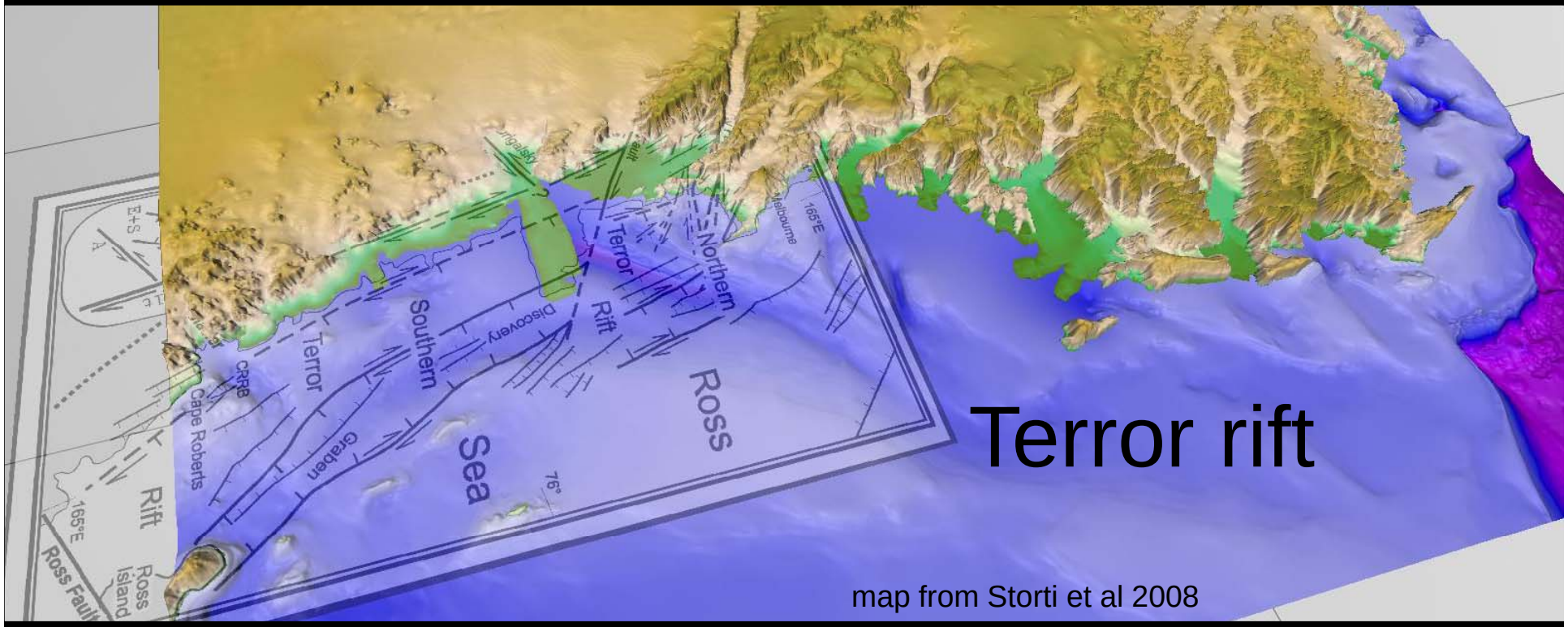
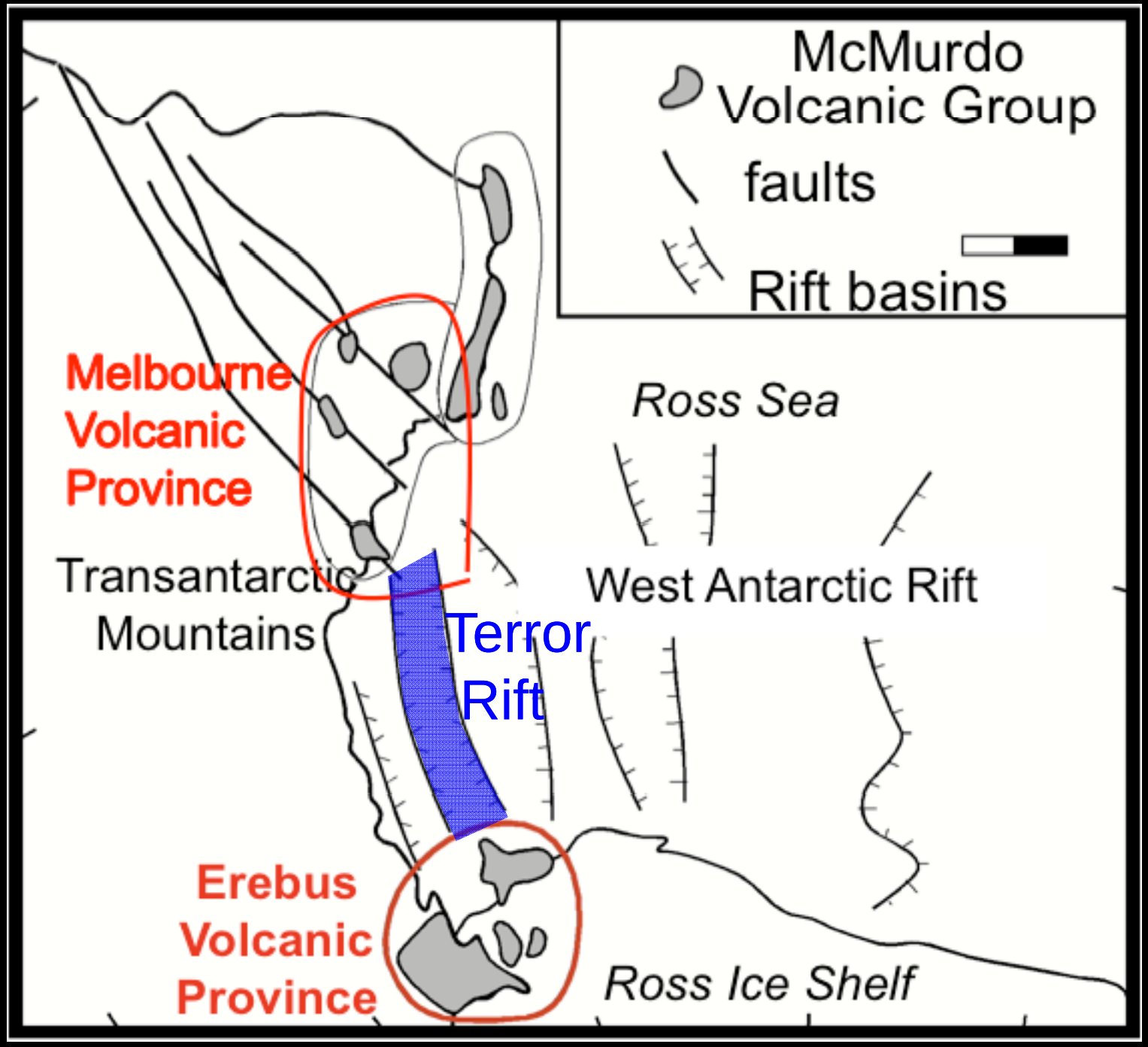
Neotectonic and Glacial History of the Southwestern Ross Sea, Antarctica:

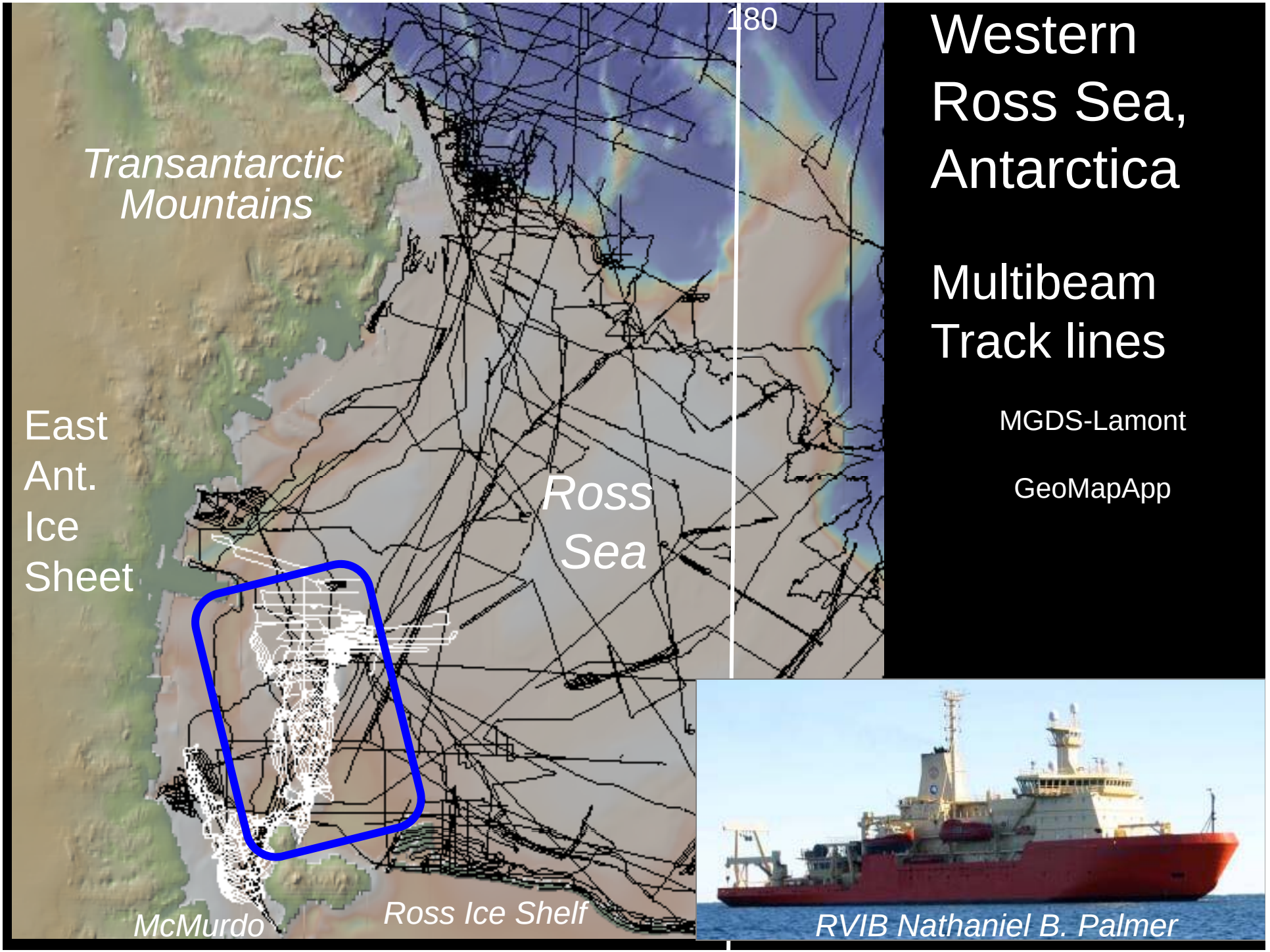
Enhanced Interpretation from Integrated Seafloor Bathymetry and Terrestrial DEMs

