Preliminary report on global distribution visible spectra of asteroid Ryugu based on clustering

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Preliminary result of global distribution of visible spectra of asteroid Ryugu derived from multi-band images obtained by ONC-T onboard Hayabuasa 2 is presented.
The ONC-T is a telescopic charge-coupled-device (CCD) camera with a 6.27° ×6.27° field of view (FOV) , having a 1024 pixels x 1024 pixels sensor and seven narrow band filters ranging from 395nm and 950nm and one wide-band filter. Images obtained by ONC-T are spatially aligned and converted into seven-band visible spectra (reflectance factor).

The spectra are clustered, and the obtained cluster id are shown on the global map. As the method of clustering, k-means++, x-means, gaussian mixture model via EM are tested for synthetized data and x-means is selected since this method is stable to obtain a suitable number of components.

The obtained spectra are divided into seven to nine groups depending the slope of the spectra. Flat spectrum group is distributed around the equatorial ridge, the redder and darker groups are in the southern hemisphere and the relatively bright and bluer spectra are observed at the polar region, in particular at Otohime Saxum. The distribution of these spectra groups appears to indicate the surface history such as space weathering and erosion and the supply from different sources.

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