Increasing the Impact of High Resolution Topography through Open, Online Access to Data and Processing

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The availability of high-resolution topography has been revolutionary for Earth science, environmental, and engineering applications. These data are powerful tools for studying the earth's surface, its vegetation cover, and the built environment. Typical surface processes act at fine spatial scales (<1m) to produce intricate landforms. High-resolution topography measures the three-dimensional geometry of the earth's surface and overlying features at appropriate resolutions. In addition, surface changes due to erosion, transport and sedimentation, as well as displacements due to earthquakes, landslides, volcanoes are often <1-10 m. Temporal comparisons of high-resolution topography enables scientists to quantify such changes in unprecedented ways that inform our understanding of surface, volcanic, and tectonic processes.
Technologies such as airborne, terrestrial, and mobile laser scanning, structure from motion photogrammetry, and multi-beam sonar are becoming increasingly accessible, making the collection of high-resolution topography more common. 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 educators, public agencies, and the commercial sector.
OpenTopography (OT) was initiated in 2009 with funding from the US National Science Foundation to democratize access to Earth science oriented high-resolution topography data and processing tools. Hosted at the San Diego Supercomputer Center (SDSC) at University of California San Diego, OT utilizes cyberinfrastructure, including large-scale data management, high-performance computing, and service-oriented architectures to provide efficient Web based 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 188 lidar point cloud datasets (>835 billion points) covering 180,381 km^2. Shuttle Radar Topography Mission (SRTM) global datasets, as well as pre-computed lidar DEMs are also available. Data come from a variety of providers through strong partnerships, including NSF supported projects and numerous US federal, state, and local agencies. As a testament to OT's success, several groups rely solely on OT to deliver data to their users. More than 10,000 OT registered users and tens of thousands of anonymous guest users have run 60,000 point cloud jobs, accessing over 2.5 trillion lidar points. This use has resulted in more than 151 per reviewed publications across numerous academic domains including Earth science, geography, computer science, and ecology.
As OT matures and high-resolution topography becomes more ubiquitous in Europe and Asia, we seek new partnerships to increase access to high-resolution topography outside the United States.

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