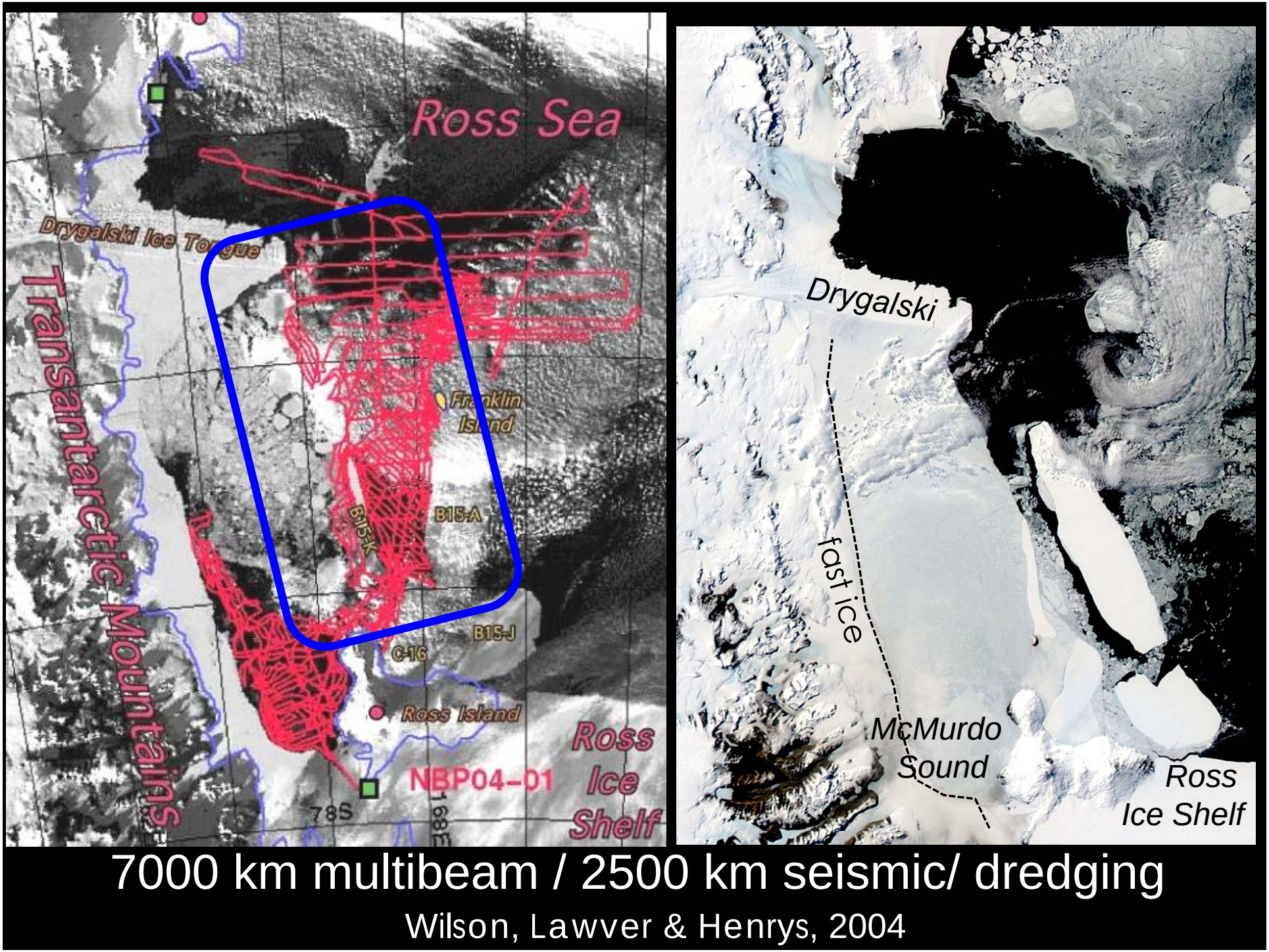


Terry Wilson, Jamey Stutz, William Magee, Christopher Gordon, and Stuart Henrys

The Byrd Polar Research Center at The Ohio State University
GNS Science, Lower Hutt, New Zealand

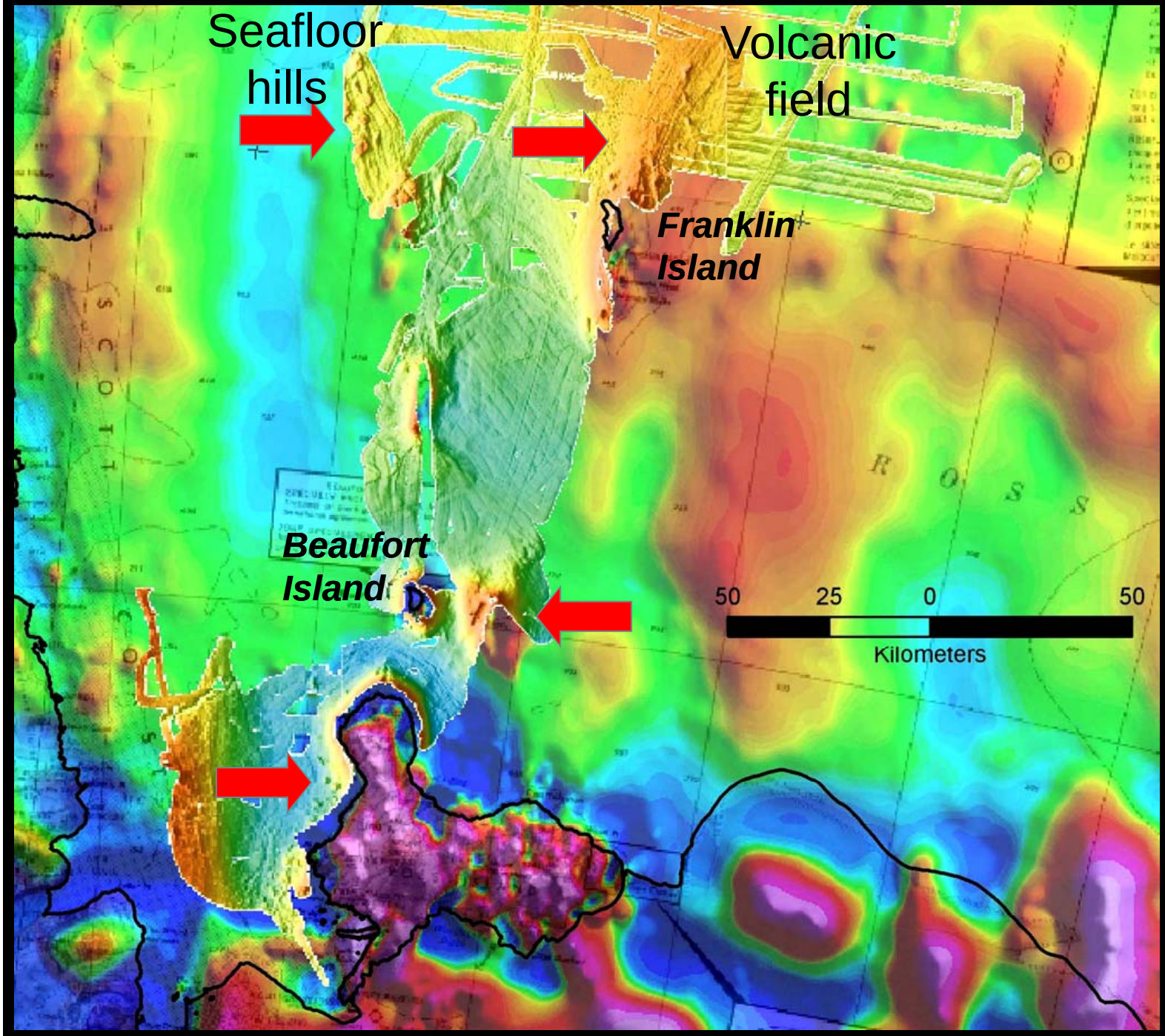

McMurdo
Volcanic Group
faults
Rift basins
Melbourne
Volcanic
Province
Ross Sea
Transantarctic
Mountains
West Antarctic Rift
Terror
Rift
Erebus
Volcanic
Province
Ross Ice Shelf


