Progress towards an Image-Enhanced 250 m DEM for the West Antarctic Ice Sheet

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An image enhancement technique based on photoclinometry is being applied to ICESat track data and a 1km DEM (with 7.5 km resolution) to generate a new DEM with a 250 meter grid spacing and resolution of approximately 500 m for the West Antarctic Ice Sheet. We present results for the Siple Coast region. The new DEM reveals the full 'undulation field' of the ice sheet catchment areas and glacier trunks, and promises to support improved regional analysis of accumulation and temperature variations around ice sheet topographic features. The DEM also quantifies flow-related features such as streaklines, and the slope break at grounding lines. MODIS data from the MODIS Mosaic of Antarctica, coupled with additional scenes from the same compilation year as the MOA data set, are calibrated by comparison with the initial DEM to generate a slope-to-brightness relationship (the 'photofunction'). This relationship is then used to generate a new, higher-resolution elevation field. Comparison to airborne laser altimetry suggests that the mean elevation precision is better than 2 meters.