New Data Sources for an Improved Gravity Anomaly Map of the Arctic Region

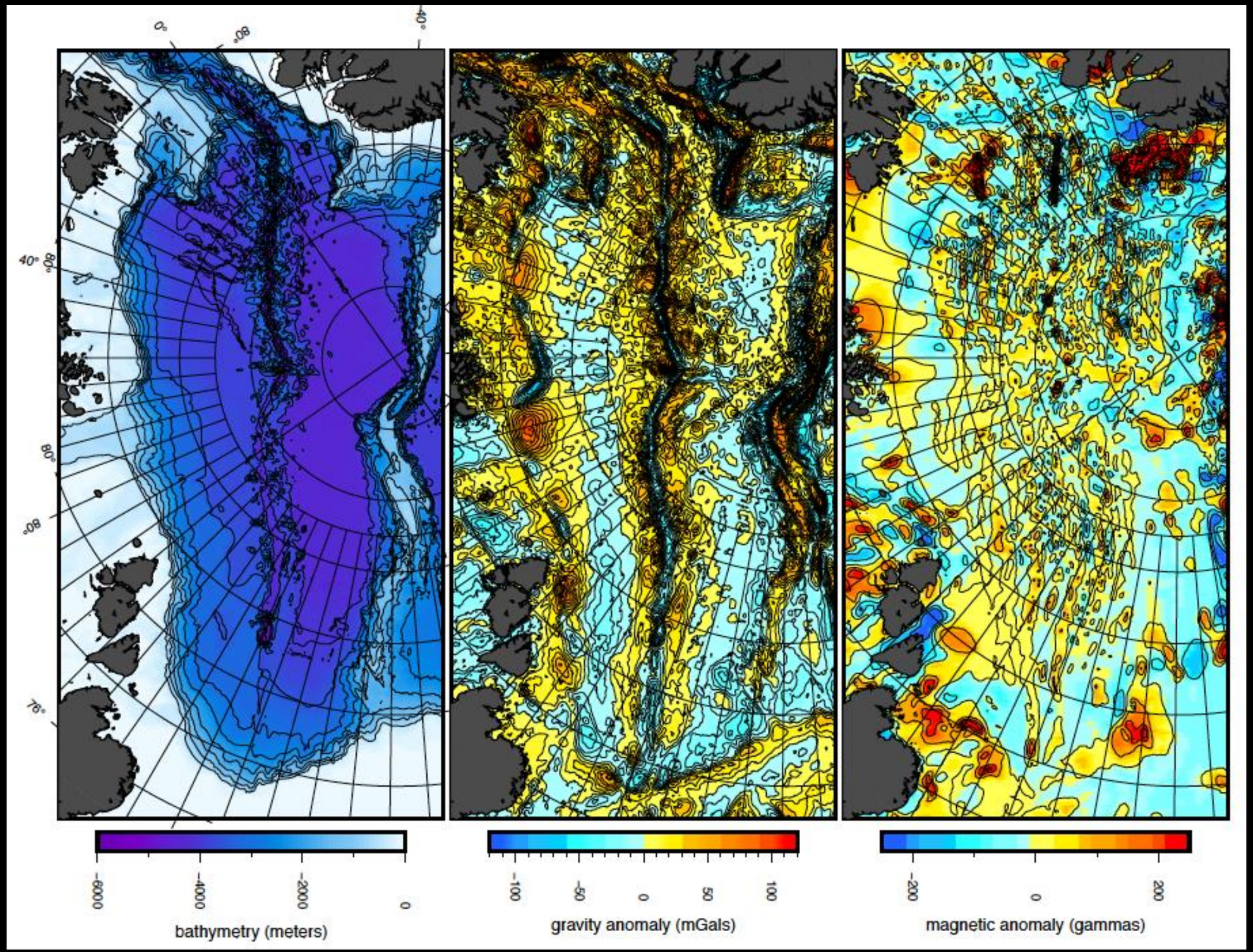
Arctic – Antarctic – North Pacific Mapping Meeting
9-10 November 2019

Bernard Coakley
Professor
Geophysical Institute
University of Alaska

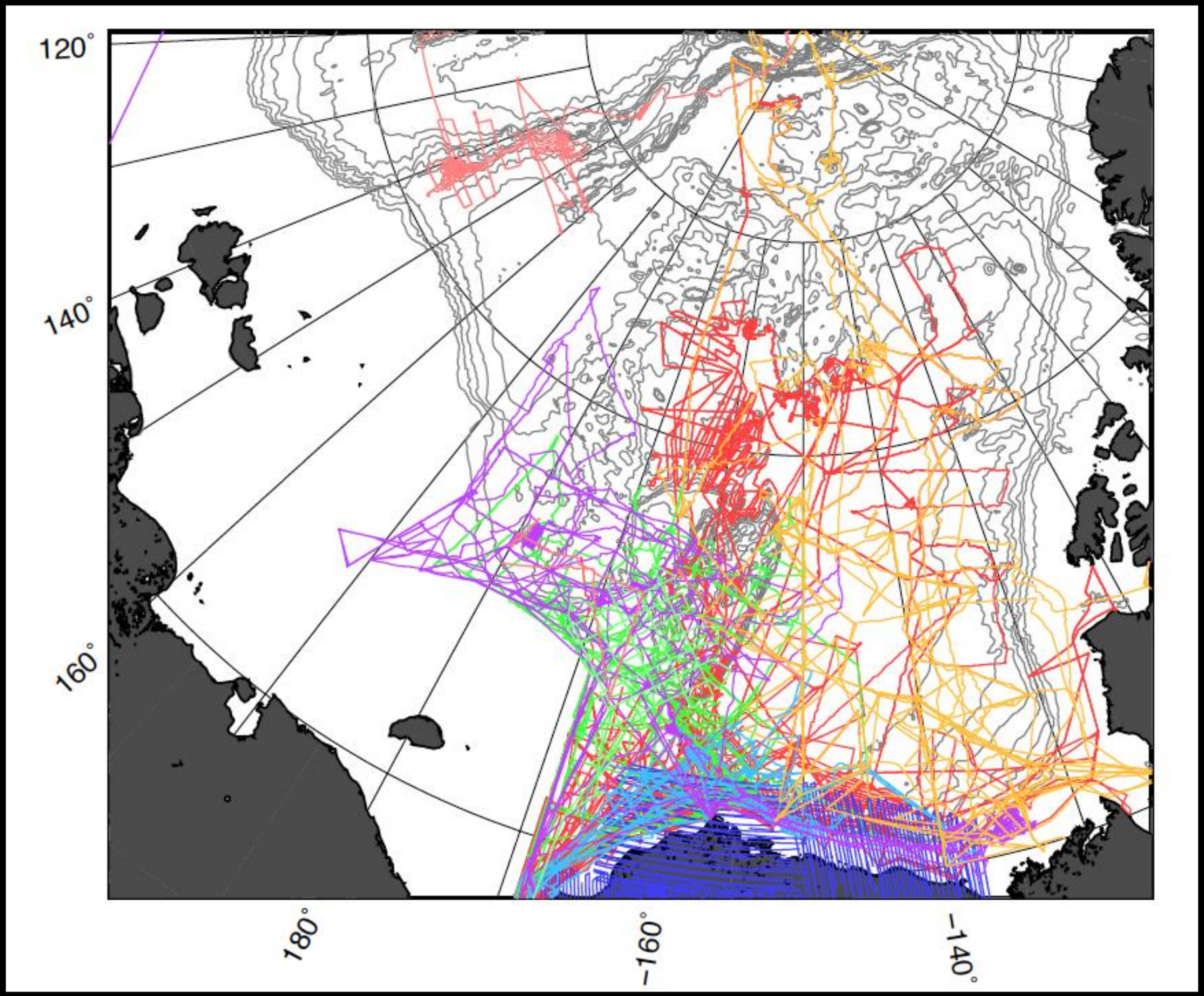
Today’s objectives

- Making the Alaska Map
- New Arctic Gravity Project Grid
- What’s Next?