180
Transantarctic Mountains
East Ant. Ice Sheet
Ross Sea
McMurdo
Ross Ice Shelf
Western Ross Sea, Antarctica
Multibeam Track lines
MGDS-Lamont
GeoMapApp
RVIB Nathaniel B. Palmer



7000 km multibeam / 2500 km seismic/ dredging

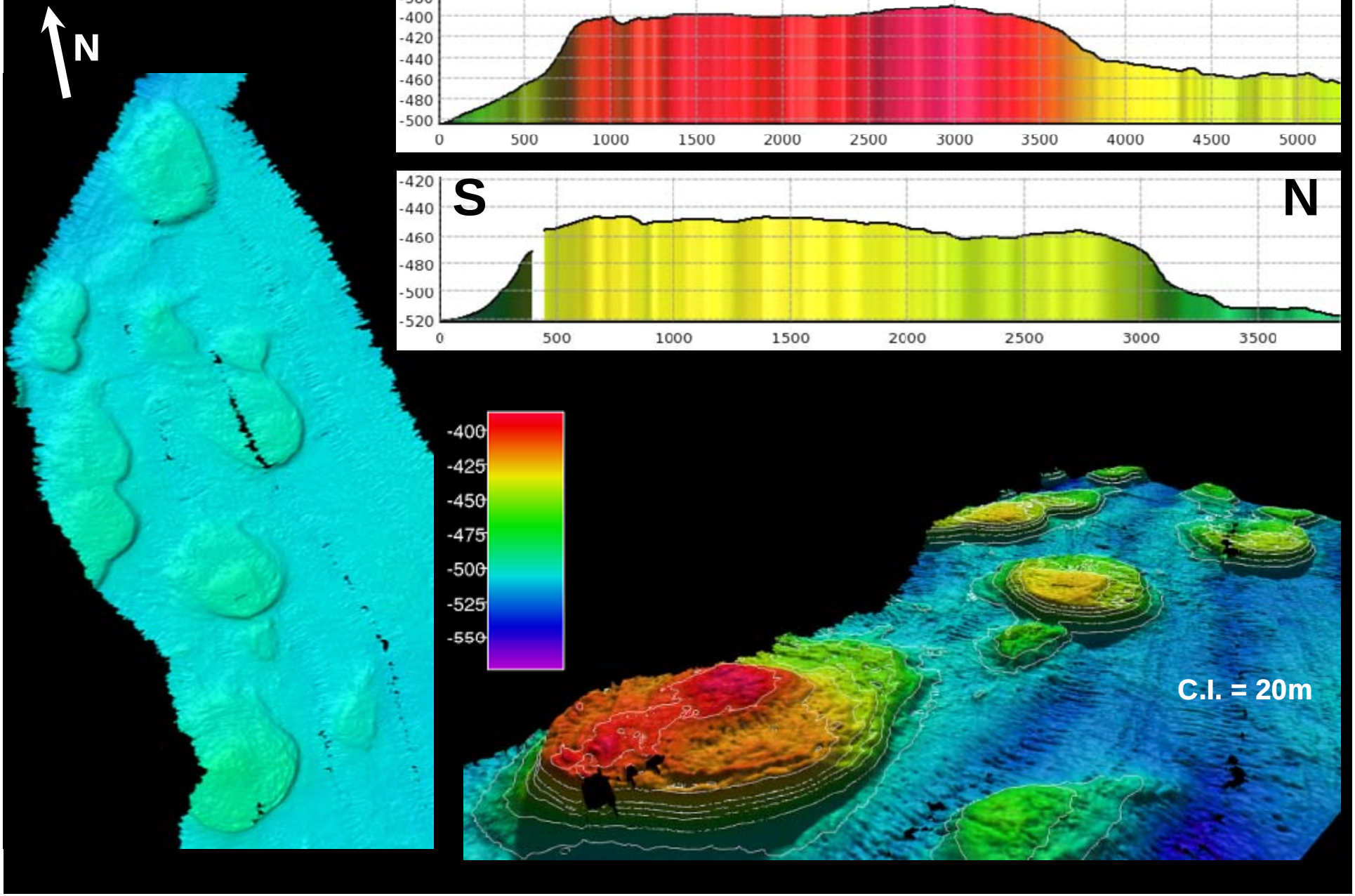
Wilson, Lawver & Henrys, 2004



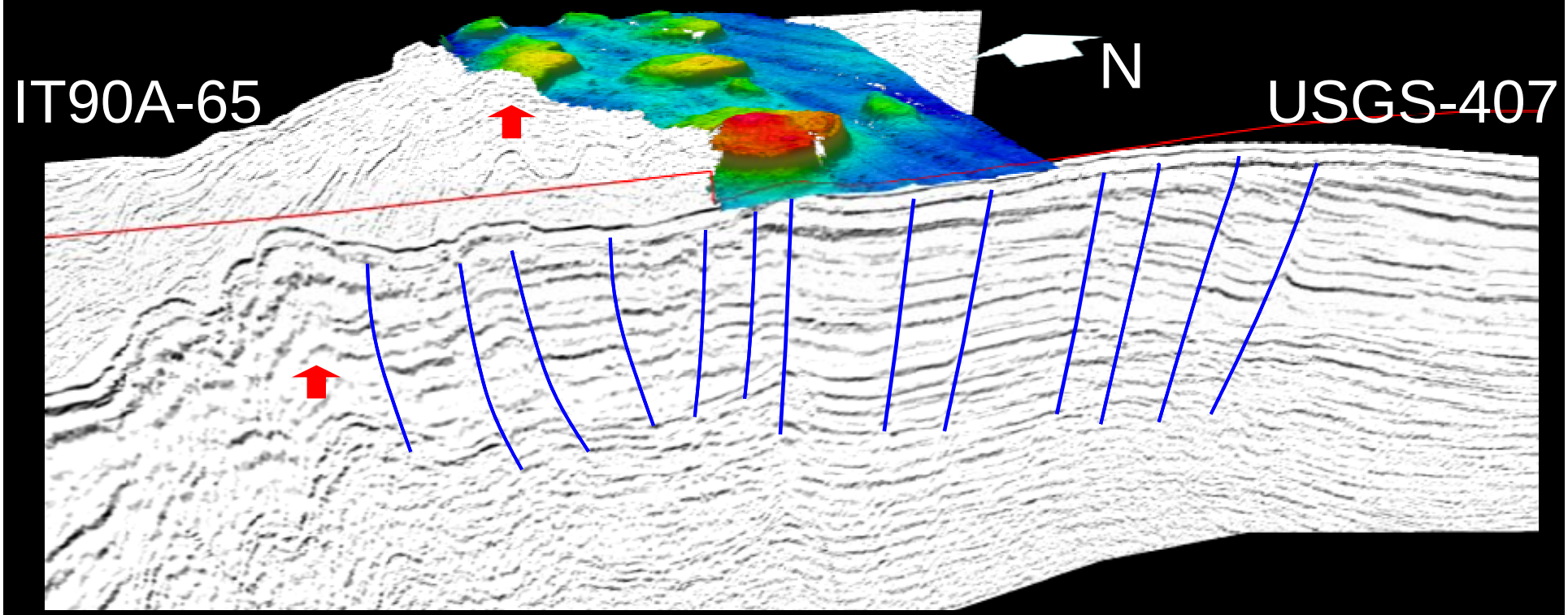
Volcanic features

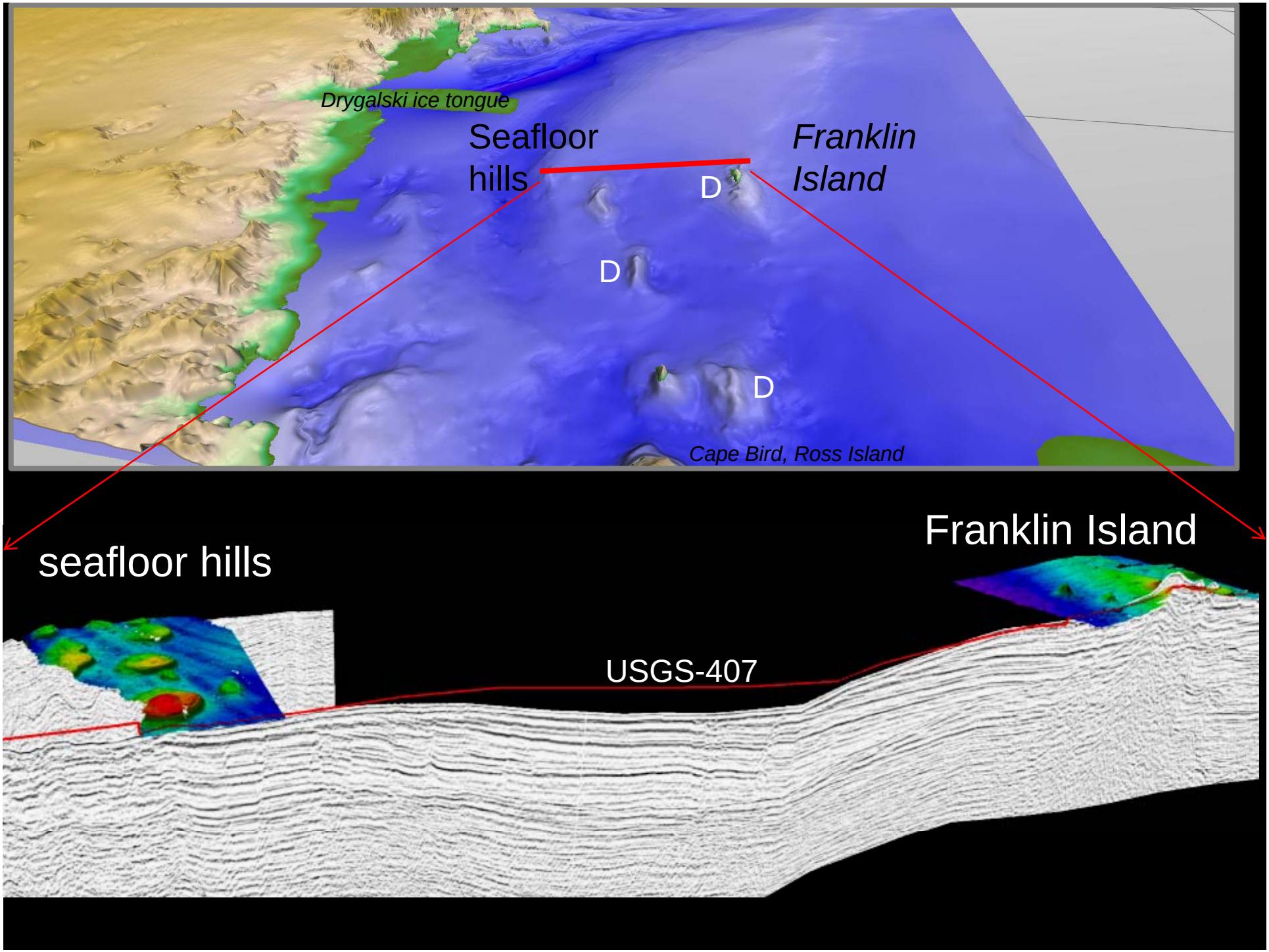
