



Morphology of Basal Crevasses at the Grounding Zone of Whillans Ice Stream, West Antarctica



2013 WAIS Workshop

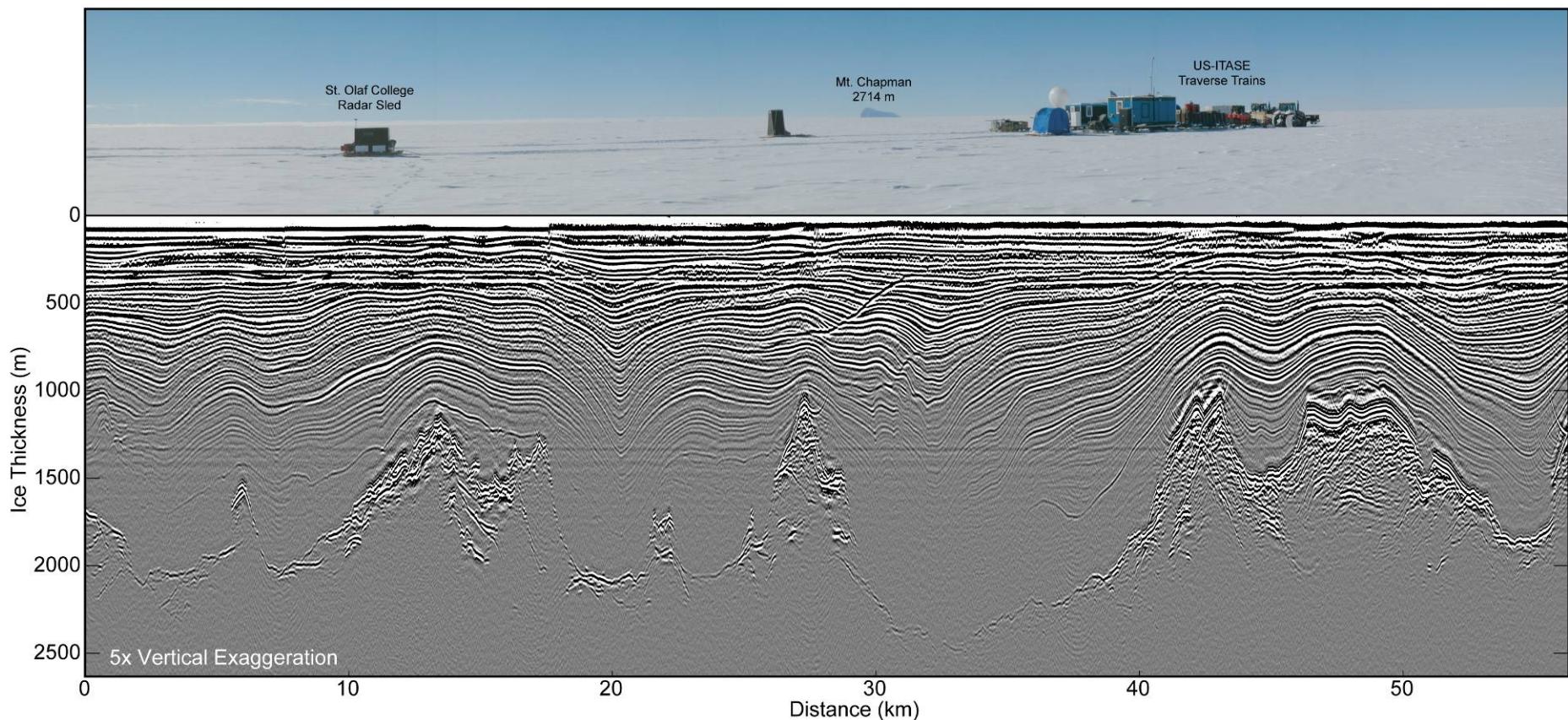
October 1, 2013

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Department of Physics



St. Olaf College

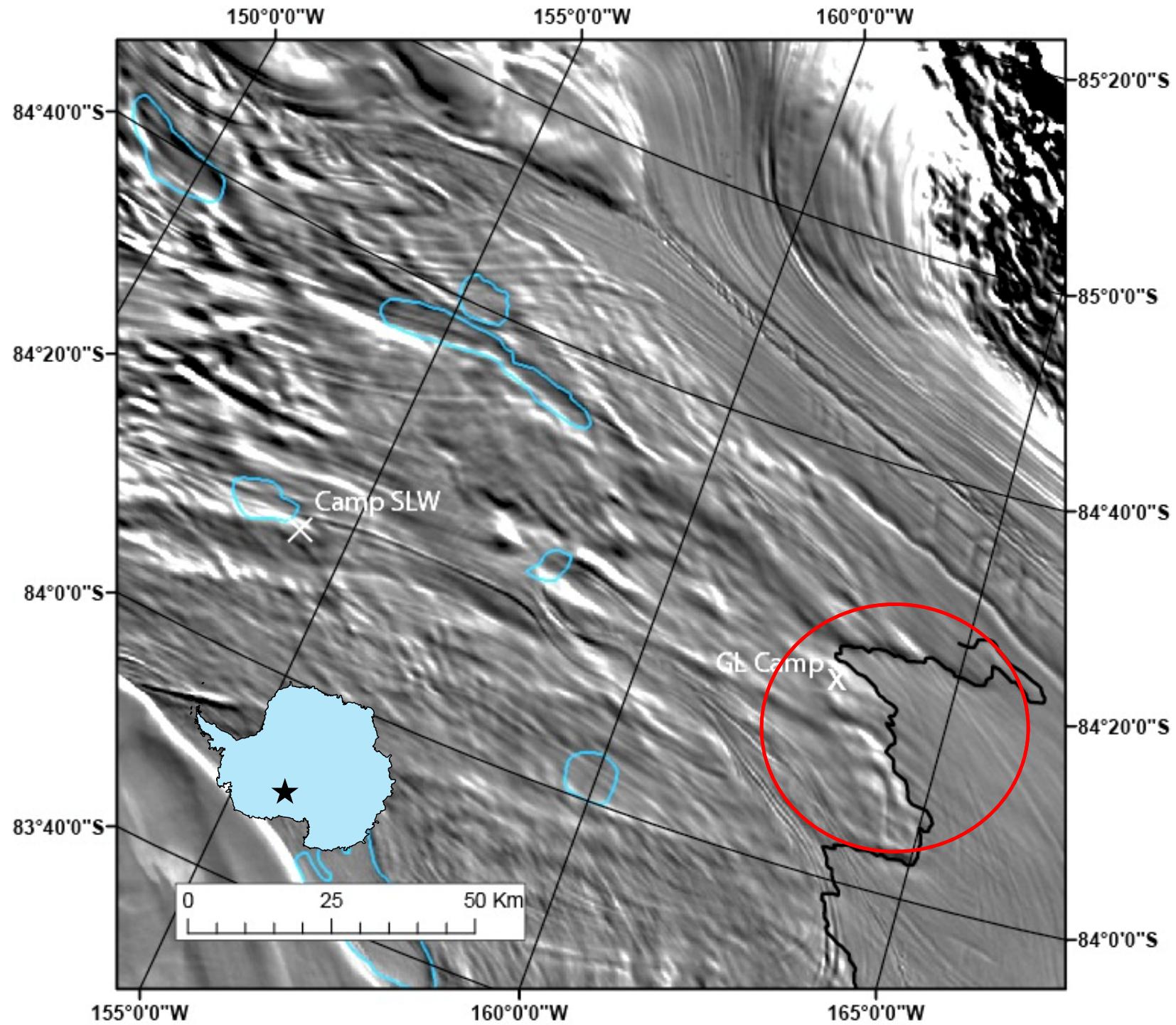


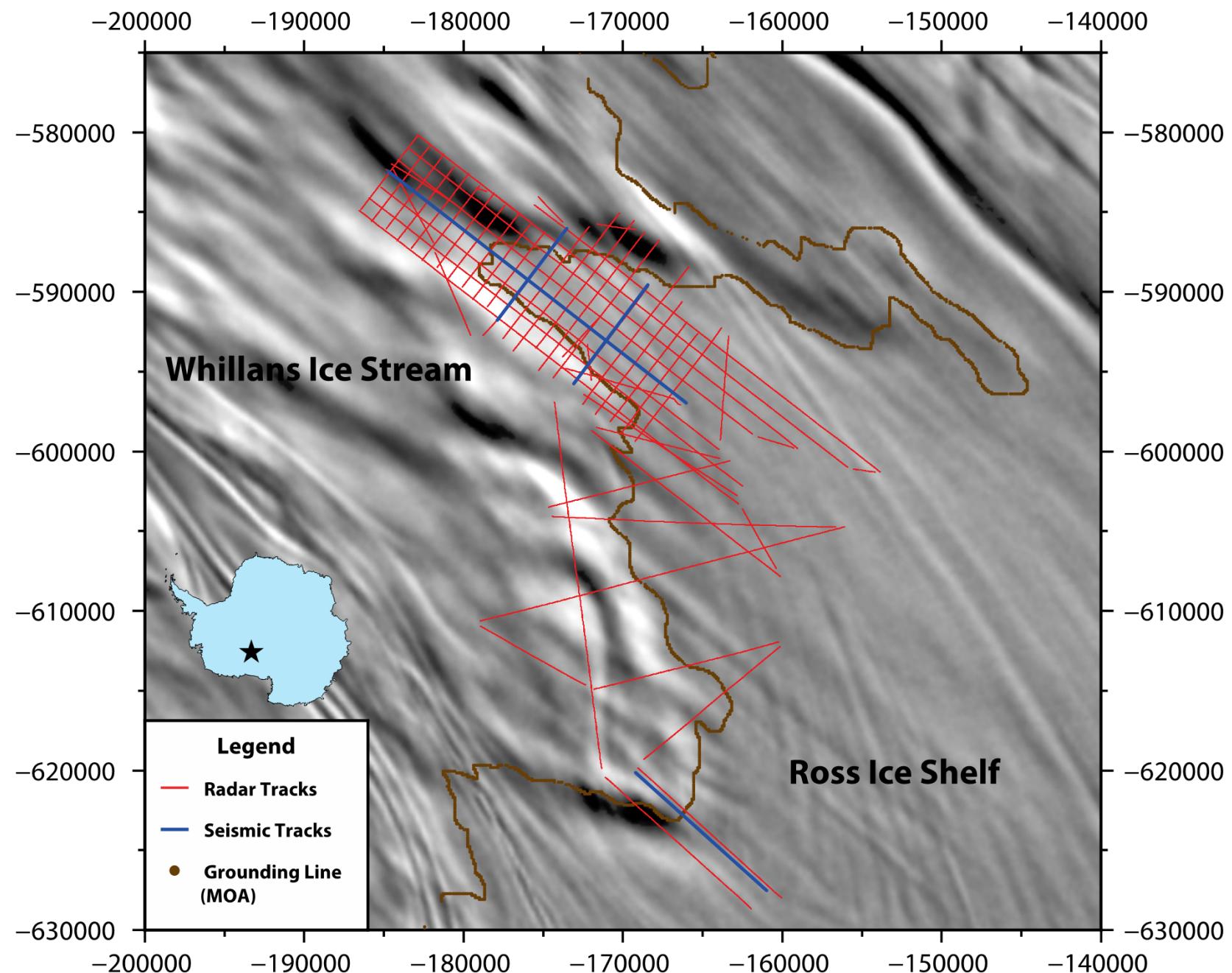
WISSARD Ground-Based Geophysics

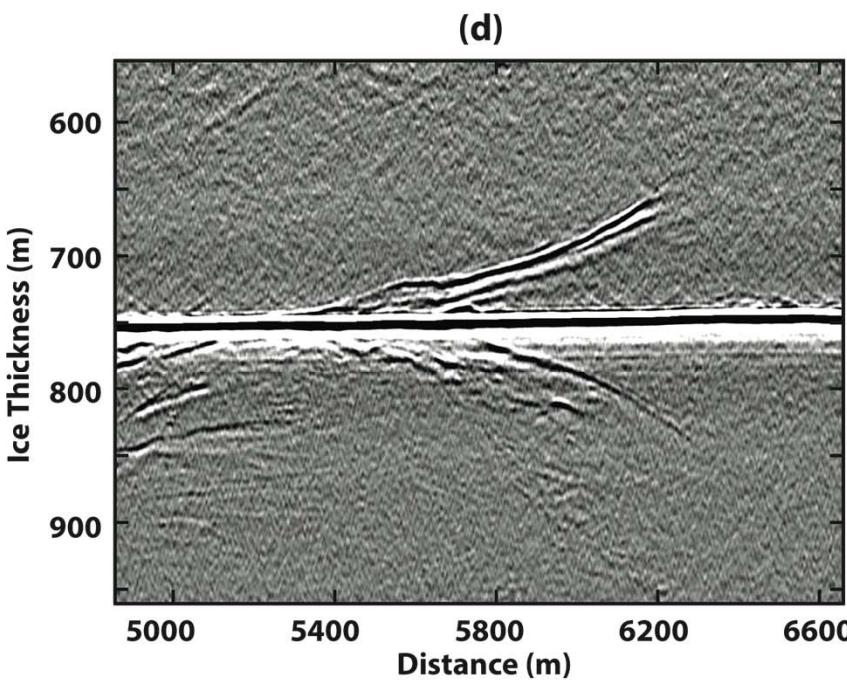
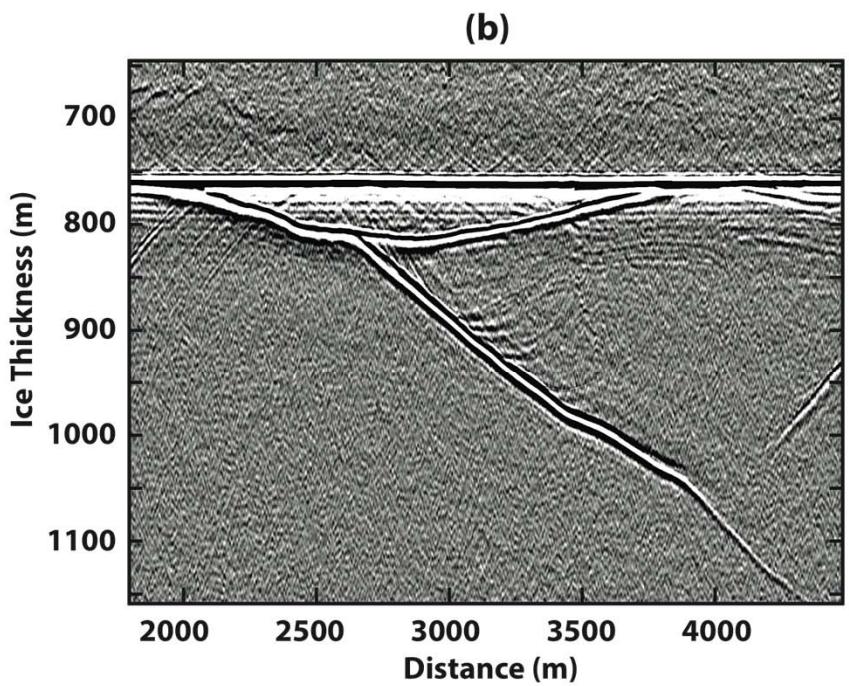
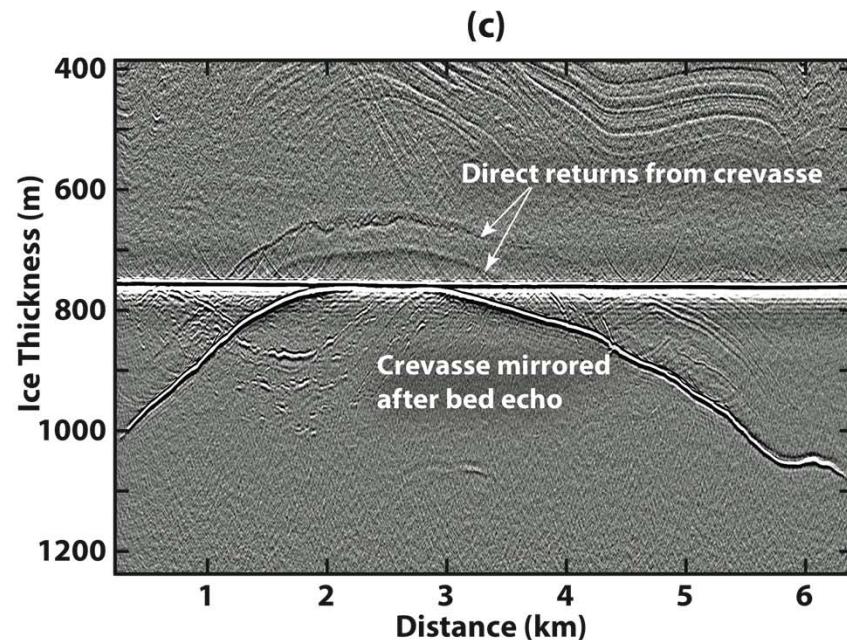
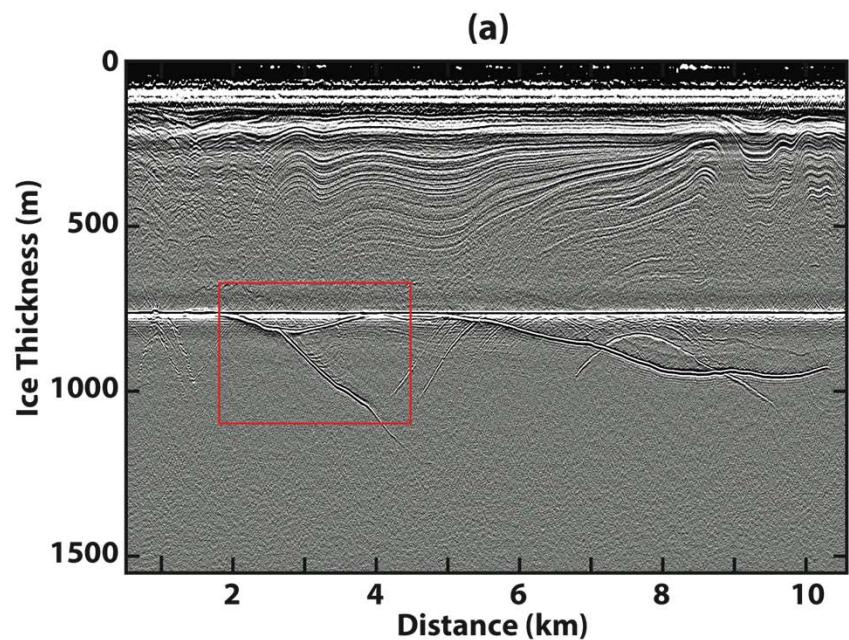
2010-12

