

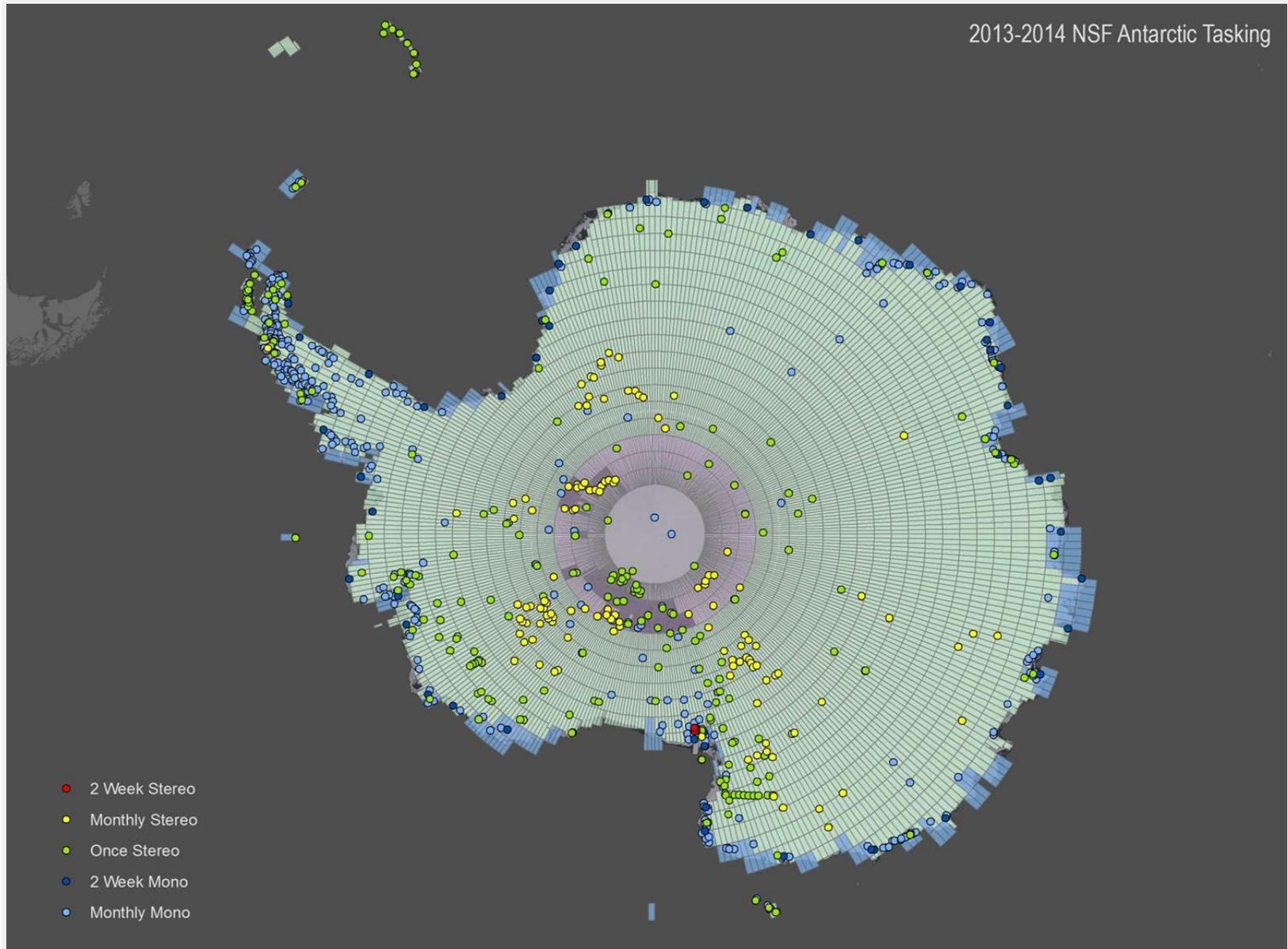
2014 US Annual Report

An aerial photograph of a research station, likely McMurdo Station in Antarctica. The station features several large, white, cylindrical storage tanks arranged in a grid-like pattern. A prominent circular logo with the letters 'NSF' in white on a blue background is visible on one of the tanks. The surrounding terrain is dark and rocky, with some snow patches. In the background, there are various buildings, parking lots filled with vehicles, and a large body of water with white foam, possibly a glacier or ice shelf.

Paul Morin
Polar Geospatial Center
University of Minnesota

TASKING

2013-2014 NSF Antarctic Tasking



ELEVATION MODELS

0/1 Software Packages

Ames Stereo Pipeline (ASP)

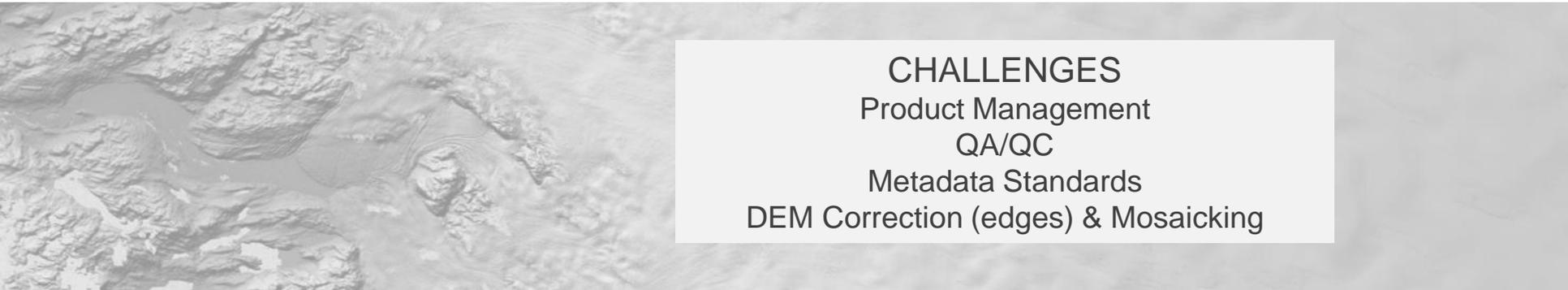
Surface Extraction with TIN-based Search-Space Minimization (SETSM)

 2-meter resolution DEM output

± 10-meter vertical accuracy without ground control

 Compute Intensive

ASP: one strip/pair averages 19 hours on 32-core node with shortcuts

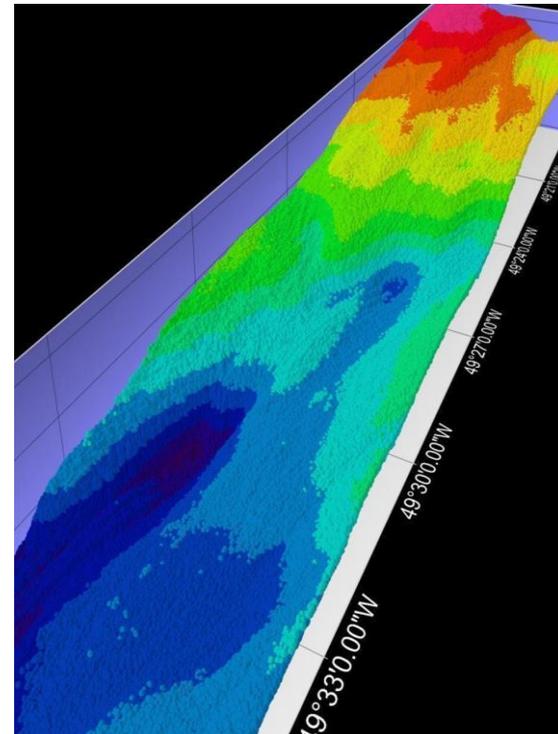
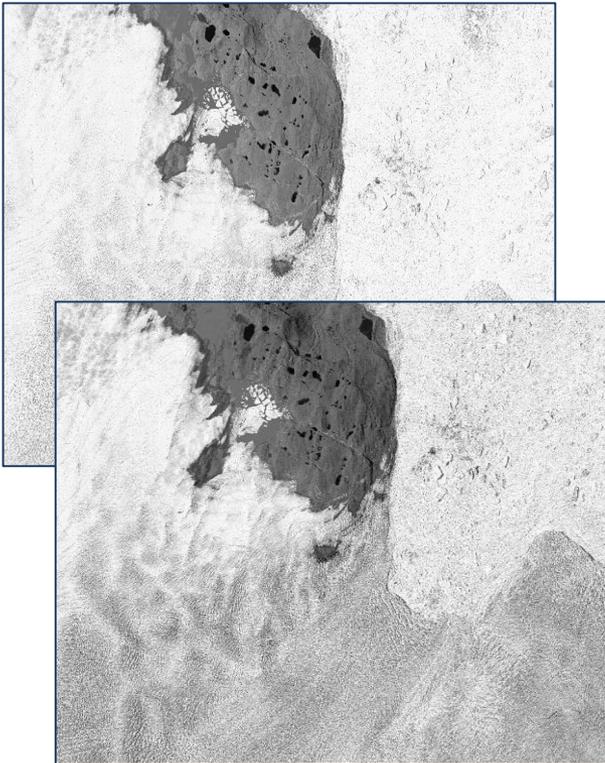
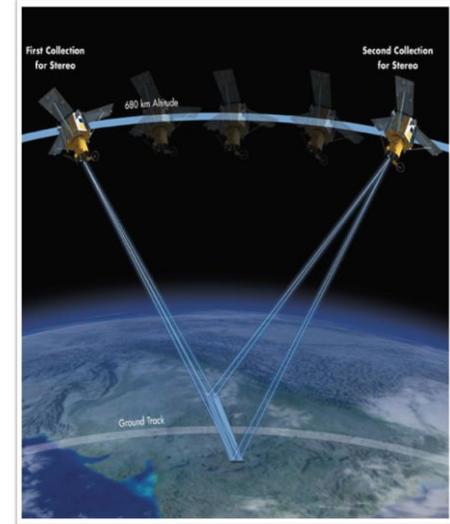


