

MRD 602- Bennu Pseudo-ranging Data Product

Data Product Overview

The "Bennu pseudo-ranging" data product will consist of a table giving DSN range measurements of the OSIRIS-REx spacecraft as if the measurements were received and transmitted by Bennu. This data product will be directly used to estimate the ephemeris of Bennu, Yarkovsky effect, YORP effect, etc. The data accuracy will depend mostly on the reconstructed accuracy of the OSIRIS-REx spacecraft with respect to Bennu, raw DSN ranging noise, and media/transponder delay calibration errors.

Overview

This product will be delivered as a data table.

Inputs:

Processed DSN range data file
Reconstructed OSIRIS-REx orbit with respect to Bennu
Planetary ephemeris file
Bennu ephemeris file from OSIRIS-REx orbit determination

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

Data Product Structure and Organization

This data product is delivered as an ASCII file for the data table.

Data Format Descriptions

The data table will have four columns as described in the [RSWG SIS](#):

1. Calendar time of the measurement in UTC
2. Measurement time in seconds past J2000 in UTC
3. Round-trip light-time in seconds
4. Station number

Data Product Generation

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

The product generation is a two-step process:

1. The spacecraft orbit will be reconstructed using DSN radiometric data and landmark tracking by the Radio Science Working Group.
2. OSIRIS-REx DSN range measurements will be converted into Bennu pseudo-ranging measurements by properly subtracting the light time of spacecraft relative to Bennu.

Multiple deliveries may be necessary as the spacecraft orbit will improve over time.

Data Product Validation

Verification will be ascertained through the data fitting process.

Data Flow

RSWG will provide OSIRIS-REx orbit.

RSWG will provide Bennu pseudo ranging data.

Standards used to generate data product

Data is stored as ASCII.