- Ice-Penetrating Radar
- Active-Source Seismics
- GPS Surface Elevation

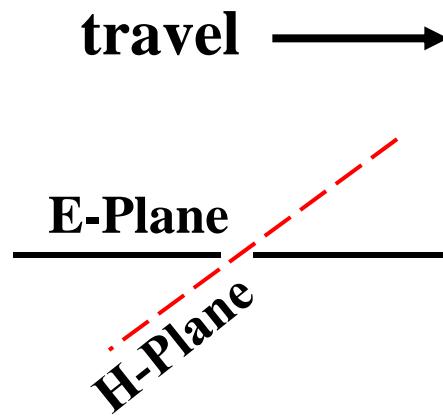




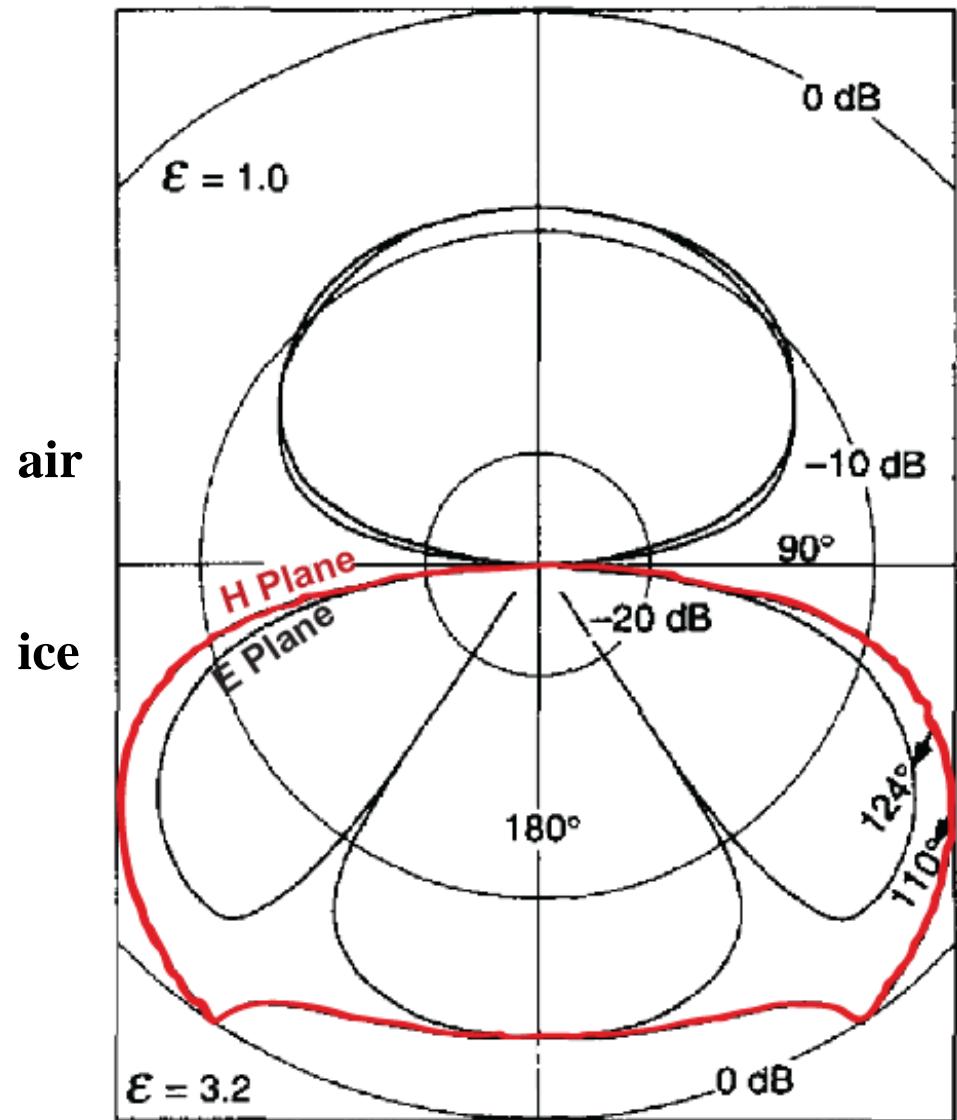




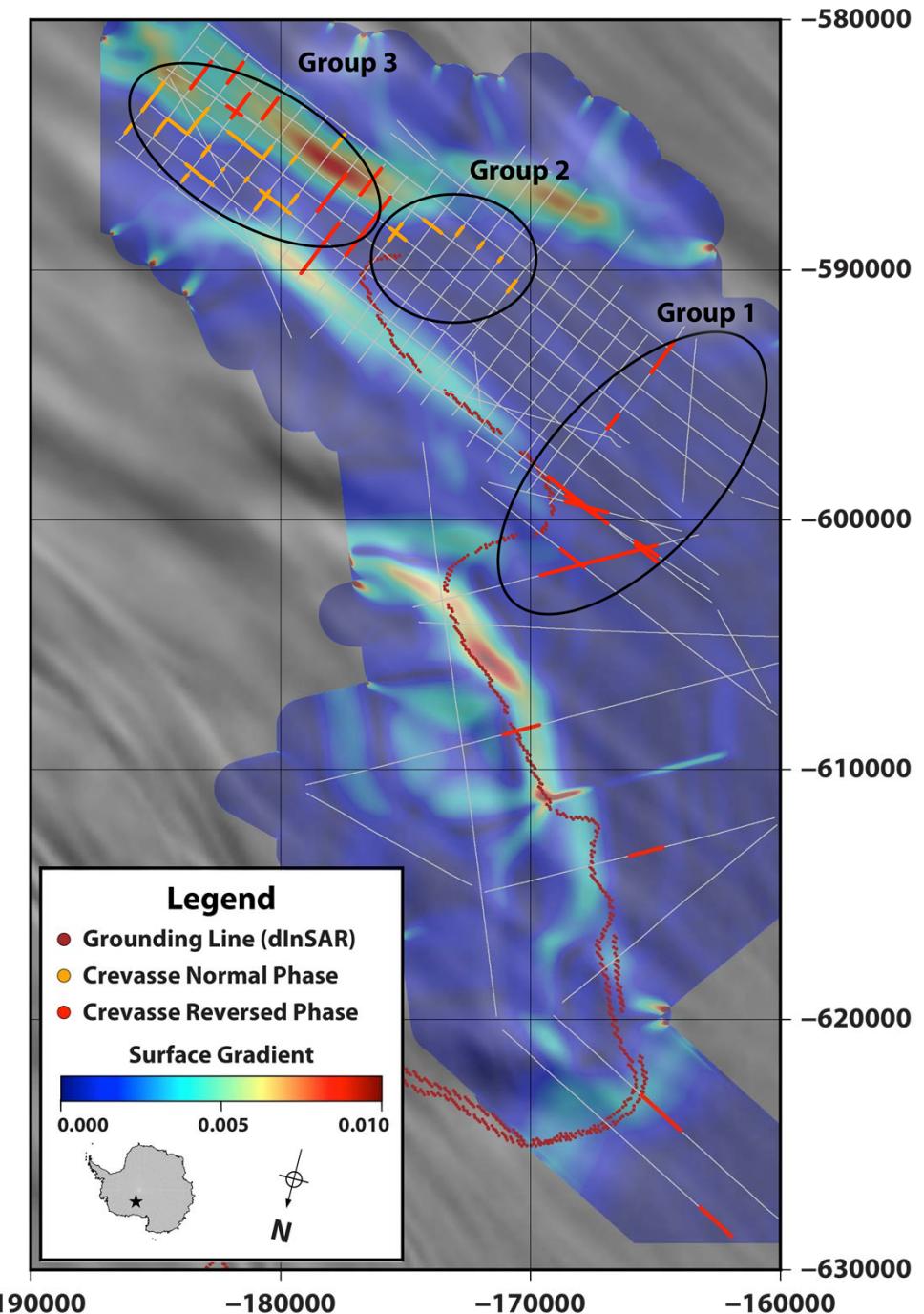
Dipole Antenna Radiation Patterns



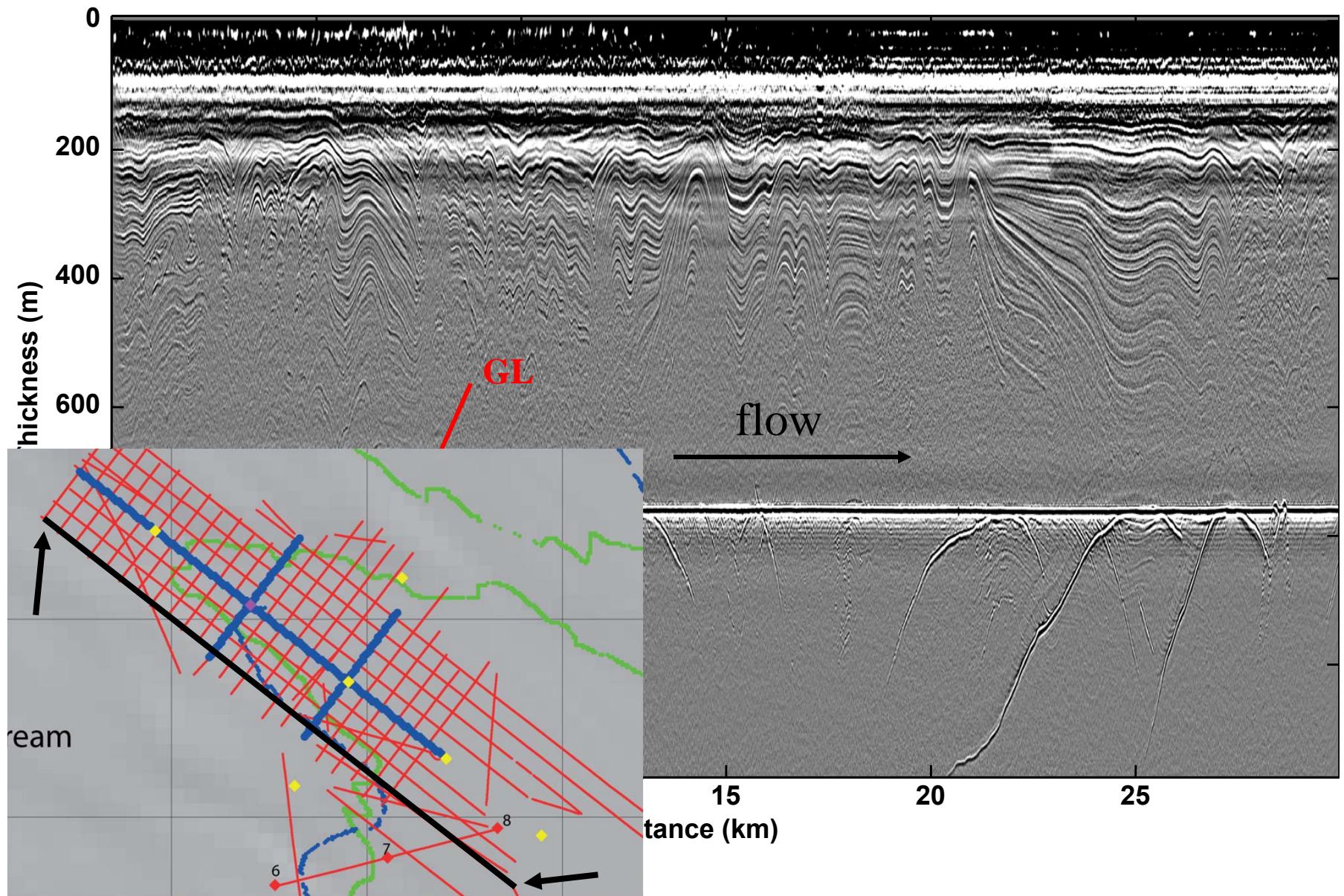
