

Global Plume Map Algorithm Description Document

Overview

This data product supports the Safety Map requirement SM. ALG.05: “SPOC shall generate a global plume input map of Bennu.” This map calculates the number of dust plumes present in each TAG site.

Inputs

- Global Shape Model (GSM)
 - Nominally 1m resolution
- Global Deliverability Map (GDM)
- Sampling site radius (circular)
- Global Dust and Gas Plume Geology Map

Outputs

- Global Plume Safety Map
 - Referenced to the GSM

Algorithm

The ‘sampling area’ centered about each facet in the GSM is defined by the Global Deliverability Map (GDM). Since the GDM is not at the same resolution as the GSM, the size of the sampling area is defined by the semimajor and semiminor axes of the nearest-latitude GDM site. If there are multiple GDM sites with the same latitude, then the nearest longitude GDM site is selected from the remaining options. The semimajor and semiminor axes of the sampling area should be converted 3-sigma values, assuming a Gaussian error distribution (the GDM input is currently 1-sigma). Alternatively, the user can input a single scalar for the sampling site area radius instead of the GDM. The sampling area in this case for every facet is a circle with the specified radius.

For each facet of the GSM

1. Sum the number of dust plumes within the sampling area centered about that facet.
2. The number of dust plumes encountered and a color coded safety rating will be assigned to the each facet of the GSM.
 - a. Green if no plumes are encountered within the sampling area
 - b. Red if 1 or more plumes are encountered within the sampling area