Aeromagnetic anomaly map: Chiappini et al. 2002

Seafloor Hills

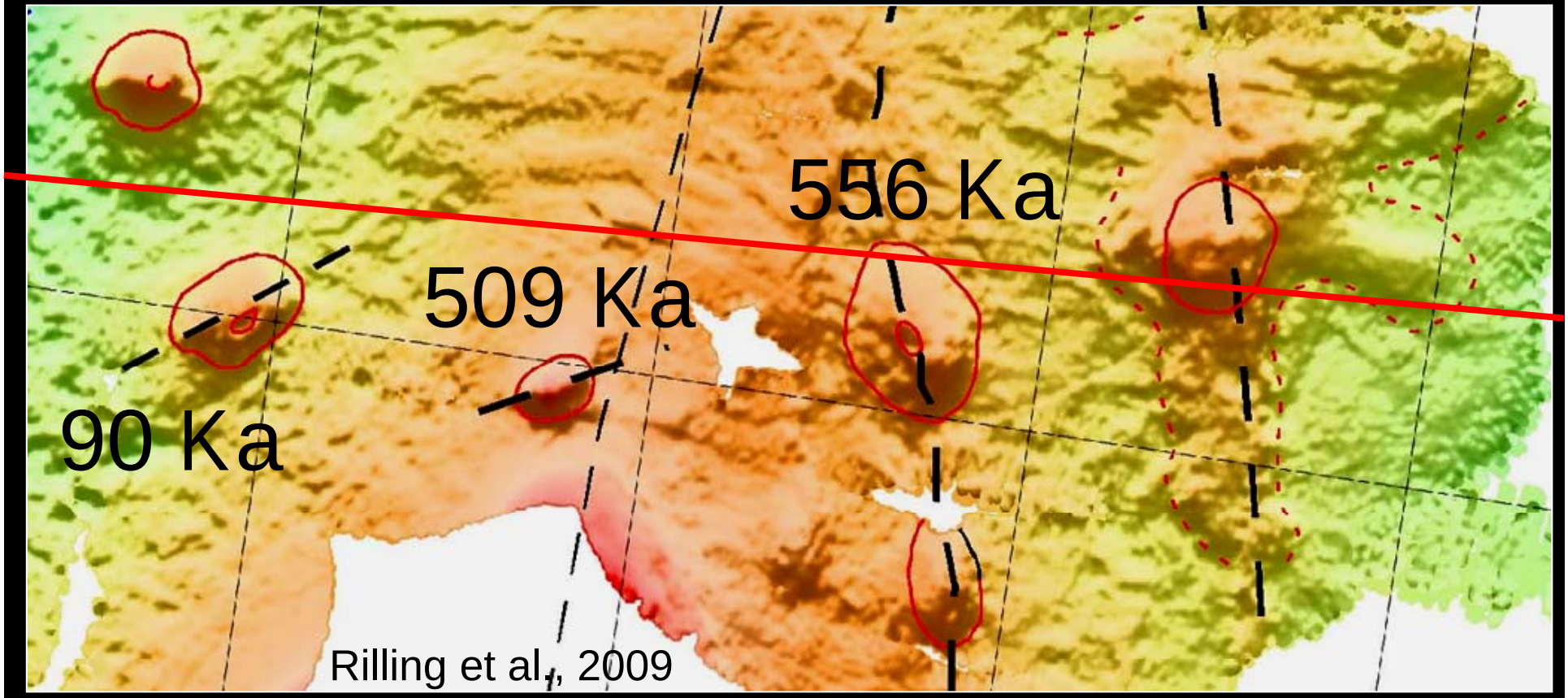


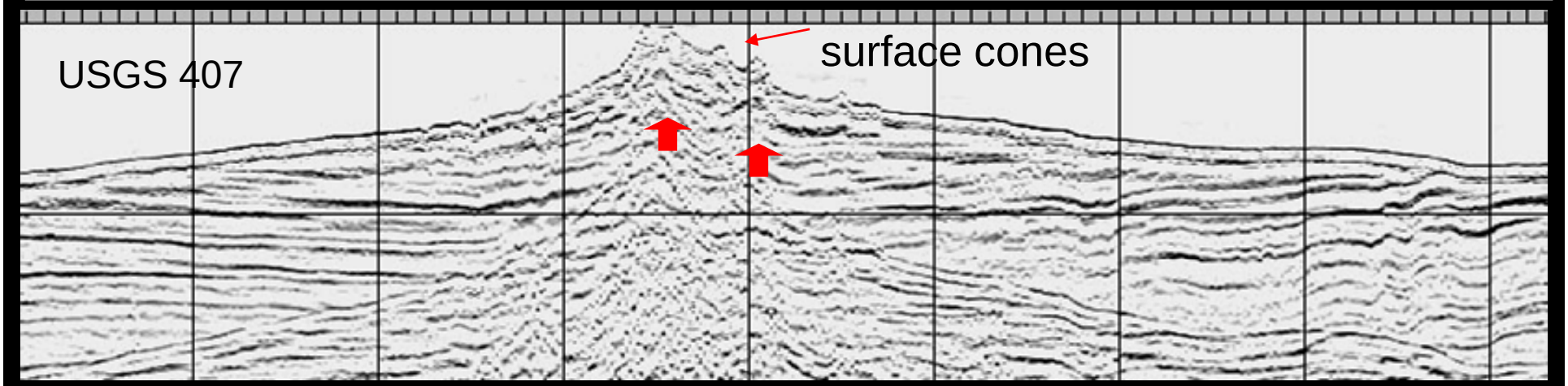
Conduits underlying the hills are fault controlled – following Terror Rift structure



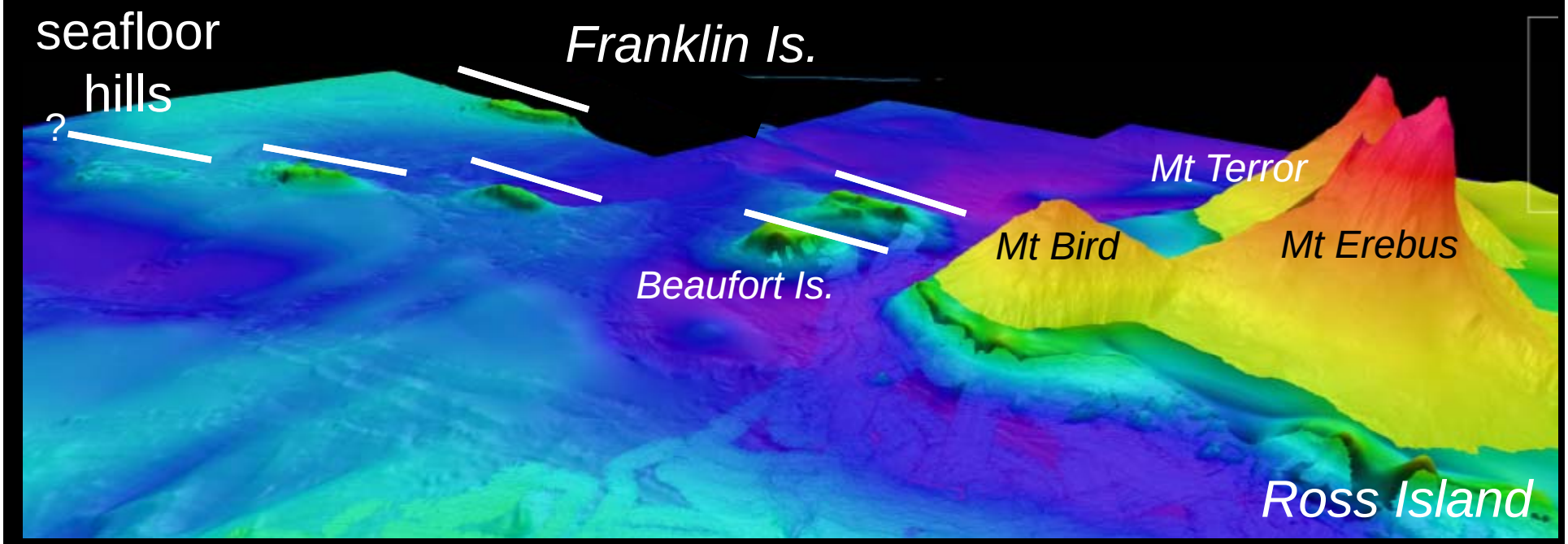

Drygalski ice tongue
Seafloor hills
Franklin Island
D
D
D
Cape Bird, Ross Island
seafloor hills
Franklin Island
USGS-407

