

Using High-Resolution Commercial Satellite Imagery to Advance West Antarctic Ice Sheet Research Goals

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The Rapid Ice Sheet Change Observatory (RISCO) and the Polar Geospatial Center (PGC) acquired and processed 0.5 to 4 meter resolution commercial satellite imagery with a repeat frequency of 2 to 4 weeks during the austral summers from 2009 to 2011 over West Antarctic glaciers and mountain ranges. Specific areas of interest include the Fosdick Mountains, Pine Island Glacier, and Thwaites Glacier. RISCO and PGC also derived 4 meter digital elevation models (DEMs) using stereoscopic image pairs of high-interest WAIS research areas which had previously been modeled at only 200 meter to 5 kilometer resolution. Accurate DEMs are critical in correcting imagery, measuring glacier thickness changes, and modeling ice flow and surface melt water drainage. With a combination of the stereoscopically derived DEMs and frequent monoscopic imagery, researchers can observe glacial dynamics with an unprecedented synoptic view.

Logistical constraints severely limit the opportunities for field research in West Antarctica. And yet, because of its topography and glacial history, studying the West Antarctic Ice Sheet is crucial for our understanding of glacial processes, oceanography, and climate, both past and future. This high-resolution imagery can compensate for the difficulty of traditional field methods by providing temporal frequency, detailed spatial resolution, and accurate elevation models simultaneously.