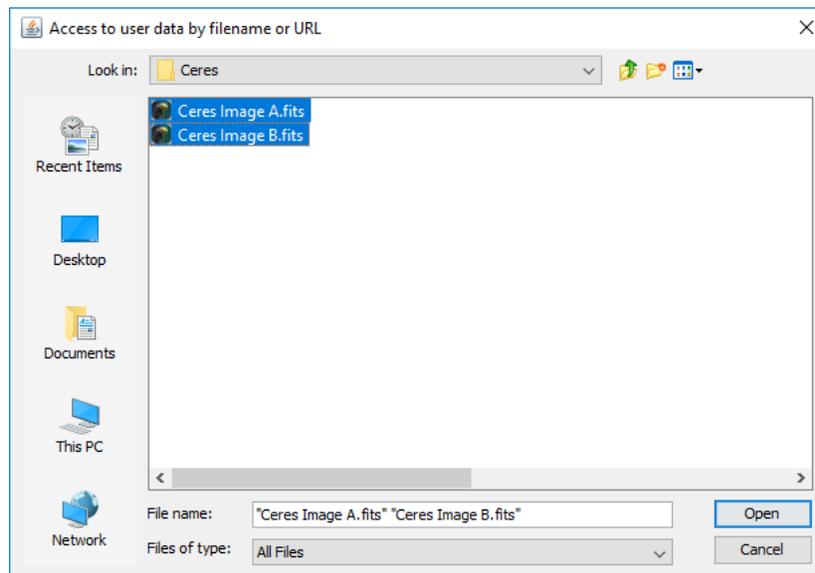
Ceres Orbital Period



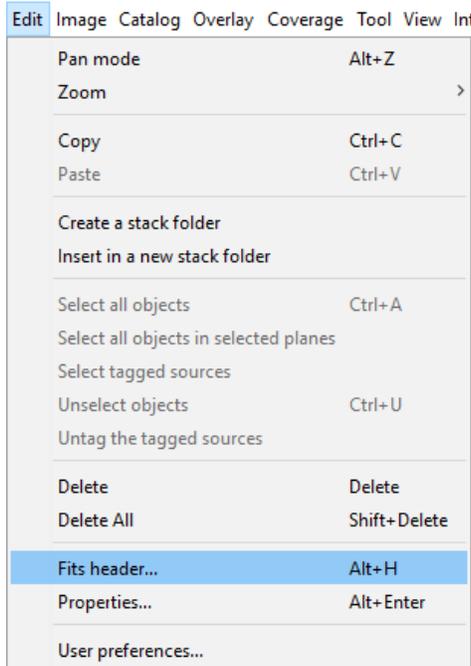
1. Go to the IASC website at <http://iasc.cosmosearch.org/> and download the Ceres FITS files
2. Open Aladin then go to File > Load local file



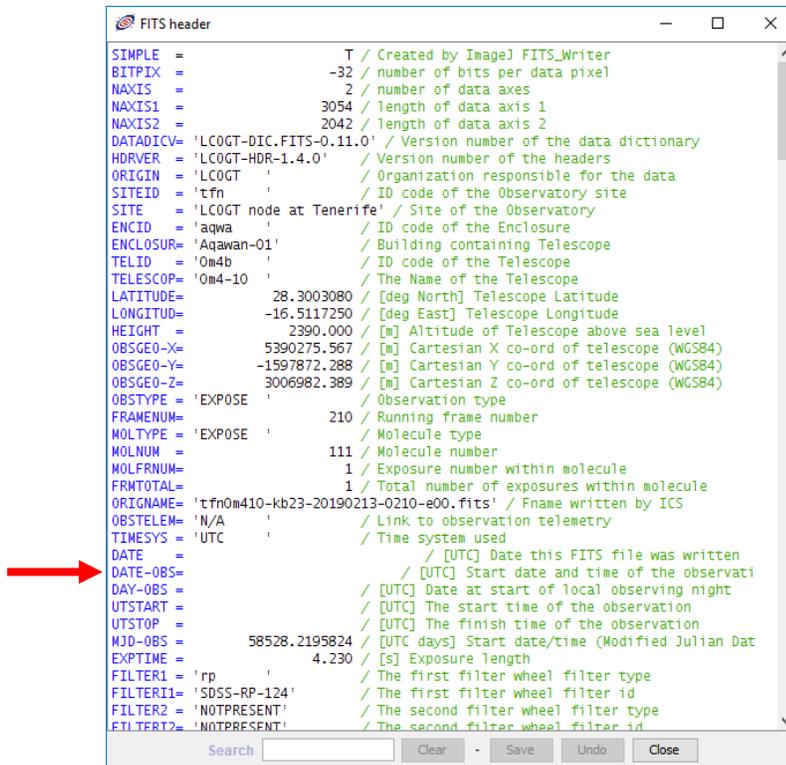
3. Locate the downloaded Ceres FITS files and select both then click Open.



