EPSC Abstracts
Vol. 5, EPSC2010-103, 2010
European Planetary Science Congress 2010

EPSC2010

The Lunar Free oscillations (LFO) and Problem the Internal Structure

O. B. Khavroshkin and A. B. Khrustalev
Institute of Physics of the Earth, RAS, Moscow, Russia
e-mail: khavole@ifz.ru

The internal structure of the Moon, the state and structure of the central zone, and the spectrum of free oscillations are important objects for Moon development. The velocity section of the crust and upper part of the mantle may be as well as the upper/middle mantle boundary, have been studied sufficiently well. However, concepts about the core–asthenosphere zone down to the center remain ambiguous. The using of approach to estimating the internal structure of the Moon including its central zone based on the spectrum of lunar free oscillations (LFO) has no alternatives. LFO are developed by using the modulated effect lunar seismicity by oscillations. Correspondingly, the series of seismic events was constructed from the time intervals between the moments (beginning) of moonquakes, while the seismogram duration was assumed as the signal amplitude. Thus, we took into account the non-Markov nature of moonquakes. The Lomb–Scargle method applied below for the spectral analysis of the data with non uniform records is boosted by the account for the non-Markov nature of the process (application of the duration of effect as the amplitude). The spectral analysis of long observation series of lunar seismicity (4–6 yr), including the simultaneous record of moonquakes induced by different types of LFO, also distinguished the peaks ofspheroidal and torsion oscillations. The lunar lithosphere is likely to have a block structure with weak contacts between blocks in the upper lithosphere, while the spectrum of free oscillations depends on the type of forcing (meteoroid fall), the angle and direction of the fall, and the energy of the shock. Since high Q-factor and fracturing of the lithosphere facilitates the development of nonlinearity of free oscillations.