Arcone, 1995, *Applied Geophysics*



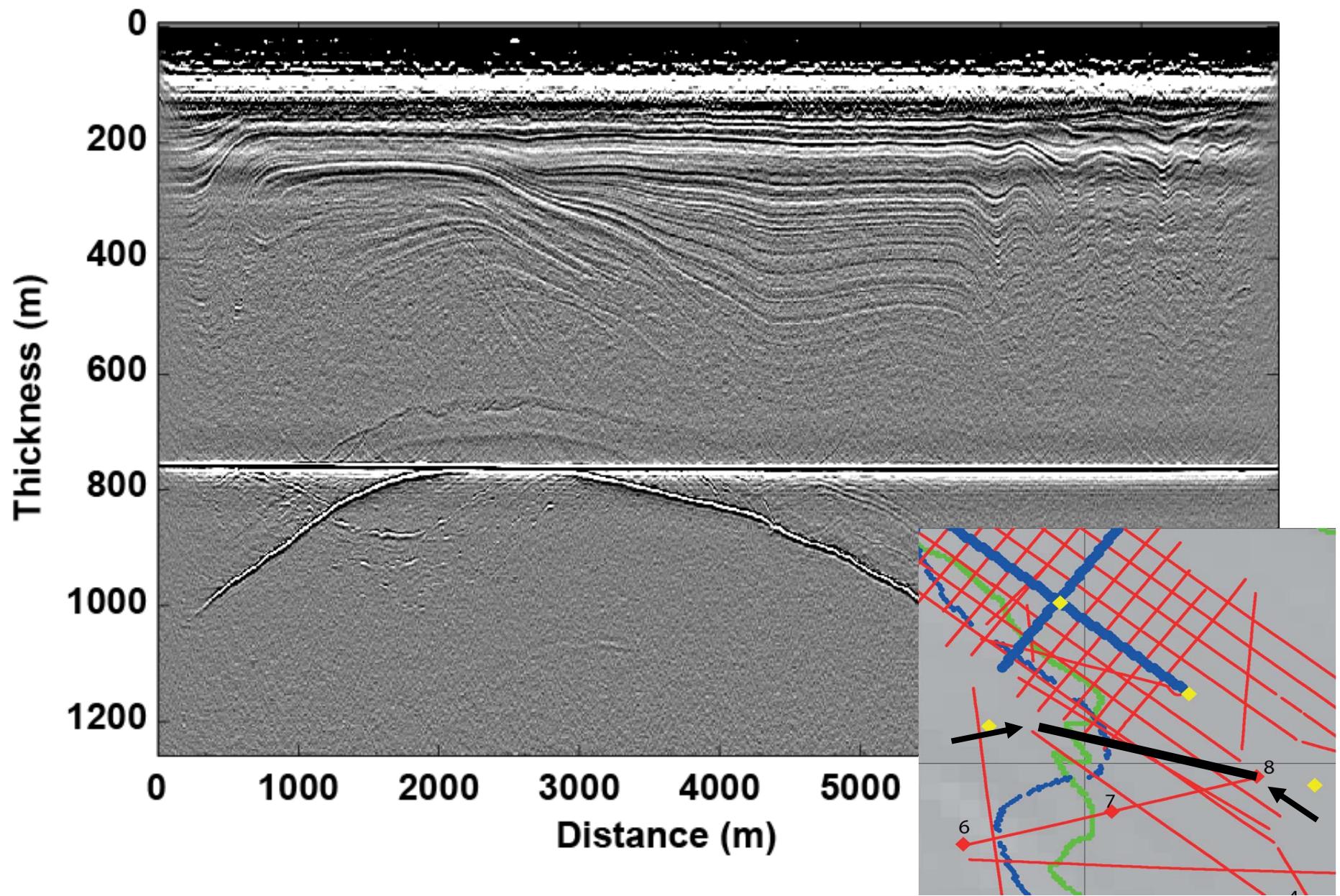
Surface Slope Gradient (color)



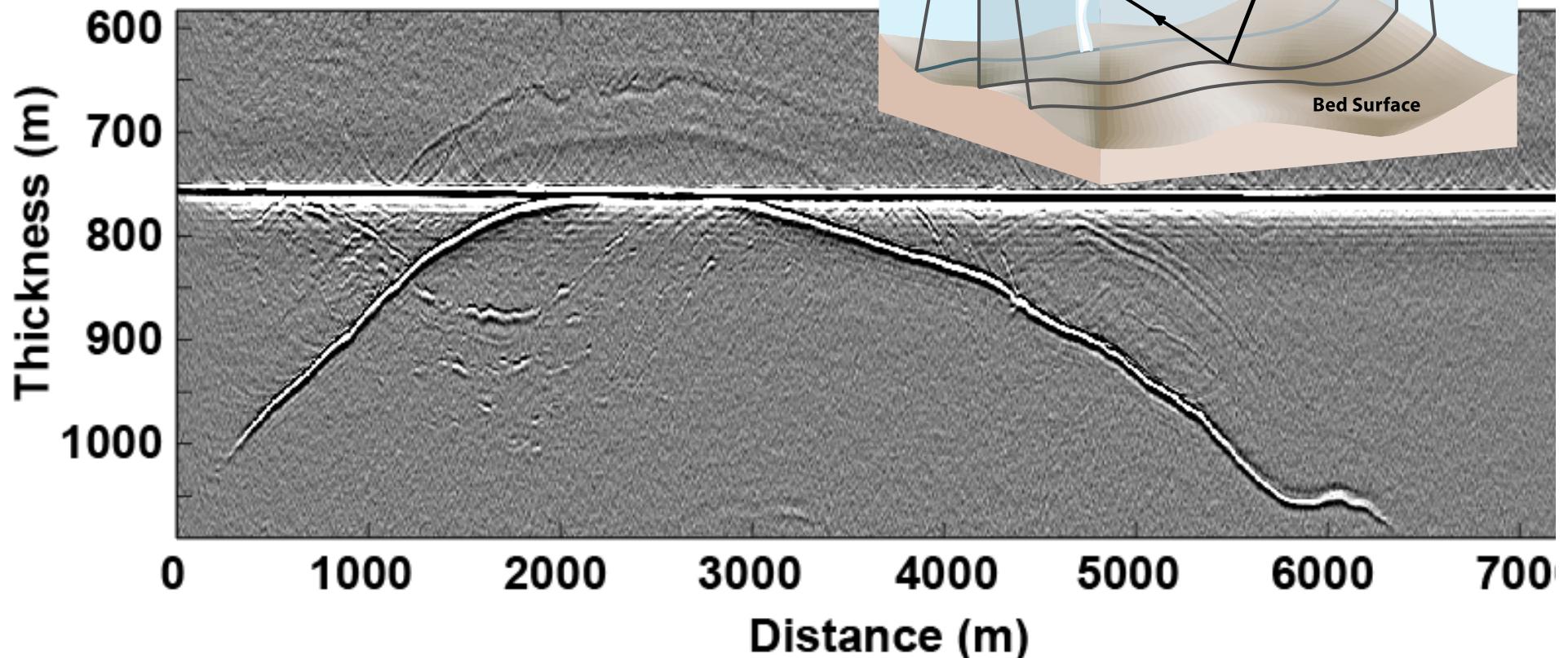
Basal Crevasses

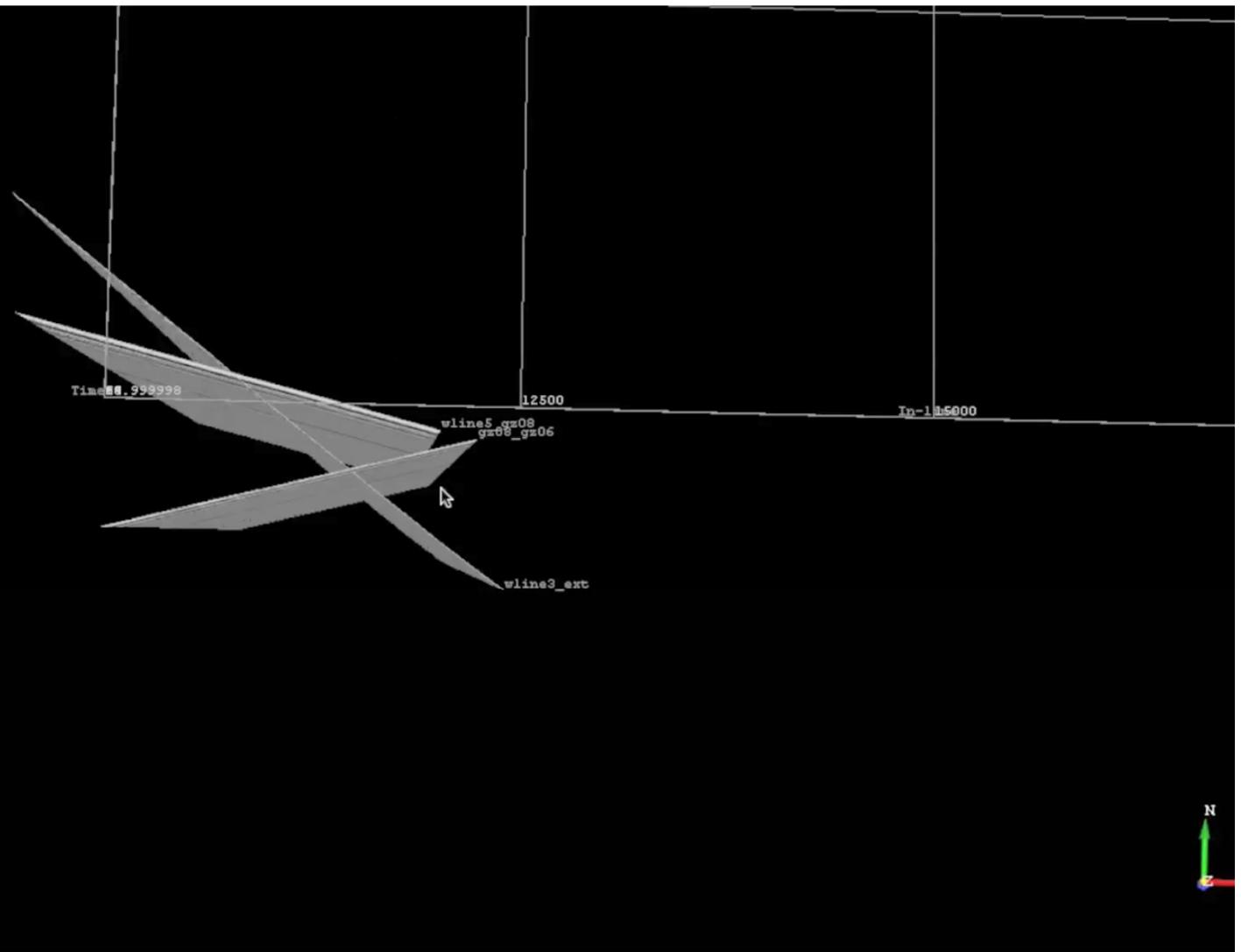
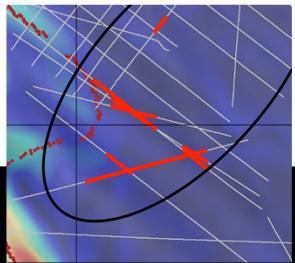