Cones - Franklin Volcanic Field



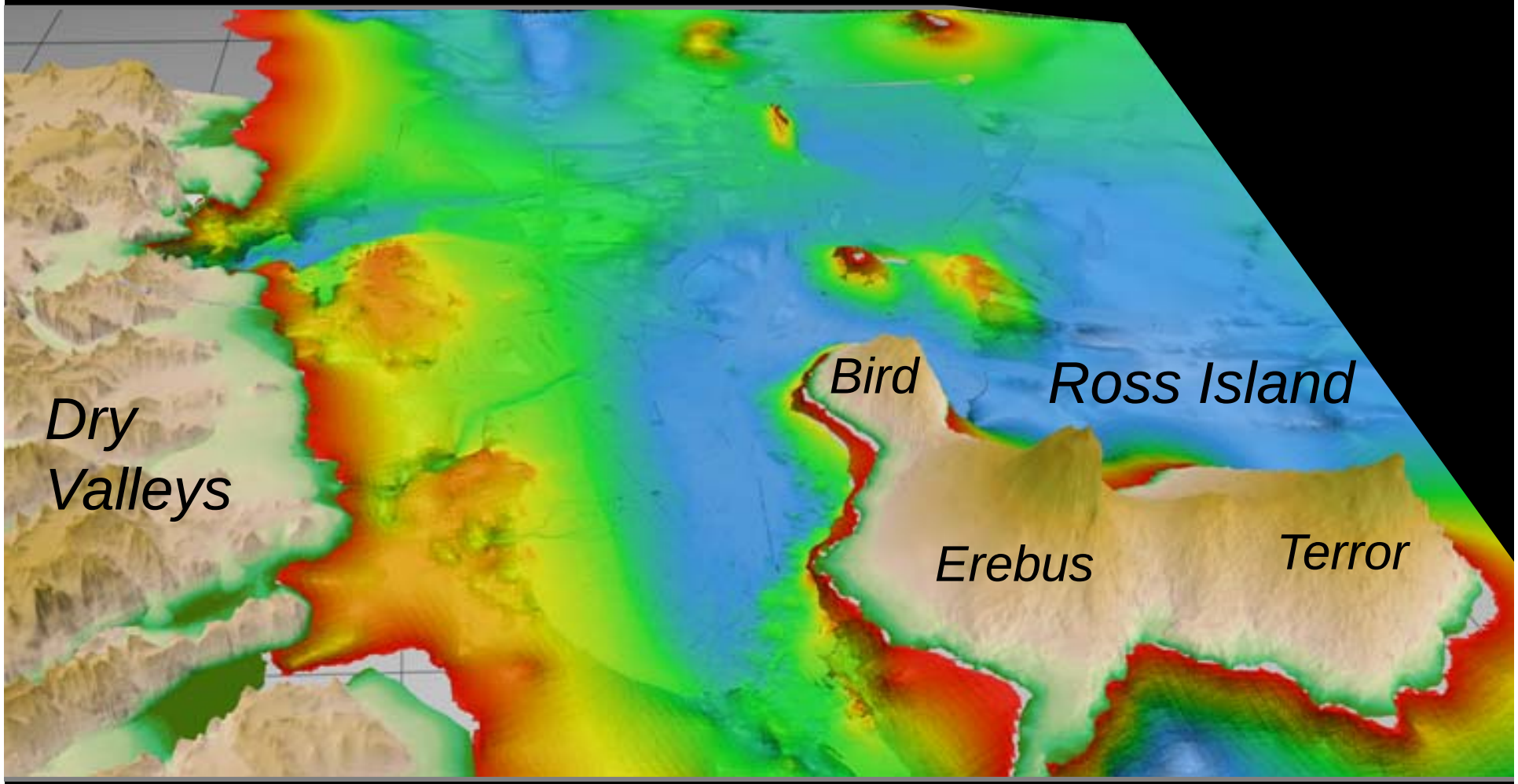


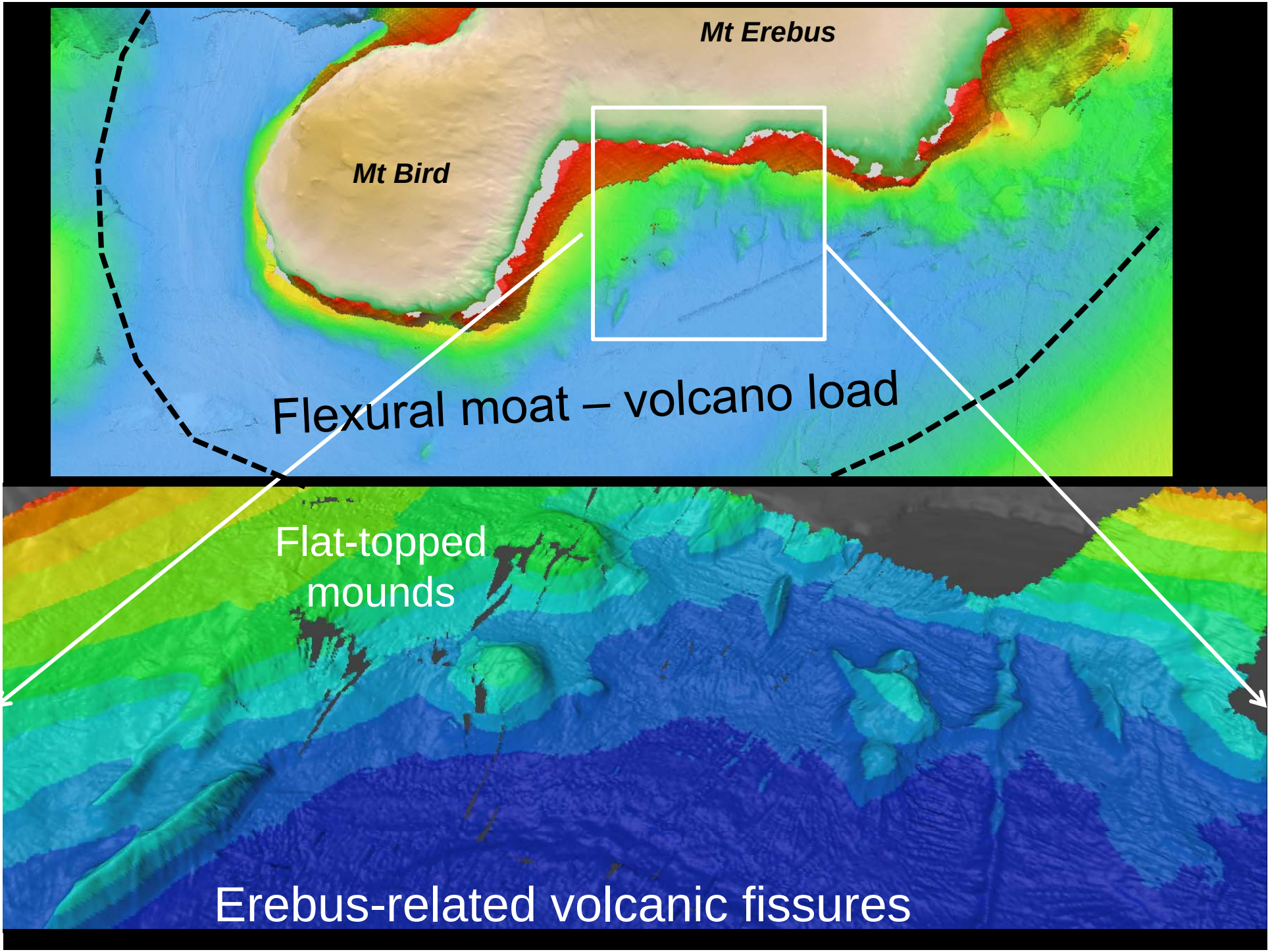
Regional Volcanic Trends



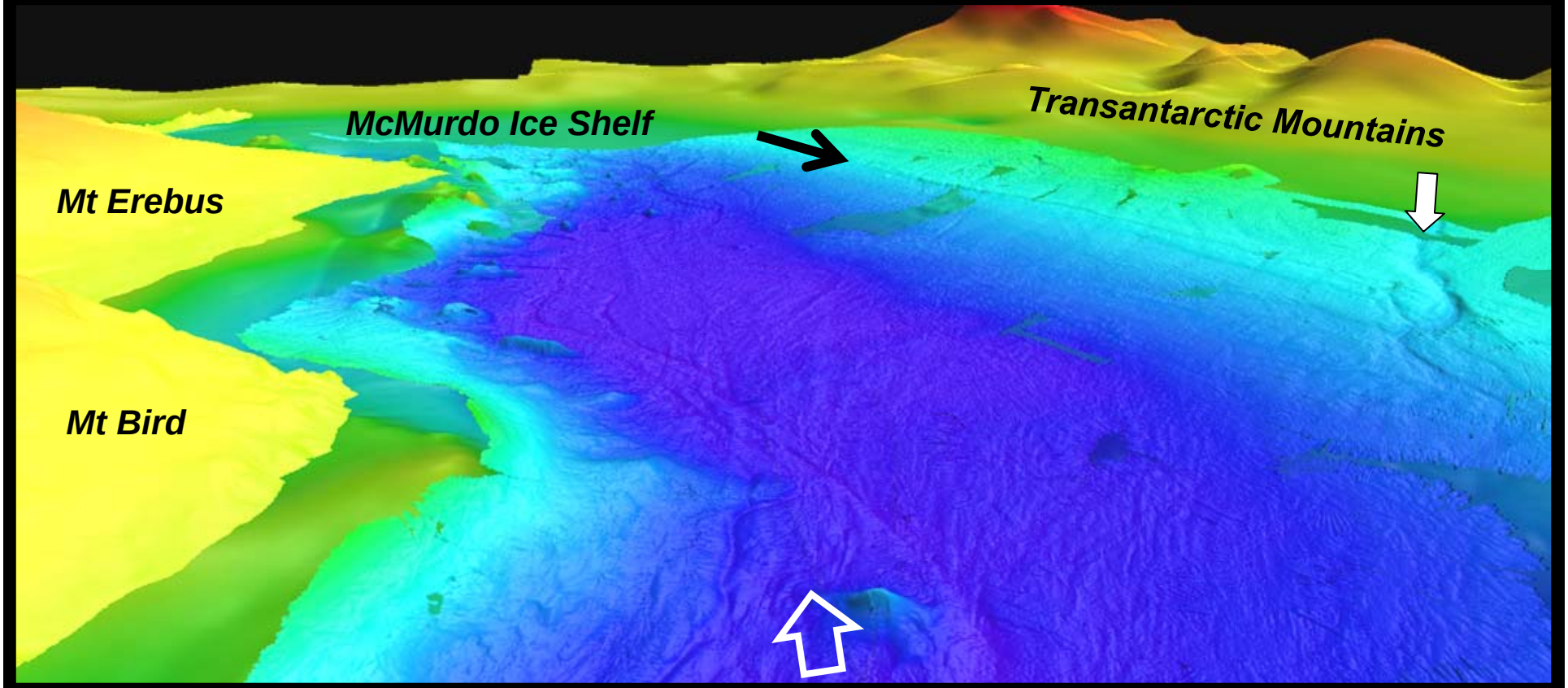
Regional arrays of volcanic lineaments on seafloor

