



Navigation and Ancillary Information Facility

Geometric Event Finding Programming Lesson (MPO)

February 2023



Geometric Event Finding: Overview

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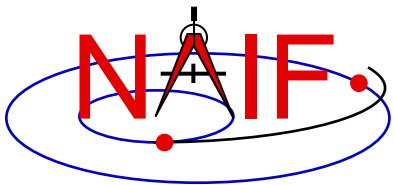
- **Problem statement:**

- Determine when the BepiColombo Mercury Planetary Orbiter (MPO) is visible from ESA's New Norcia station, within the time interval

2027 JAN 03 TDB

2027 JAN 06 TDB

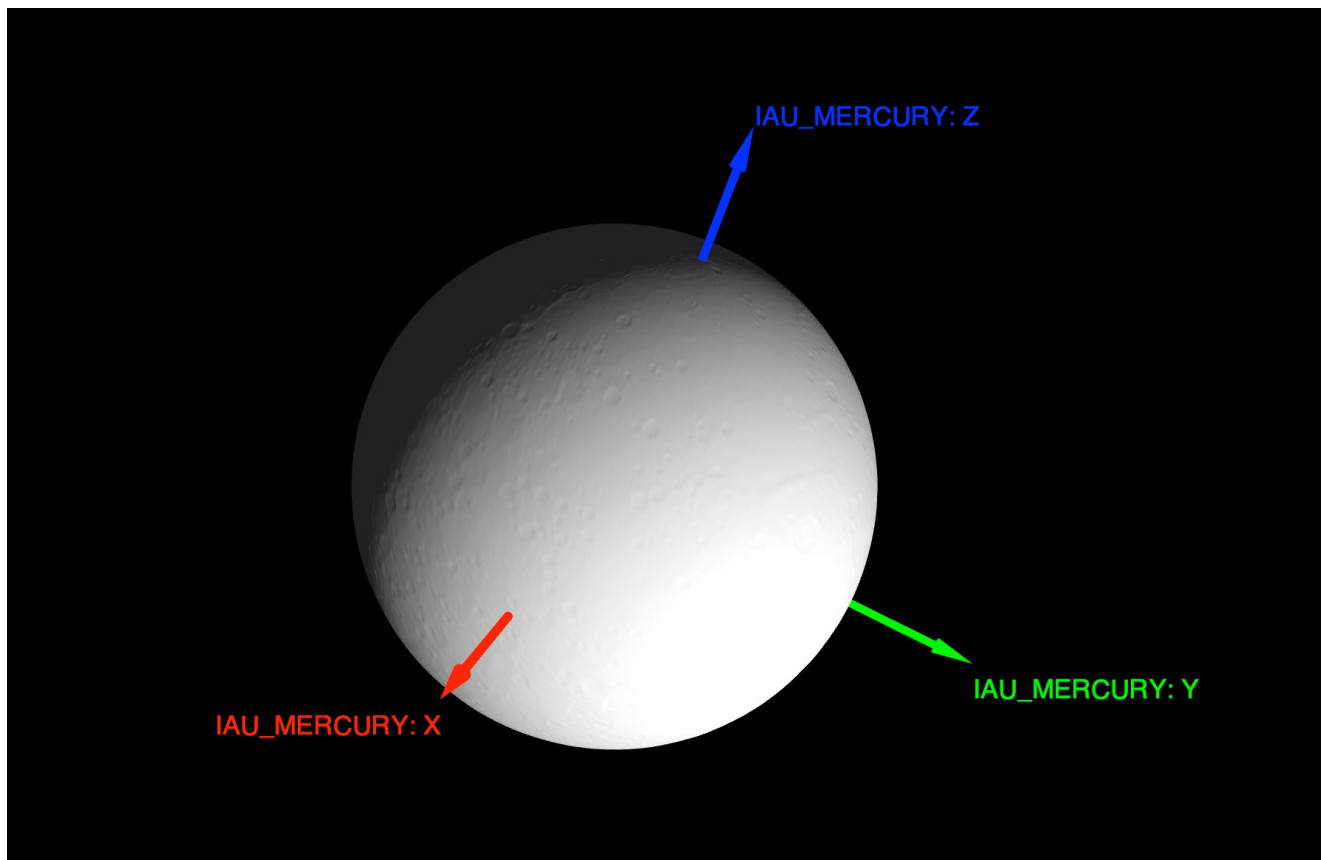
- For the spacecraft to be considered visible, the apparent spacecraft position relative to New Norcia station must have elevation of at least 6 degrees in the station's topocentric reference frame NEW_NORCIA_TOPO.
 - » Use light time and stellar aberration corrections to compute the spacecraft position relative to New Norcia.
- Account for possible occultation of the spacecraft by Mercury, using an ellipsoidal shape model and a DSK shape model.
- Compute a SPICE window representing the visibility period.
- Display the start and stop times of each time interval in this SPICE window.

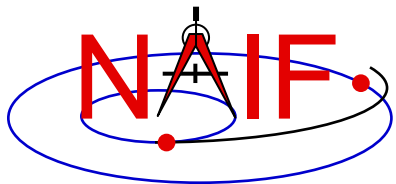


Mercury Shape

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Spacecraft occultation ingress and egress times computed for Mercury modeled as a triaxial ellipsoid and as a triangular plate model provided in a DSK differ noticeably due to the Mercury topography differing from the ellipsoidal surface for some areas by many kilometers, as illustrated by the view below.





Visibility Geometry

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