Seamless Hyperspectral High Spatial Mosaic Derived From Chang’E-1 IIM

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Introduction to IIM

The Chang’E-1 Interferometric Imaging Spectrometer (IIM) is a grating-based spectrally modulated Fourier transform imaging spectrometer (Table 1 and Fig. 2).

Calibration and Photometric correction of IIM

The lab spectral calibration shows the spectral position accuracy of 0.04 nm (0.143 mm to 2.48 mm) over the full FOV. The IIM radiometric calibration shows average uncertainty of 3.56%. The IIM signal chain is linear over the range (0-150) with a small nonlinearity at the low-end signal levels (2.5%). IIM is very stable because it has no mobile apparatus and with good thermal protection.

The photometric correction of the Moon was calculated into 4 classes (Fig. 4: very bright areas, highland basins, and high-signal areas, respectively, and the IIM signal was estimated. The photometric correction was applied to each pixel by applying a suitable model-pixel-by-pixel.

The in-flight flat-field correction often removes the cross-talk photometric signal. We provided a new method for detecting the combined effect of the photometry and non-linearity of detector response along the cross-track. The method for deriving the correction factor is systematically distributed with respect to the incident angle, the photometric effects can be compensated by subtracting the flat-field signal (Fig. 5).

Previously, the bad pixels were denoted commonly with only a single bad pixel detected. We used multiple bad pixels to detect bad pixels with spatial angle mapping. Subsequently, the bad pixels were replaced by the average value of their immediate neighbors.

References