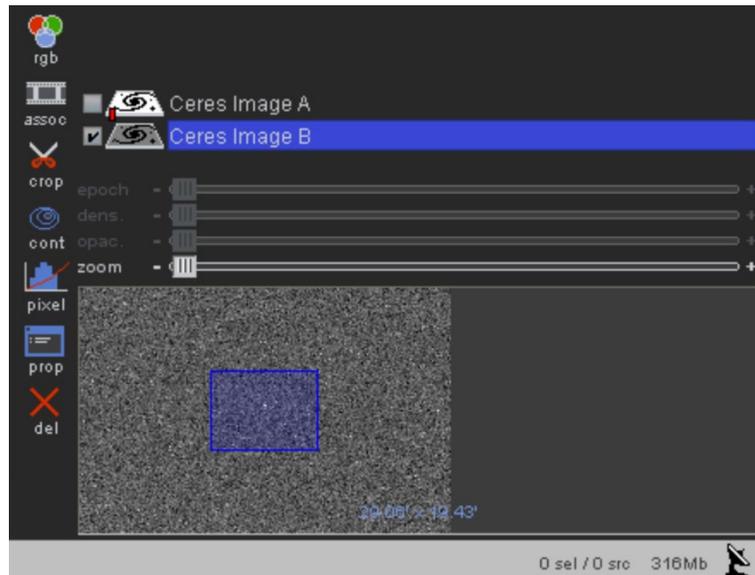
4. Select Edit > Fits header



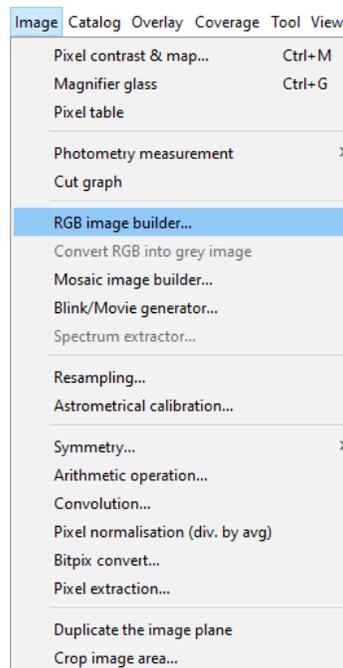
5. A window will open. Locate the DATE-OBS value. Write down the date and time, you will need it later



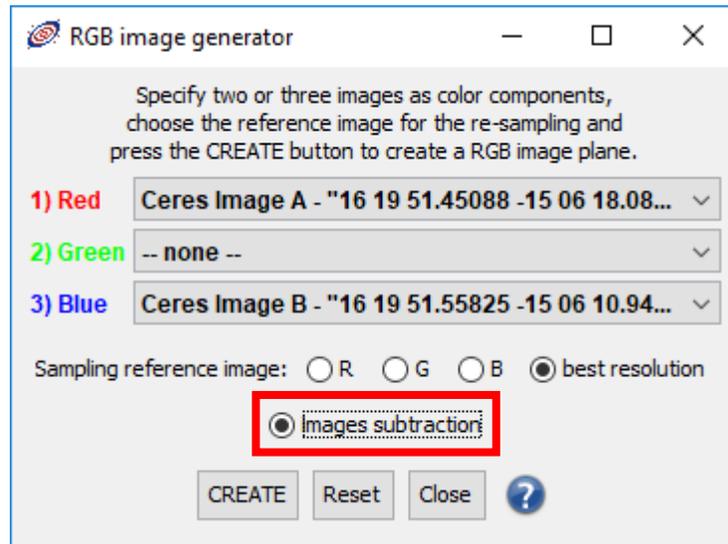
- Now, you want to do the same for the other image. To select the other image, go to the bottom right of your screen and check the second image.