CHALLENGES
Product Management
QA/QC
Metadata Standards
DEM Correction (edges) & Mosaicking

DEM Extraction From Stereo

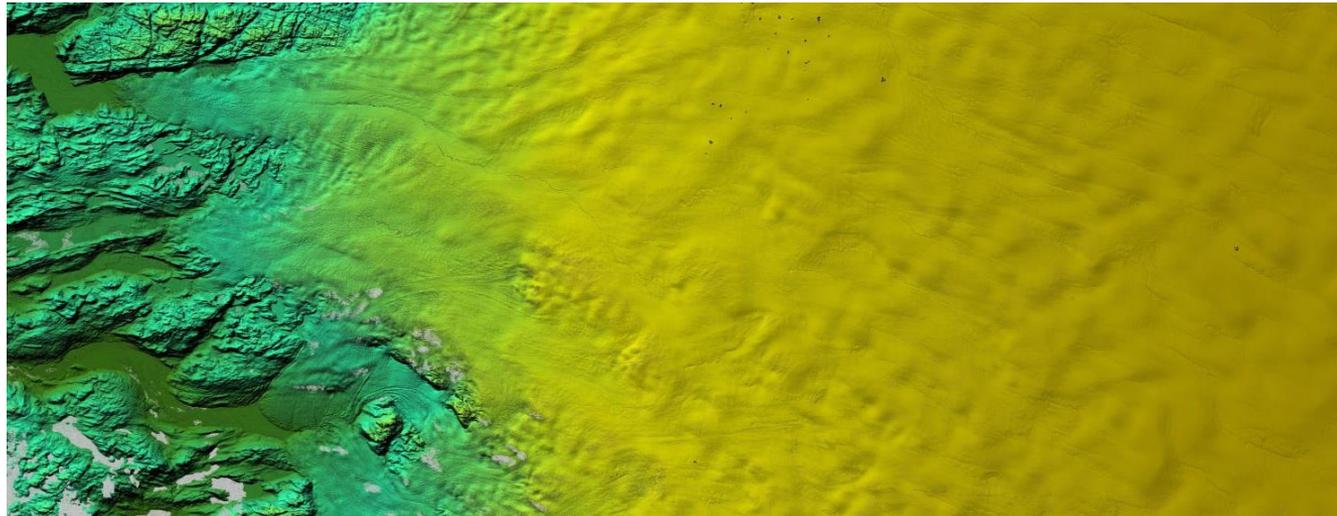
Generic Process

1. Iterative image matching, pyramid-based approach
2. Mass point calculation
3. Filtering and interpolation

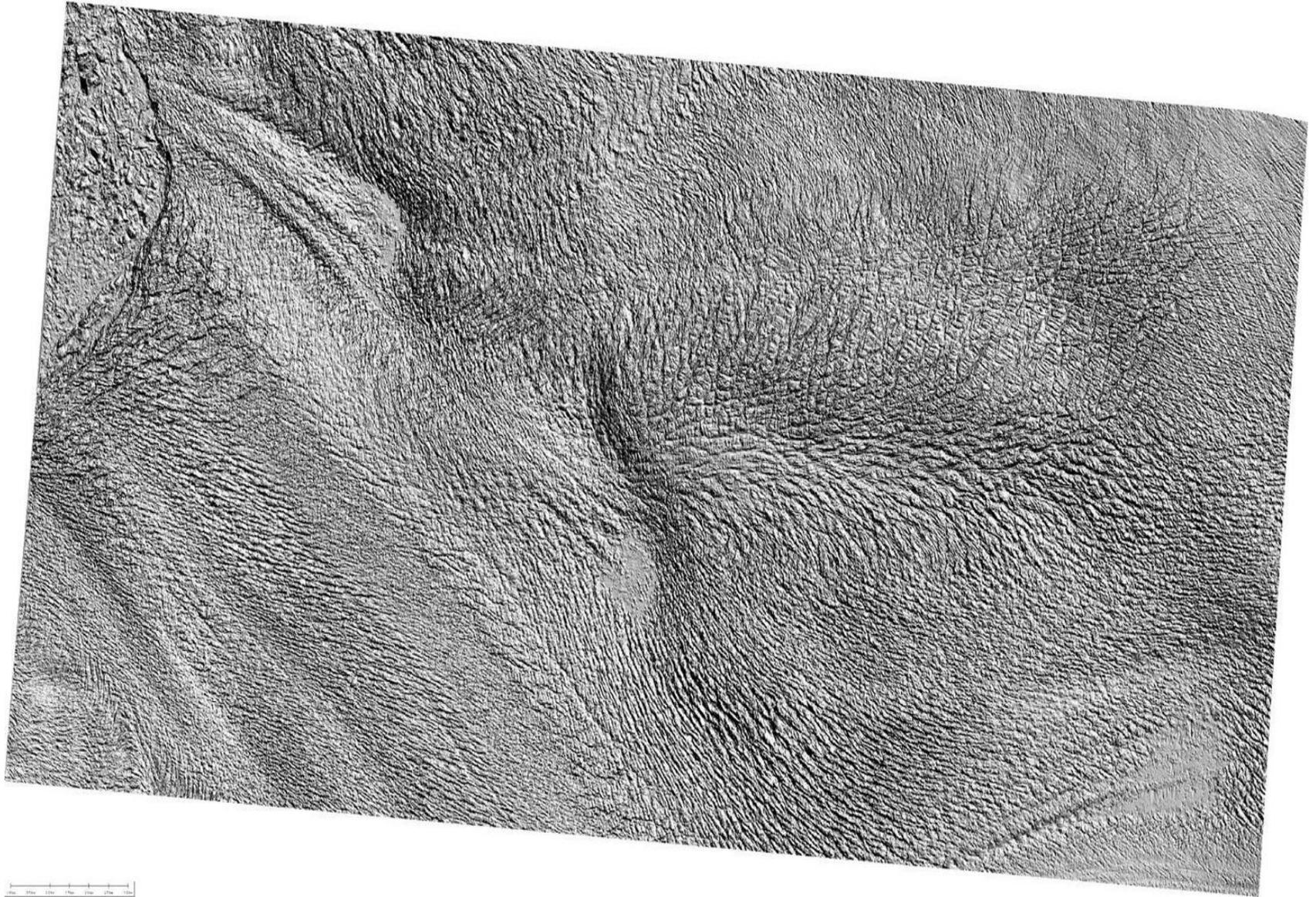


DEMs from Stereoscopic Imagery

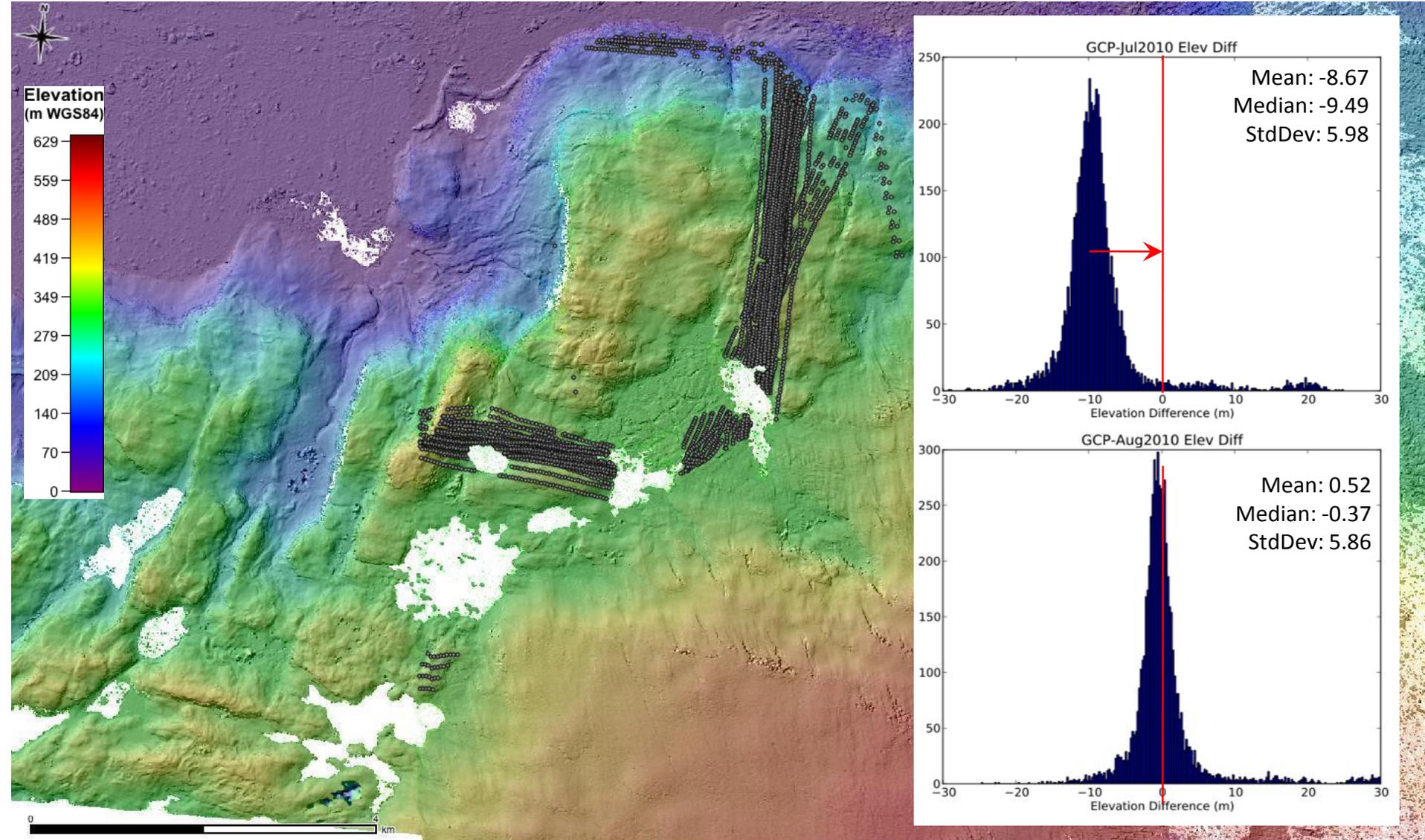
- Packages
 - Ames Stereo Pipeline (ASP)
 - Surface Extraction with TIN-based Search-space Minimization (SETSM)
- 2m resolution DEM output, +- 10m vertical accuracy without GCPs
- Compute Intensive
 - ASP: 1 strip pair avg 19 hours on a 32 core node with shortcuts
- Challenges
 - Product management/ quality control and metadata standards
 - DEM correction/
mosaicking