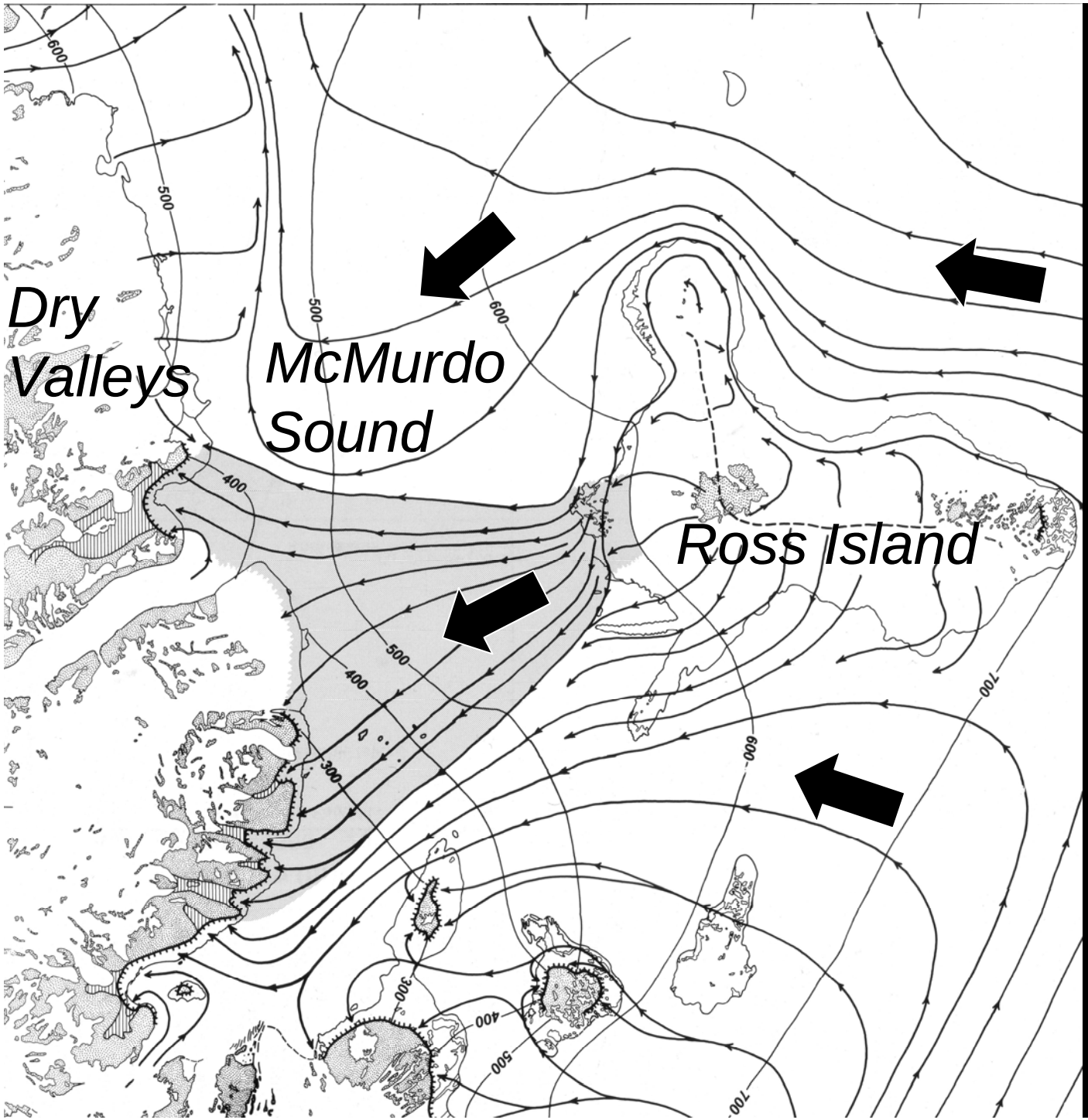
McMurdo Sound




Mt Erebus
Mt Bird
Flexural moat – volcano load
Flat-topped
mounds
Erebus-related volcanic fissures

McMurdo Sound:
grounded ice features – margins only!

