MRD 139- Global Linear Features Geology Map

Data Product Overview

This is a map of geomorphological features on the surface of Bennu that are not impact craters or boulders and are linear in appearance. The GLFM serves as a subcomponent of the Integrated Geology Map. It also serves long-term science for interpreting asteroid surface and subsurface processes. It is produced in two stages, where at the end of Detailed Survey a "Linear Features Feature Map" is produced indicating the location of linear features on Bennu. The long-term science product "Global Linear Features Geology Map" includes the location of the features as well as geologic interpretation based on additional inputs, including compositional indicators, and their location on the asteroid (see for example, Buczkowski, D.L., Barnouin, O.S. & Prockter, L.M., 2008. 433 Eros lineaments: Global mapping and analysis. Icarus, 193, pp.39–52.)

Overview

Data type

- ShapeFile format

What does it measure at what scale?

- All linear features on the surface of Bennu > 1 m in width and > 10 m in length.

What observations are required to provide the input data needed to make the data product?

- Feature Map requires Global Imaging Mosaics and Global Topography.
- Geology Map requires additionally Global Slope Map, Global Space Weathering Map, Global Mineral and Chemical Maps, Global Bond Albedo and Reflectance Factor Maps and the Global Thermal Inertia Map.

When in the DRM are the observations that make the data product scheduled to be taken?

- Starting at the Preliminary Survey phase, ending during Detailed Survey.

How long does it take to produce the data product?

- The Feature Map takes several weeks, and the Geology Map takes up to several months depending on the number of features identified.

Is this product used sample site selection, science value, or long-term science?

- The rapidly produced Feature Map is used for sample site selection as an input to Global Science Value Geologic Feature Map (MRD-114). The long-term Geology

Map is and for long-term science as an input to the Global Geology Map (MRD-195a).

Data Product Structure and Organization

What is the structure of the data product?

- ShapeFile format

How is the product organized?

- ShapeFile format details information for each individual mapped feature, which are separate pieces of data.

Data Format Descriptions

- Header information (metadata) included with data product.
- Start/End time of observations that makeup data product
- Lat/lon or other geometric parametersMap scale/ resolution
- Map projection
- Instrument parameters or housekeeping data needed to process data
- Calibration files used in processing

Detailed Description of data format

- ShapeFile format

Data Product Generation

How and by whom is the product generated?

- Co-I Olivier Barnouin and RDWG

What are the input products needed to produce the product?

Global Linear Features Feature Map (map of linear features locations):

- Global Mosaic @ 21cm resolution (MRD-121)
- Global Topographic Map (MRD-122)

Global Linear Features Geology Map (long-term science, includes analysis and interpretation):

- Global Slope Map (MRD-126)
- Global Space Weathering Map (MRD-542)

- Global Mineral and Chemical Maps (MRD-140)
- Global Bond Albedo Map (MRD-154)
- Global Reflectance Factor Maps (MRD-154)
- Global Thermal Inertia Maps (MRD-155)

Are there format expectations for the input products?

- All input data should be either co-registered map-projections or ShapeModel+Ancillary format.

What algorithms and/or calibration data is used to generate products?

- Create a map indicating the locations of linear features. Use contours to indicate changes in elevation associated with the linear features. Also, potentially use color ratio maps to determine if the feature differs in composition from the surrounding material. OVIRS data can potentially be used to assign chemical and mineral abundances.

Has a specific Science Team Member been assigned to produce this product?

- Co-I Olivier Barnouin

Will multiple versions of the product be generated?

- Yes. An intermediate "Feature Map" will be produced at the end of Detailed Survey that maps the locations of any detected linear features. A final "Linear Features Geologic Map" will be completed on a longer timescale and include geologic interpretation and analysis considering more input data.

Observational Requirements

Measuring a 1-m feature requires a combination of imaging resolution and sun angle such that a shadow can be positively identified. An observed scenario including a station at 30° east of noon local time within +/-5° latitude, +/-10° longitude (as written in MRD-429) would provide shadows of 31-83 cm for 1m of vertical relief (necessarily assuming equality of vertical and horizontal relief) and then a minimum imaging resolution of 31cm(4px) would be required for 80% of the surface with a North and South observing station.

