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THE ELECTRONIC FIELDBOOK: AN INNOVATIVE TOOL FOR LUNAR SCIENCE AND FIELD
OPERATIONS

Abstract

Scientific exploration will form an important part of future human missions to the Moon. In order to enhance the scientific return of these missions, it is important to accurately record, index and store all the scientific information collected during exploration, and then rapidly distribute it in a structured way amongst the relevant mission support personnel. Such capabilities will be essential for the ground-based science teams supporting these future missions for maintaining situational awareness, enabling them provide useful and timely feedback to the astronauts and thereby enhance the scientific expertise present on the lunar surface. The Electronic FieldBook (EFB) is a deployable system being developed to address these requirements. It is designed to support field mission operations, scientific data gathering and direct interaction with support teams through the automatic exchange of information. The EFB enables near real-time situational awareness between astronauts on a field traverse, astronauts supporting the traverse from an IV position, and ground support teams such as a science backroom. It achieves this through several methods. The system provides a structured way to collect data during scientific traverses. Users can document a sampling procedure, retrieve information from several sensors or analytical tools, look up reference information, and take notes. All information gathered is automatically geo-located and tagged to ensure it is associated to specific sites or samples along a traverse. The EFB comes as a fully integrated package, including portable devices for data collection and field-deployable wireless mesh data transmitters. The system ensures disruption tolerant information exchange, allowing users to continue working regardless of temporary or extended loss of connection. Provided connectivity is present, any user of the system will receive any information gathered in near real time, enabling them to direct or support the operations, and provide relevant and informed scientific advice where required. EFB has been the key supporting tool for ESA's PANGAEA/PANGAEA-X 2018 and PANGAEA 2019 field campaigns, which offer planetary geology training integrated with operations and technology testing. Within this context, the EFB has co-evolved to support both ESA training and testing activities, and provides a solution to the data integration challenge presented by future human scientific exploration in space.