We can “see” the Arctic



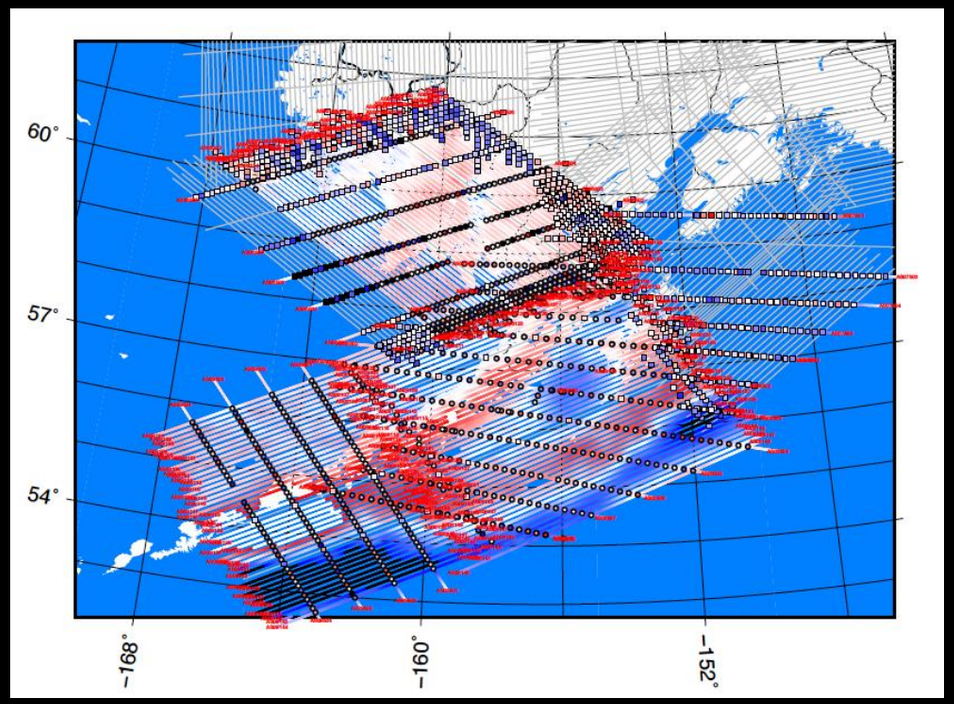
New Gravity Anomaly Data since 2008



GRAV-D and Free Air Anomalies

GRAV-D Survey Parameters

- Blocks designed based on aircraft capabilities, available airports, and target area
- Data lines spaced 10 km apart
- Cross lines spaced 60-80 km apart
- Flight altitude 20,000 ft (~ 6,000 m)
- Nominal speed 220-250 kts



These data are a bit different….

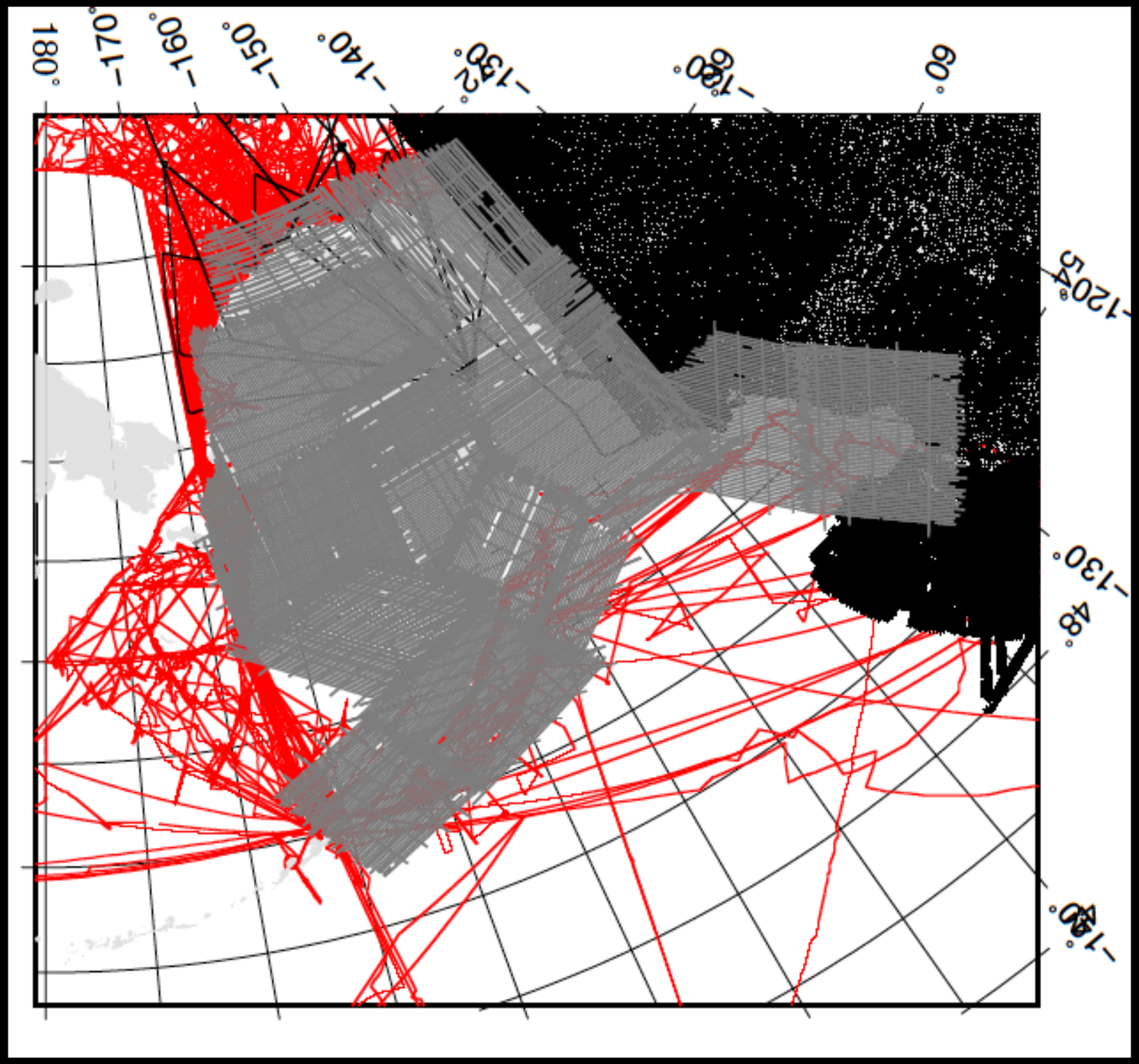
hese are Free Air Disturbances, located ~6 km above the ellipsoi

To use them with other data, we want them on the geoid.

These data will “see” features in the gravity field differently.