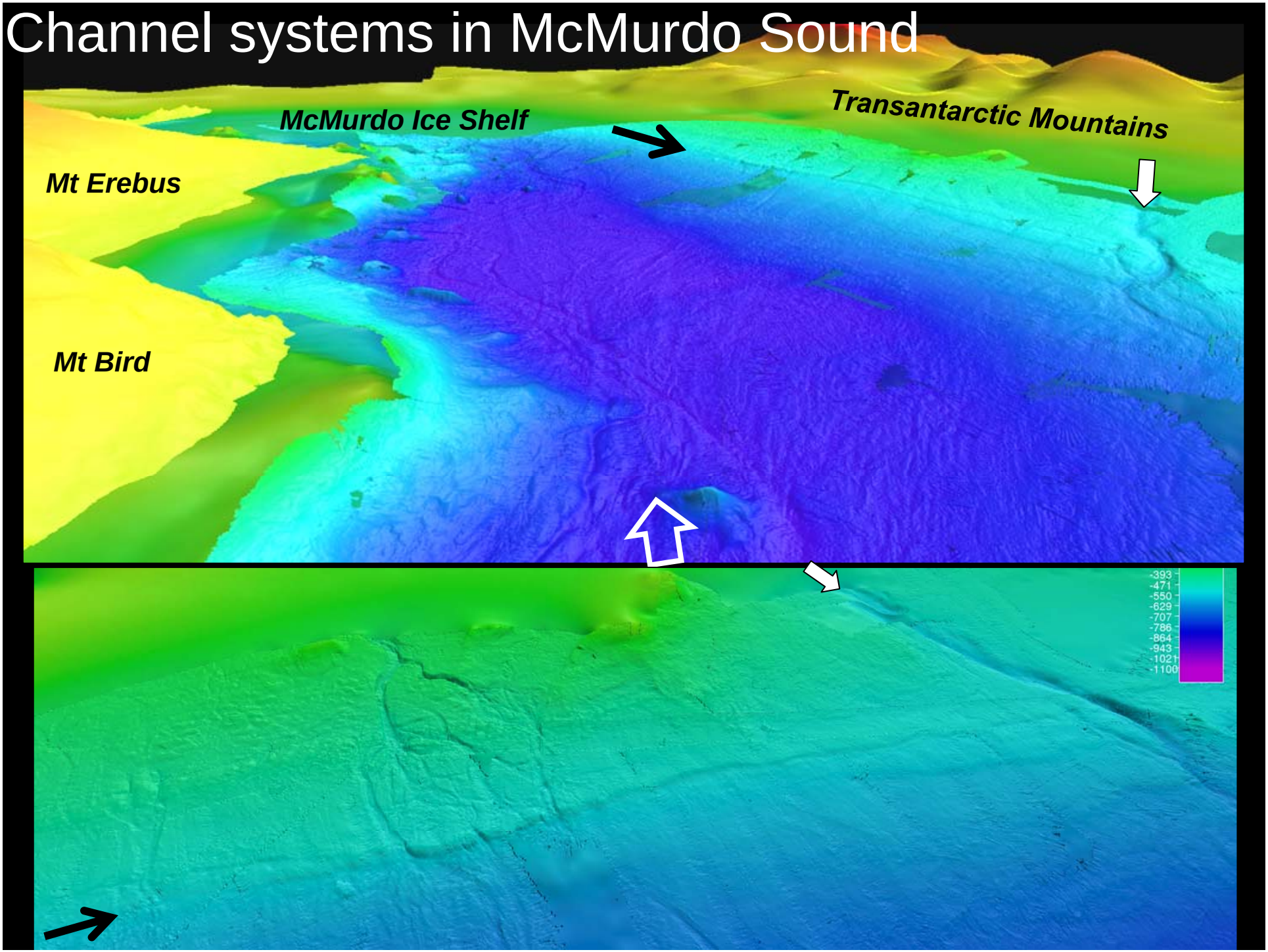


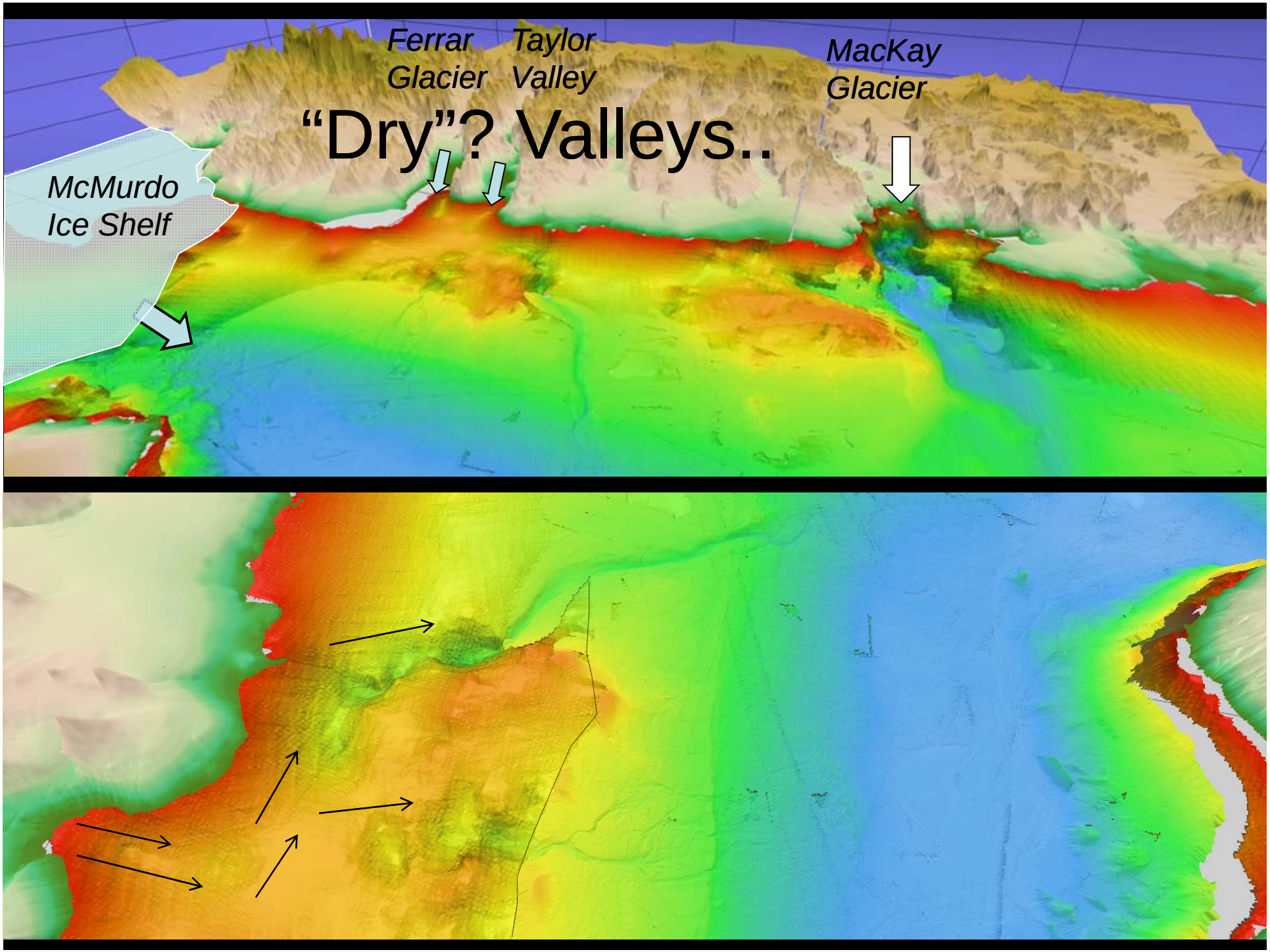


LGM
Ross Ice Sheet reconstruction

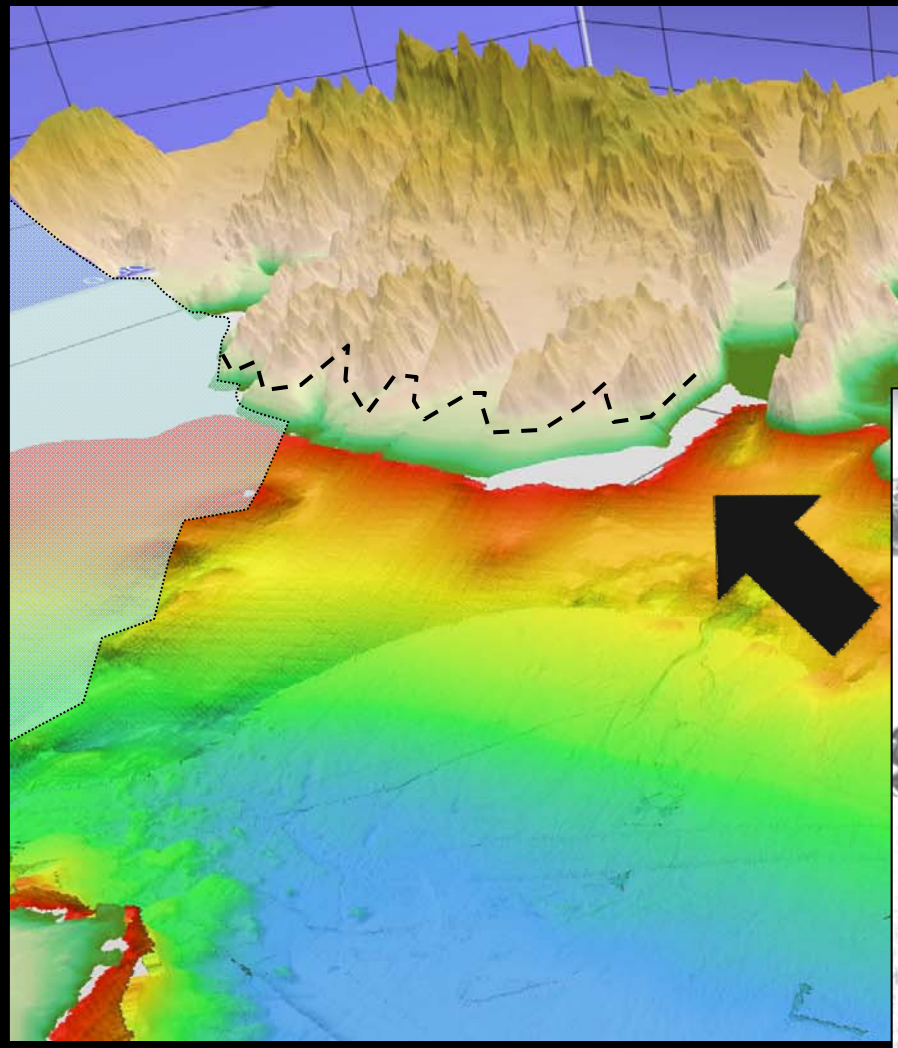
Denton & Marchant
2000

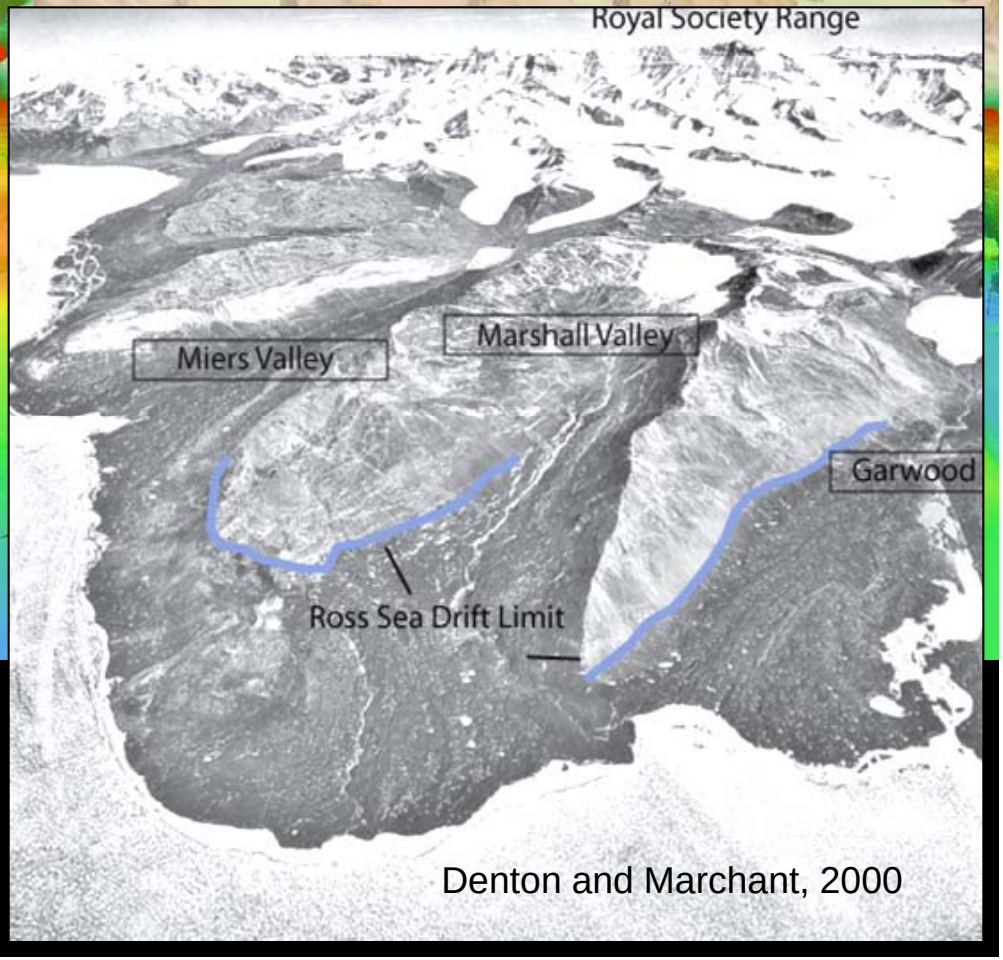
Channel systems in McMurdo Sound




Ferrar Glacier
Taylor Valley
MacKay Glacier
"Dry"? Valleys..
