Lunar and Planetary Laboratory
The University of Arizona

Memorandum

Subject: **Mapping with euv_imtool**	
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Beginning with version 1.15, euv_imtool uses an improved method of determining the look vector that corresponds to a pixel. The details of the new method are described in "Mapping an EUV image into space" by Sandel and King, 7 August 2002. This memo documents some of the practical differences between the two methods. First I describe the differences in the direction vectors, and then I show an example of using the direction vectors to map a plasmapause in L, MLON space.

The differences between the two methods vanish on both the horizontal and vertical centerlines of an image, and the differences reach their maximum values at the corners of the image. The errors are symmetric about both horizontal and vertical centerlines, so I consider only the first quadrant of an image in detail here. Figure 1 shows the angular error on the sky at a grid of image positions in the first quadrant.

Figures 2 and 3 show the angular differences between look vectors calculated by the two methods. The differences are computed for the worst-case conditions, namely along a diagonal of the image. (In fact, not precisely along a diagonal, because the real EUV image is 10 pixels taller than wide; I have neglected this fine point and calculated errors along a line of slope 1 through the central pixel.) Figure 2 shows the total angular difference, and Figure 3 shows the radial component of the difference. The negative values in Figure 3 mean that all the new points are closer to Earth than the old points.

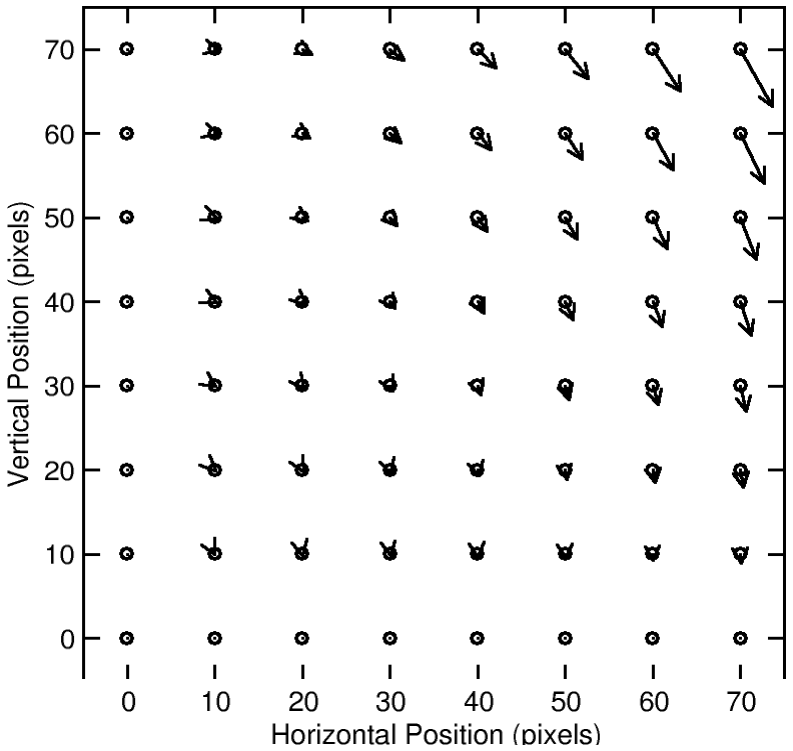

Figure 1. The length of the arrow is proportional to the angle between look vectors calculated by the two methods. The longest arrow corresponds to an angle of 7.7°. The direction of the arrow is a rough indication of the direction of the error. The coordinate (0,0) is the center of the image. [Note: This is **not** a map showing old and new pixel positions.]

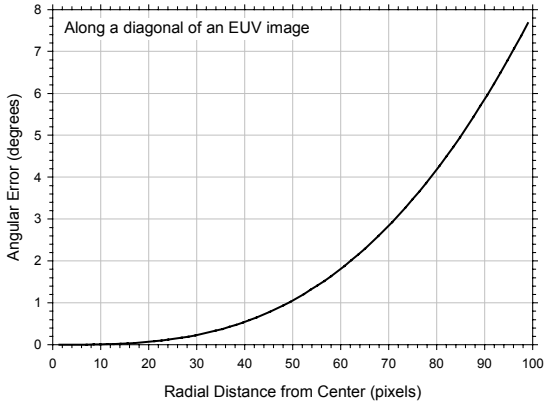

Figure 2. Total angular error on the sky for pixels along a diagonal from the center to the (almost) corner.

