

MRD 196- Orbital Stability Analysis

Data Product Overview

The "orbital stability analysis" data product will consist of a descriptive memo in combination with a table giving ranges of orbit elements for various orbital outcomes. The quantitative aspect of the data will be orbit stability measures (still TBD) tied to different prospective orbits about the asteroid. These will incorporate both natural co-orbitals and the nominal spacecraft model.

Overview

This data product is used for safety, science value, and long-term science.

This product will be delivered as a data table and a report.

Inputs:

Asteroid Shape Model [[Shape model \(MRD-123\)](#)]

Mass Model [[Asteroid Mass Model \(MRD-133\)](#)]

Gravity Field

Satellite ephemerides

Spin State [[Pole location \(MRD-127\)](#), [wobble \(MRD-128\)](#) and [rotation period \(MRD-129\)](#)]

Spacecraft SPK Kernel

This product is derived purely from other data products, and as such doesn't directly use any observations.

Time to produce will be on the order of days to complete the analysis and the associated report.

Data Product Structure and Organization

This data product is delivered as a pdf report. There will be only one version.

Data Format Descriptions

The format will be in PDF/A format.

Data Product Generation

This data product is generated by the Radio Science Working Group.

There are a wide range of different algorithms and approaches used to determine the surface environment. An introduction to, discussion of, and citations to relevant papers is found in the citation:

D.J. Scheeres, *Orbital Motion in Strongly Perturbed Environment: Applications to Asteroid, Comet and Planetary Satellite Orbiters*, Chapter 10, Springer, 2012.

The process used to generate this data product is also discussed [here](#).

The inputs to this algorithm are listed above.

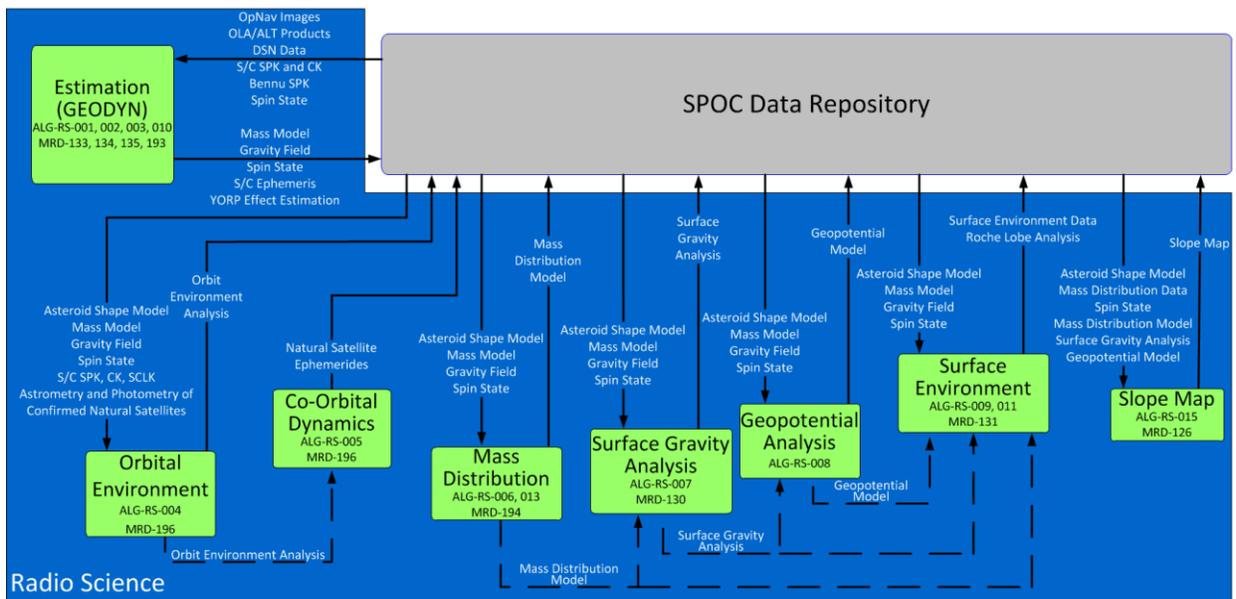
There are no format expectations of the input products.

Data Product Validation

Verification will be ascertained by comparison with legacy computations and analyses, with known models and analytically derived results.

Data Flow

In the current RSWG data flow diagram, shown below, the generation of this data product can be found in the box on the bottom left.



Data flow for this data product is simple: inputs come from the SPOC (or directly from other RSWG algorithms), go through our algorithm, and the data product is produced.

The file size for the data table can vary widely, but should be on the order of MB. Likewise, the PDF will be on the order of MB.

Standards used to generate data product

Any standards will be discussed in the report.

Data is stored as ASCII.

