

Spectral observation system of lunar surface using CCD camera

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Ground observational systems of the lunar surface and the image analysis system are developed. Observational system consists of the telescope with cooling CCD camera, and narrow band pass filters.

For flat field images, scattered light on the screen lightened by two electric-bulbs at night, or the daytime sky are targeted. We also adapted the position of each filter in CCD camera depending on the imaging wavelength. Geographic and relative-radiometric corrections are applied to these images.

RGB color-ratio composite images of Mare Imbrium, Mare Serenitatis, and Mare Tranquillitatis indicate that the tendencies of titanium and iron contents are consistent with the ones of Apollo samples.

Ground observational systems of the lunar surface and the image analysis system are developed. Observational system consists of Schmidt-Cassegrain telescope (Meade LX-200-20 F10), cooling CCD camera (SBIG ST-6), and narrow band pass filters. 3 filters of 415nm, 750nm, and 950nm, are applied to investigate the compositions and contents of maria, especially, titanium and iron contents.

For flat field images, scattered light on a screen lightened by two electric-bulbs at night, or the daytime sky are targeted. The former method is suitable for flat fields of long wavelength (750 nm / 950 nm), and the latter is for the ones of shorter wavelength (415 nm). We also adapted the position of each filter in CCD camera depending on the imaging wavelength.

In order to image an entire nearside moon, more than 15 images are necessary in our system. Geographic and relative-radiometric corrections are applied to these images. Applying image-to-image methods of ENVI system, all images are mosaiced in each wavelength.

RGB color-ratio composite images are created from 3 spectral band mosaic images, (e.g., Pieters, et al., 1994) for Mare Imbrium, Mare Serenitatis and Mare .Tranquillitatis. The results indicate that the tendencies of titanium and iron contents are consistent with the ones of Apollo samples. Moreover, 950 nm and 750 nm ratio composite image of Mare Fecunditatis and Mare Nectaris indicates the tendency of iron contents consistent with Fe map obtained by Lucey et al.(1997).