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Dione Model Comparison Against Images

This document compares the SPC model and the Thomas (2010) model against the Cassini spacecraft images. In addition to comparing the two models, it also shows how we validate our model by comparing it against spacecraft images, which is something that is routinely performed during our model generation. As an example, we have chosen a Cassini image that shows a large portion of the limb of Dione. We then rendered both models using the same spacecraft position and pointing, as well as the same lighting conditions, as the Cassini image. Since the Thomas model is a set of a, b, and c axes, we have generated a triaxial ellipsoid for comparison against the Cassini images. Note that while the SPC model is an entire shape we have not extracted the a, b, and c axes. The spacecraft image and the rendered image are combined into a "RGB composite image". The "RGB composite image" is generated by assigning the spacecraft image to the red channel, the rendered image to the blue channel, and leaving the green channel black.

Figure 1 shows these images for the Thomas model of Dione, Figure 2 shows portions of Figure 1 at increased scale, and Figure 3 shows these images for the SPC model. For this comparison we are only interested in the limbs, though it is obvious that the craters in the spacecraft image can also be seen in the SPC model. Figures 1 and 2 do not show limb mismatch between the Thomas model and Cassini image. Figure 3 does not show a limb mismatch between the SPC model and Cassini image. A 400% zoom level of this document can be used to compare the composite images in more detail. The Thomas model is a good fit and is compatible with the SPC model, and the axes of the two models are about the same.

Figures are below.

