

## Consideration of causes of deep moonquake generation and heterogeneity of the lunar mantle

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The Apollo lunar seismic experiments have revealed that lunar seismic events; deep moonquakes, occur repeatedly from specific source regions at depth of 700-1400 km in the lunar interior. The deep moonquake occurs periodically related with positions of Earth, Moon and Sun; that is tidal forces (e.g., Lammlein, 1977, Bulow et al., 2007), but the generation mechanism of deep moonquake is not understood well regardless of some theories (e.g., Cheng and Toksoz, 1978, Araki, 2001).

In this study, we investigated characteristics and mechanism of deep moonquake generations from active well-located 15 deep nests. From previous analysis of Apollo seismic data, we know that deep moonquake occurs with different amplitudes among each deep nest (Lammlein, 1977). We, therefore, derived seismic moment from each deep moonquake event and analyzed the variation of the amplitude and the difference among deep nests. This investigation showed that amplitudes of seismic moments of the deep events are different among the active nests and they have regional characteristic.

Then, we calculated tidal stresses worked on region of each active nest during Apollo-era to reveal the correlation between the seismic moments and the tidal stress in terms of the amplitude and the time variation. From this analysis, we do not clearly identify the correlation between amplitudes of the seismic moments and those of the tidal stresses, but the deep nests occur the events with large seismic moment tend to have lower correlation between the occurrences and time variation of the tidal stresses than the nests with lower seismic moment. These results indicate that generation mechanism of deep moonquake may be different among each deep nest and/or the lunar mantle may have different elastic characteristics around each region of deep nests.

In this presentation, we will show the results derived from further analysis of more deep moonquake events and validation of previous results. Then, we will progress the discussion about the mechanism of deep moonquake generations and heterogeneity of the lunar mantle.

Keywords: Deep moonquake, Seismic moment, Tidal stress, Generation mechanism of deep moonquake, Lunar interior structure, Lunar exploration