Phase Reversal for a Basal Crevasse

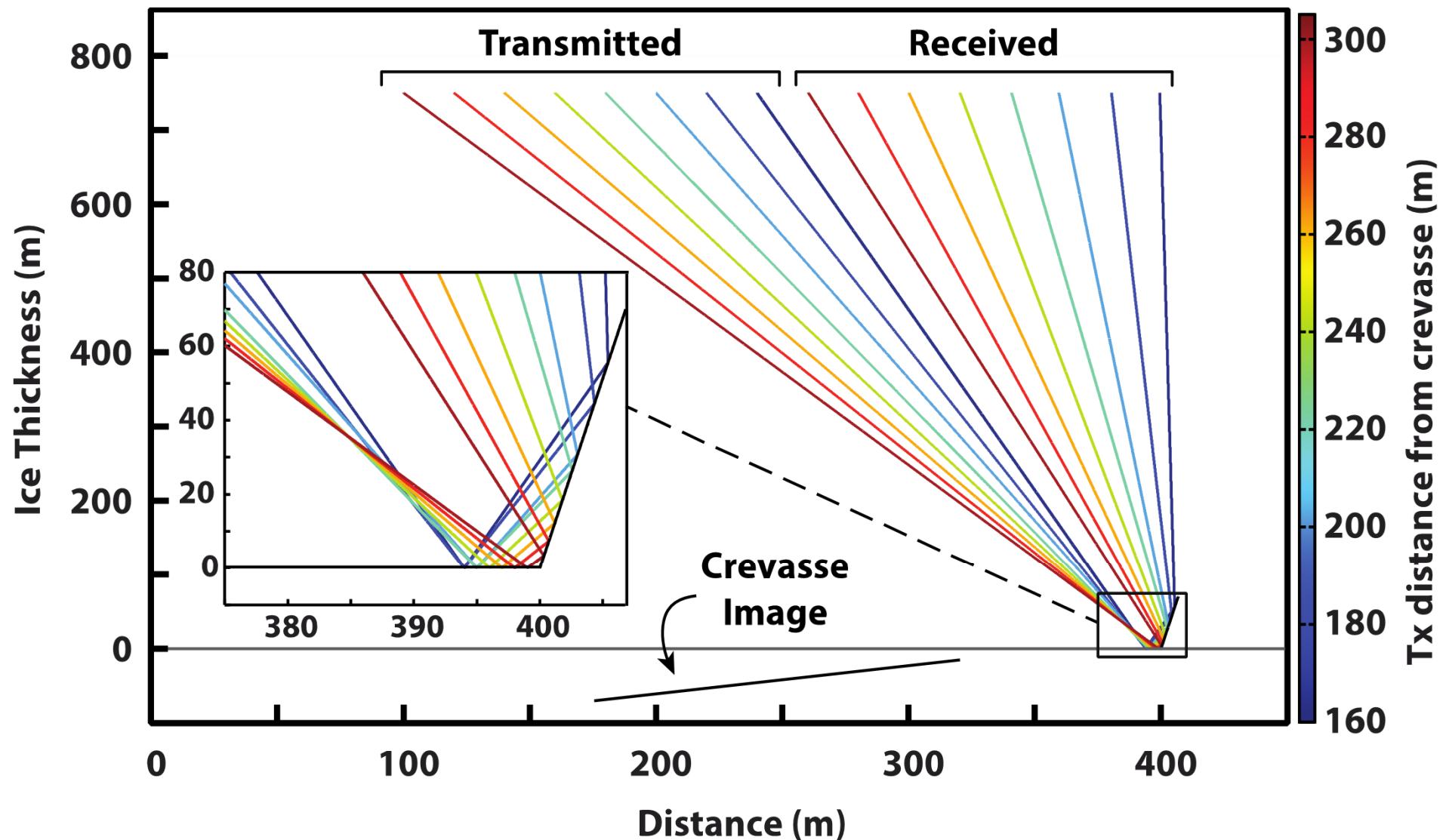


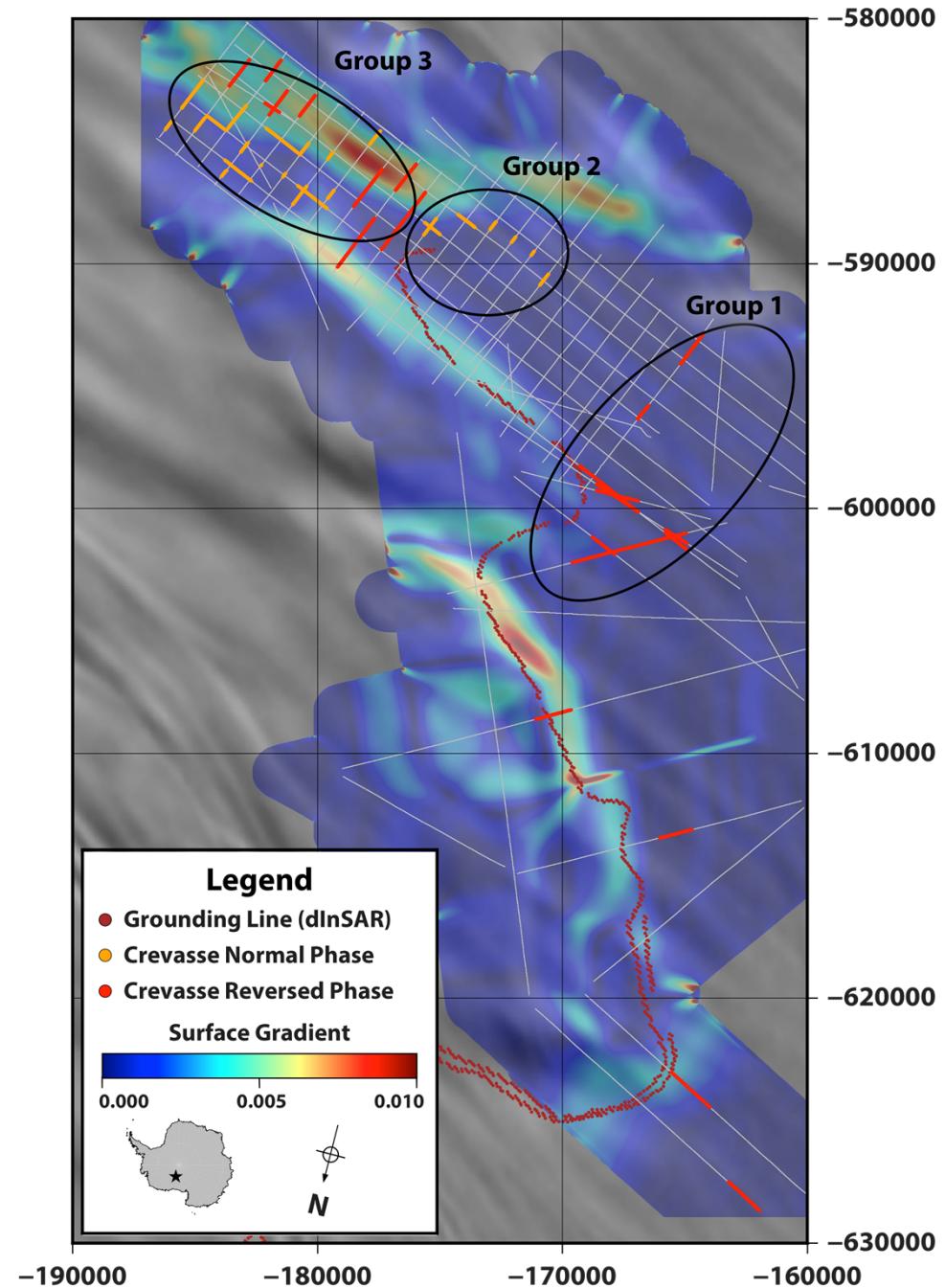
Phase Reversal From a Basal Reflection

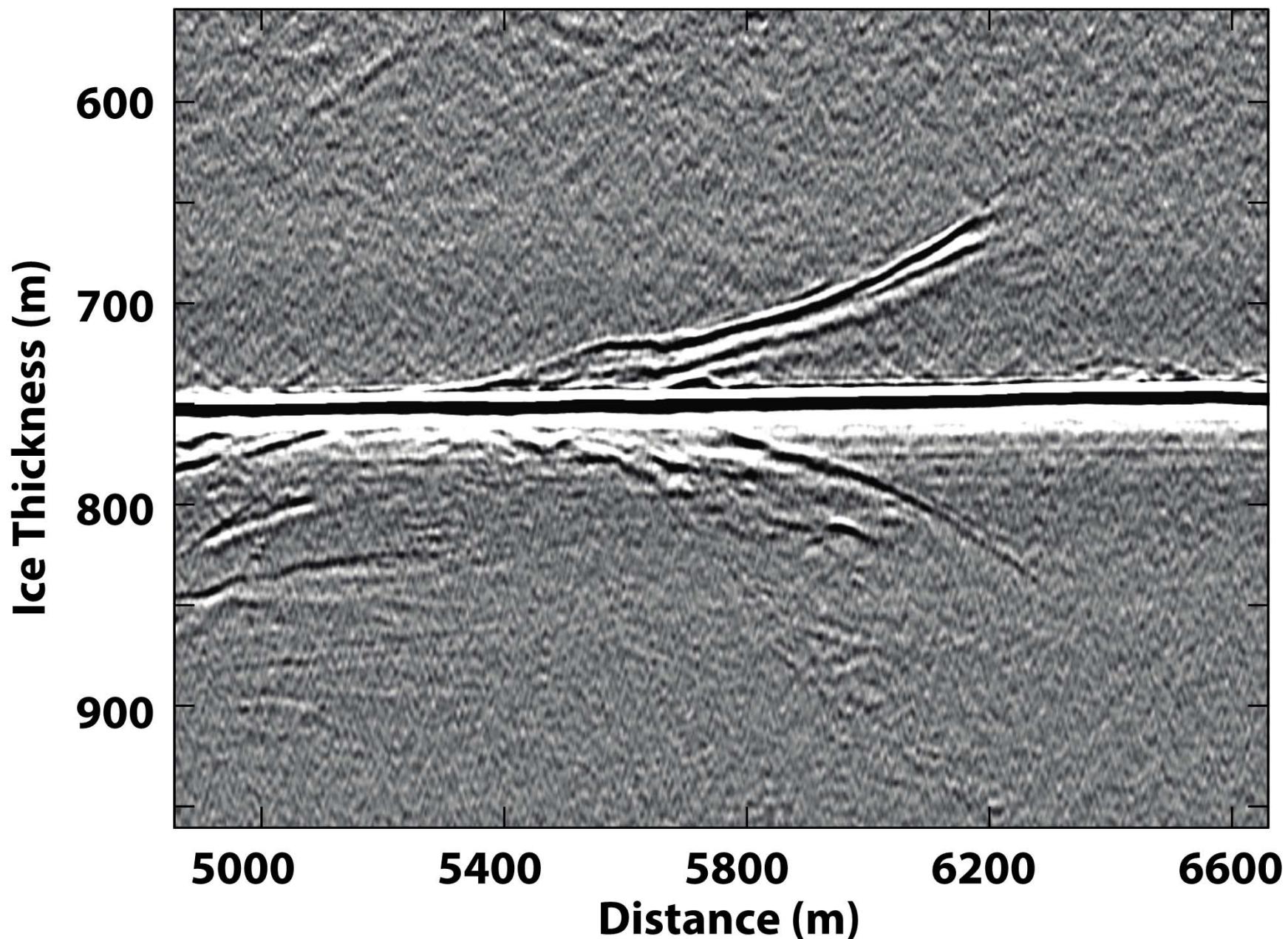


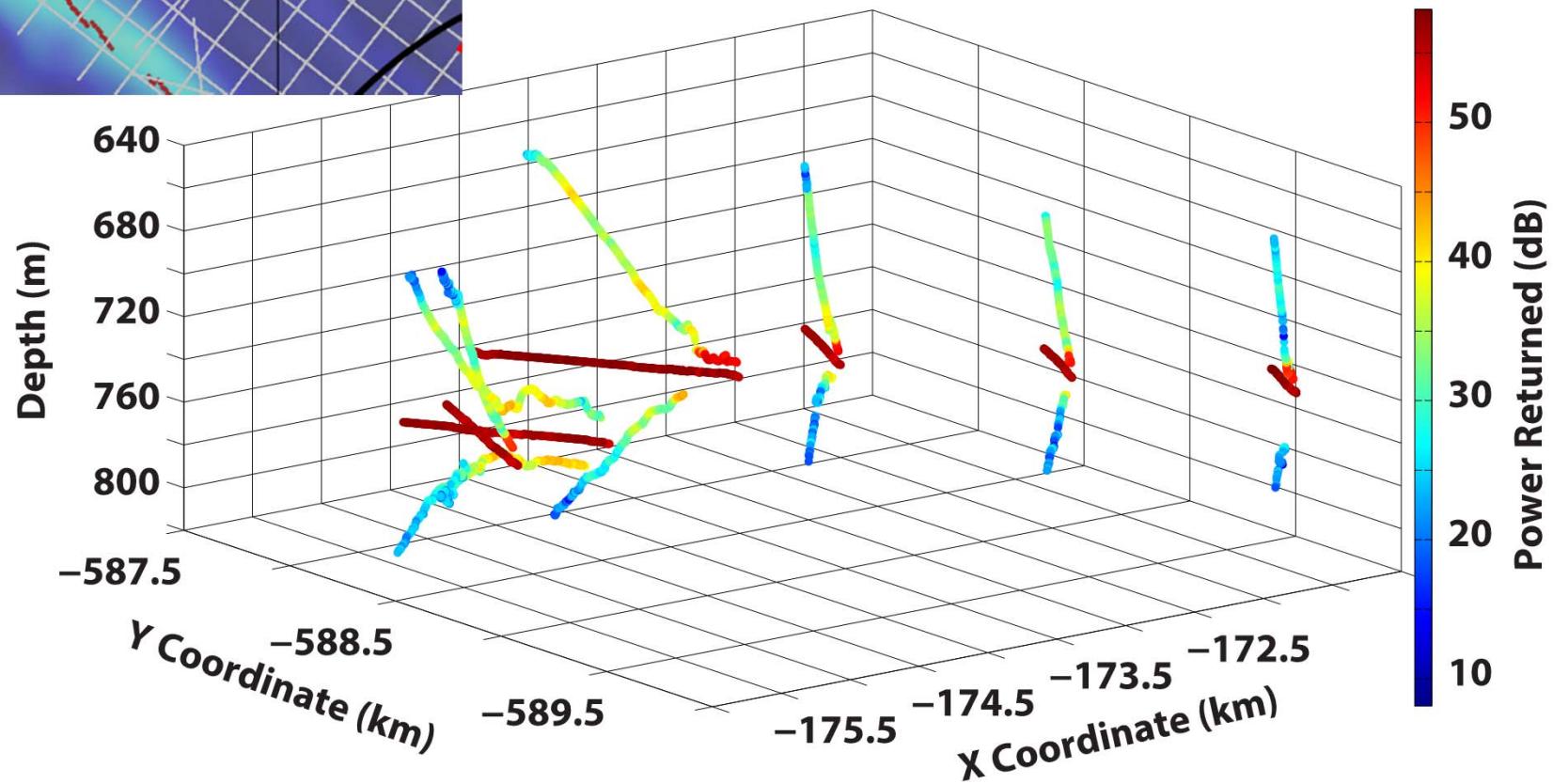
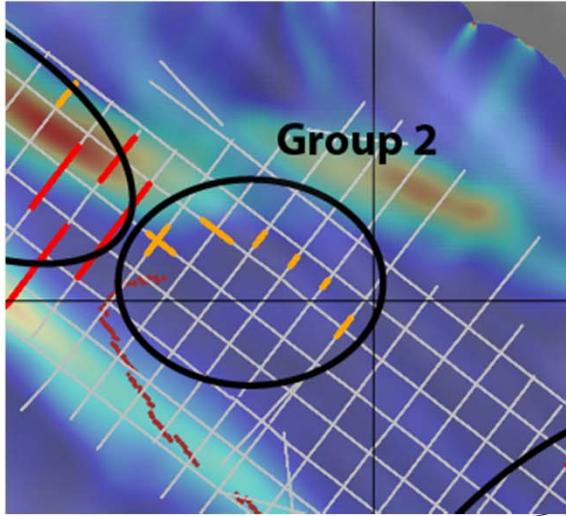


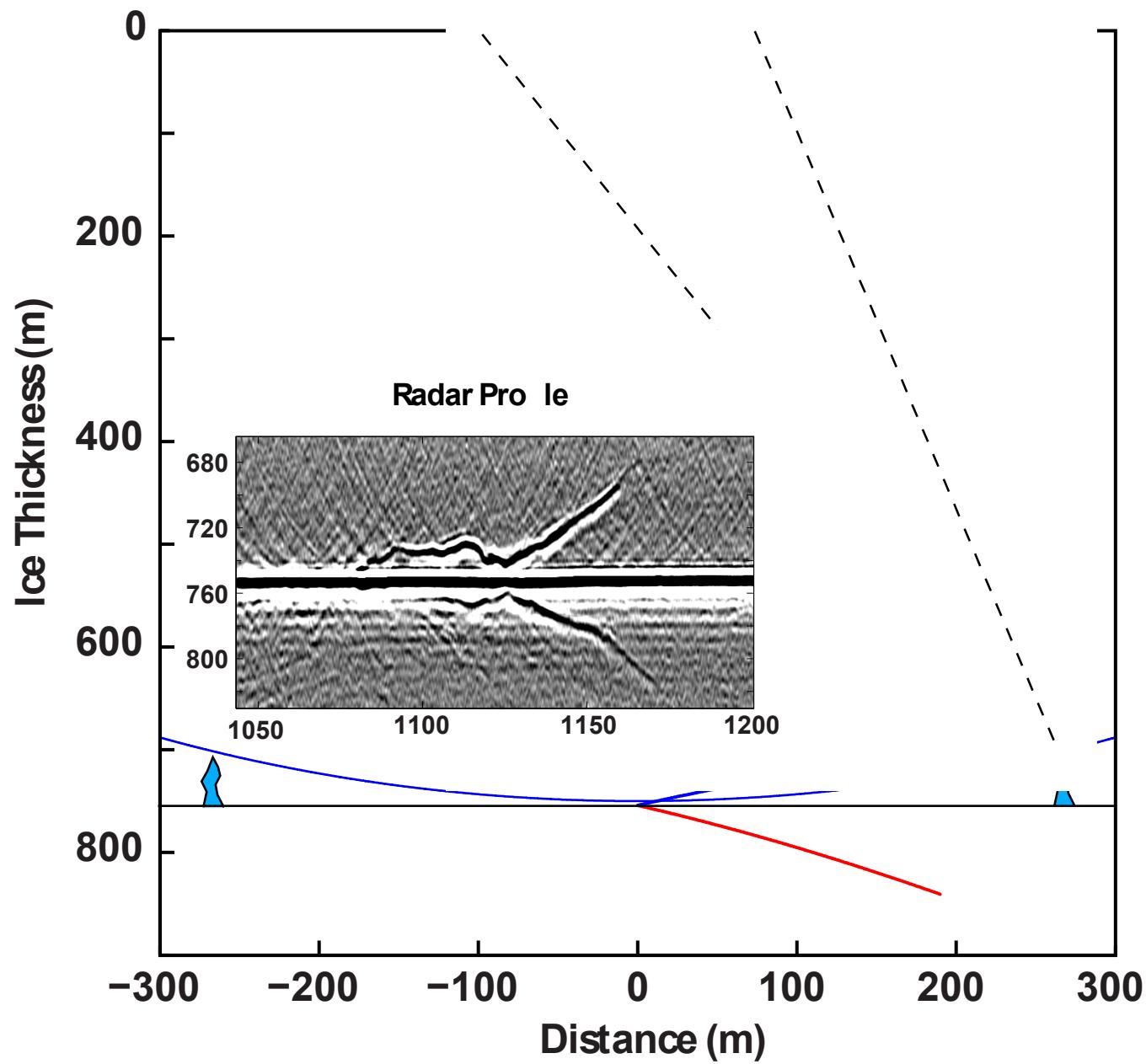
Geometric Model for Crevasse Double-Reflection











