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Re-examination of Apollo 17 LSPE data with respect to new LRO coordinates

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We examine the existing Apollo 17 Lunar Seismic Profiling Experiment (LSPE) data with respect to new coordinates obtained through the combined use of lunar surface photography and high-resolution Lunar Reconnaissance Orbiter Camera (LROC) data.
The LSPE of Apollo 17 was used to explore the subsurface structure of the Moon. For the analysis of such seismic data sets it is necessary to have the exact positions of all used equipment, such as geophones and seismic sources.
The Lunar Reconnaissance Orbiter (LRO) mission launched on June 18, 2009. The LROC mapped the surface of the Moon from orbit, at a maximum resolution of 50 cm/pixel (20 inch/pixel), and therefore allows us a detailed mapping of the Apollo landing sites and a reconstruction of the geometry of the seismic network used.
In addition, we re-examined the surface photography taken by the astronauts during the extra-vehicular activities (EVA). Astronauts documented the deployment of equipment by using calibrated Hasselblad Electric Data Cameras by taking single shots with prominent features in the background or by taking a series of panoramic images while driving in the area of the deployed equipment.
By combined analysis of both high-resolution LROC orthoimages and Apollo surface images we determined geometrically accurate lunar-fixed ME-coordinates (Mean-Earth/Polar Axis) of the Apollo landing sites and equipment.
We find significant point deflections ranging from 1m up to 10m between previously published coordinates and the new LROC supported values for geophone and seismic source locations.
Consequently, we are now in progress to re-evaluate the data from the Apollo 17 Profiling Experiment with the new obtained coordinates, in order to obtain improved models concerning layering and seismic velocity structure of the lunar subsurface. Progress in this effort will be reported at the conference.
This study is supported by the Helmholtz Alliance “Robotic Exploration of Extreme Environments – ROBEX”. The ROBEX alliance aims to develop a new seismic experiment concept that can be conducted autonomously by robotic rovers on the Moon.