ArcticDEM; A Publically Available, High Resolution Elevation Model of the Arctic

Paul Morin (1), Claire Porter (1), Michael Cloutier (1), Ian Howat (2), Myoung-Jong Noh (2), Michael Willis (3), Brian Bates (4), Cathleen Willamson (4), and Kennith Peterman (4)

(1) University of Minnesota, Geology and Geophysics, Minneapolis, United States (lpaul@umn.edu), (2) The Ohio State Universtiy, School of Earth Sciences, Columbus, OH, (3) Cornell University, Earth and Atmpspheric Sciences, Ithica, NY, (4) National Geospatial-Intelligence Agency, Springfield, Virginia

A Digital Elevation Model (DEM) of the Arctic is needed for a large number of reasons, including: measuring and understanding rapid, ongoing changes to the Arctic landscape resulting from climate change and human use and mitigation and adaptation planning for Arctic communities. The topography of the Arctic is more poorly mapped than most other regions of Earth due to logistical costs and the limits of satellite missions with low-latitude inclinations. A convergence of civilian, high-quality sub-meter stereo imagery; petascale computing and open source photogrammetry software has made it possible to produce a complete, very high resolution (2 to 8-meter posting), elevation model of the Arctic. A partnership between the US National Geospatial-intelligence Agency and a team led by the US National Science Foundation funded Polar Geospatial Center is using stereo imagery from DigitalGlobe's Worldview-1, 2 and 3 satellites and the Ohio State University's Surface Extraction with TIN-based Search-space Minimization (SETSM) software running on the University of Illinois's Blue Water supercomputer to address this challenge. The final product will be a seemless, 2-m posting digital surface model mosaic of the entire Arctic above 60 North including all of Alaska, Greenland and Kamchatka. We will also make available the more than 300,000 individual time-stamped DSM strip pairs that were used to assemble the mosaic. The Arctic DEM will have a vertical precision of better than 0.5m and can be used to examine changes in land surfaces such as those caused by permafrost degradation or the evolution of arctic rivers and floodplains. The data set can also be used to highlight changing geomorphology due to Earth surface mass transport processes occurring in active volcanic and glacial environments. When complete the ArcticDEM will catapult the Arctic from the worst to among the best mapped regions on Earth.