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Lunar internal structure estimated from local admittance between gravity and topography

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For the study of lunar basins of which diameter are comparable to lunar radius, localization by two -dimensional Fourier analysis is not appropriate. Instead, we use spectral filter of wavelet analysis that automatically adjusts spatial size and a band width so as to remove undesired signals at wavelength longer than the size of studied area properly from local spectra. Then we adopt the method developed by Simons et al. (1997). This method also has an advantage to Fourier analysis that the gravity and topography models can be calculated without a loss of spectral information. This advantage is particularly important for distinguishing several compensation mechanisms of the lunar basins. The mathematical procedures of localization of gravity and topography are described in detail by Simons et al. (1997) and Wieczorek and Simons (2005). The latter proposed new kinds of windows that maximize spatial energy within a polar cap and spectral power within a spherical harmonic bandwidth to remove bias of stochastic processes from global data optimally. For numerical simplicity, however, we follow the former method and use truncated spherical harmonic expansions of boxcar caps as a window function. New analysis reveals a difference of internal structures of highlands, as well as basins, on nearside and farside.

Keywords: Moon, Internal structure, thermal history