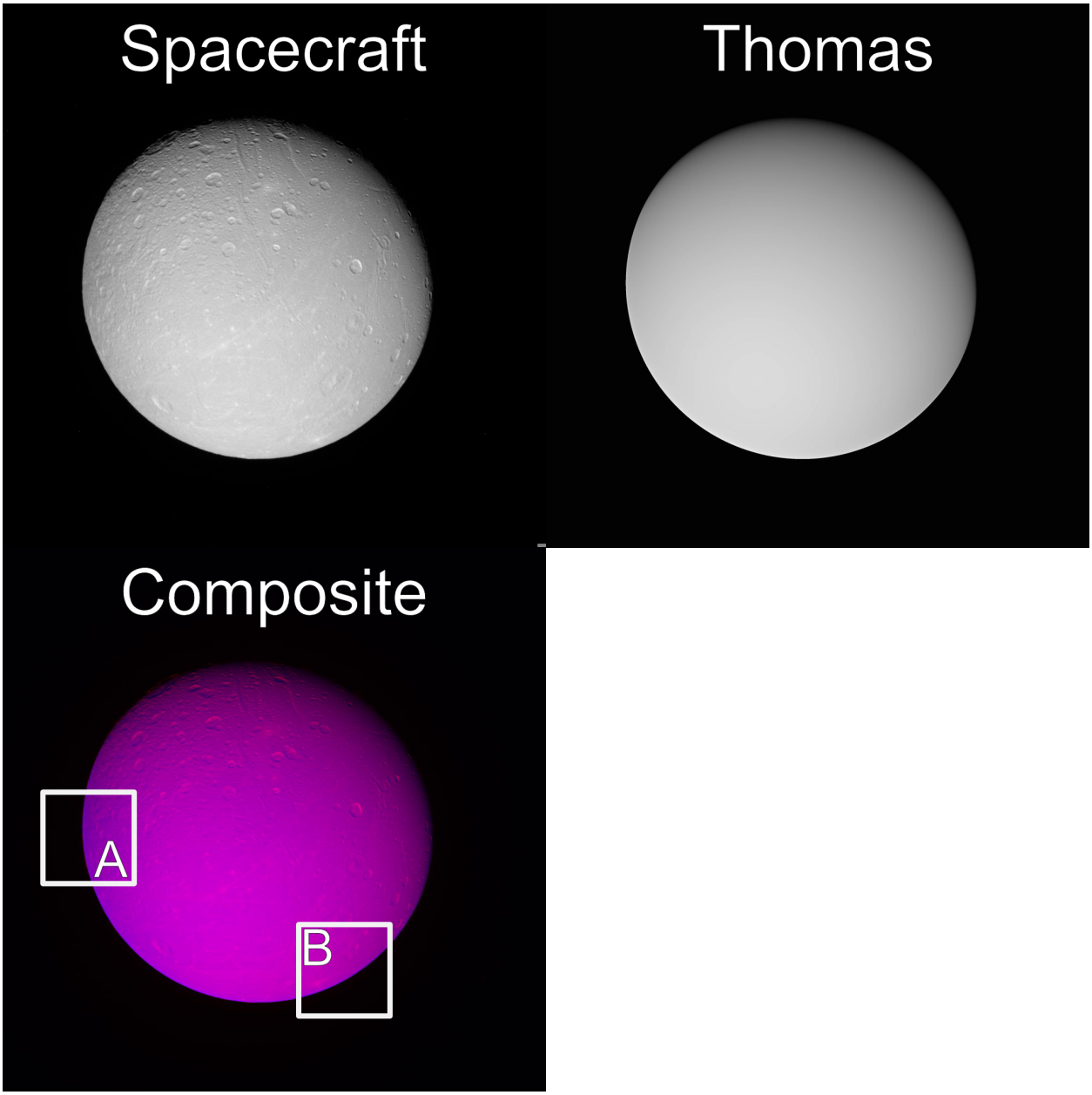

Figure 1. Comparison of the Thomas model to the Cassini image N1507718022. Panel "Spacecraft" upper left: Cassini image N1507718022. Panel "Thomas" upper right: Thomas model rendered with the same conditions as the Cassini image. Panel "Composite" lower left: RGB Composite image with the Cassini image in the red channel and the Thomas model in the blue channel. Subtle red or blue hue indicate a mismatch between the model and spacecraft image, though the mismatches are very slight. Boxes "A" and "B" are shown at a larger scale in Figure 2.

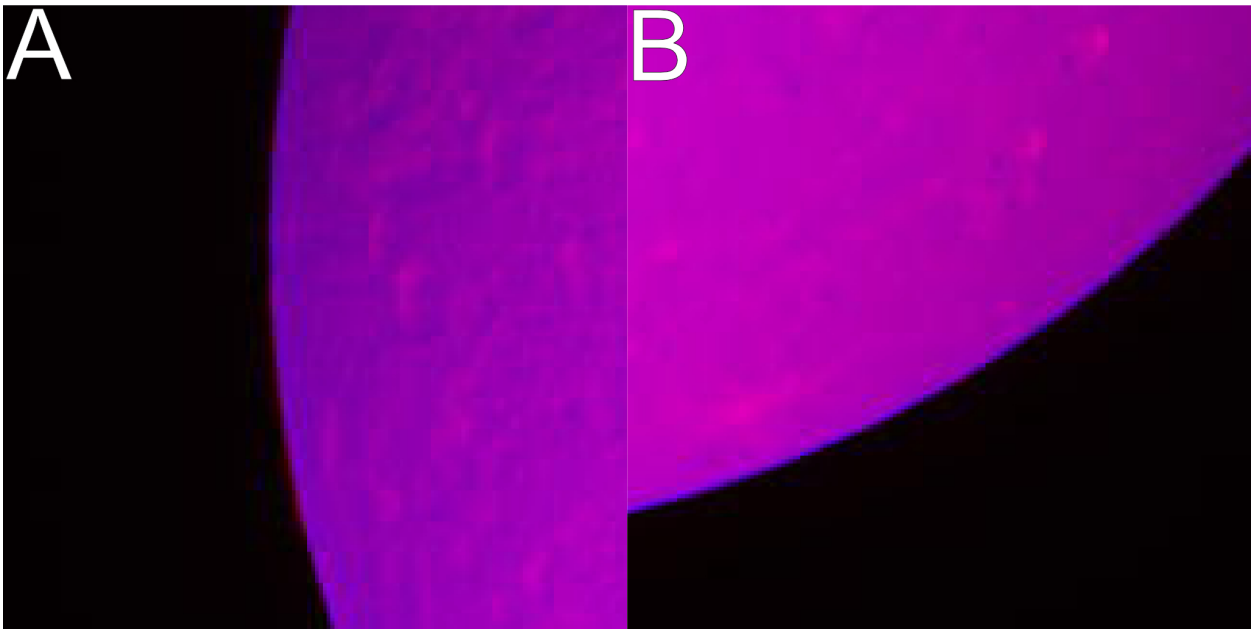

Figure 2. Boxes “A” and “B” from Figure 1 at increased scale, showing there is very little mismatch (i.e. red or blue) at the limb.