McMurdo Ice Shelf

Mapping ice limits

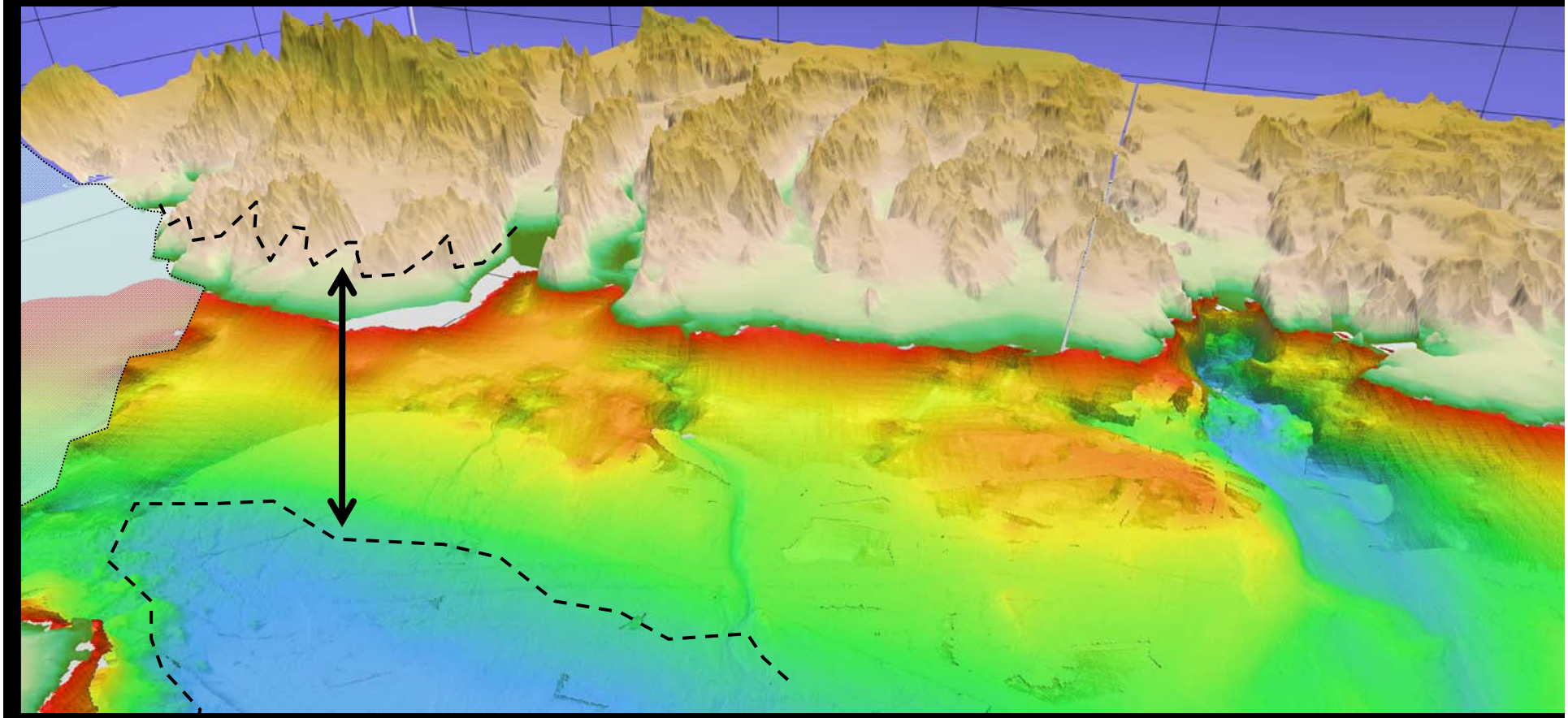




Terrestrial mapping

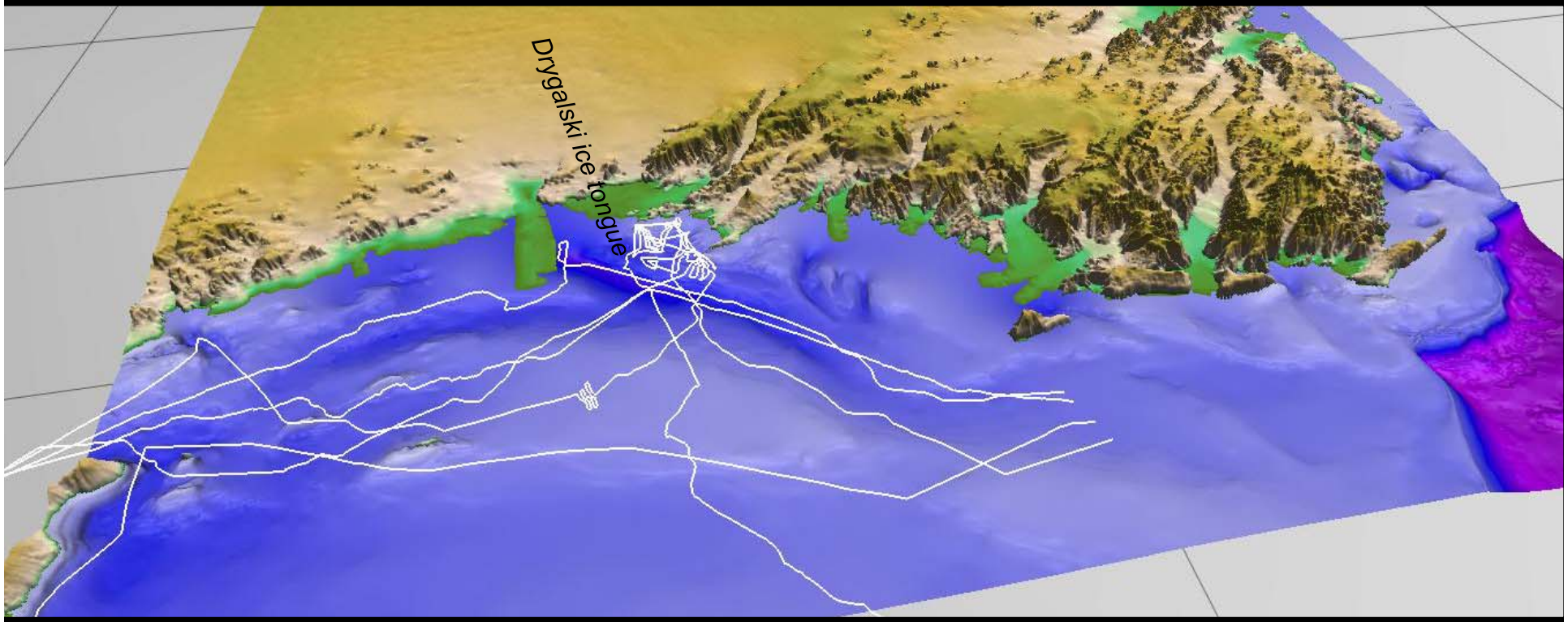
Ice volume calculations:

modeling GPS-derived vertical motions from glacial isostatic adjustment



Grounded ice limit – seafloor mapping

Host of geological targets in the Ross Sea



More data !