GeoMAP on REMA

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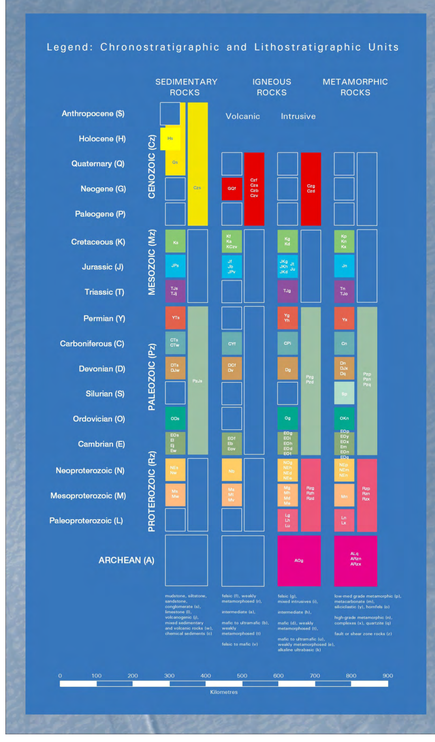
The first version of GeoMAP (v.201907) will be released here at the ISAES XIII meeting. It is a modern geological GIS dataset describing exposed bedrock and surficial geology of Antarctica.

This poster illustrates the continent-wide GeoMAP surface geology draped over another recently released dataset - the Reference Elevation Model of Antarctica (REMA).



GeoMAP Action Group

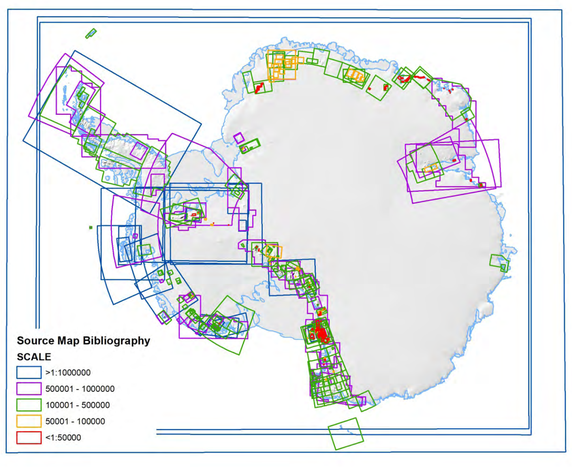
Project Background

The SCAR GeoMap (Geological Mapping Update of Antarctica) action group has been an international effort to gather both rock and surficial deposit information and compile it into a modern GIS framework. Construction from 2015-2019 has involved principal collaborators from USA, Norway, Italy, UK, Australia, Russia and New Zealand, but includes contributions from at least 14 nations. Much of the manual work has been completed by an 'engine room' of 11 student volunteers. Many others have provided advice, data and support.

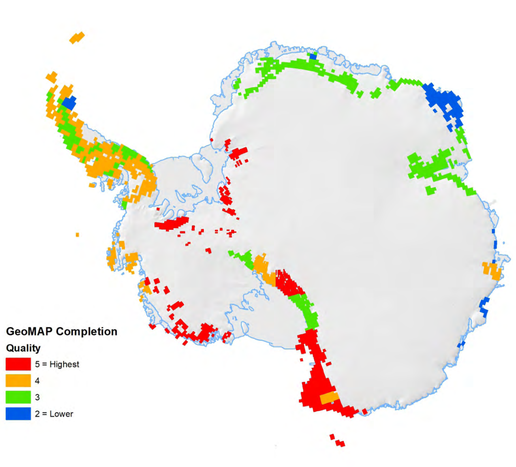
The aim has been to capture existing geological map data, update its spatial reliability, and improve representation of glacial sequences and geomorphology. The new GIS dataset comprises over 95,000 polygons describing 'known geology' of rock exposures, rather than 'interpreted' sub-ice features, using a mixed chronostratigraphic- and lithostratigraphic-based classification.

GeoMAP construction involved a 'top-down' work-stream, starting from a continent-scale, low density, attribute-poor dataset that has been added to and improved through multiple iterations. It involved capturing existing geological map data, refining its spatial reliability, then improving representation of glacial sequences and geomorphology. Feature classification and description rock and moraine polygons employs international GeoSciML data protocols to provide attribute-rich and queriable data; including bibliographic links to source maps and literature.

Bibliography of Map Sources



Completion, Quality & Work to Do



The Data behind this Poster

The map displayed above renders GeoMAP geological unit polygons with colours reflecting rock or deposit age, many of which will be difficult to see at a continent scale. But you can zoom in on the computer and a rich attribute table enables these data to be displayed or queried in a wide-variety of ways. Other data captured for GeoMAP includes a source bibliography of 502 polygons outlining maps and previous work (shown left), 1476 fault lines and 3850 structural data points.

GeoMAP has been displayed over a shaded greyscale image of REMA (Howat et al. 2019) relief, downscaled to 200 m resolution with data gaps filled by a 100 m DEM to provide visual continuity. REMA was constructed using the Blue Waters supercomputer and the open source photogrammetry software SETSM. A series of individual DEM's were developed from DigitalGlobe optical stereoscopic satellite images acquired from 2009-2017, then registered vertically to satellite altimetry measurements from Cryosat-2 and ICEsat. REMA has absolute uncertainties of less than 1m over most of its area and relative uncertainties of decimetres. Version 1 has been developed into a high resolution (8 m) terrain map covering ~98% of the Antarctic continental landmass.

GeoMAP has potential to provide fresh perspectives, for example, through combined geological legends and interrogation of continent-wide time-space plots. It is also ideal for continent-wide perspectives and cross-discipline science. Visit https://www.scar.org/science/geomap/geomap/ for further information and links to download data.

Invitation to contribute

One of the hardest tasks for GeoMAP has been, and still is, building consistency and capturing the local nuances of different interpretations available. There will undoubtedly be debate as to how well this has been achieved for v.201907, but there is full-expectation that it will continue to evolve and improve over time. There is a quality layer shown to the left) providing information on the attention various areas have received, relative quality of the information provided (Scale Lowest=1 to Highest=5), and work still needed.

The next stage of work will involve reviewing and finalising GeoMAP for publication. It is expected GeoMAP v.201907 will undergo peer scrutiny, QA/QC and editing for full publication around mid-2020. The Action Group are looking for people to contribute their local knowledge, so please contact Simon Cox (s.cox@gns.cri.nz) if you would like to be involved.

Reference:
Howat, I. M., Porter, C., Smith, B. E., Noh, M.-J., and Morin, P. 2019: The Reference Elevation Model of Antarctica, The Cryosphere, 13, 665-674, https://doi.org/10.5194/tc-13-665-2019, 2019.

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