

## Overview

Algorithm for making 2-D maps of temperatures determined from the OTES emissivity/temperature separation algorithm.

## History

Draft - 17 Aug 2013

Baseline - 30 Nov 2013

## Algorithm Description

1. Read in output file(s) from OTES emissivity/temperature separation algorithm. These files will contain spot values and ancillary geometric data (e.g., latitude and longitude of each spot).
  - o Input data are from a single observing station (e.g., 3:00 pm) during Detailed Survey or a single site during Reconnaissance Phase (or Orbit-B)
  - o Input data may be down-selected based on other quality parameters such as signal-to-noise, albedo, etc.
2. Bin data by desired spatial resolution latitude/longitude grid
3. Calculate average and standard deviation of temperature in each bin. Also propagate measurement uncertainties.
4. Write output array: first channel of map element contains 2-D array with average temperature using desired geometric projection; second channel stores standard deviation of temperature for each pixel using same geometric projection

## Parameters

### *Input*

- Spot temperature files from OTES emissivity/temperature separation algorithm. It is assumed that the headers for these files will include pointing and timing information
- Desired spatial resolution / grid of map
- User inputs for constraints used to create a specific map. Examples include, but are not limited to: data quality, incidence angle, emission angle, spot temperature.

### *Output*

- Map structure
  - o 2-D floating point array of binned averaged temperatures
  - o 2-D floating point array of standard deviation of temperature data in each element of the map
  - o 2-D floating point array of # of OTES spectra included in each element of the map
  - o 2-D floating point array of average local time of OTES data used in each element of the map
- Number of x and y bins in the array
- Start longitude, latitude ([1,1] element) of the array
- Longitude/latitude bin size

- UTC Start/end time of OTES observations used to produce the temperature data used in the map
- Version of OTES Calibration algorithm used to create the temperature data used in the map
- Version of OTES Temperature/Emissivity separation algorithm used to create the temperature data used in the map
- Bennu position relative to the Sun (distance, ecliptic longitude and latitude) when OTES data were collected
- Bennu position relative to the spacecraft (distance, ecliptic longitude and latitude) when OTES data were collected
- Name/location of shape file used to project the OTES data and compute the latitudes and longitudes used in the map
- User inputs for the constraints (quality, local time, etc) used to create the map

*Keywords*

## **Proposed Software**

The davinci software is the software package/programming language in which the binning, averaging, data quality constraining mapping software will be written. This software will be installed on the SPOC system for use on all OTES data processing. Any reprojection of the maps to specific geometric projections will be done using the OSIRIS-REx geometric projection processing software (ISIS, TBD).