-5800000

-180000

-170000

-160000

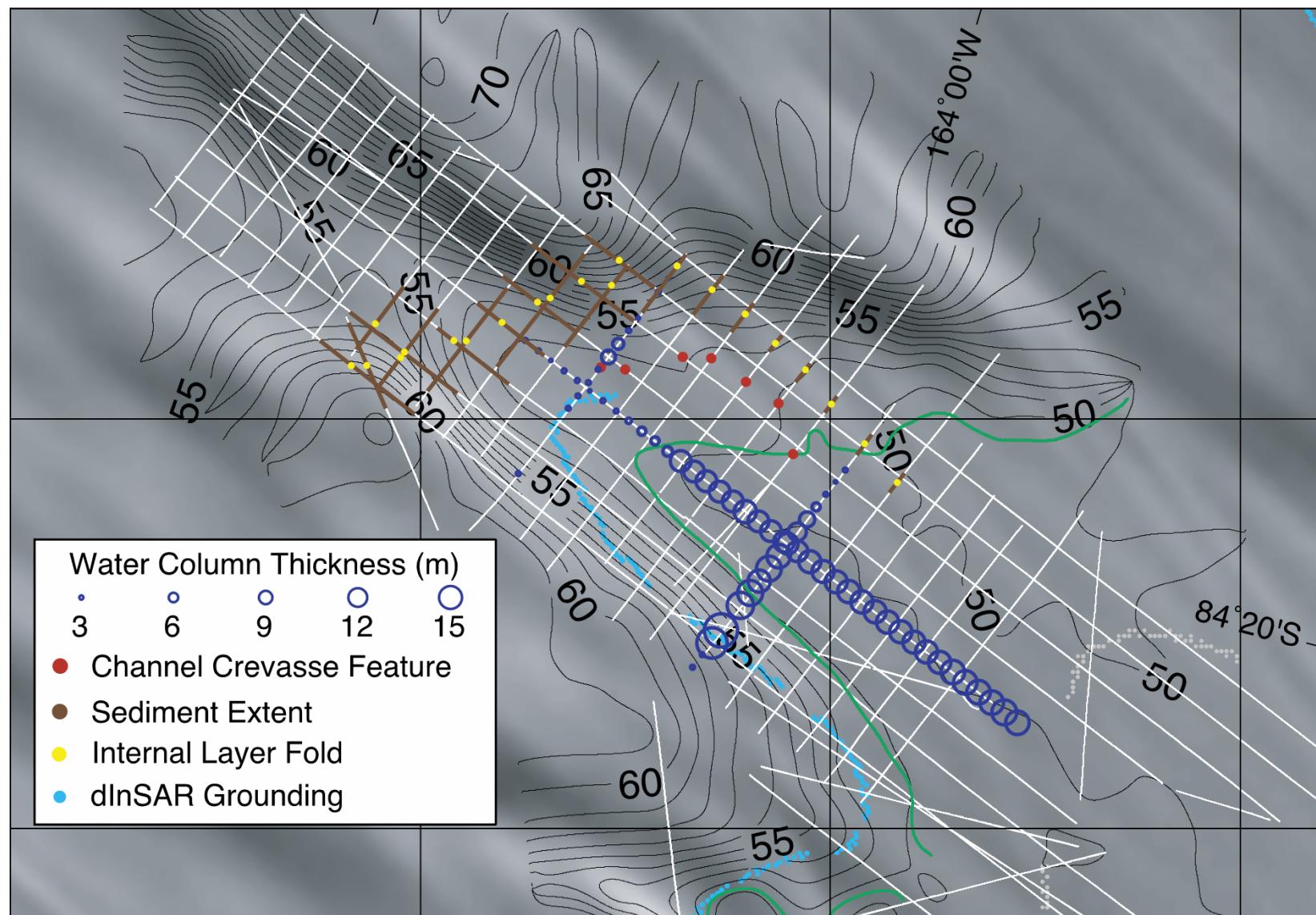
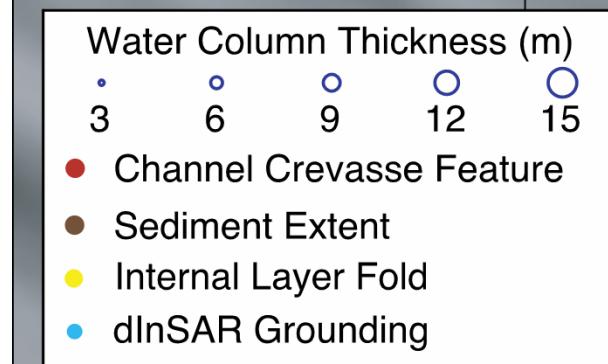
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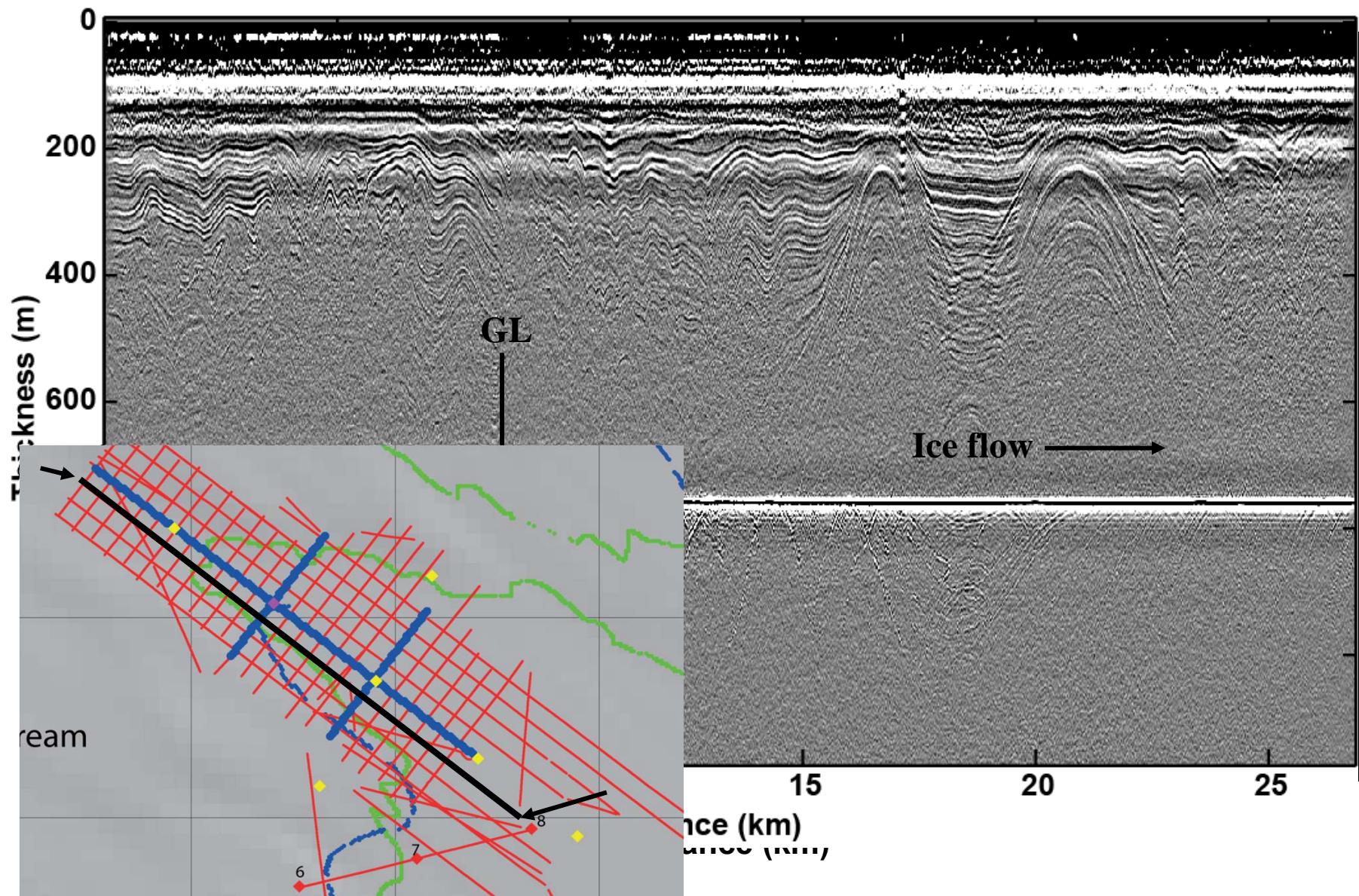
WGZ Crevasses Take Away

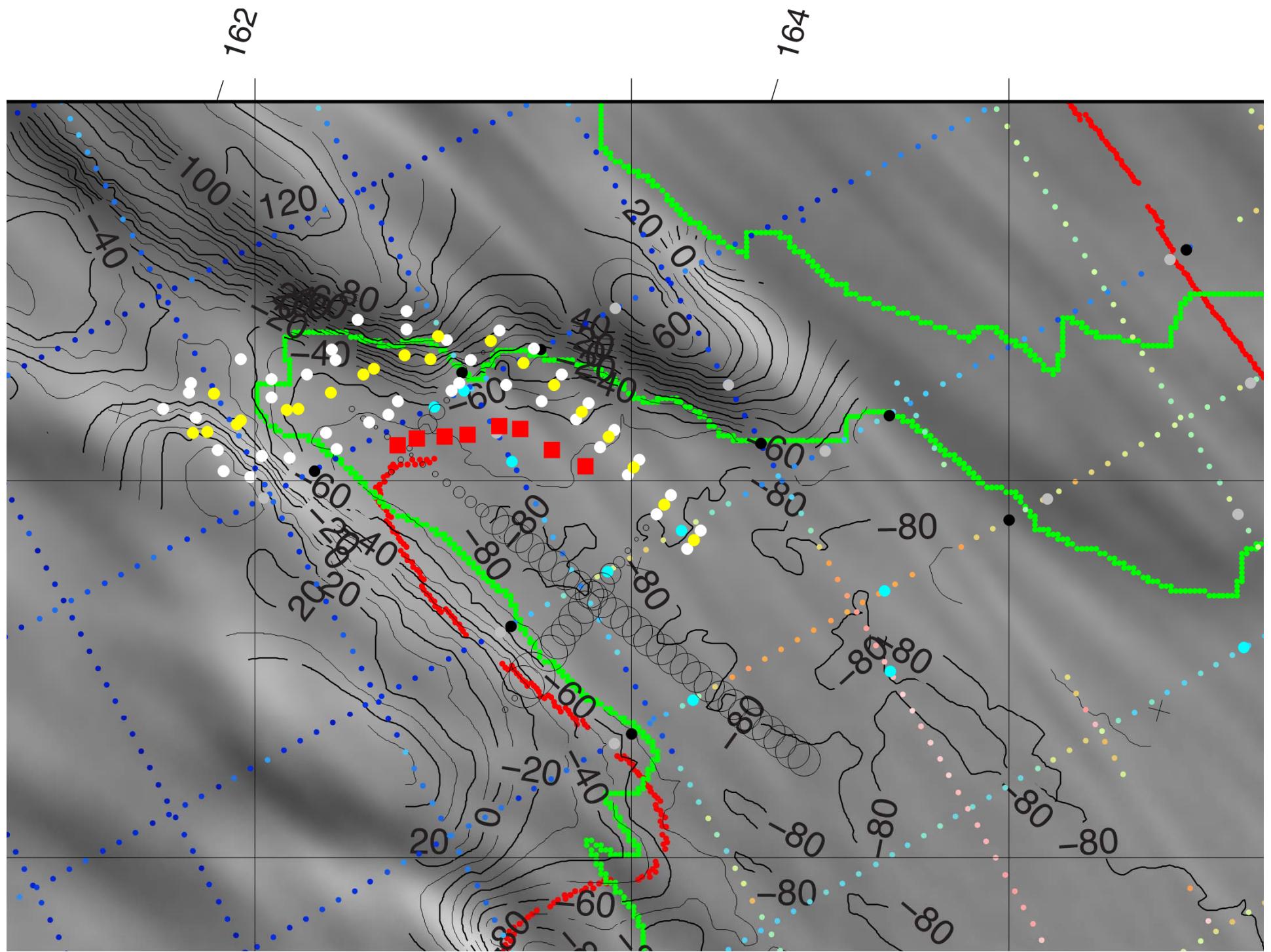
- Crevasses provide a rich dataset for diagnosing stress state and salient processes across a grounding zone.

