EPIC Geolocation Quality Summary

Algorithm Revision 07

Product Version 04

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National Aeronautics and
Space Administration

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1 EPIC QUALITY SUMMARY

This is a brief summary of known algorithm and software implementation issues in the EPIC L1A/B geolocation. For more information regarding the geolocation algorithm, please refer to the “EPIC Geolocation and Color Imagery” document.

2 GEOLOCATION ERROR

This version of the geolocation has some minor fixes over the previous version. There is a fix to increase accuracy for parallax that effects the view angle results. Additionally there are some improvements to the handling of the external georeferencing source data that will fix some intermittent quality issues seen in the previous version.

The current solution is within a pixel for most products. There may be occasionally some rotational correction error, cause by problems with the external georeferencing source, which can cause as much as a 2 pixel offset at view zenith angles greater than 70 degrees.

3 VIEW ANGLES

An issue was identified with the Earth view zenith angles where a discrepancy of 0.05 from the center of the Earth to 0.2 degrees at the outer edge. (View angle resolution is ~0.17 degrees per pixel at center to 0.35 degrees/pixel at the edge). A problem was identified with the horizontal parallax correction that when repaired, rectified the issue. This change was applied also applied to the sun zenith angle, but the difference is minimal at less than 0.02 degrees per pixel.

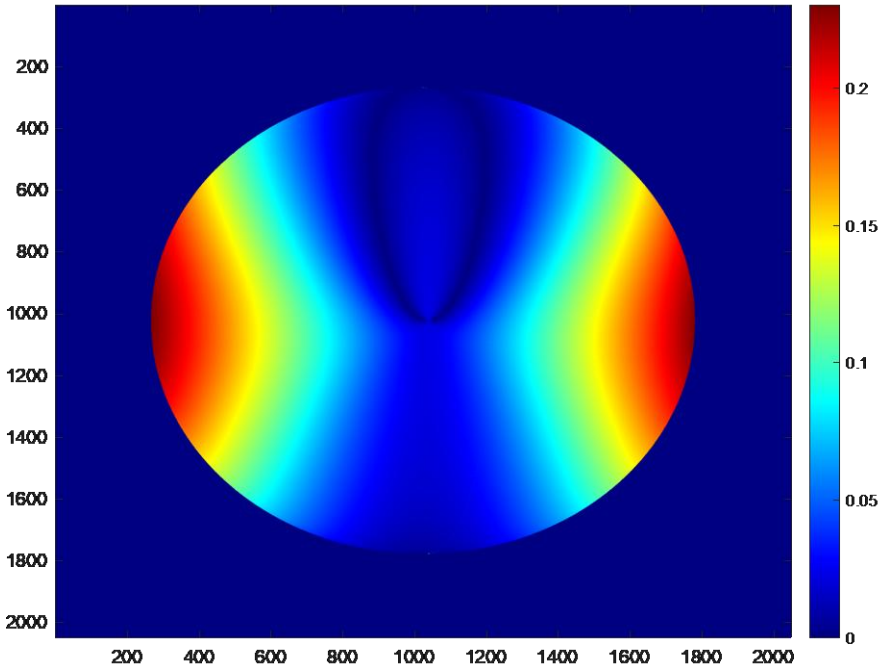

Figure 1 - Difference in view zenith angle between version 3 and 4

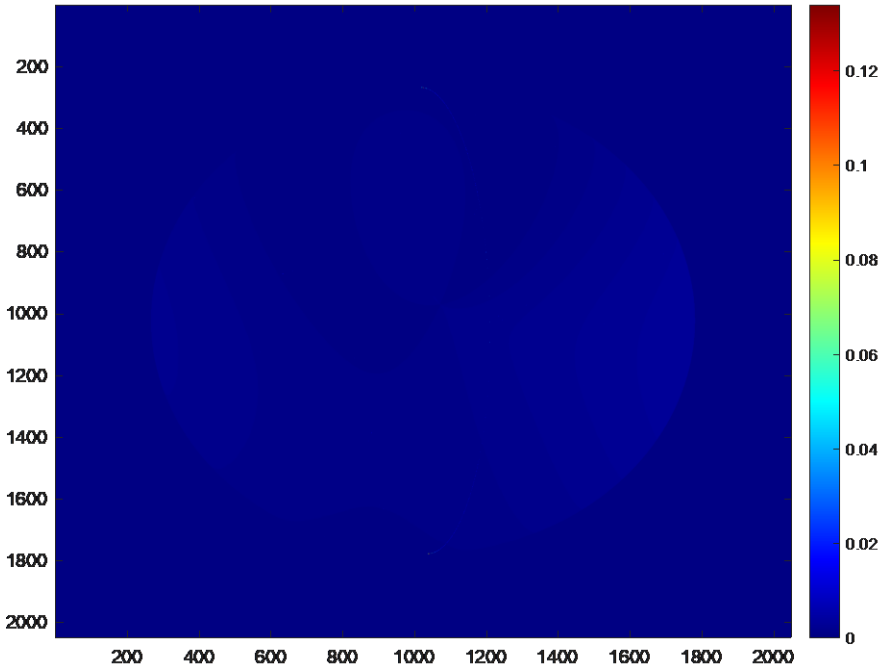

Figure 2 - Difference in sun zenith angle between 3 and 4

4 STAR TRACKER ACCURACY & CORRECTIONS

DSCOVR is in a Lissajou orbit, which has a slow, approximately 6 month period roll. The star tracker is used to determine the z-axis rotational orientation of Earth to the spacecraft, i.e., where North is in the image. From analysis, it is apparent that the star tracker accuracy is no better than .5 degrees, which means that the geolocation can have an equivalent roll error.

The previous of the algorithm introduced a fix for this which employs comparing against other satellite imagery to determine the correction. This satellite imagery is downloaded from the NASA GIBS service. It was discovered during deployment of the algorithm that occasionally, due to spacecraft and instrument outages, occasionally the reference would have blacked-out or “empty” areas, which would cause problems with the EPIC geolocation algorithm and a poor solution.

This version of the software includes the ability to identify a bad reference image and switch to another satellite. A ranked list is used, and the software has multiple available sources (primarily MODIS/VIIRS at the time of this publication). This

should improve the accuracy of some datasets and generate a more complete collection.

5 GEOLOCATION WITH MOON

The Moon is occasionally imaged for calibration purposes. In these situations, the geolocation will run and produce an L1A dataset. No L1B will be produced. There is currently no geolocation solution provided for the Moon, but the EPIC Data Format Control Book does contain information on how it would be structure if implemented in the future.

6 NO L1B PRODUCTS WHEN EARTH AND MOON ARE IN VIEW

The geolocation software will not product a L1B product when both the Earth and Moon are in view. This is due to the object centering algorithm (centroiding) being able to handle only one object in the field of view. The color images released during these events are produced using a special imaging sequence to limit effect of Earth's rotation, plus a manual centering and a special statistics-based band registration process.

7 NO L1B PRODUCTS DURING DARK SPACE IMAGING

There are no L1B images produced during dark space imaging. Dark space imaging is defined as imaging of any body other than the Moon or Earth, or during periods of poor attitude solution which may feature partial Earths in the field of view. In this situation, an L1A will be produced with the appropriate metadata indicating a dark space image.