MEETING

Outlining a Strategic Vision for Terrestrial Geodetic Imaging

Charting the Future of Terrestrial Laser Scanning in the Earth Sciences and Related Fields; Boulder, Colorado, 17–19 October 2011

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A workshop hosted by UNAVCO and funded by the U.S. National Science Foundation (NSF) brought together 80 participants representing a spectrum of research fields with the objective of outlining a strategic vision for the future of terrestrial geodetic imaging as applied to a broad range of research activities at all levels of the community.

Earth science investigations increasingly require accurate representation of the Earth surface using three-dimensional data capture, display, and analysis at a centimeter scale to quantitatively characterize and model complex processes. Recognizing this community need, researchers at several universities and UNAVCO established the NSF-funded Interdisciplinary Alliance for Digital Field Data Acquisition and Exploration (INTERFACE) project to support a terrestrial laser scanning (TLS) instrument pool and data collection expertise now based at UNAVCO. Enhanced instrument accessibility and capabilities, coupled with efficient workflows and unprecedented science applications, have catalyzed rapid community development and diversification. Engaging the community at this early stage represents a critical element in the growth of a coherent and effective research community. UNAVCO and INTERFACE researchers collaborated with other NSF-supported facilities including OpenTopography and the National Center for Airborne Laser Mapping (NCALM), federal agencies including the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) and the U.S. Geological Survey, and other universities to plan the workshop.

The convergence of participant ideas and experiences, a large and growing demand for TLS data and equipment, and clear consensus on issues repeatedly reached during the workshop resulted in several recommendations outlined below.

The workshop group recommended that product levels include raw sensor data (L0), sensor data in a sensor-independent exchange format (L1), merged, aligned point cloud data (L2), and derived data products such as digital elevation models (L3).

In addition, participants recognized that TLS metadata and best practices are required for each data level. The workshop group agreed that standardized metadata formats such as E57 (American Society for Testing and Materials (ASTM) International) are necessary and should be informed by community needs and set the standard for archived data sets.

The group also noted that there is demand for community training in TLS data acquisition, processing, analysis, and exploration through workshops, short courses, online resources, and user forums. In particular, procedures and best practices for rendering surface models from point clouds and standards for characterizing precision and uncertainties are needed for all products.

Recommendations for community support suggested building on core competencies and roles of several complementary groups. The workshop participants concluded that (1) UNAVCO serves as the primary NSF facility for TLS data acquisition and archiving, (2) OpenTopography is the primary NSF facility for TLS data dissemination, and (3) NCALM is the NSF facility with capabilities for mobile platform scanning (cars, aircraft, etc.) and archiving of these products. Communication and integration among the NSF facilities are essential to the effective realization of research goals and the broader impact of TLS capabilities. The communities served by these facilities would benefit from a comprehensive data management plan and policy. The NSF facilities will sustain and develop strong collaborations with leading geodetic imaging groups including federal agencies and principal investigators in geoscience, cryosphere, ecology, anthropology, and engineering. Terrestrial geodetic imaging support must include a holistic mixture of lidar (light detection and ranging), photogrammetry, and ground-based radar resources.

A comprehensive workshop report is available at http://www.unavco.org/community/meetings-events/2011/tls/tls.html.

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