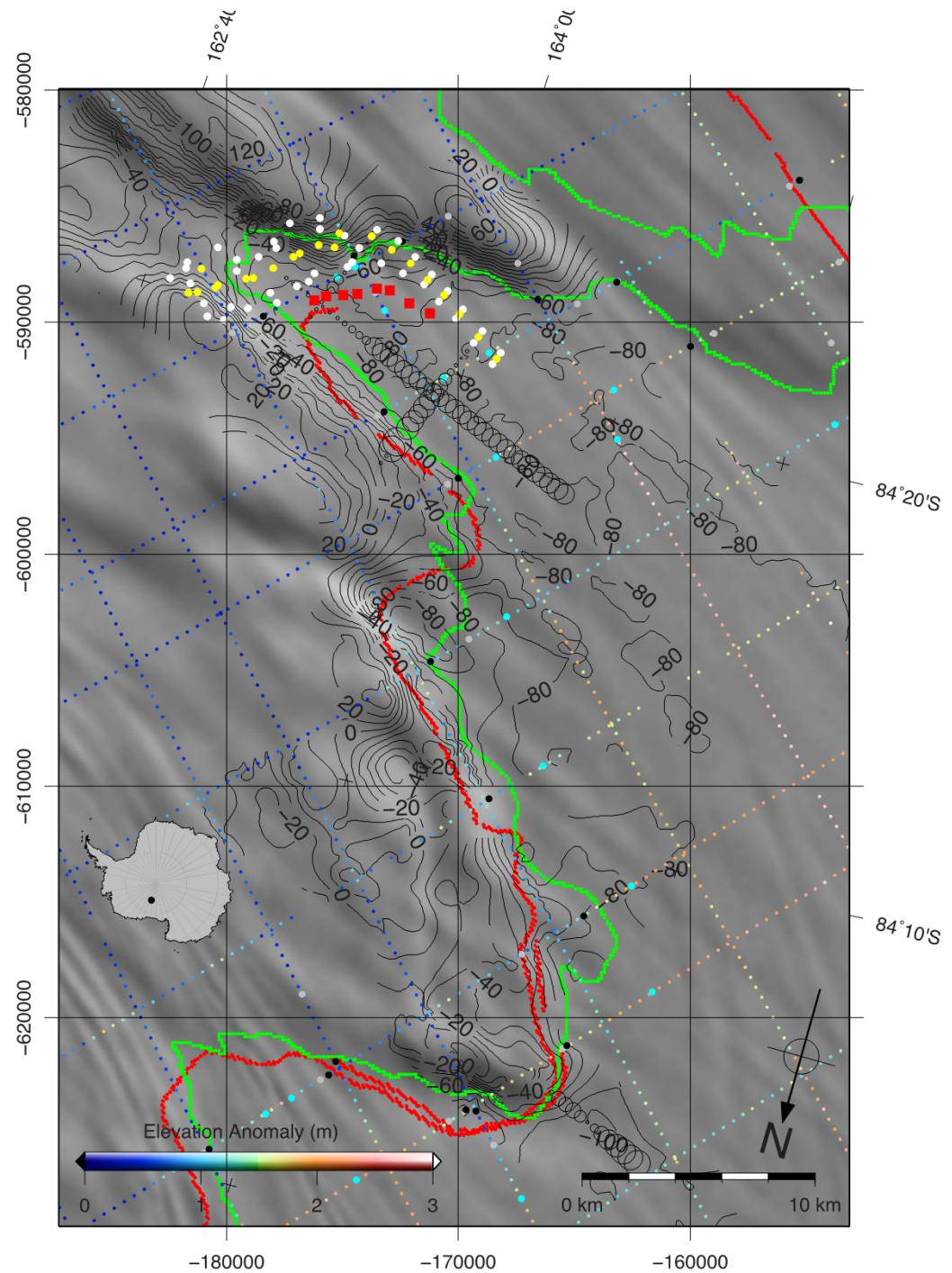


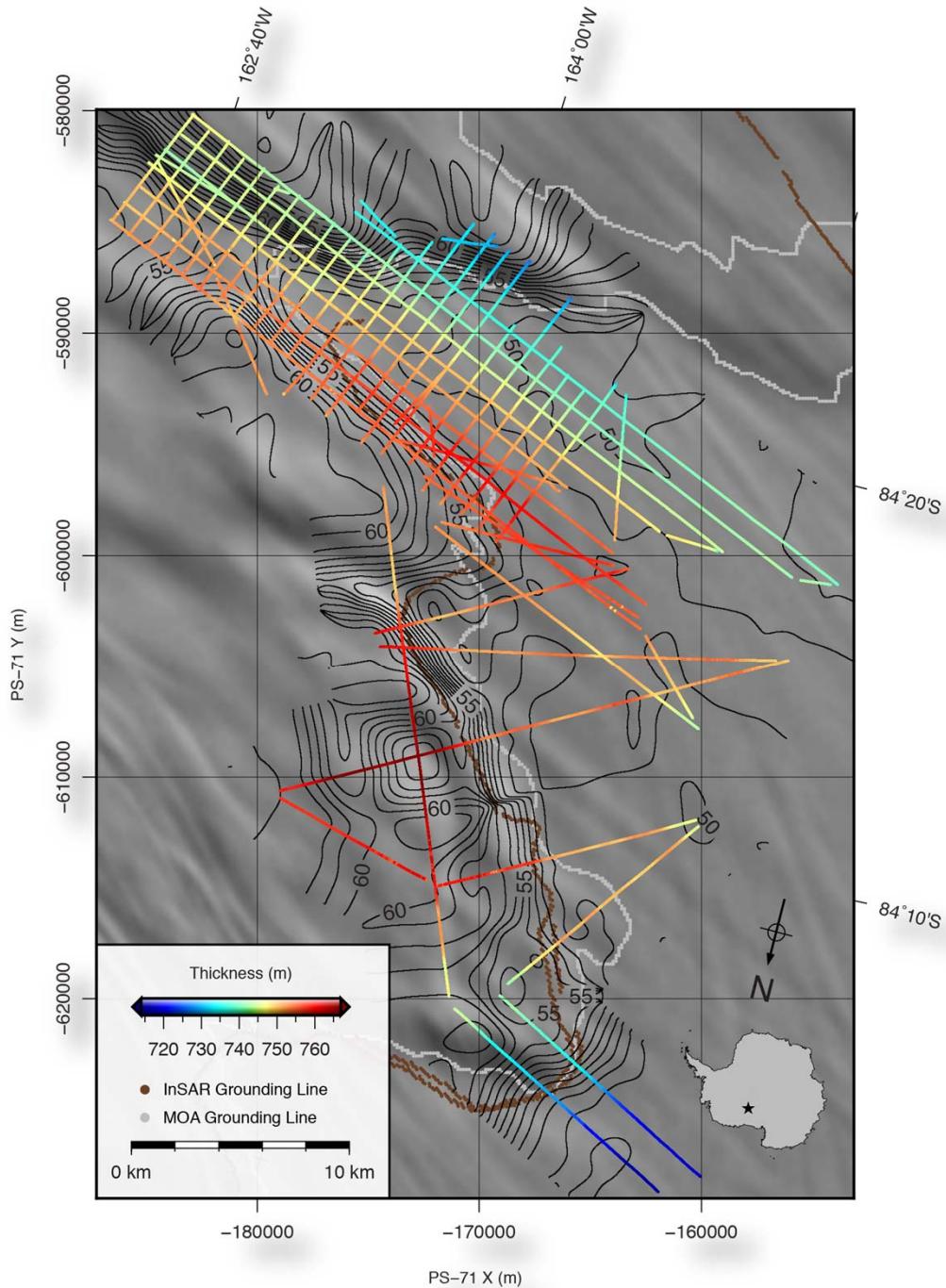
- Special care is needed in interpreting returns from a system with wide beam patterns where off-nadir targets can provide strong returns.
- At the same time, the off-nadir echoes can be exploited to provide an illuminating view of the world below.

