The study of visualization of dense and large area DEM data with Red Relief Image Map

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1.Introduction
Advancement of aviation laser measurement technology has made it possible to obtain accurate DEM data excluding the influence of trees in a short time. Up to now, laser measurement has been done in the range of 50% of country. On the other hand, because the data is high precise, it was also a big challenge for conventional terrain representation techniques to express an appropriate scale for easy to use in field surveys. The RRIM was developed in 2002 as a method to visualize very complicated and precise topography data by laser measurement (Chiba et al., 2006, etc.). In this study, we report on the principle of the RRIM and recent achievements on application to big data which not from laser measurement.
2.Red Relief Image Map (RRIM)
There are several methods for creating images directly from DEM by calculation, such as shadow plots, oblique maps, and advanced step diagrams, but each has its advantages and disadvantages. The common problem of these methods is difficult to express by one sheet and the 3-dimensional expression will be changed with rotation. The RRIM had been developed as a method for solve these problems. For create RRIM, after obtain the inclination, negative openness and positive openness from DEM, we multiplied the image of inclination which is proportional to the red saturation and the image of ridge valley value which obtained from the positive openness and the negative openness and are proportional to the lightness. Since this image is perceived as ortho, it is expressed stereoscopically, so it was possible to incorporate much information into a small scale figure. The one used for the visualization of the laser measurement data was very effective for the field survey in the jungle area. The beginning of the development of RRIM was the Aokigahara area in Mt. Fuji, but since then it has been used not only for volcanoes in various places but also for landslide surveys and active fault surveys.
3.Expansion of scope of application
We applied it to data with larger mesh size, which proved that it is possible to express the wider terrain clearly. It has been evaluated to be useful for topography understanding by applying to 10 m mesh data in Japan and 4 km mesh data of the whole Earth so far. In addition, this expression technique can be applied as long as it is data having one Z value for a set of YX values. Therefore, we tried to apply relief data of 0.1 micron mesh by laser microscope and data of Mars and Moon. In this poster, we will introduce contrivances of expressions that are tailored to the purpose of each data with respect to attempts to express data other than those.
4.Retardation color palette
The RRIM has a problem that it can’ t get altitude information and tilt direction information. For that confrontation, it has been done to overlay contour diagrams or to overlay weak shadows, but it was difficult to understand. Recently, I attempted to approach this problem by using interference fringe color by using retardation color palette from DEM. I will introduce the current idea here.

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