

How to generate safety index maps

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■ Source codes

- `hyb2astmap.exe` (C++): To calculate geometrical parameters (sub-Earth distance, slope angle, local solar angle, and roughness) from a shape model
- `plot_safety_index.m` (Matlab): To calculate safety index from the geometrical parameters calculated by “`hyb2astmap.exe`” and draw a safety index map

■ Input files

- SPICE meta kernel: `hayabusa2.tm`
- Shape model: `SHAPE_SFM_800k_v20180804.stl`

The file names above are examples that was used for the journal manuscript

■ How to run

- `hyb2astmap.exe`
 1. Compile the C++ source code “`main.cpp`” in the “`hyb2astmap`” folder with necessary libraries by using “`CMakeLists.txt`”.
 2. Run a script by executing the following command:

```
$ adt_hyb2astmap SHAPE_SFM_800k_v20180804.stl --epoch 2018-10-23T00:00:00 --mk hayabusa2.tm
```

* Note that the evaluation epoch must be specified with the option “`--epoch`”.

Result: The data file “`SHAPE_SFM_800K_v20180804_db.dat`”, which describes the geometrical parameters for each facet is generated in the current folder.
- `plot_safety_index.m`
 1. Place the data file that was generated by “`hyb2astmap.exe`” in the folder that is specified by the variable “`ip_data_folder`” in the `.m` file.
 2. Run a script by executing the following command:

```
$ plot_safety_index.m
```

Result: A safety index map is generated in the “`output`” folder with the corresponding data files.