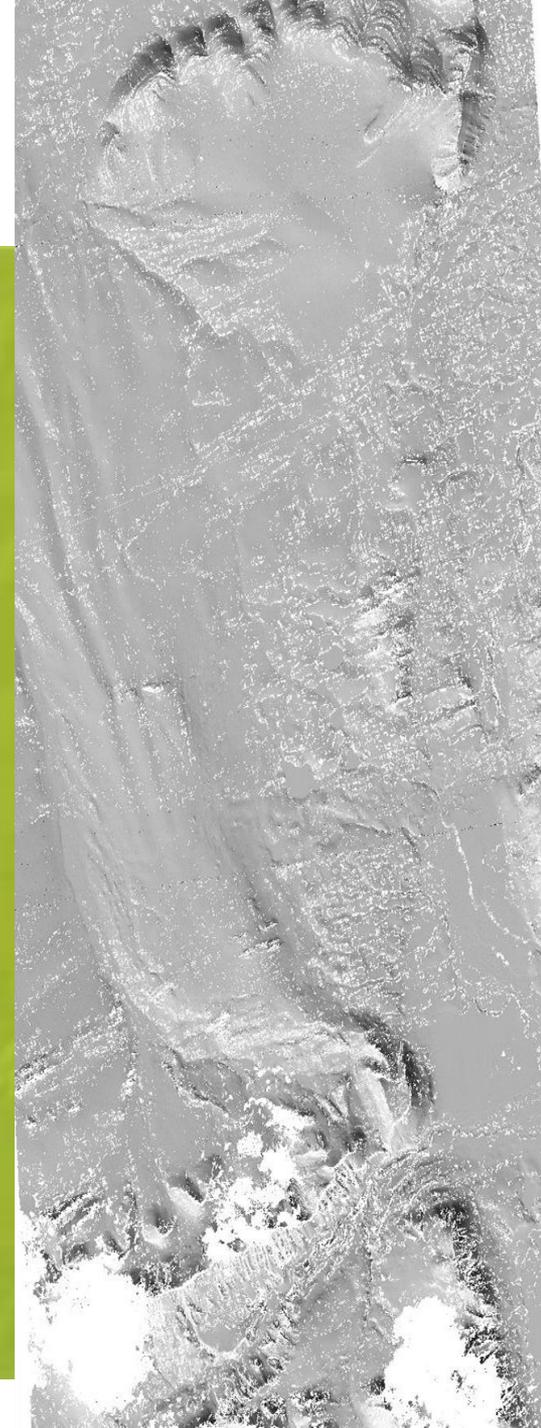
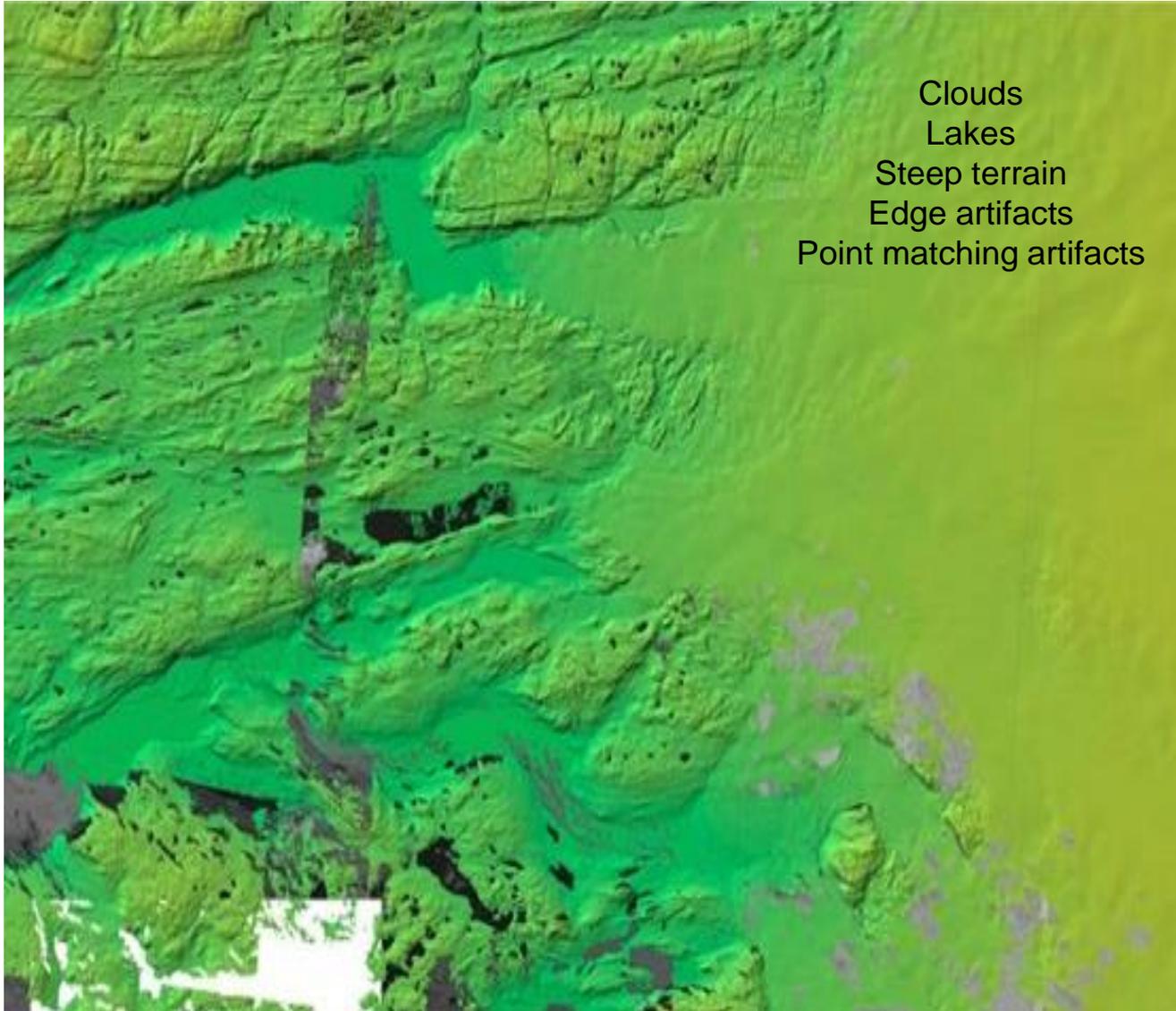
DEM Extraction From Stereo



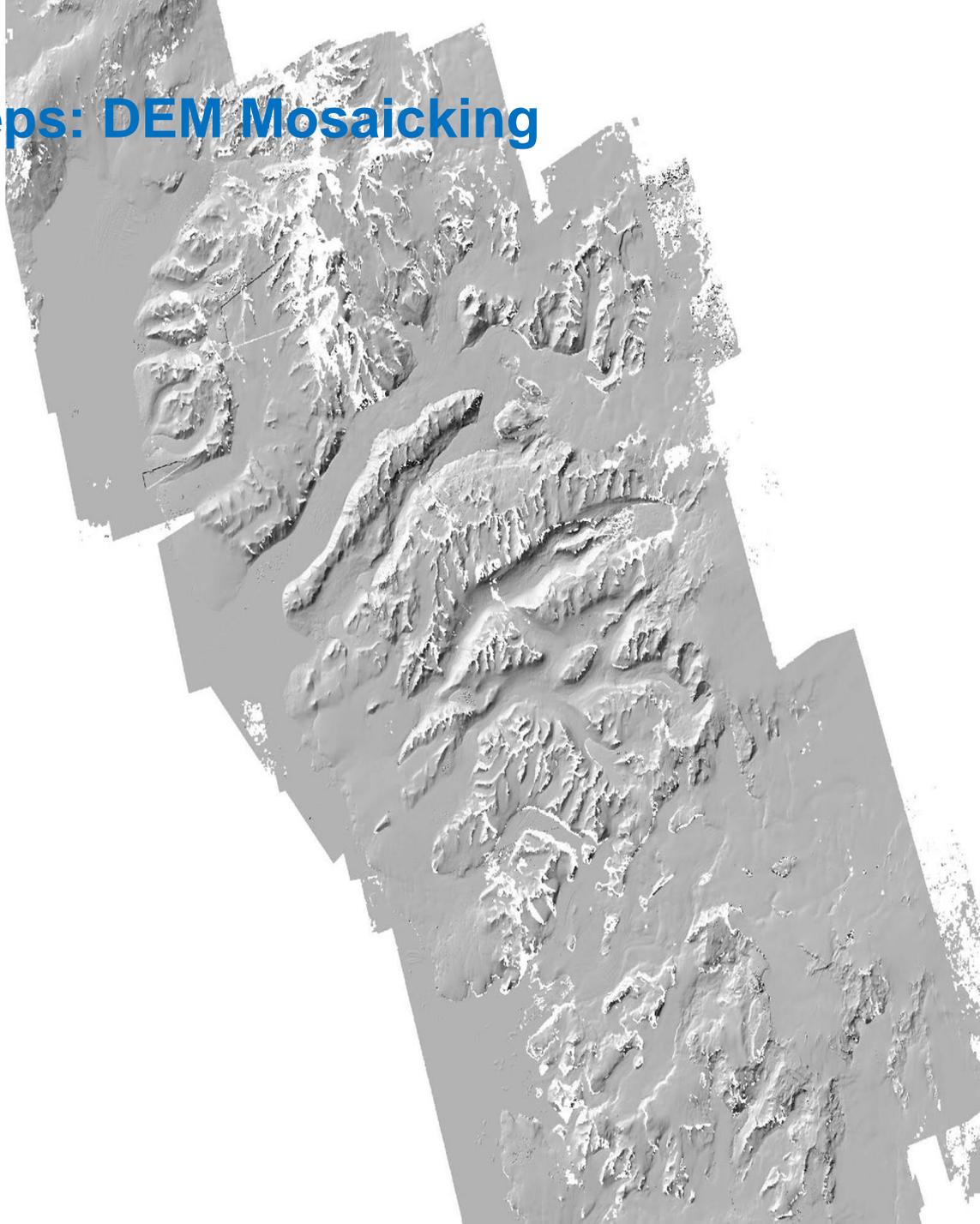
Accuracy Assessment (ASP)



