UNSUPERVISED LEARNING OF NIRS3 DATA: RYUGU SPECTRAL SURFACE REGIONS CLASSIFICATION

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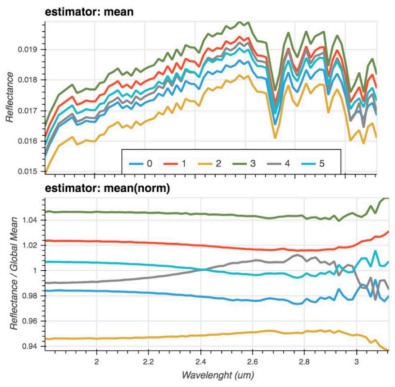
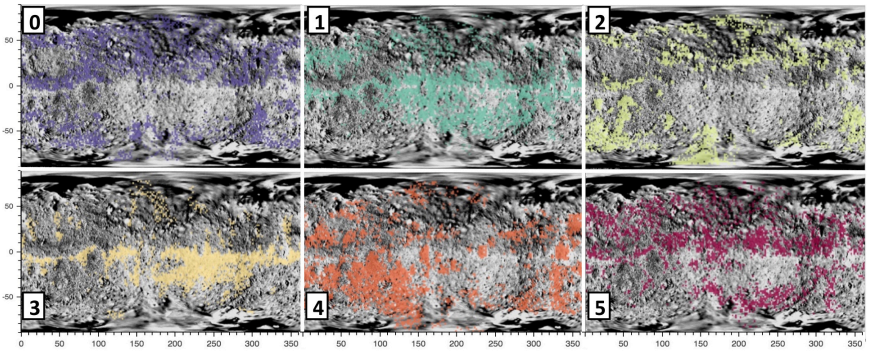
The 27th of June 2018 the Japanese Hayabusa2 spacecraft approached the C-type Near Earth asteroid 162173 Ryugu. Hayabusa2 is equipped with three remote sensing instruments such i.e. as the Thermal Infrared Imager TIR, the NIRS 3 spectrometer and the Optical Navigation Camera-Telescopic (ONC-T) with a wideband and seven narrow band filters. A Lidar instrument allowed to reconstruct the shape model of the asteroid and to measure the altimetry, in order to perform a precise touchdown in sampling the asteroidal regolith. Additionally, by using the robotic landers Minerva-II and Mascot, Hayabusa 2 has conducted in situ surface experiments. Ryugu is a top-shaped Cb type asteroid and is covered by a large number of boulders. It is one of the darkest object in our Solar System with a quite homogenous composition, including OH-rich materials. In conclusion, we find an automated approach to extract spatially coherent region on Ryugu surface based only on spectral data using almost the whole NIRS3 spectral range. Those classes show a significant spatial correlation with geomorphological feature and different spectral trends.

Keywords: unspuervised, machine learning , spectral surface regions



Classes average (top) and normalized to global mean.



Classes distribution on the surface of Ryugu