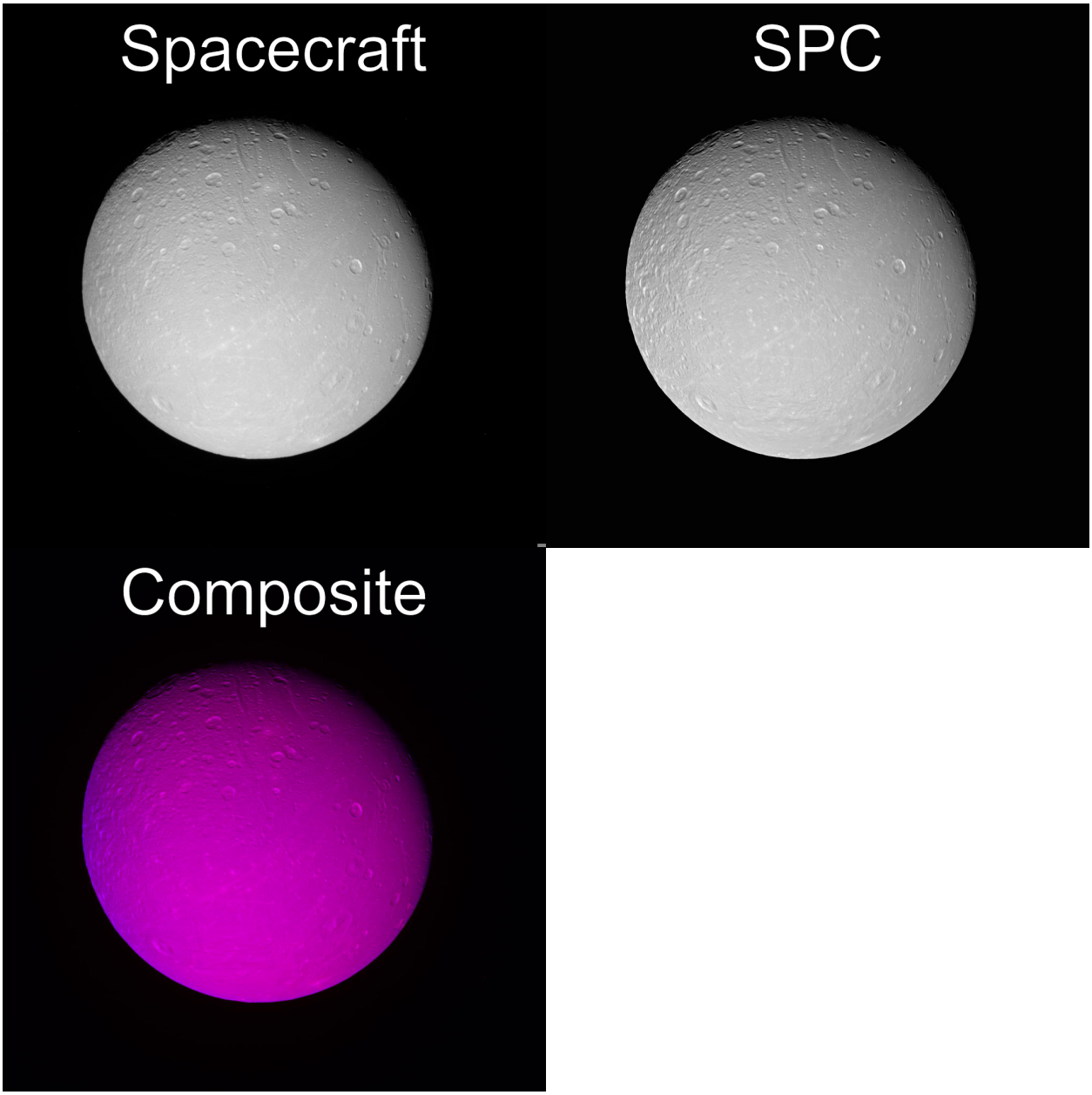

Figure 3. Comparison of the SPC model to the Cassini image N1507718022. Panel "Spacecraft" upper left: Cassini image N1507718022. Panel "SPC" upper right: SPC model rendered with the same conditions as the Cassini image. Panel "Composite" lower left: RGB Composite Image with the Cassini image in the red channel and the SPC model in the blue channel. The radius of Dione from the Thomas model was good, and the SPC model is equally good. Increasing the zoom level will allow for a more detailed comparison between the composite images from this figure and Figure 1.