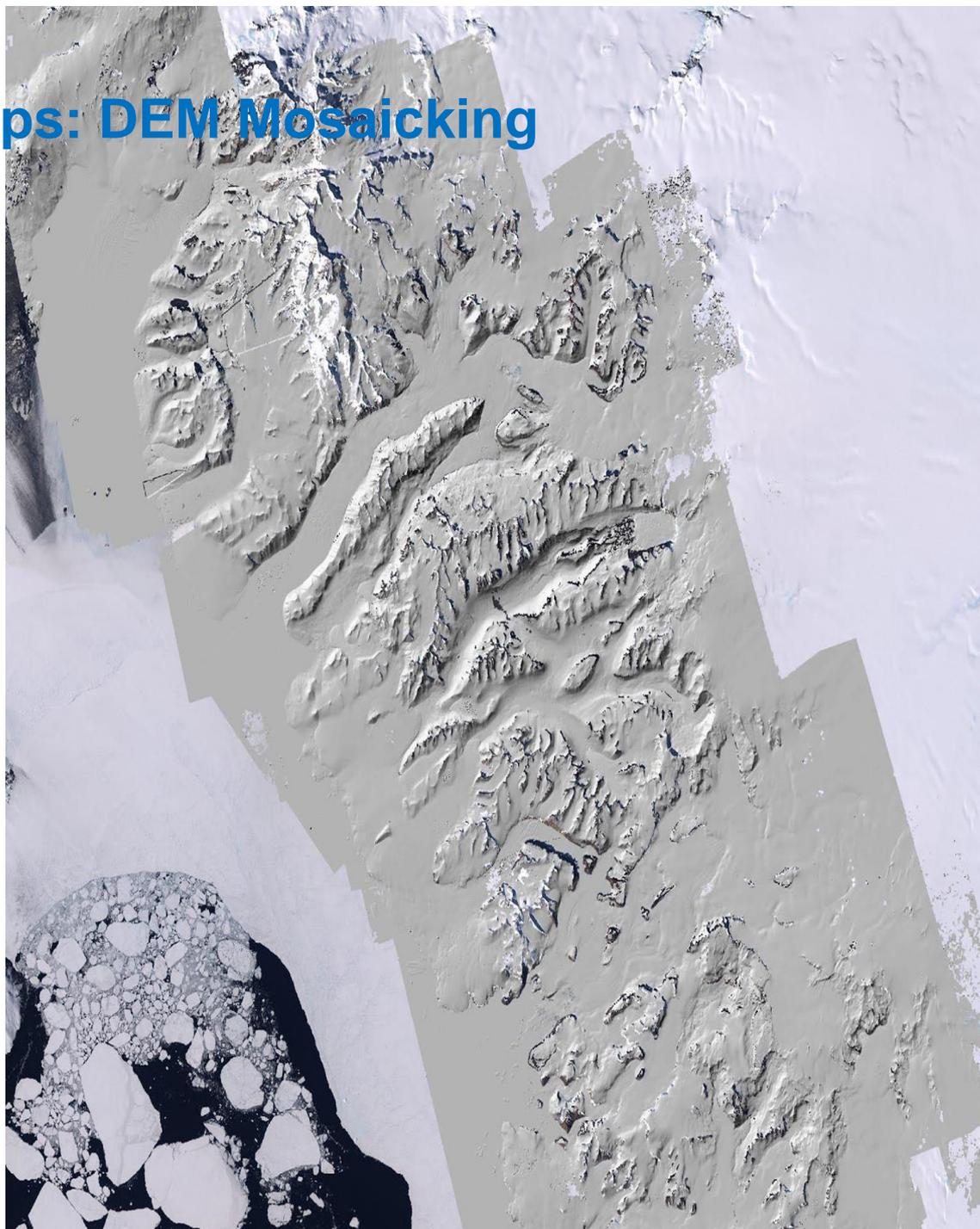
Sources of Error



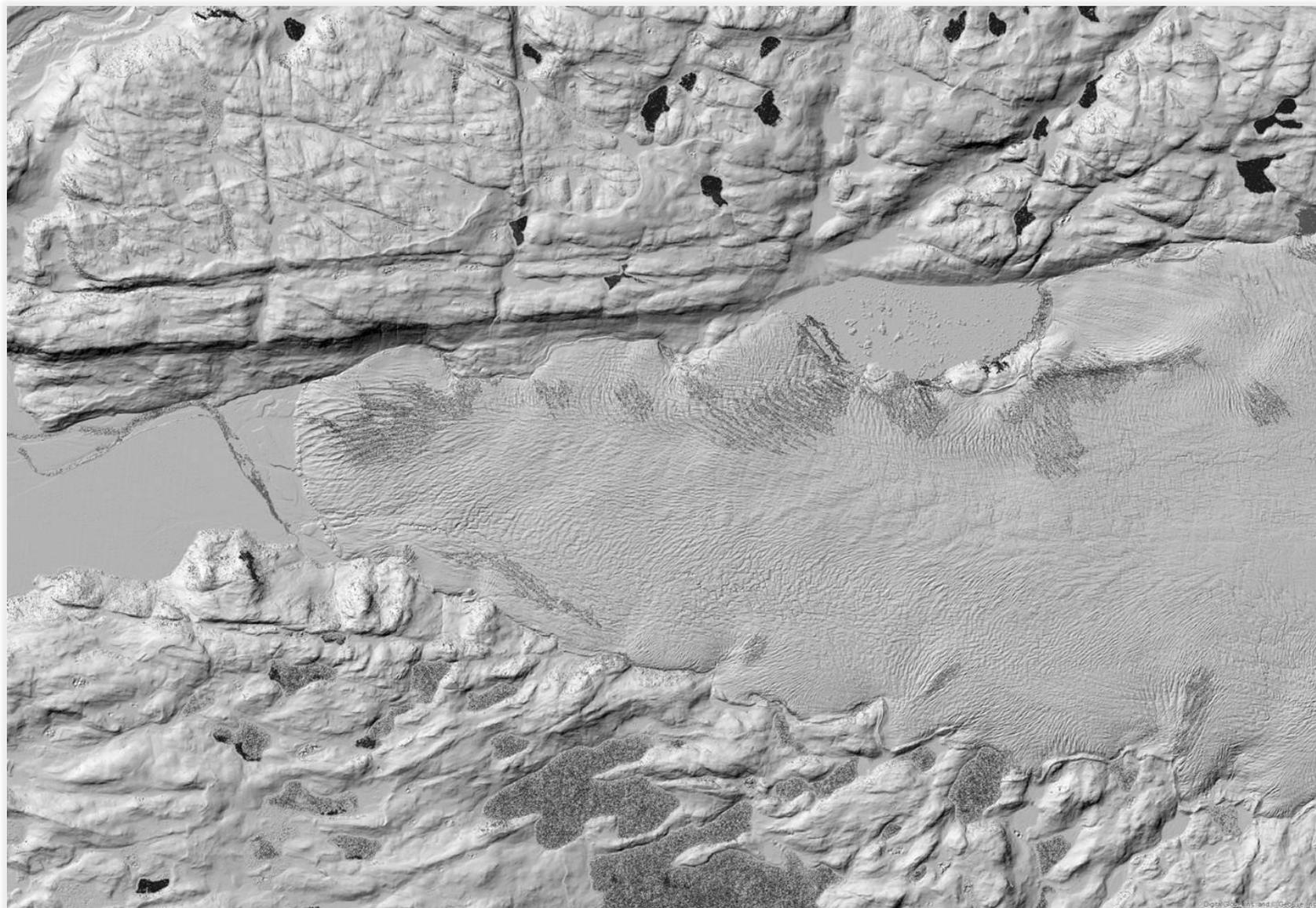
Next steps: DEM Mosaicking



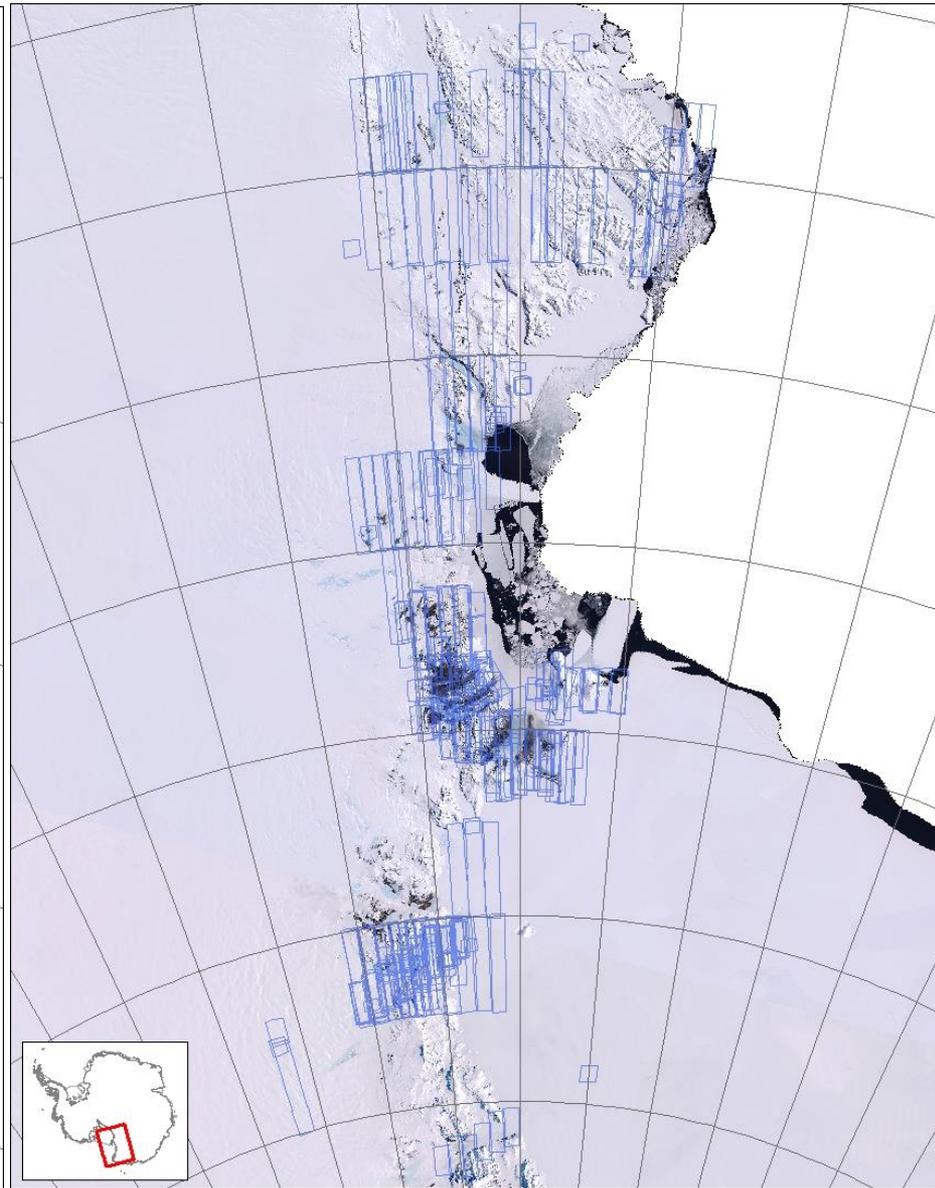
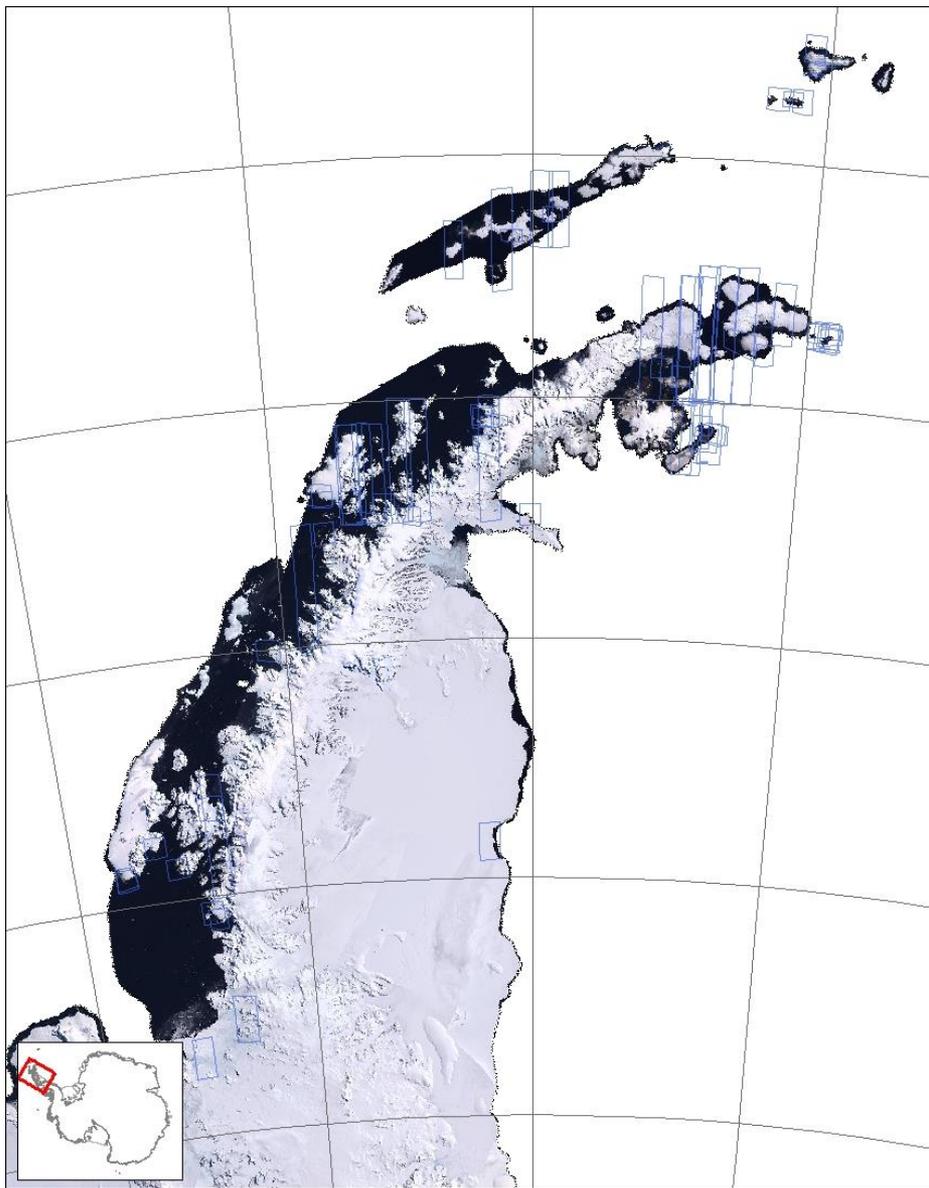
Next steps: DEM Mosaicking



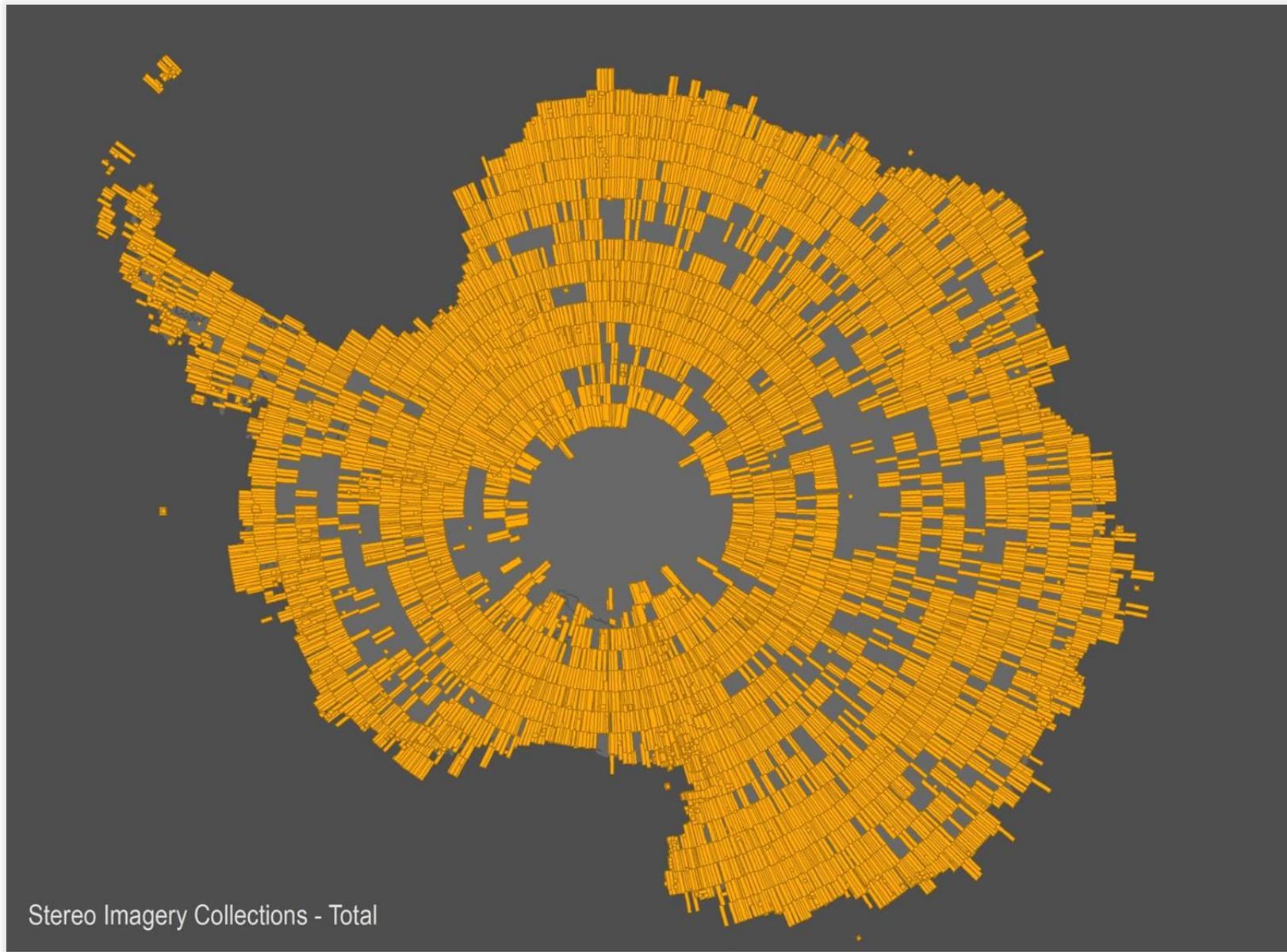
ELEVATION MODELS



Shaded Relief: Jakobshavn Isbræ, Greenland



ARCHIVE



data preservation & improvement

Brad Herried

MAP ARCHIVE

In collaboration with the **U.S. Geological Survey** and UMN's **Borchert Map Library** the PGC is actively

 **COLLECTING**

 **SCANNING**

 **GEOREFERENCING**

 **CATALOGING**

 **DISTRIBUTING**



historic and **contemporary polar maps** from many authors/organizations

MAP ARCHIVE



Map Authors:

United States

American Geographical Society
Department of Defense
National Geospatial-Intelligence
Agency
National Geographic
NAVOCEANO
Polar Geospatial Center
Toolik LTER
U.S. Geological Survey
University of Texas
...