When in the DRM are the observations that make the data product scheduled to be taken?

- Starting at the Preliminary Survey phase, ending during Detailed Survey.

How long does it take to produce the data product?

- A preliminary geologic map can be produced within three months of sample stowage and a final map within six months of sample stowage. Production of a certified USGS map of Bennu is not in the scope of this data product.

Is this product used for sample site selection, science value, or long-term science?

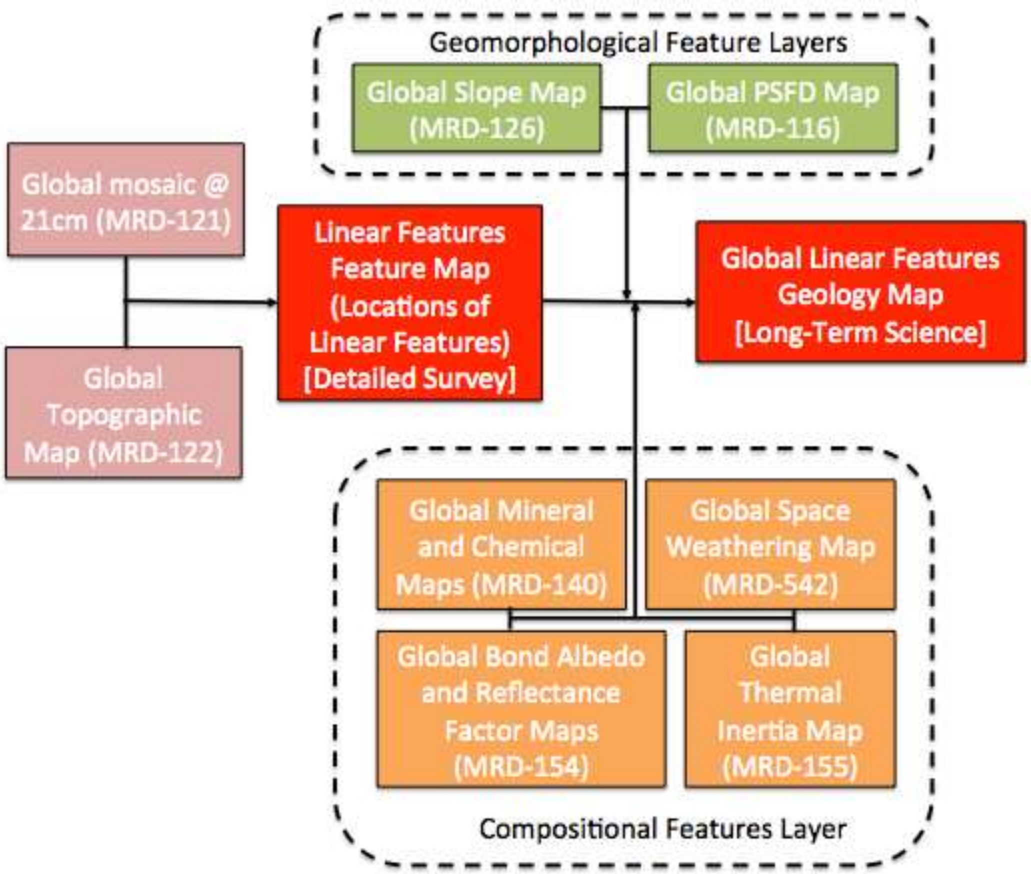
- Long-term science

Data Product Validation

How will the product be vetted to ensure contents and format are correct?

- Through a consensus opinion of the science team in 'real' time. Further validation will occur later with the long-term goal of publishing the science behind the maps and that will also be peer reviewed.

Data Flow



Standards used to generate data product

Time

- Either spacecraft time or UTC.

Coordinate System

- Bennu latitude and longitude

Data Storage Conventions

- Little Endian with either PackBits or LZW compression