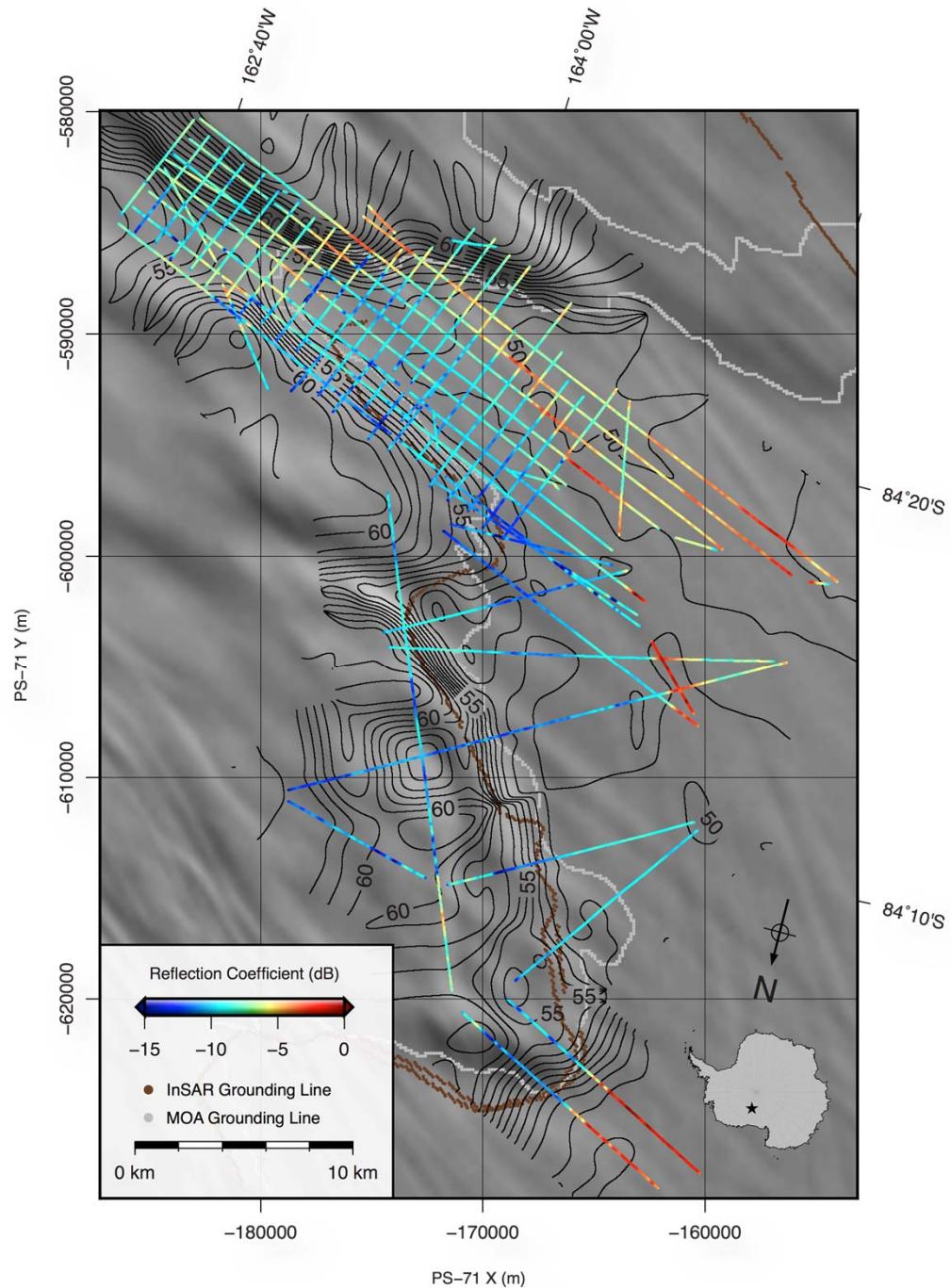
Wline1 Basal Crevasse

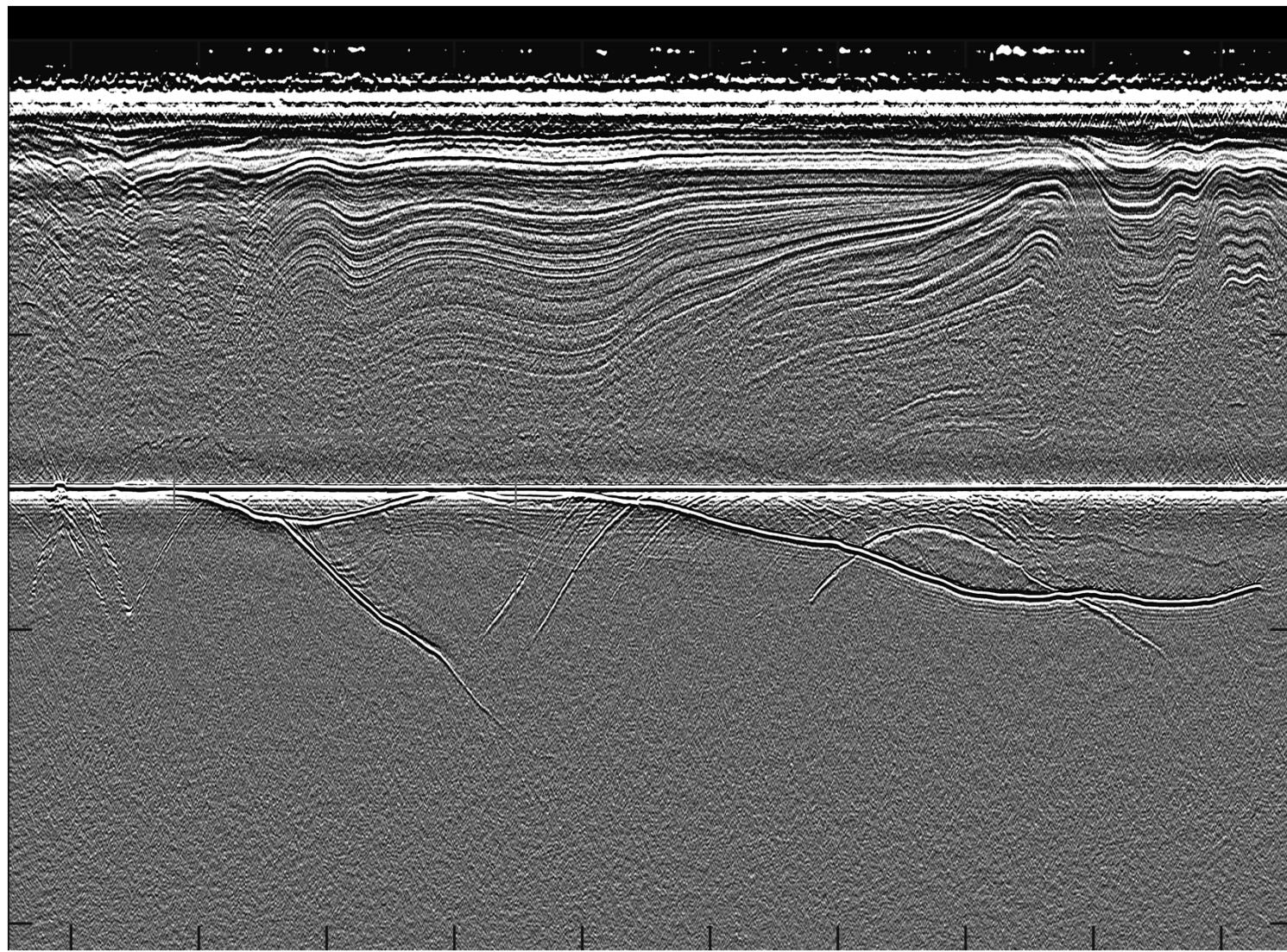


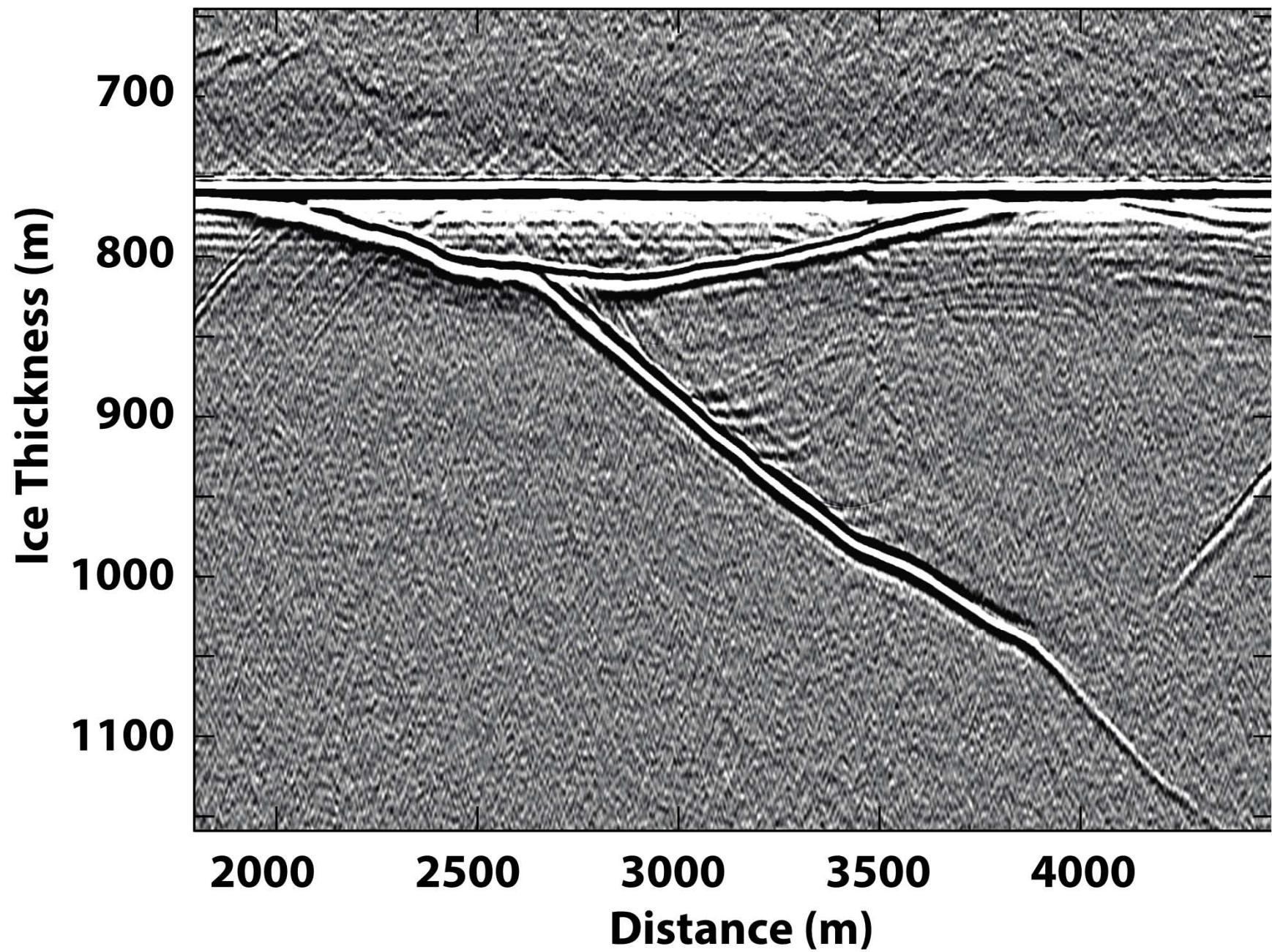


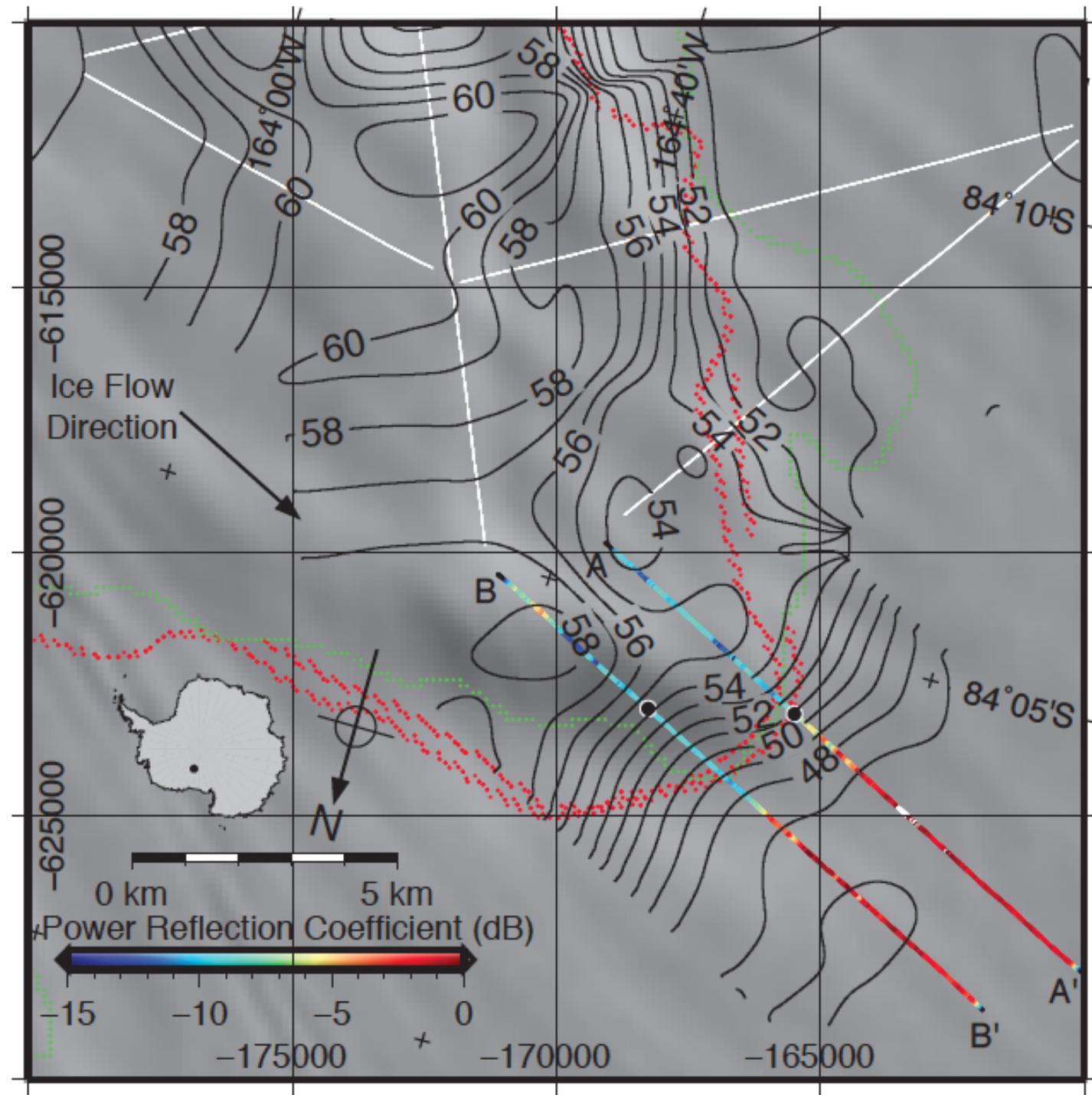


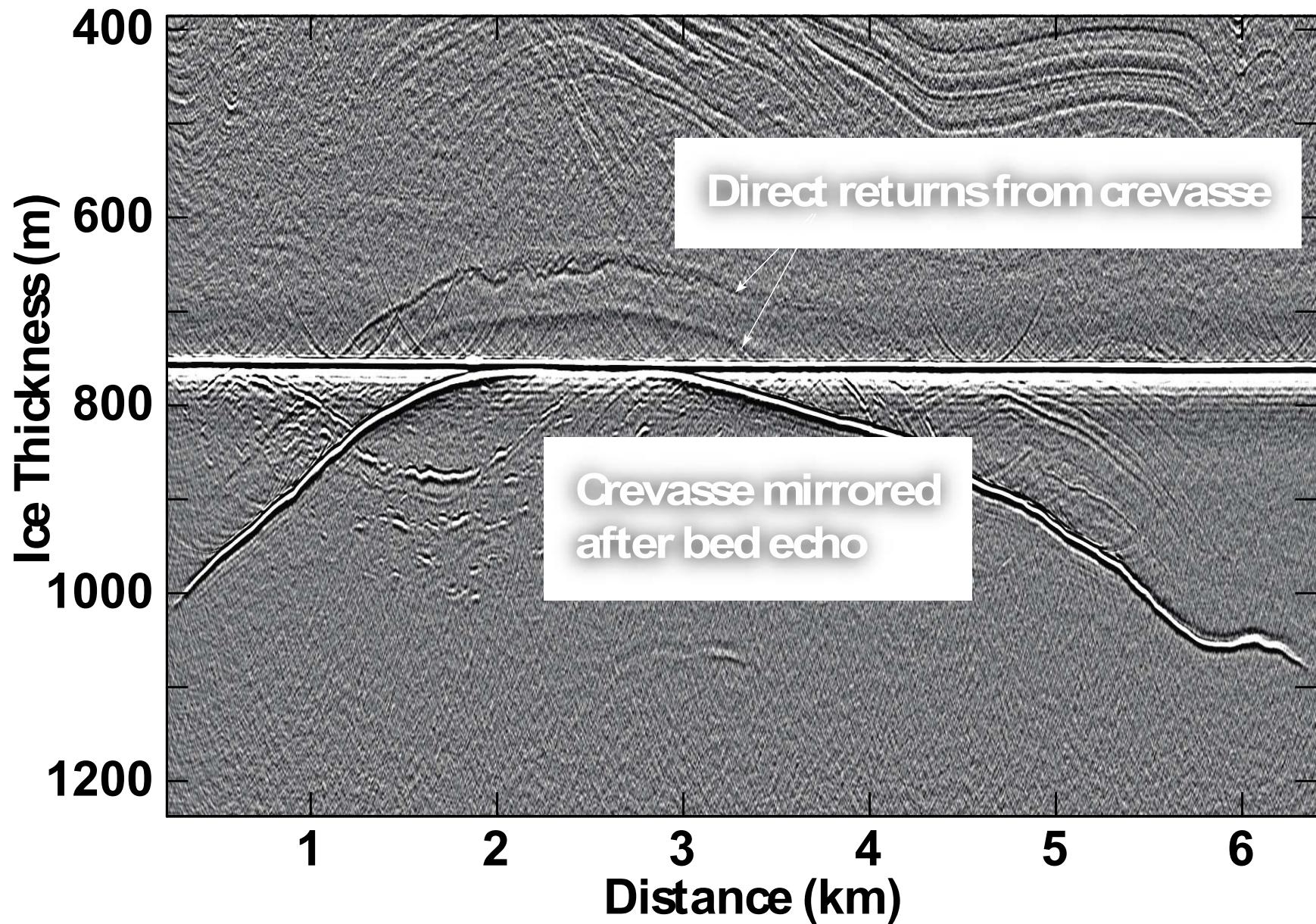


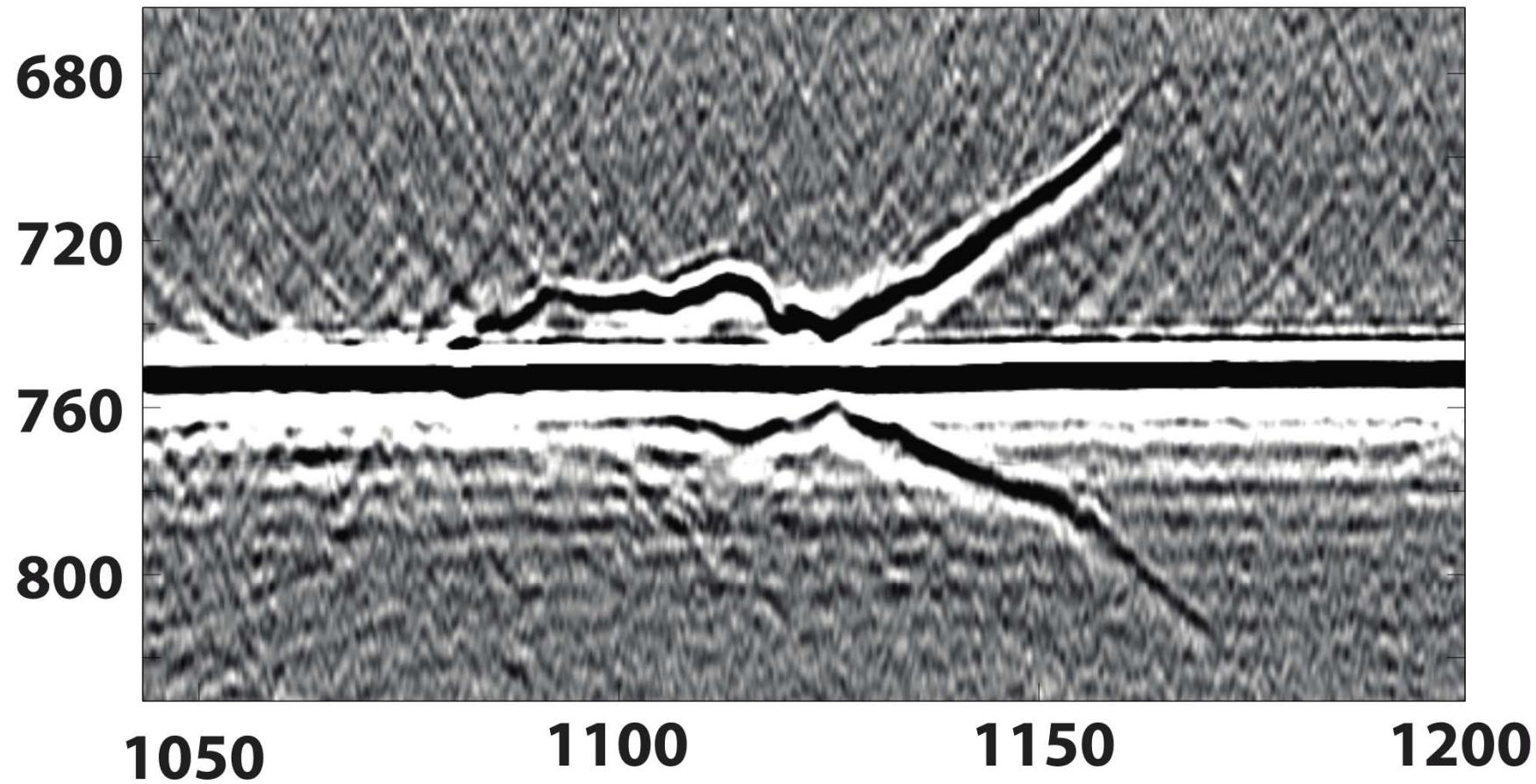


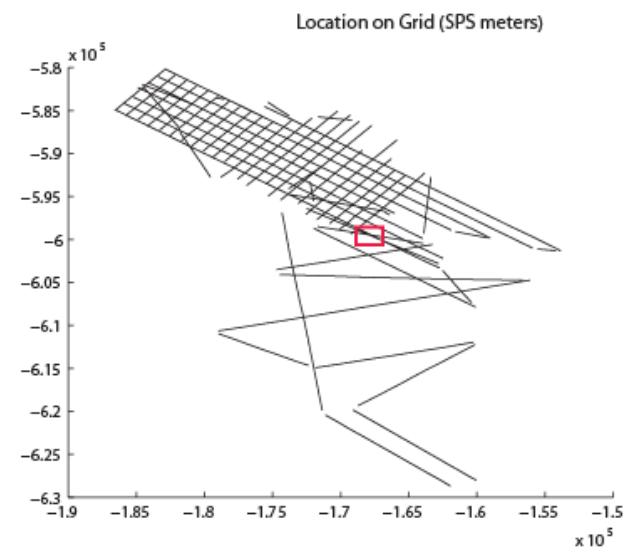