International

Asiaq (Greenland)
Australian Antarctic Division
Bulgaria (APCB)
British Antarctic Survey
GNS Science (New Zealand)
Land Information New Zealand
France (SHOM)
SAGA Maps (Greenland)
Scott Polar Research Institute
UK Hydrologic Office & Ordnance
Survey
...

** additional organizations have not yet been added to public archive*

MAP ARCHIVE

USGS (and others) **organize** and **ship** maps to UMN Borchert Map Library.

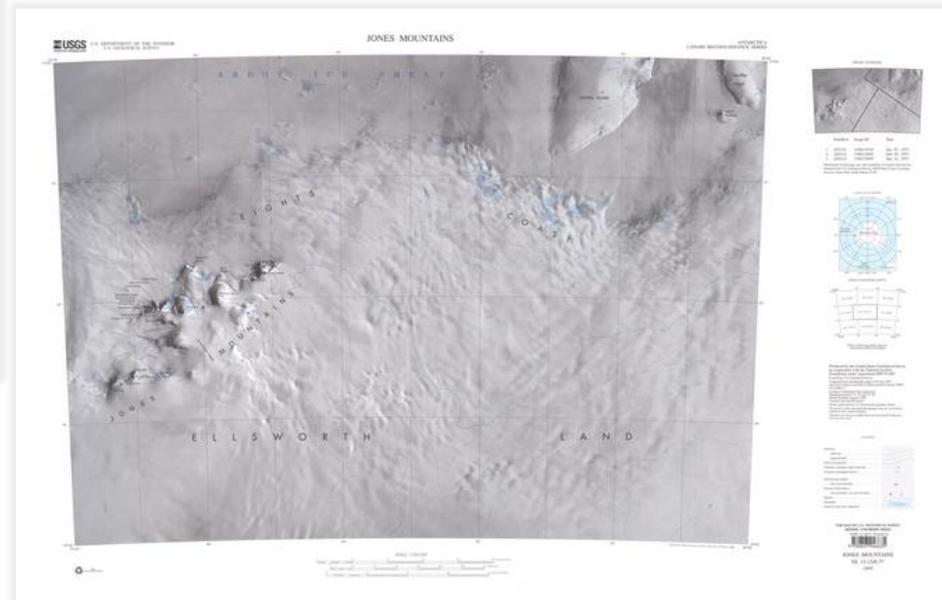
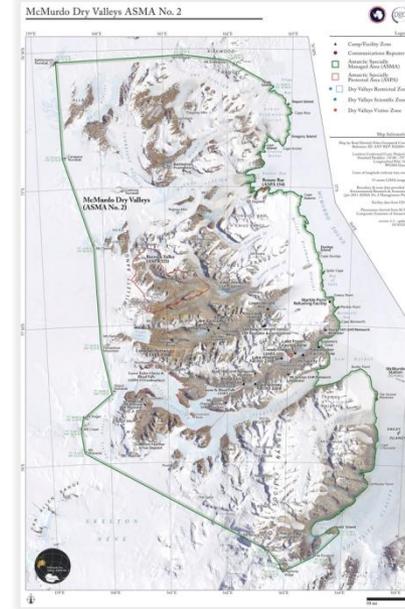
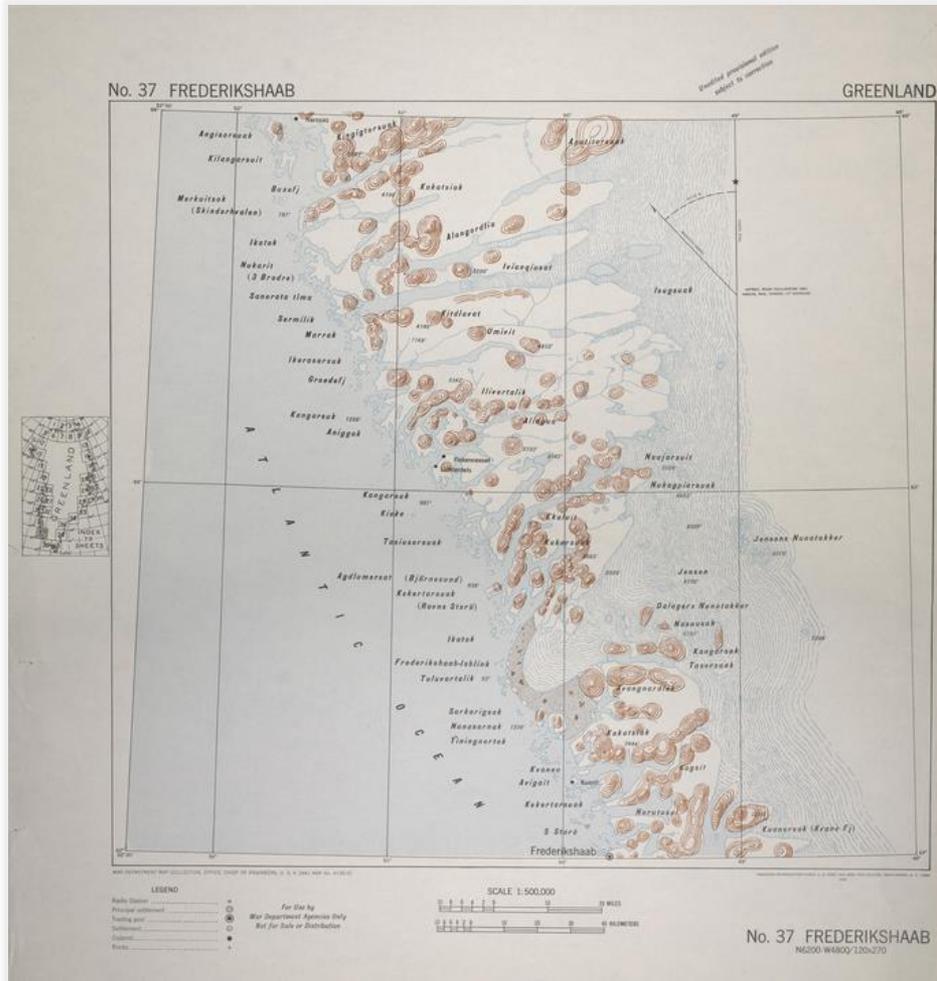
Borchert **scans** (~25 microns) and **delivers** digital maps to PGC.

PGC staff & students **archive, georeference, and catalog.**

Public maps available as no-cost digital download from PGC website as TIF, JPEG, PDF, and/or GeoTIFF.

Private maps (non-distributable archive, maps with commercial imagery) available to researchers on request.

MAP ARCHIVE



MAP ARCHIVE



Status & Timeline

1. Currently offering over 1,000 maps
2. More to be scanned & cataloged (time-consuming)
3. Do we integrate with SCAR Map Catalogue?
4. Does the PGC website search work effectively?
5. How do we decide on public vs. private archives?

ANTARCTIC PLACE NAMES

PGC, in accordance with the Advisory Committee on Antarctic Names (ACAN), is curating the Antarctic place names database

United States only from SCAR Composite Gazetteer of Antarctica (CGA)

Collaboration with international groups

Improved geographic placement of point features

Polygon digitization

ANTARCTIC PLACE NAMES



Status (April 2014):