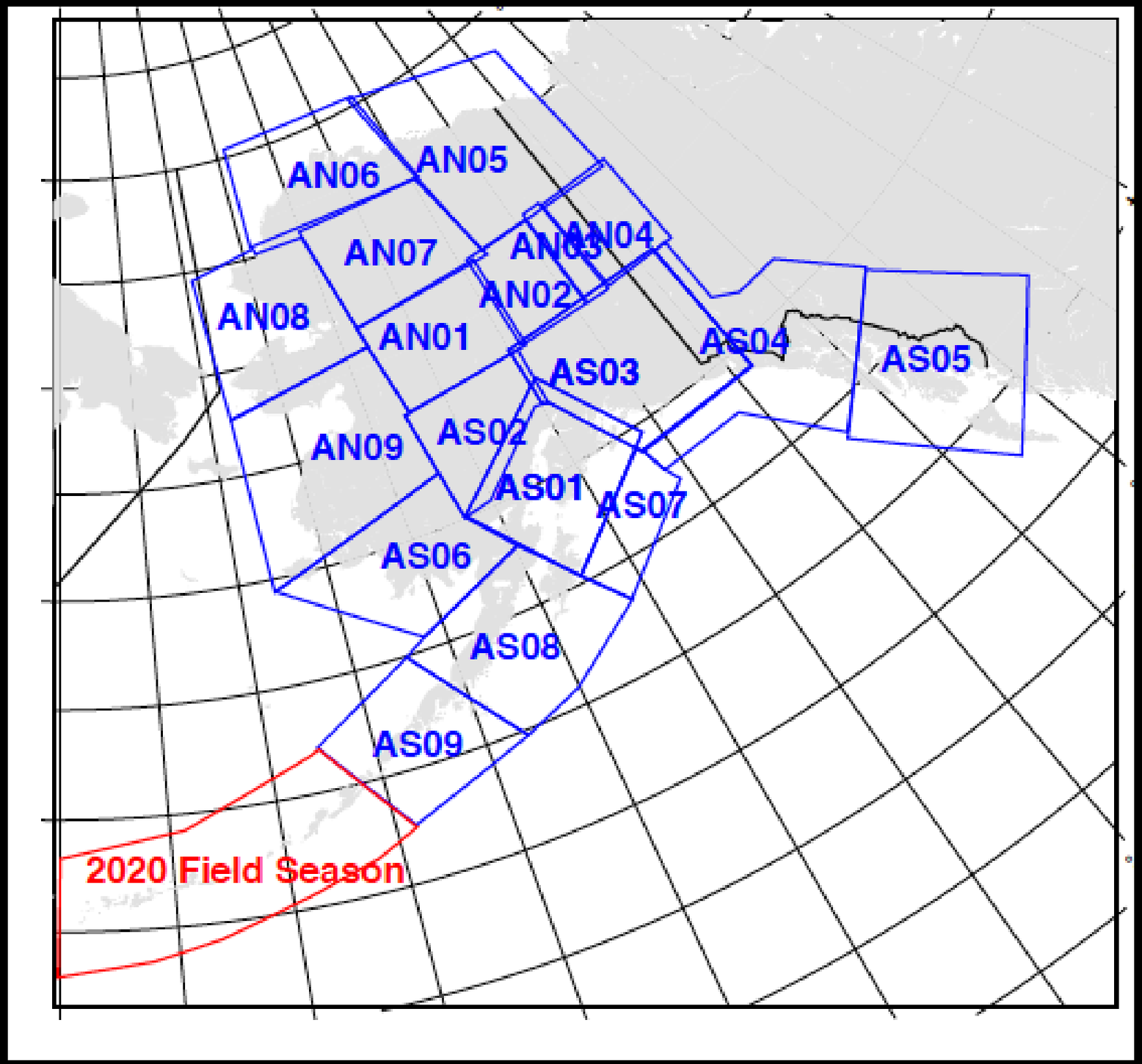
Make a map of Alaska

Data Sources

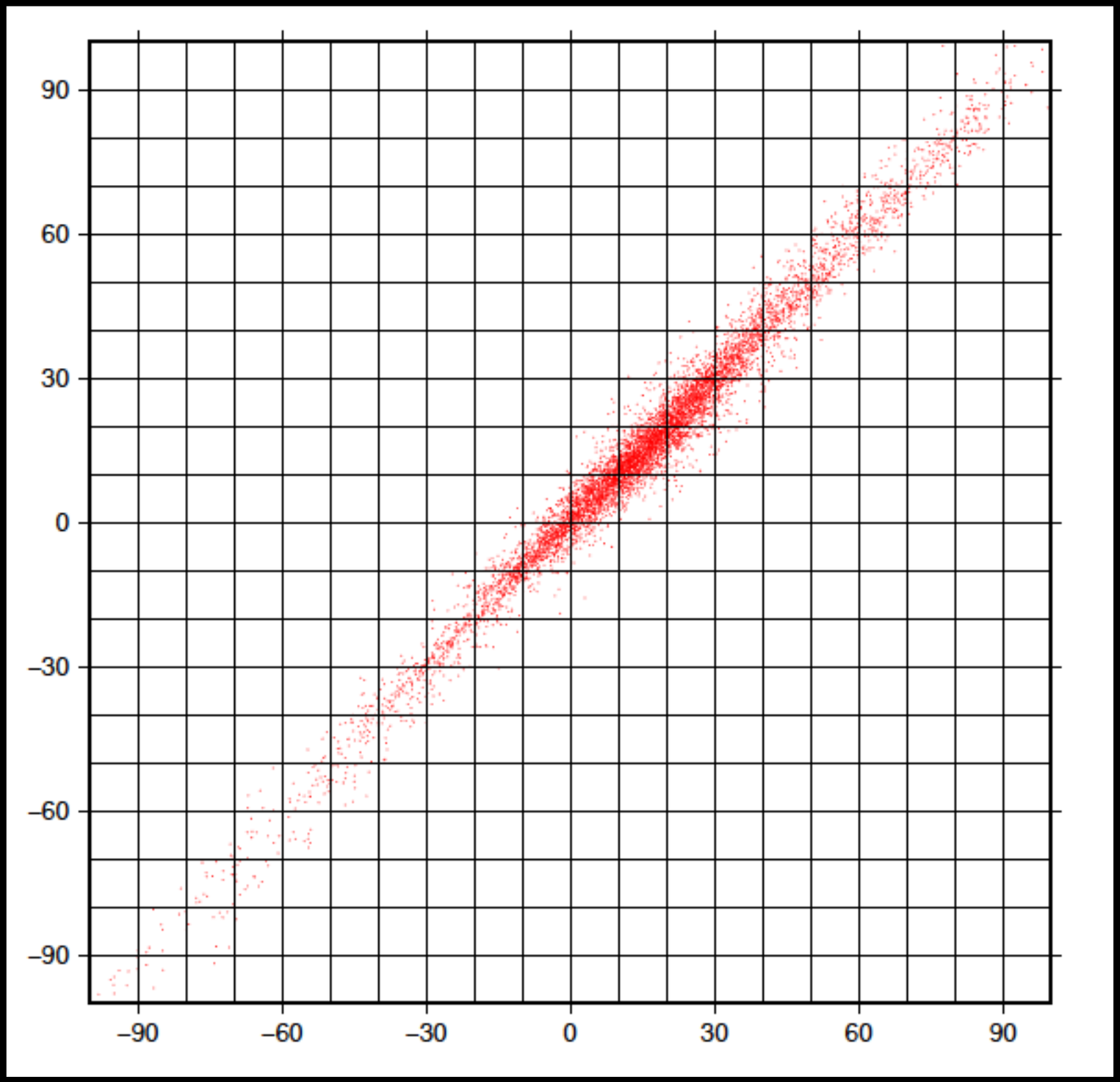


Survey Blocks

blue - completed

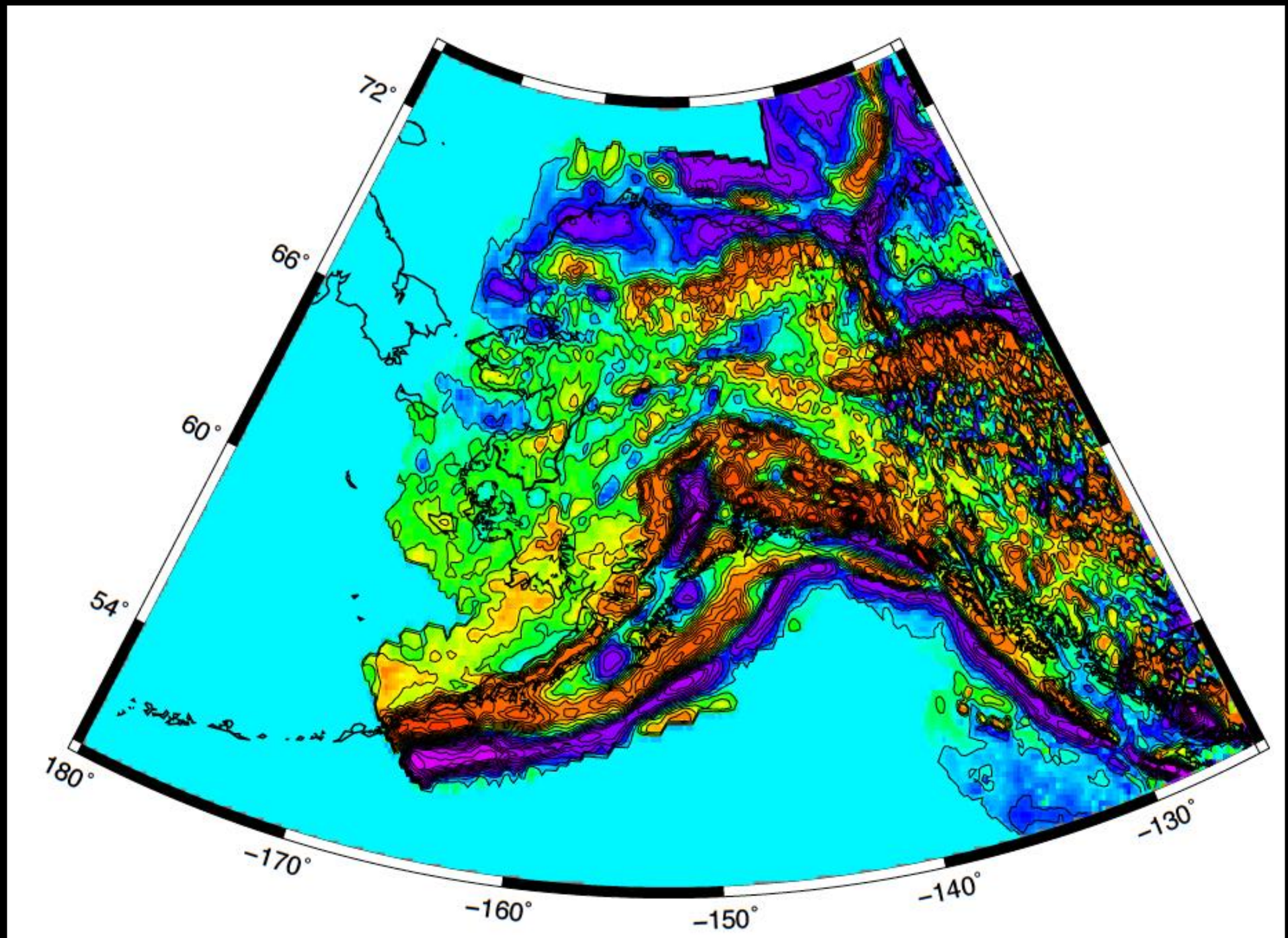


