



Normal Reflectance Albedo Map

Data product description from Dani, Keiko, Beth

Request for New Data Product

Date: 11 May 2016

Submitter: Keiko Nakamura-Messenger

WG requesting the new data product: Sample Site Science Working Group

Requested Data Product would come from which Working Group: Image Processing Working Group

Data product name: Normal Reflectance Map

Description of the new data product: Normal Reflectance of the Surface of Bennu, from MapCam or PolyCam Panchromatic global mosaics from Detailed Survey, using the 12:30pm (or 3:00pm) station data (if MapCam), or the Baseball Diamond data (if PolyCam). The Global Panchromatic Mosaic shall be photometrically corrected to laboratory normal reflectance units (Reflectance Factor, REFF, at incidence=0, emission=0, phase angle=0). Where:

$$\text{Normal Reflectance} = \text{REFF} (i=0, e=0, \alpha=0) = (I/F(i=0, e=0, \alpha=0))/u_o$$

Motivation for the new data product: For Science Value mapping, the goal is to know where darker (e.g. carbon-rich) material may be concentrated on the surface of Bennu, and the criterion of sample albedo (normal reflectance) is inversely correlated with organic material content. The

darkest areas of Bennu will be most likely to exhibit organic-rich material, and these materials would be of very high science value.

Discuss how will this new data product affect the current Charter (and or SOW) of the WG producing the data product: This will be an additional Data Product that the Image Processing Working Group would produce. As processing schedules are tight during Detailed Survey, the new Data Product may require additional person-hours for labor during proximity operations. Otherwise, the data flow and logic pathways to the data product are relatively straight-forward. We are producing the needed photometric model anyway, and we are processing the necessary OCAMS Level-2 I/F data anyway, and the IPWG is already making a global mosaic that will be photometrically corrected to (30,0,30). This new data product could be created almost at the same time by creating a copy of the global mosaic and photometrically correcting it to (0,0,0).

Is the new data product one to be generated by the requesting WG or is it a receive-able?

It is an Image Processing Working Group deliverable, and a Sample Site Science Working Group receivable.

Has the WG that will produce the new data product approved the request and ensured that they can deliver the product (provide verification e-mail as an attachment)?

E-mail response from the IPWG lead (5/12/2016) is attached.

How will the requested Working Group produce the new data product?

We will use a photometric model to correct the OCAMS Panchromatic radiance factor (I/F) global mosaic to Normal Reflectance (REFF(0,0,0) units).

How will the requested Working Group test (V&V) the software for producing the data product?

During operations, we will V&V by comparing our data product with other reflectance and albedo maps of Bennu to check for self-consistency.

What test data are required, and where will they come from?

Standard radiance/irradiance imaging of an airless surface will be required, plus a photometric model. IPWG already has developed a set of test OCAMS images that can be used for this process.

What new resources would be required to deliver the new data product?

This basemap can be generated using a set of images that have already undergone the photogrammetric control process (e.g. the PolyCam images used in the global basemap). From there, it will take an additional 120 hours to photometrically correct these images to (0, 0, 0) and reassemble them into a global mosaic.

The requester is required to provide a description of the new data product to the appropriate Instrument Scientist (IS) or Deputy IS for review (to make sure the measurements that will flow into the new Data Product are feasible). Please provide IS comments on the feasibility of the new data product:

For this item, we will check with Dani DellaGiustina, **Bill Boynton**, and Bashar Rizk for concurrence, but because the new Data Product requires only new processing of existing data streams, there is no impact expected to the DRM.

Does this new data product feed into the Sample Site Selection process? If so, describe how:

Yes, this new data product would be helpful to the Sample Site Science Working Group - Science Value mappers in determining a location that is most consistent with high science-value materials.

Content below is only to be filled out post-submission by Ed Beshore and Kate Crombie.

Confirmation from Deputy PI (Ed Beshore) and SPOC STI (Kate Crombie) that the New Data Product request was received (specify date of receipt):

Date sent to the SEC:

Decision of the SEC (to accept or reject proposed new data product):

Change Log (to the request form only):

Submitted to the SEC 1 November 2013

13 December 2013: Updated by MSS (Harold Connolly) by the request of the PI and uploaded to the Wiki.

17 December 2013: Modified slightly by MAS (Beth Clark) to clarify format

10 January 2014: Modified by MAS (Beth Clark) to include test data and V&V fields

18 February 2014: Modified by MSS (Harold Connolly) to include a question on review by IS and to include a question that was in the original version of is the new data product feed into the SSS process.

19 February 2014: Modified by MAS (Beth Clark) to add more detail to the IS review requirement.