Point Features

Total: 13,149

59.5%

complete

Polygon Features

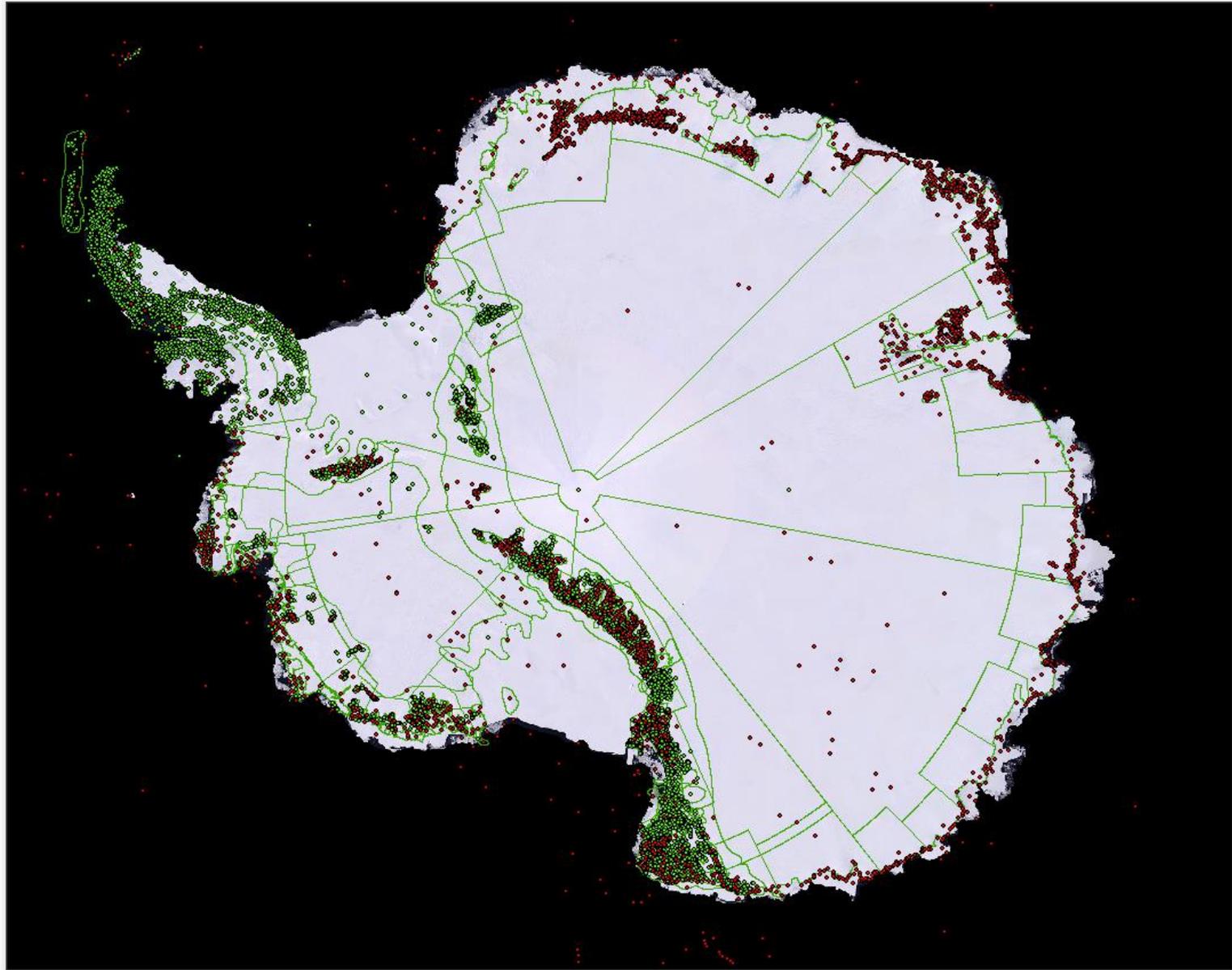
Total: 6,836 *

49.3%

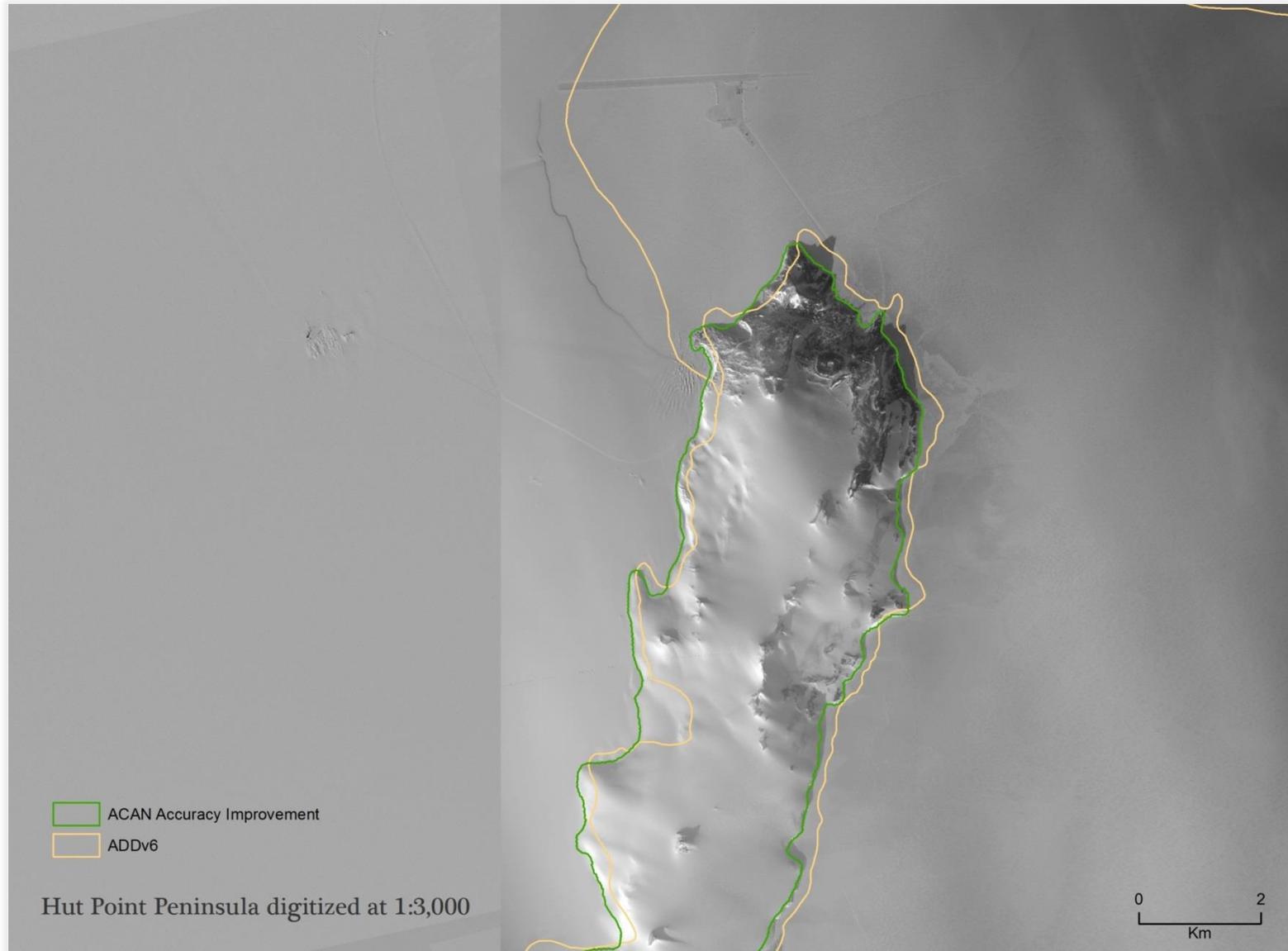
complete

** eventually, there will be a polygon for all features*

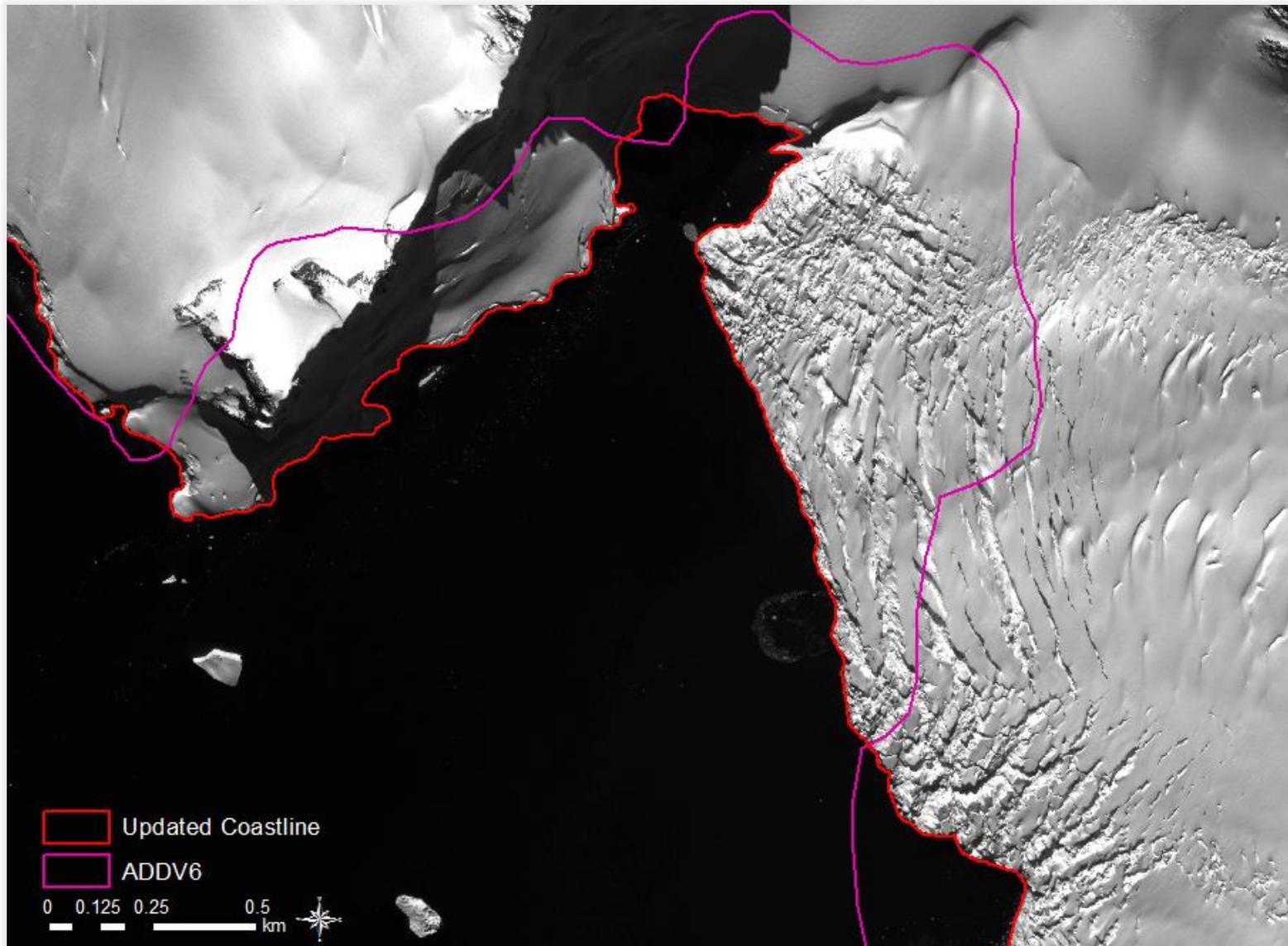
ANTARCTIC PLACE NAMES



ANTARCTIC COASTLINE



ANTARCTIC COASTLINE



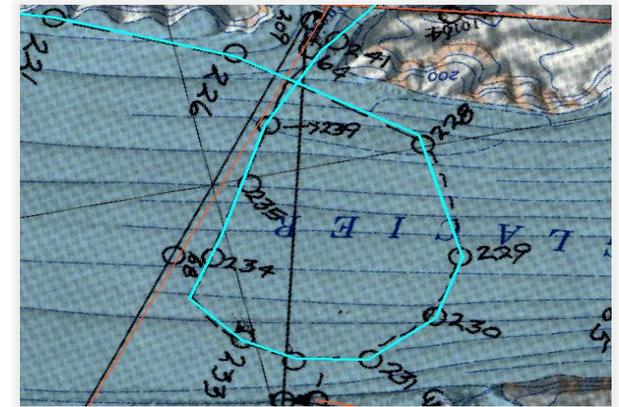
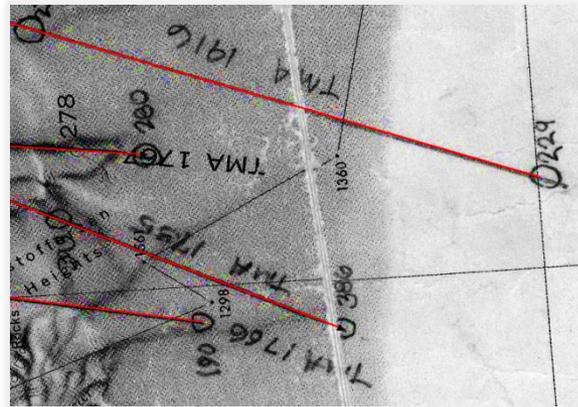
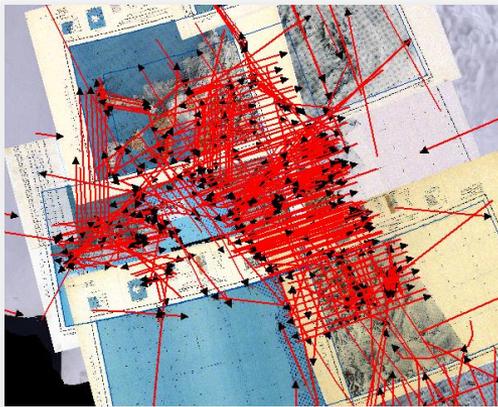
AERIAL PHOTOGRAPHY