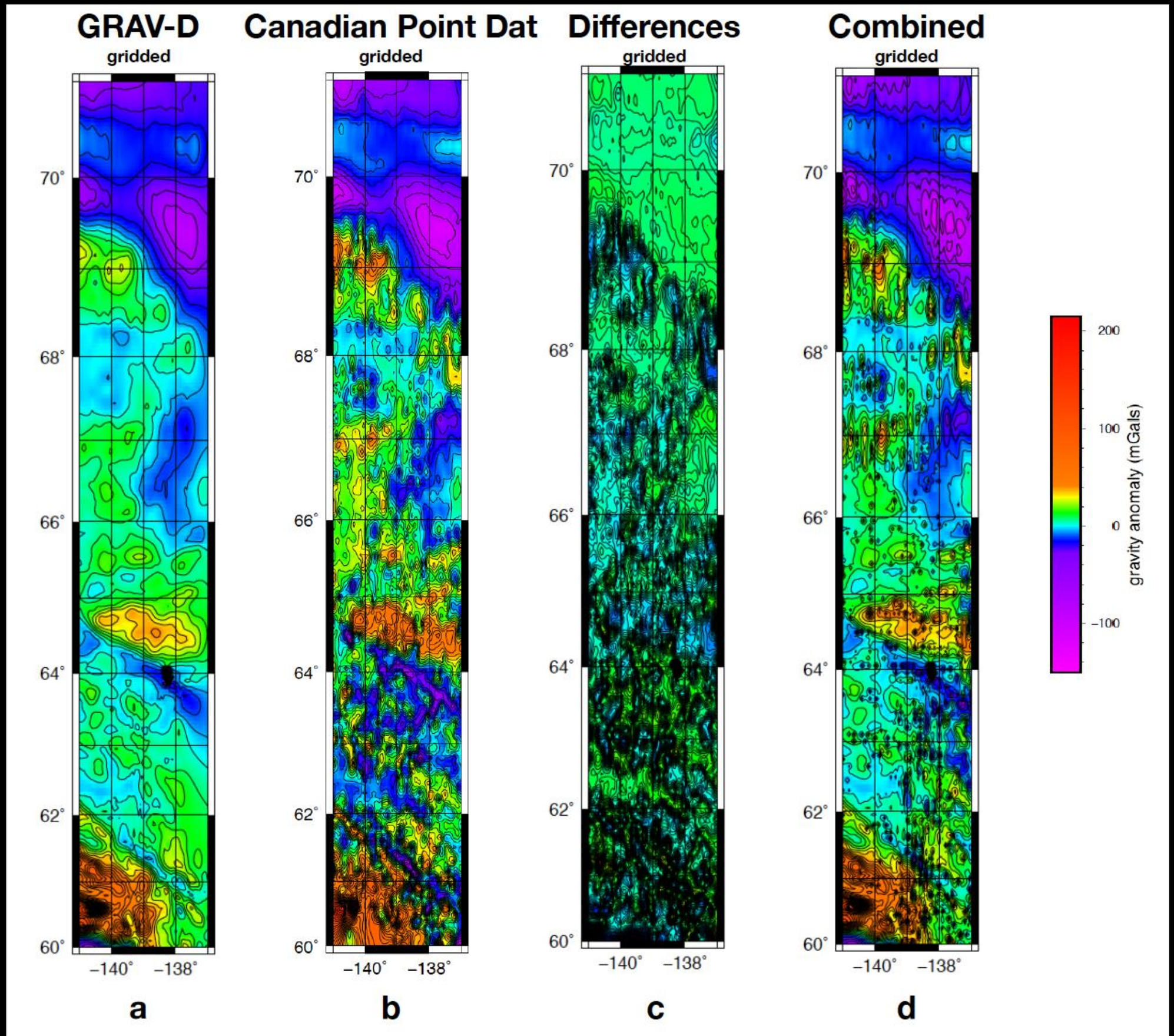
All GRAV-D Crossovers



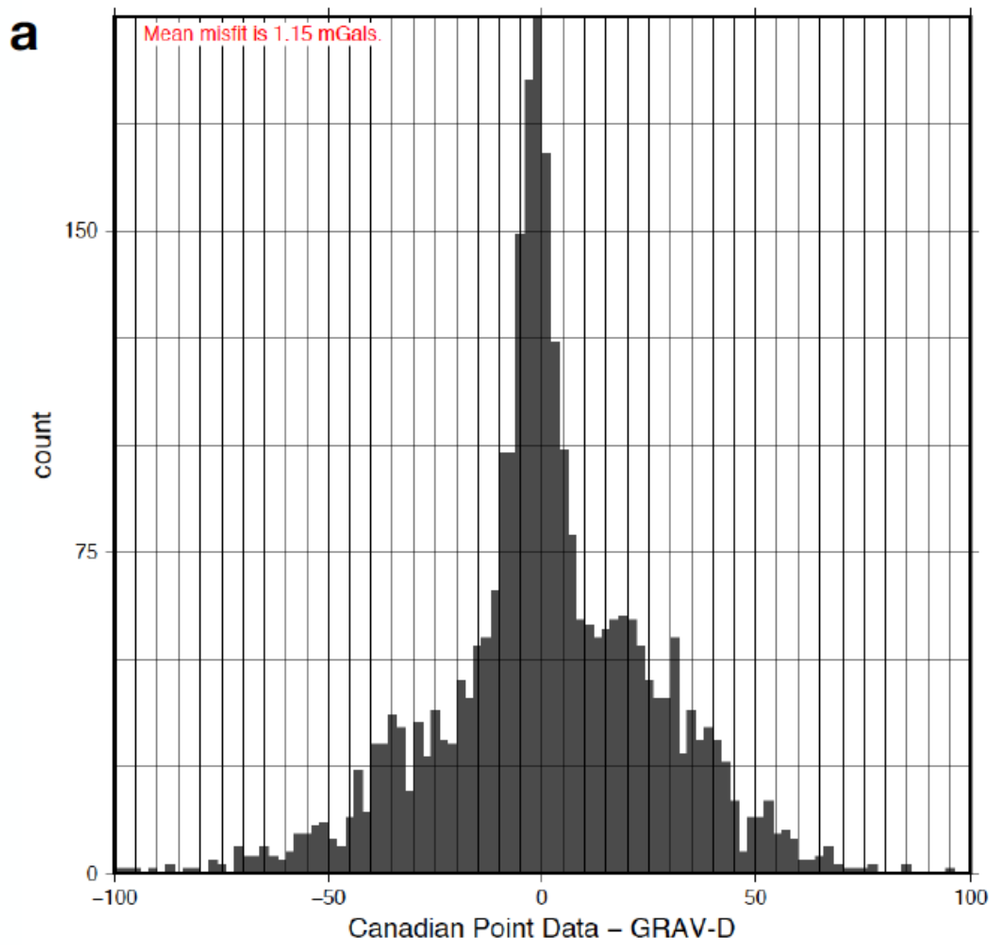
Alaska 10 minute grid

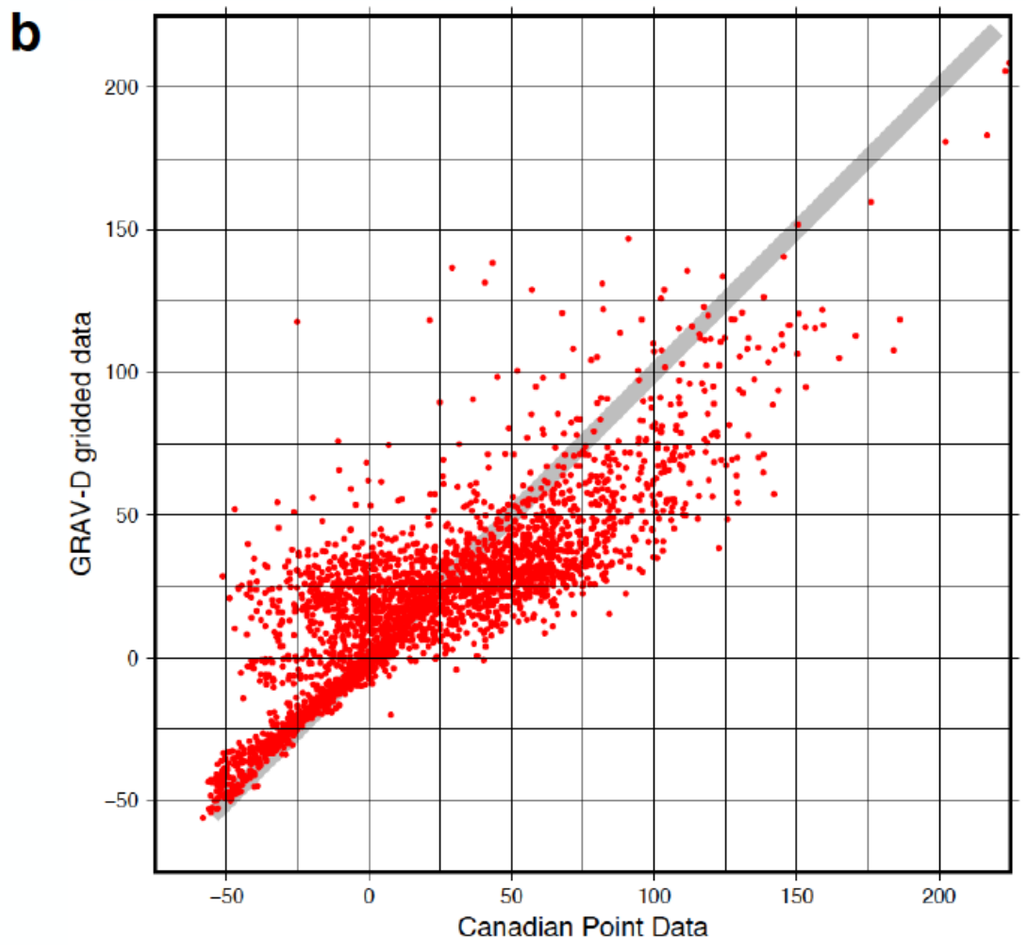
GRAV-D + Canadian Point Data




GRAV-D
gridded
Canadian Point Dat
gridded
Differences
gridded
Combined
gridded
70°
68°
66°
64°
62°
60°
−140°
−138°
200
100
0
−100
gravity anomaly (mGals)
a
b
c
d

