



The Reference Elevation Model of Antarctica (REMA)

A High Resolution, Time-Stamped Digital Elevation Model for the Antarctic Ice Sheet

Background

The Reference Elevation Model of Antarctica (REMA) provides the first high resolution (8 m) terrain map of nearly the entire continent. REMA is constructed from hundreds of thousands of individual stereoscopic Digital Elevation Models (DEM) extracted from pairs of submeter resolution DigitalGlobe optical satellite imagery acquired between 2009 and 2017, with most collected in 2015 and 2016, over the austral summer seasons (mostly December to March).

This map was created from a version of REMA downloaded to 200 m resolution with data gaps filled by the 100 m resolution Antarctic Peninsula DEM by Cook et al. (2012) and the 1 km Cryosat-2 DEM by Helm et al. (2014) to provide visual continuity. The shaded relief image was exaggerated to enhance the texture of the ice sheet.

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Authorship

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Data Description

Data processing was accomplished using the Blue Waters supercomputer using the open source photogrammetry software SETSM by Noh et al. (2015, 2017, 2018). Each individual DEM was vertically registered to satellite altimetry measurements from Cryosat-2 and ICESat, resulting in absolute uncertainties of less than 1 m over most of its area and relative uncertainties of decimeters. Because each REMA grid point has a timestamp, any past or future point observation of elevation provides a measurement of elevation change.

REMA may provide corrections for a wide range of remote sensing processing activities, such as image orthorectification and interferometry, and provide constraints for geodynamic and ice flow modeling, mapping of grounding lines, and surface processes. REMA also provides a powerful new resource for field logistics planning.

References

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