- Repeat steps 4 and 5. Make note of the time difference between the two files.
- Select Image > RGB Image Builder.



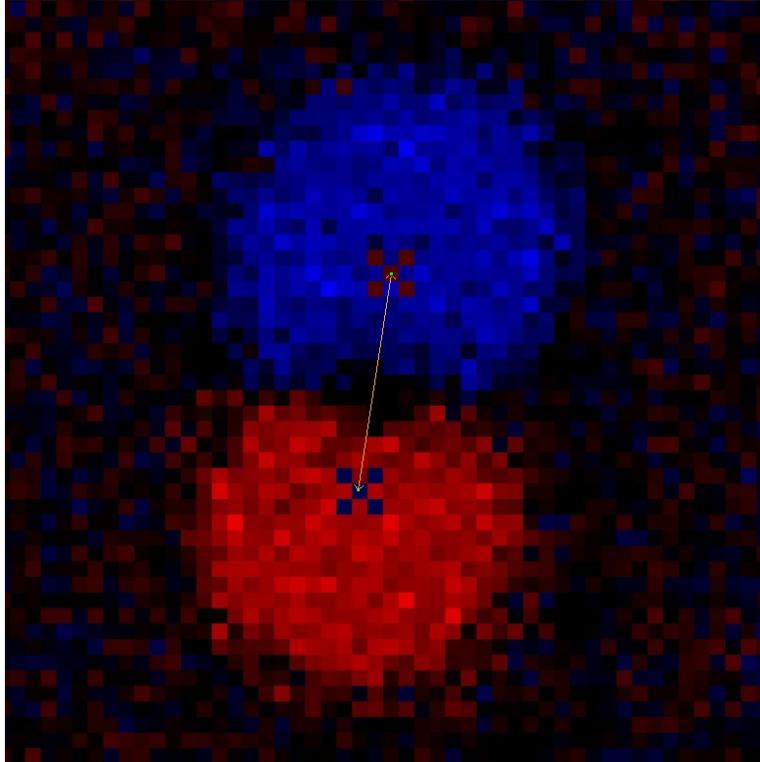
- A window will open. Load Ceres Image A into the Red channel and load Ceres Image B into the Blue channel. Select Images subtraction then click CREATE.



- Wait for a few seconds, you should now see a red image layered onto a blue image. Zoom in using your mouse wheel or by going to Edit > Zoom. Move the image slightly so that reticle isn't on the object.
- Go over to the right side of your screen and select the Distance Icon.



12. Click, hold and drag from the middle of one "X" to the middle of the other "X" and release. You should have a line that connects the two with a number written next to it. Make note of this number.



13. Close out of Aladin.

General Information:

$$1 \text{ AU} = 1.496 \times 10^8 \text{ km}$$

1. The measurement you took in Step 12 is the distance Ceres traveled in seconds of arc in the 15-minute interval between the two FITS files. To convert this measurement to *Seconds of Arc/hr*, just multiply by 4.
2. Determine the distance, "d", Ceres is from the Sun by using the two formulas below where ω is the value of *Seconds of Arc/hr* and the result of "d" is in Astronomical Unit (AU).

$$\alpha = \frac{148}{\omega}$$

$$d = \left(\frac{\sqrt{4\alpha + 1} - 1}{2} \right)^2$$

3. We can determine the orbital period of any object by using any of these formulas where "p" is the orbital period measured in years and "a" is the distance from the Sun measured in AU's.

$$p^2 = a^3$$

$$p = a^{3/2}$$

$$a = \sqrt[3]{p^2}$$

Determine which formula to use and validate your answer by searching the Internet.

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