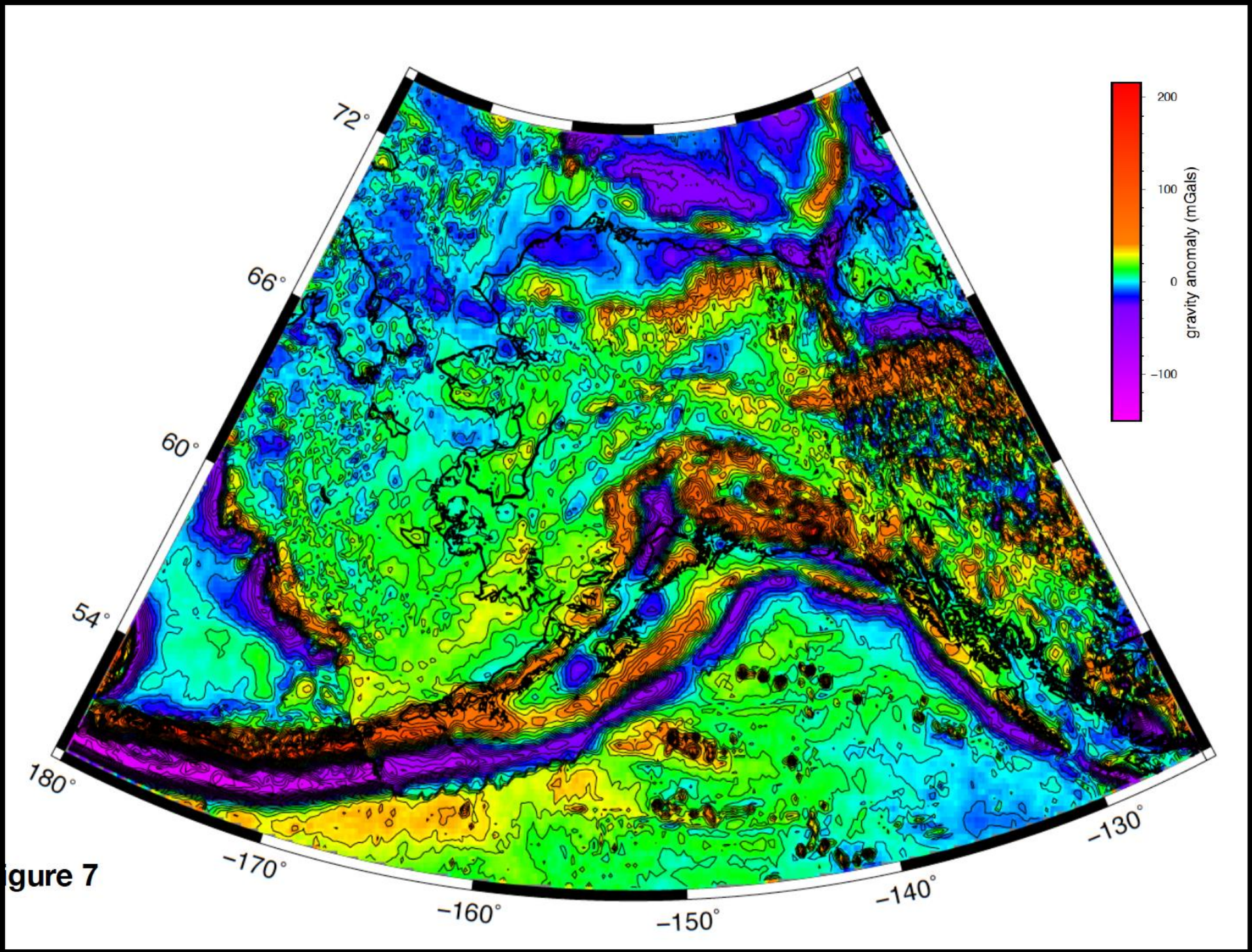
Point Comparisons





10 Minute Grid

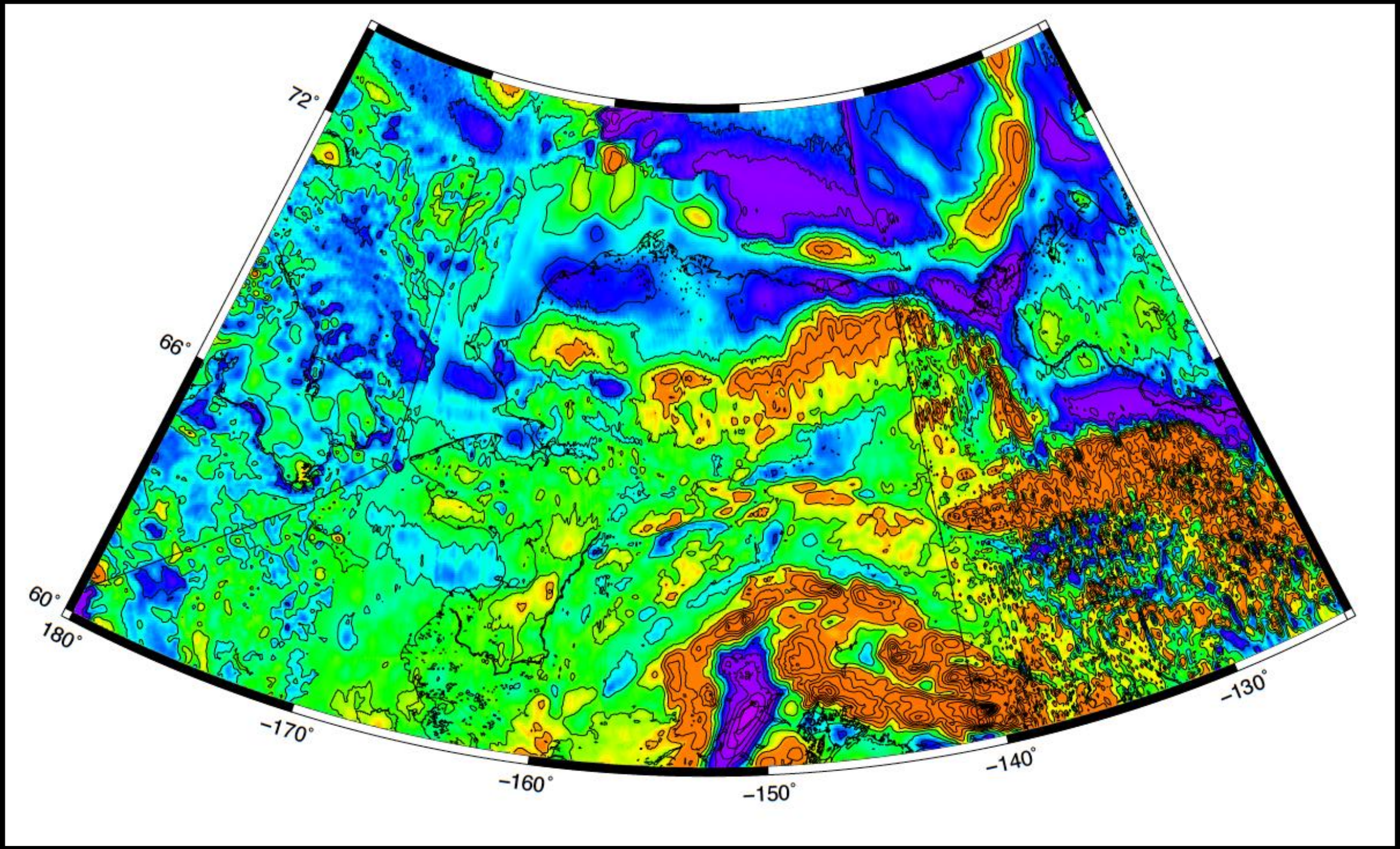
GRAV-D + Canadian Point Data + Sandwell Grid