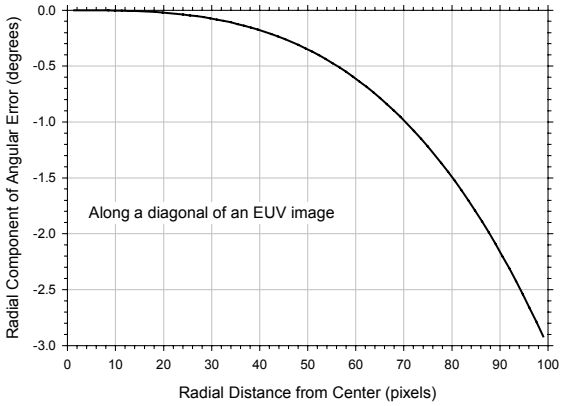

Figure 3. Radial component of the angular error shown in Figure 2.

Finally, I consider the differences between the old and new methods in a specific example of mapping the plasmapause in L, magnetic longitude coordinates. Figure 4 shows old and new positions for the same pixels selected by clicking in euv_imtool.

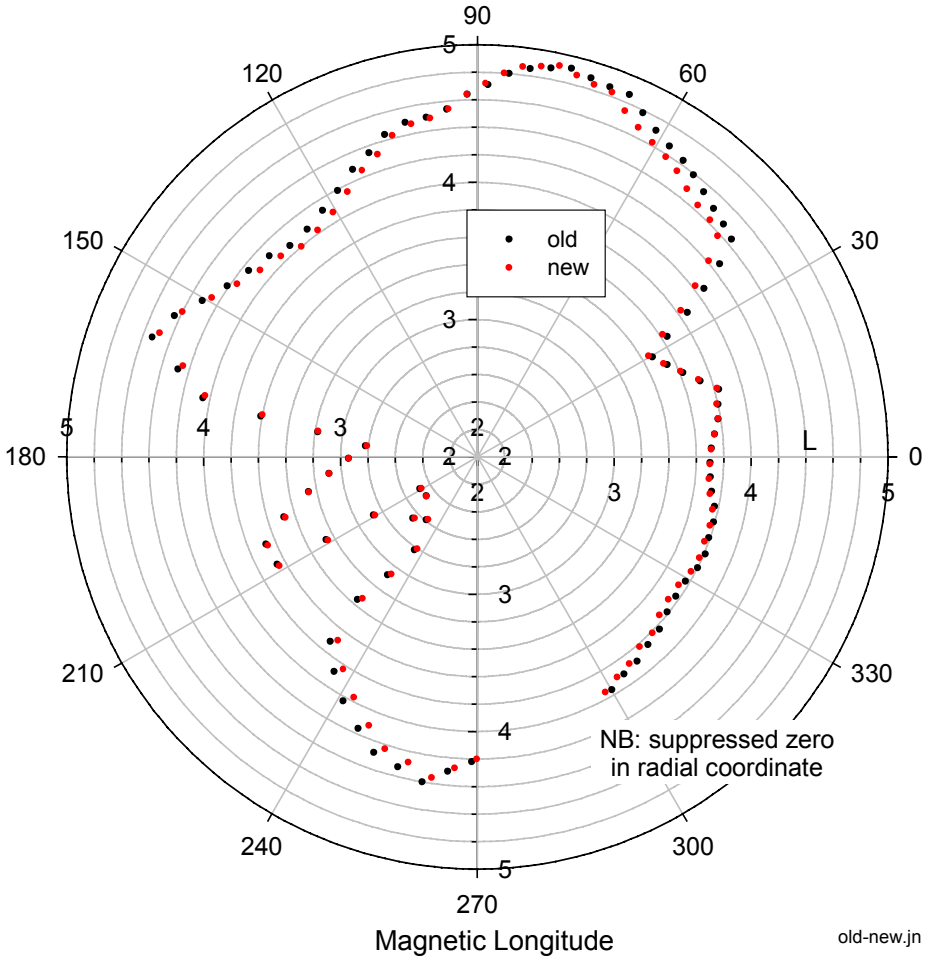

Figure 4. Comparison of plasmapause positions determined by the old and new methods. For 2000-177/10:55.