Using historic, scanned flight line maps, PGC is digitizing flight lines and photo centers for TMA Aerial Photography in Antarctica

Historic maps have hand-drawn flight lines

Ensure correct directionality and metadata

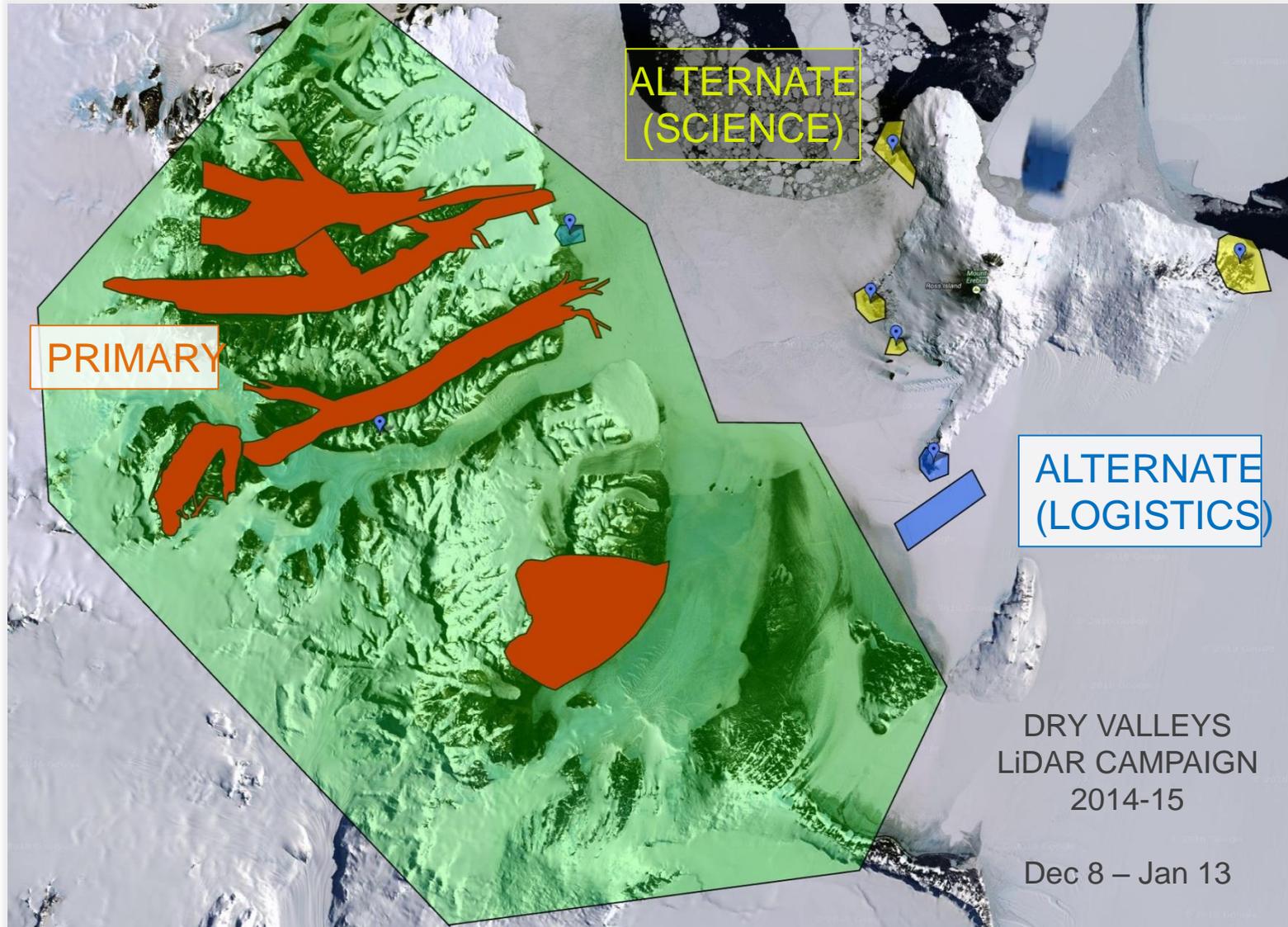
Enables a *spatial* search for historic flight lines



mcmurdo dry valleys lidar campaign

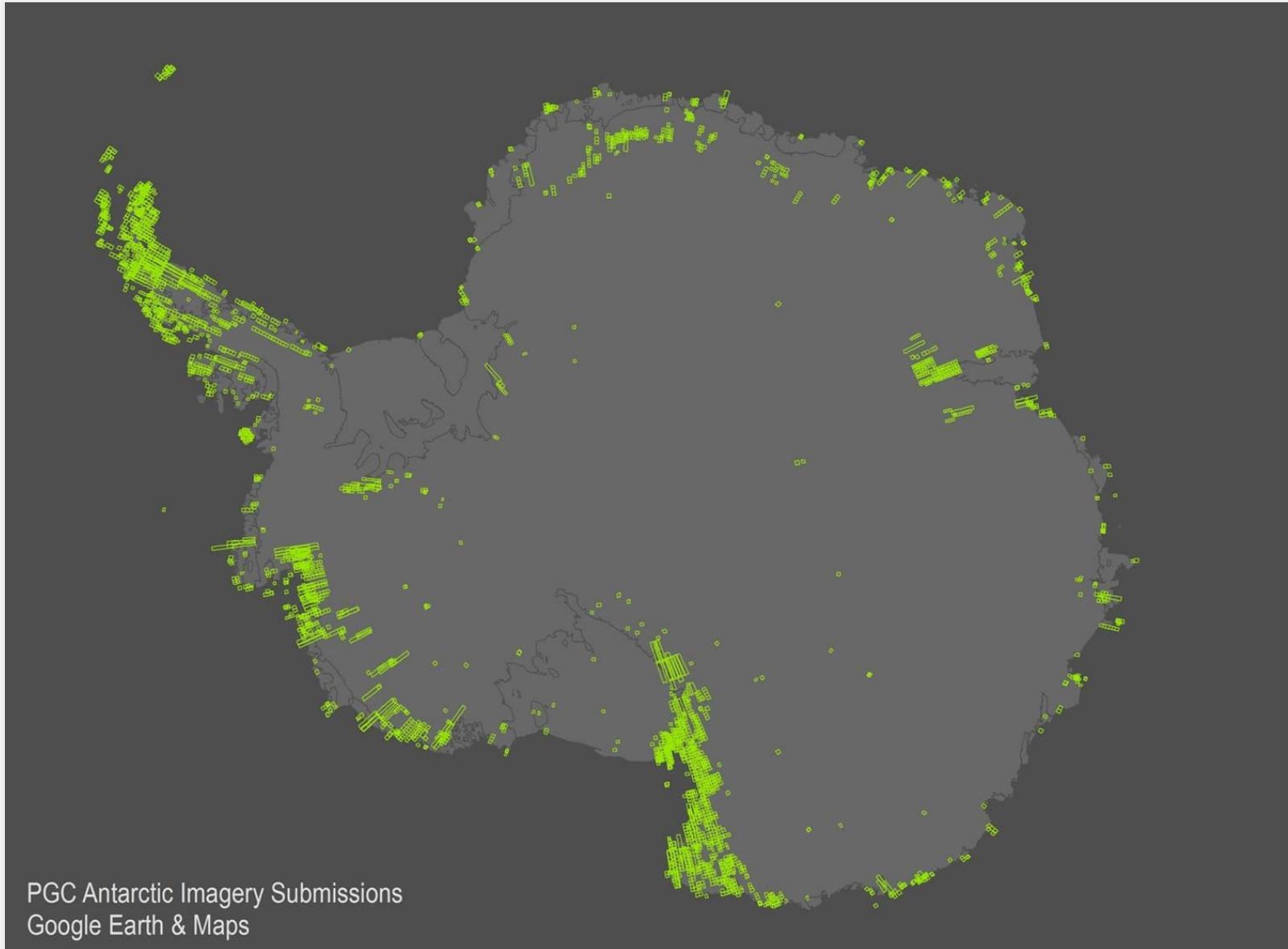
Paul Morin

TARGET AREAS



Planned LiDAR targets in McMurdo Dry Valleys & Ross Island

HIGHLIGHTS



Antarctic submissions to Google Earth & Maps