# Estimation of the lunar near-surface effects on Moonquake waves amplification.

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Ever since the Apollo days, pioneering works on lunar seismology have mainly focused on understanding the deep structure of the Moon. Over the last decades we have witnessed a significant leap in high-resolution mapping of the surface of the Moon and lunar surface geology and topography became well known. However, the effects of the lunar surface geological features on moonquakes amplification remain poorly described in the lunar seismology literature. Meanwhile, studies of the terrestrial near-surface geology and topography effects on earthquake wave-amplification evolved and led to the establishment of a whole new branch of seismology, referred to as ‘Near-surface seismology’. It became a scientific fact today that the near-surface geology and the complexity of the topography play significant roles as far as earthquake wave amplification is concerned.

The aim of this study is to attempt an initial near-surface seismology analysis of the lunar seismic data recorded at the different Apollo Lunar Surface Experiments Packages (ALSEP) sites deployed by NASA during the different Apollo missions. We propose to adapt and apply modern seismic site effect estimation techniques, such as the seismic spectral ratio and the reference site response to the surface lunar meteorite and artificial impacts, as well as the shallow moonquakes cataloged by ALSEP. Results from this study will provide a new perception of the near-surface wave behavior in a lunar environment, and help the estimation of the lunar regolith effects on moonquake wave amplification. The understanding of the lunar near-surface geological and topographical effects on the moonquakes behavior will provides key elements for the future Lunar Geophysical Network deployment site selection, by avoiding the potentially high amplification sites based on the surrounding topography and local geology.

Keywords: Lunar seismology, Site effect estimation, Near-surface geology amplification