The impact of open access to high-resolution topographic data

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High-resolution topography (HRT) is a powerful observational tool for studying the Earth's surface, vegetation, and urban landscape, with broad scientific, engineering, and education-based applications. Sub-meter resolution imaging is possible when collected with laser and photogrammetric techniques using ground, air, and space-based platforms.

Open access to these data and a cyberinfrastructure platform that enables users to discover, manage, share, and process them increases the impact of investments in data collection and catalyze scientific discovery. Furthermore, open and online access to data enables broad interdisciplinary use of high-resolution topography across academia and in communities such as education, public agencies, and the commercial sector.

OpenTopography, supported by the US National Science Foundation, aims to democratize access to Earth science oriented high-resolution topography data and processing tools. We utilize cyberinfrastructure, including large-scale data management, high-performance computing, and service-oriented architectures to provide efficient Web based visualization and access to large, high-resolution topographic datasets. OT colocates data with processing tools to enable users to quickly access custom data and derived products for their application, with the ultimate goal to make these powerful data easier to use.

OT's rapidly growing data holdings currently include 280 lidar and photogrammetric point cloud datasets (>1.1 trillion points) covering 221,085 km2. As a testament to OT's success, more than 83,000 users have processed over 5 trillion lidar points. This use has resulted in more than 250 per reviewed publications across numerous academic domains including Earth science, geography, computer science, and ecology.

New advances in the OT system include Web-based topographic differencing of high-resolution topographic data when areas are imaged two or more times. This multi-temporal topographic differencing can detect surface change from a variety of tectonic and geomorphic processes including earthquakes, volcanic eruptions, flooding events, and landslides. In addition, OT now provides a "Community Dataspace" that allows collectors of HRT data to upload, archive, and publish new datasets for citation and reuse.