

New paradigm of planetary science education comes from 'Subaru'

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Many people had interest in 'the closest approach of the Mars' that it happened in August 2003. Astronomical observation network for high school students (Astro-HS) have chosen this Mars as an observation theme in this year. One of these highlights, 'Subaru Telescope' has granted the request for the educational use of the Mars observation. It was not the image of the JPEG figure for the public information, but the FITS images of infrared region was provided. At present, the high school students are doing the analyses of these data. In these images, precious data about planetary science are contained. For example, it can get the physical quantity of the Mars from the provided images.

(1) The distribution of the ice cloud of the water from IRCS (Infrared Camera and Spectrograph)

The polar cap of the Mars is formed with carbon dioxide. But, it is considering that the ice of water exists the underground of that. The distribution information of the underground water ice is estimated from a gamma ray observation of the probe. As for the Mars of this year, the southern polar cap was seen from the Earth. The polar cap reduction was confirmed from the high school students' observation as well. The lower layer ice of the water sublimates due to the sublimation of the ice of carbon dioxide which covers the Mars surface. Then, those ice clouds occur at once in the Mars environment whose atmospheric pressure is low. The distinction of the ice cloud of water and carbon dioxide is difficult in the visible range. However, it becomes possible in the near infrared region because of their wavelength dependence of reflectance if suitable narrow band filters are used. Three kinds of filters were used with the imaging observation of IRCS in consideration of this. The distribution of the ice cloud of water can be estimated by comparing the image taken with the filters.

(2) The temperature distribution of the Mars from COMICS (Cooled Mid Infrared Camera and Spectrometer)

The observation in mid infrared region is wavelength range that heat radiation excels in more than the reflection of the solar light. Ten kinds of wavelengths between N-band 8.7 microns and Q-band 24.5 microns were used with actual observation. Temperature can be estimated from the ratio of each image flux, which is calculated from Planck's formula of radiation. The temperature from the observation almost corresponds with the measurement by the probe Viking. Of course, it can get the temperature distribution of the Mars whole surface from the image analysis. From them, 'the temperature pattern' is very different from the visible pattern of the Mars surface. Furthermore, it seems that the specific heat of the rock on the surface of the Mars can be estimated from the comparison with N-band and Q-band.

Unfortunately, Japanese 'Nozomi' couldn't be thrown to the Mars. However, the probe of USA is employed smoothly, and the latest data of the Mars will be able to be investigated. The new educational subject of the comparison planet can be expected by comparing the result of the data by 'Subaru Telescope' with that by the remote sensing of the Earth. It can be said that it is the new first step of the Mars observation about this. Astronomy is thought to influence many fields as a leader of planetary science of the 21st century. At the presence, the new paradigm of planetary science education will come from the communication between researchers and educators.