Using ArcticDEM to identify and quantify pan-Arctic retrogressive thaw slump activity

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With the increased availability and coverage of high resolution satellite imagery, characterizing processes at the pan-Arctic scale is now possible. This baseline pan-Arctic product will enable us to highlight areas for future research efforts and to standardize observations that are currently locally or regionally focused. The ArcticDEM project (www.arcticdem.org) has released a large collection of 2 meter resolution Digital Elevation Models (DEMs) for all land areas above 60 °N. These DEMs are created using high resolution (~0.5 m) stereo paired satellite images (by DigitalGlobe and include Worldview-1 (launched 2007), 2 (2009), 3 (2014) and GeoEye-1 (2008) satellites). Using repeat DEMs, we are developing algorithms for automated detection to identify and quantify land surface topographic changes from Arctic volcano eruptions and mass wasting events to create a pan-Arctic mass wasting inventory, including retrogressive thaw slumps. Currently, retreat rates reported for retrogressive thaw slumping activity differ between studies, and our dataset will enable rates to be standardized for slump activity after 2007. Furthermore, our mass wasting inventory will enable us to investigate the triggers of mass wasting events and to analyze the linkages to the contributing factors including climate, topography, and geology. We will be presenting preliminary results focusing specifically on retrogressive thaw slumps, including time series analysis for topographic change detection and using field observations for validation. We welcome collaborators who can share the field or remote sensing observations to aid in our validation efforts.