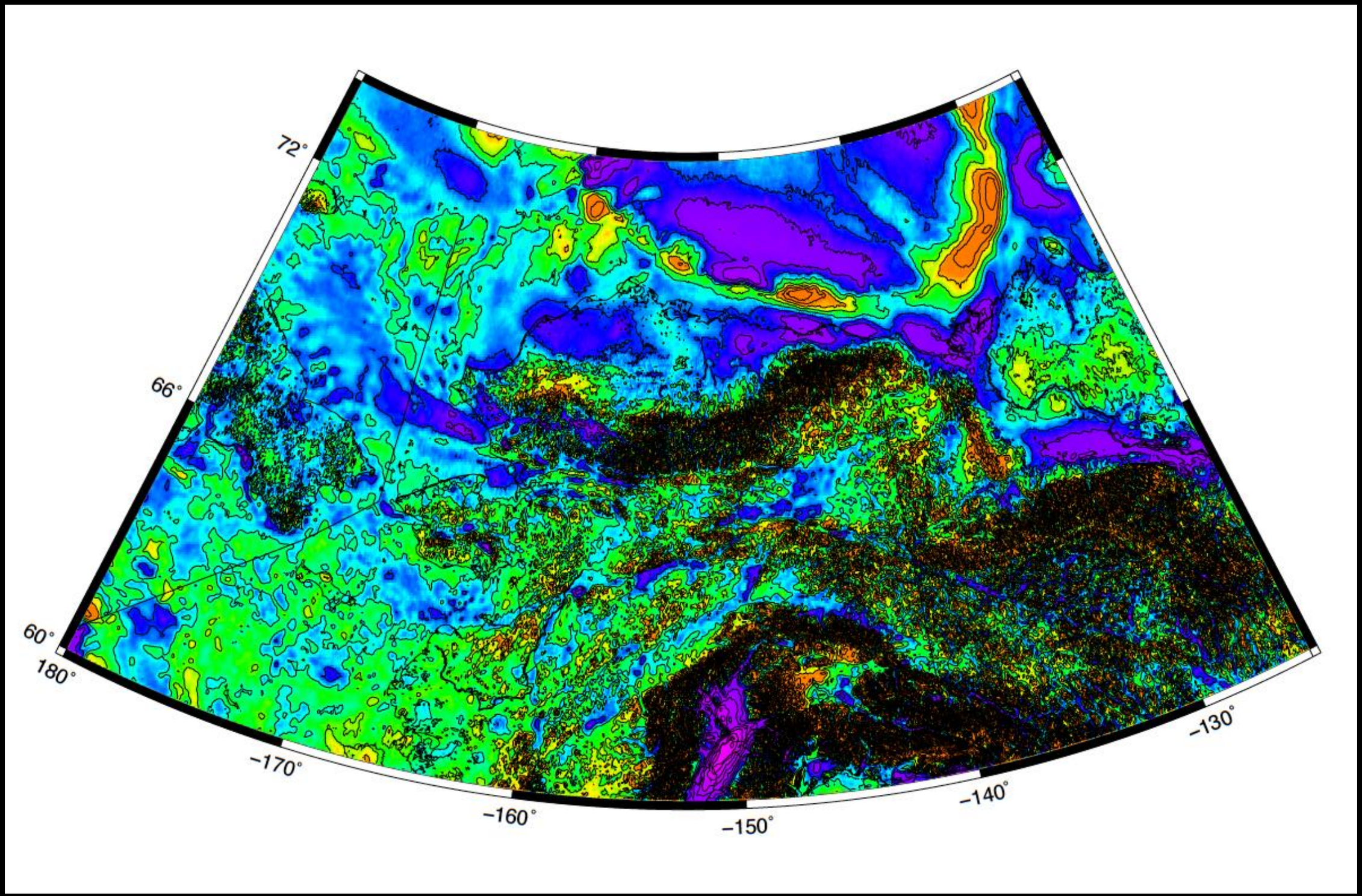
igure 7

GRAV-D vs new AGP

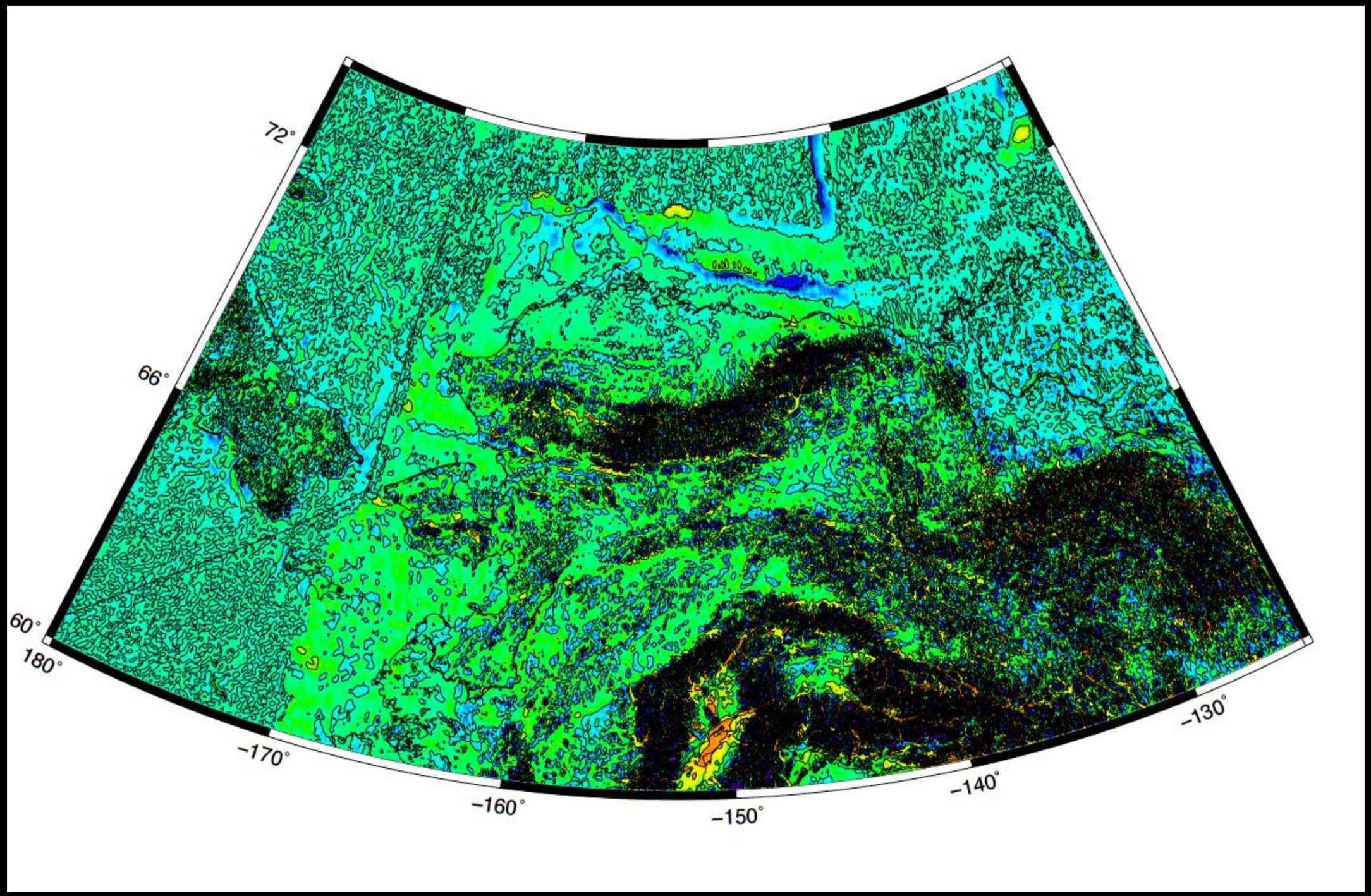
Alaska Map



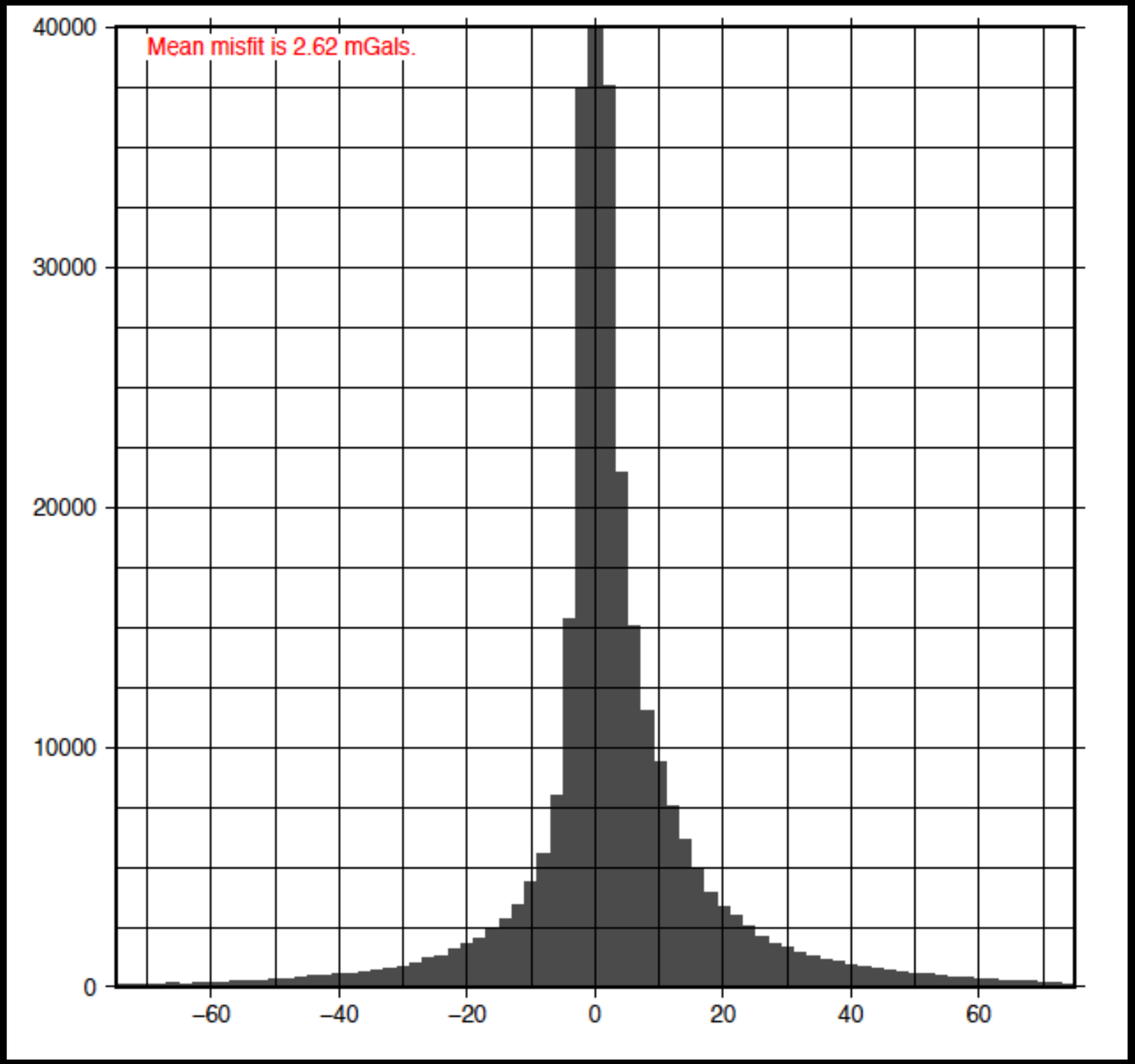
New AGP



Map of Differences

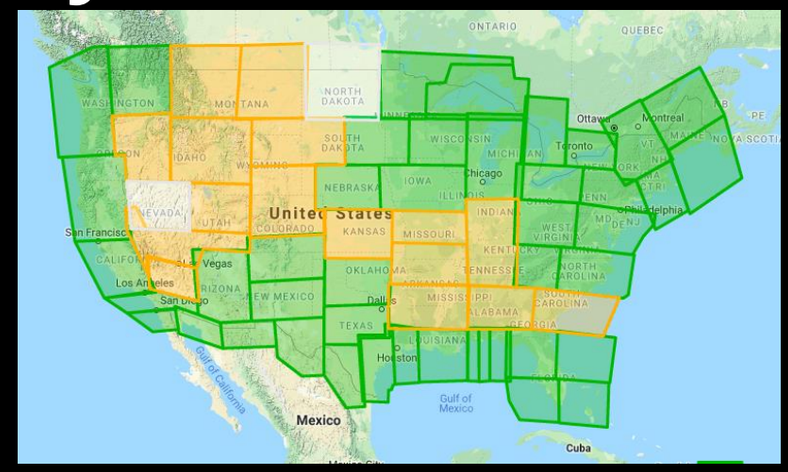


GRAV-D vs AGP

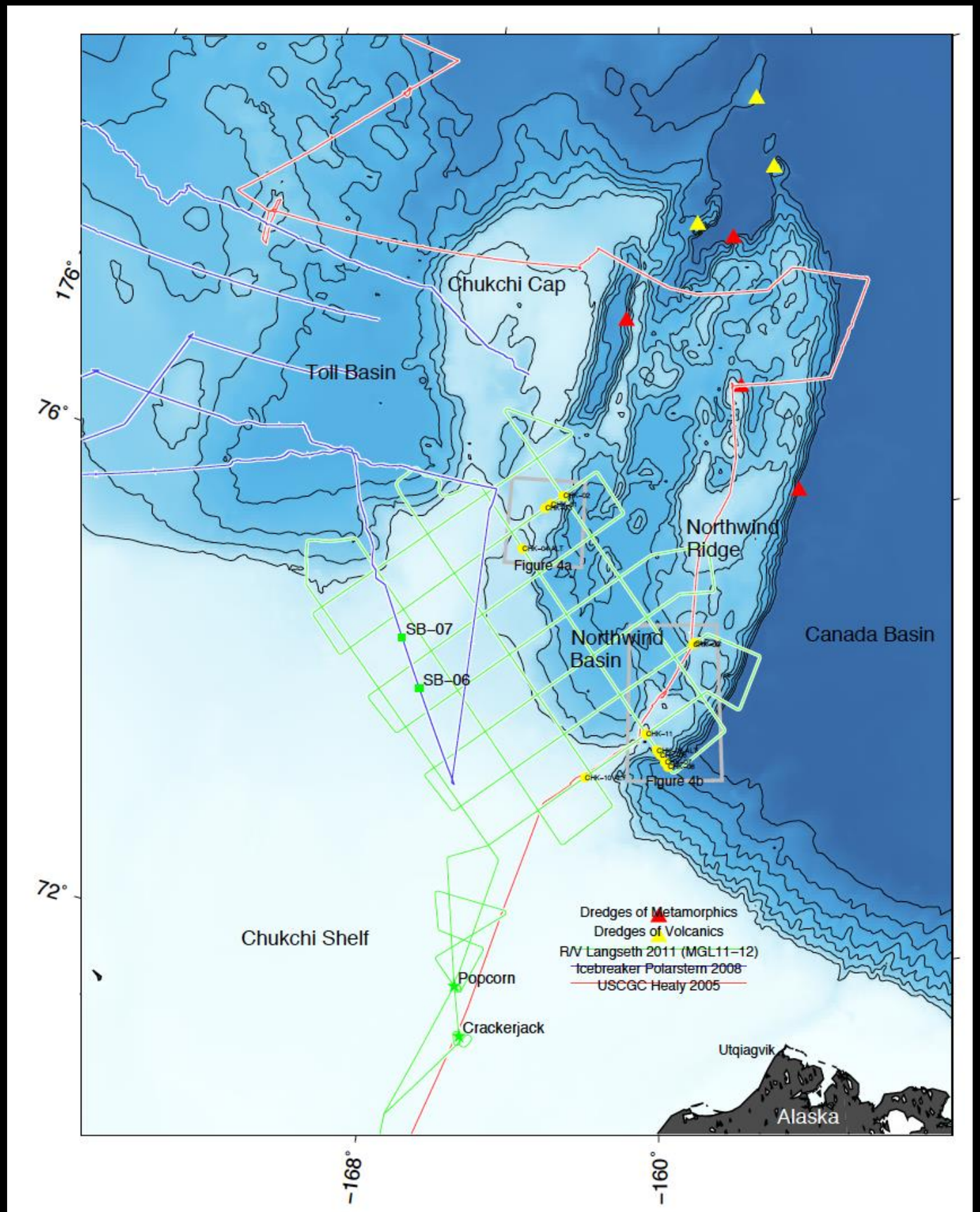

Mean misfit is 2.62 mGals.
40000
30000
20000
10000
0
−60
−40
−20
0
20
40
60

What's Next?

- More data from Sikuliaq and Healy
- Release of the new Arctic Gravity Project grid
- Completion of GRAV-D surveys
- IODP Pre-proposal
- Another Arctic cruise



IODP
Pre-proposal



Chukchi North

on RV Sikuliaq - Summer 2021