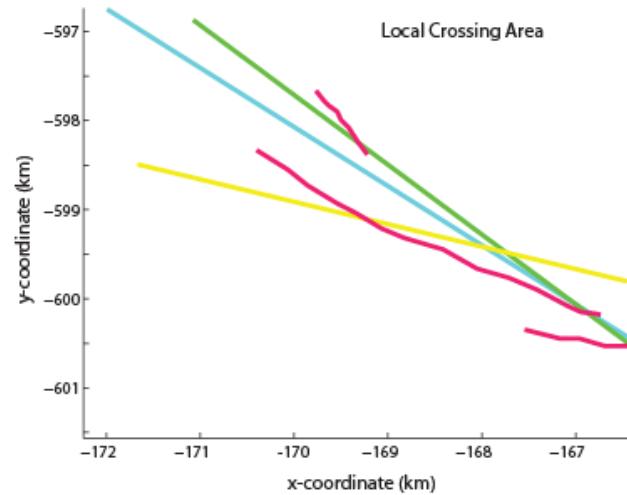
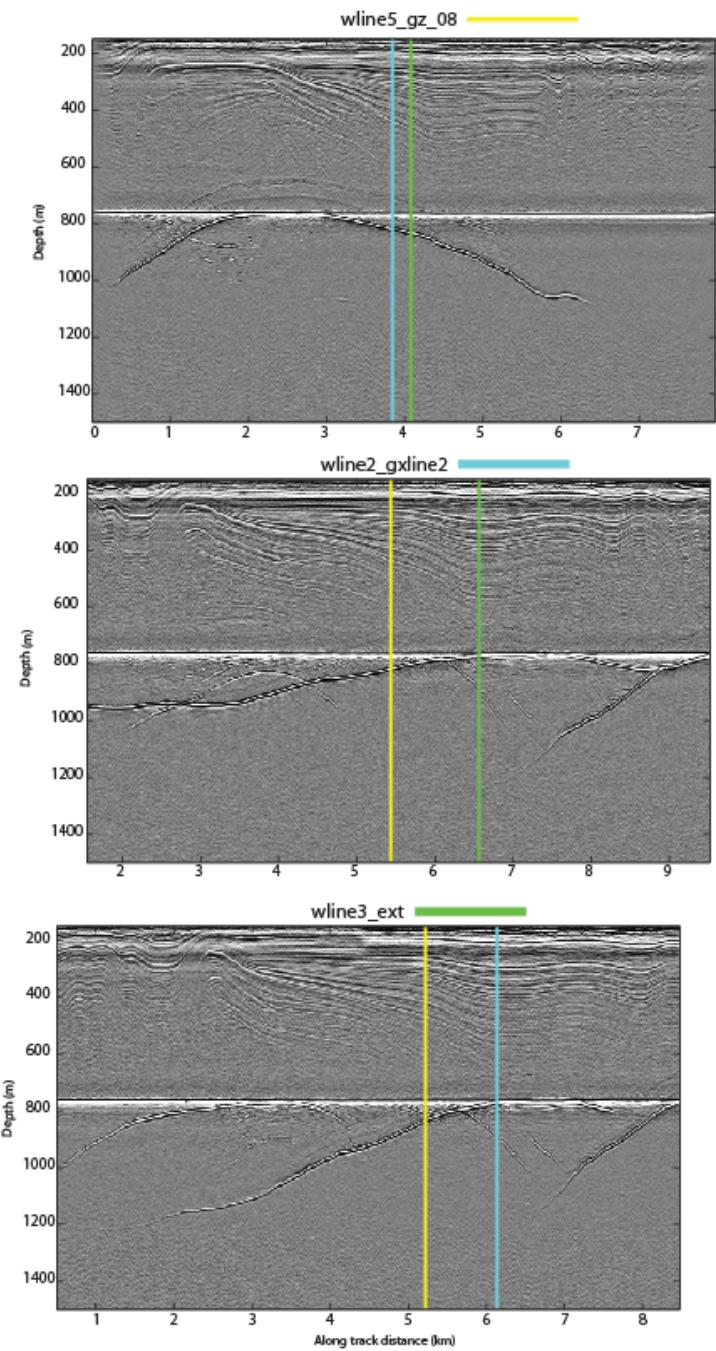


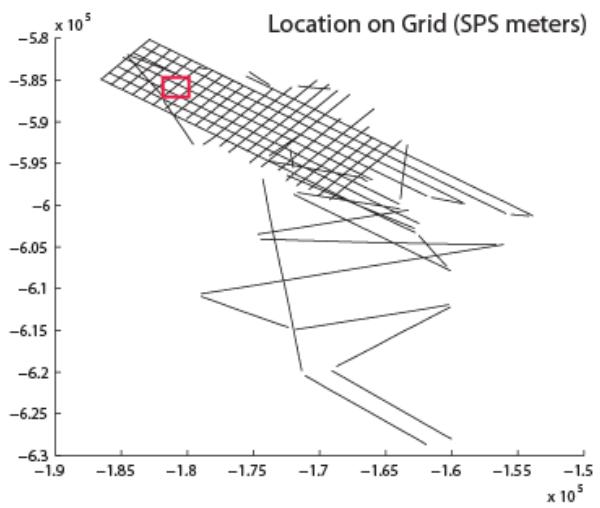
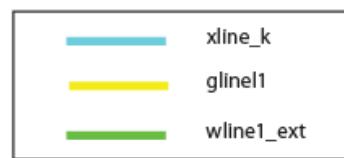
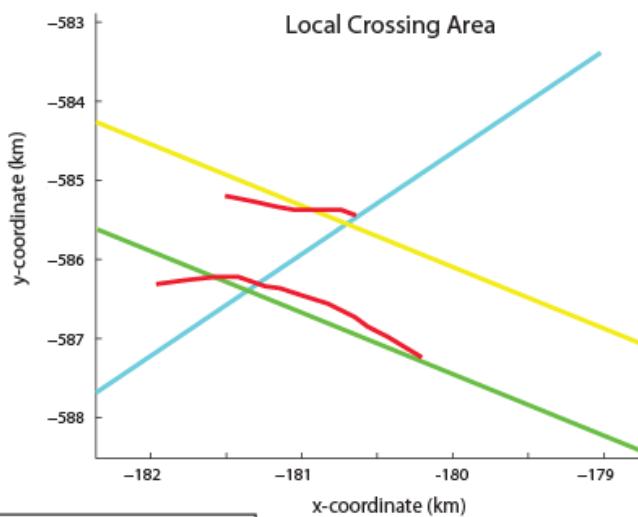
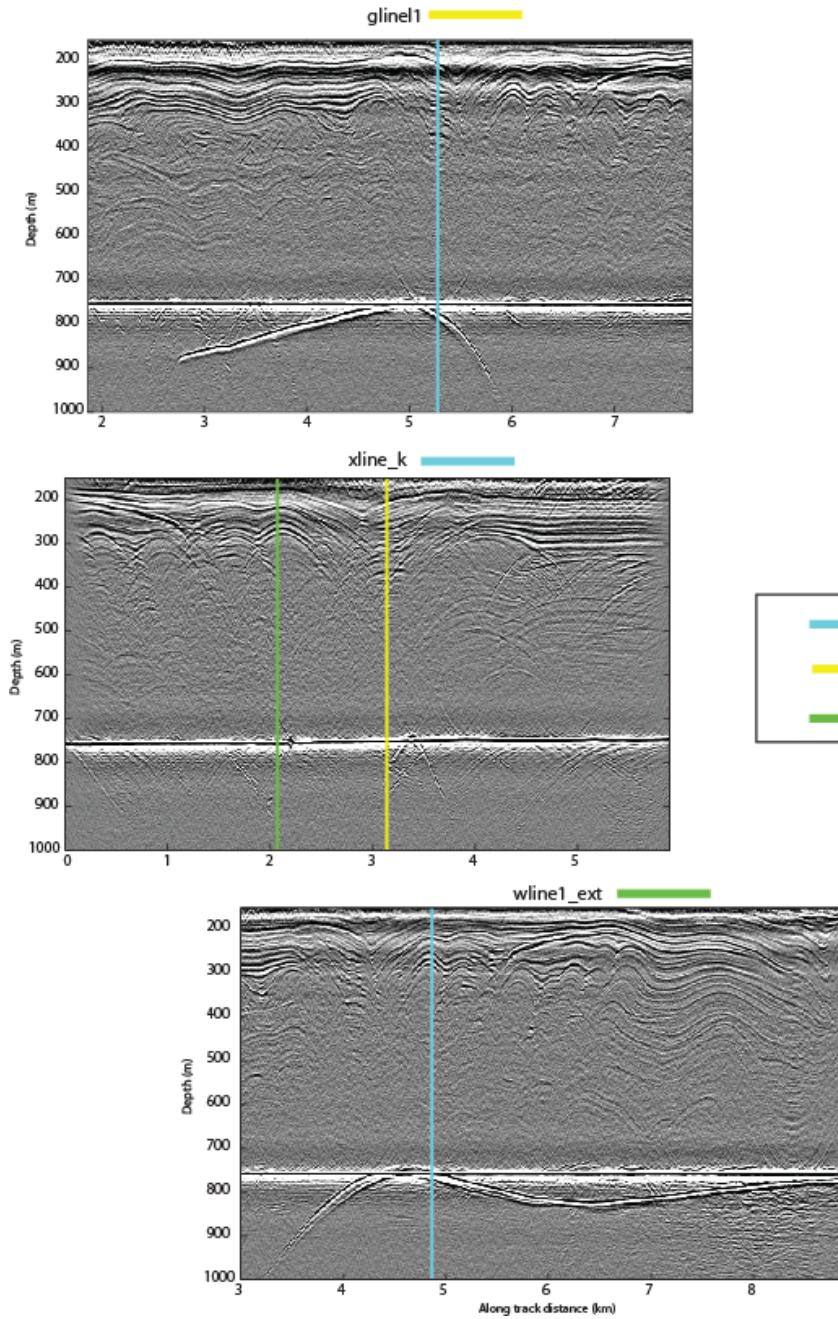




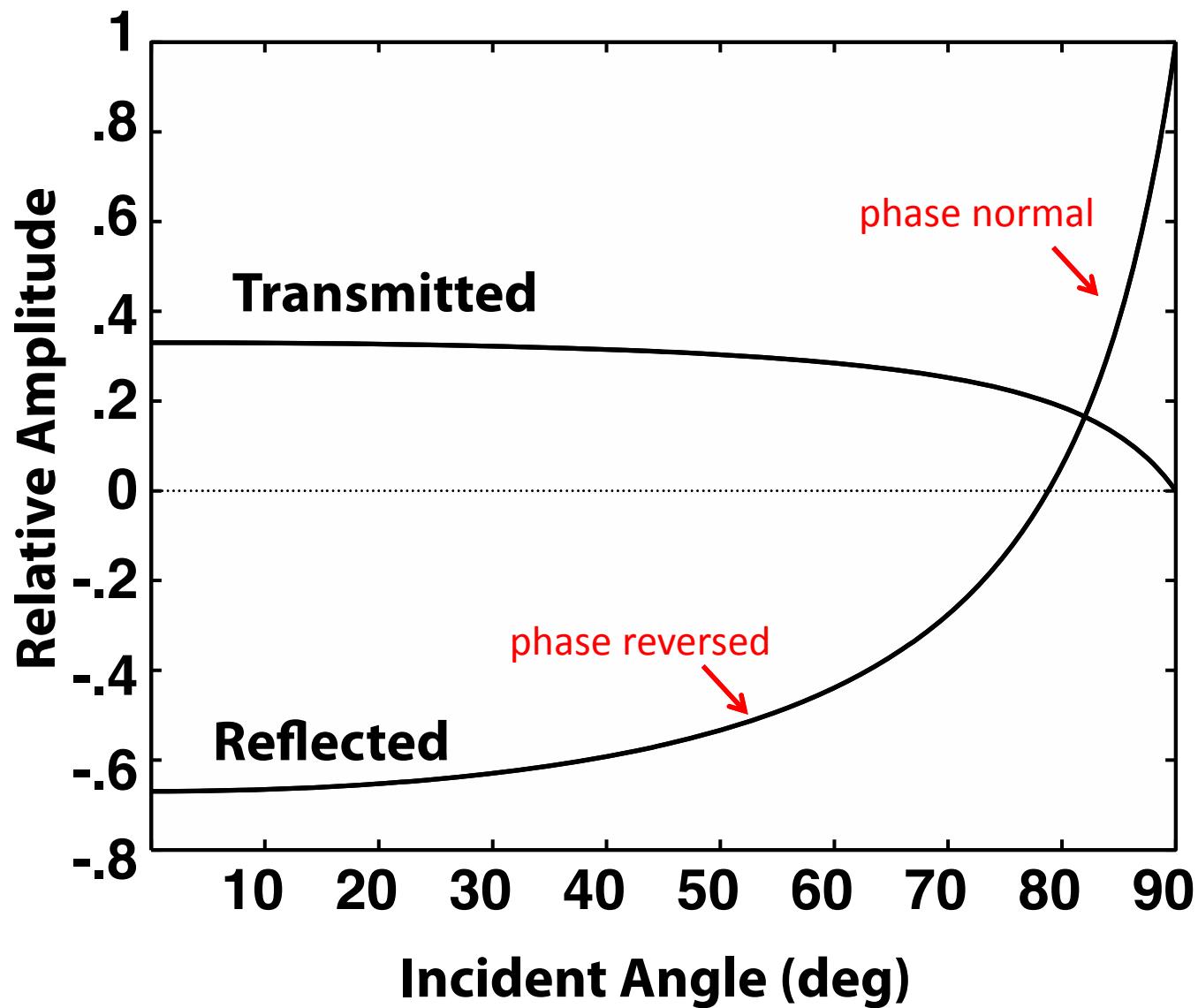




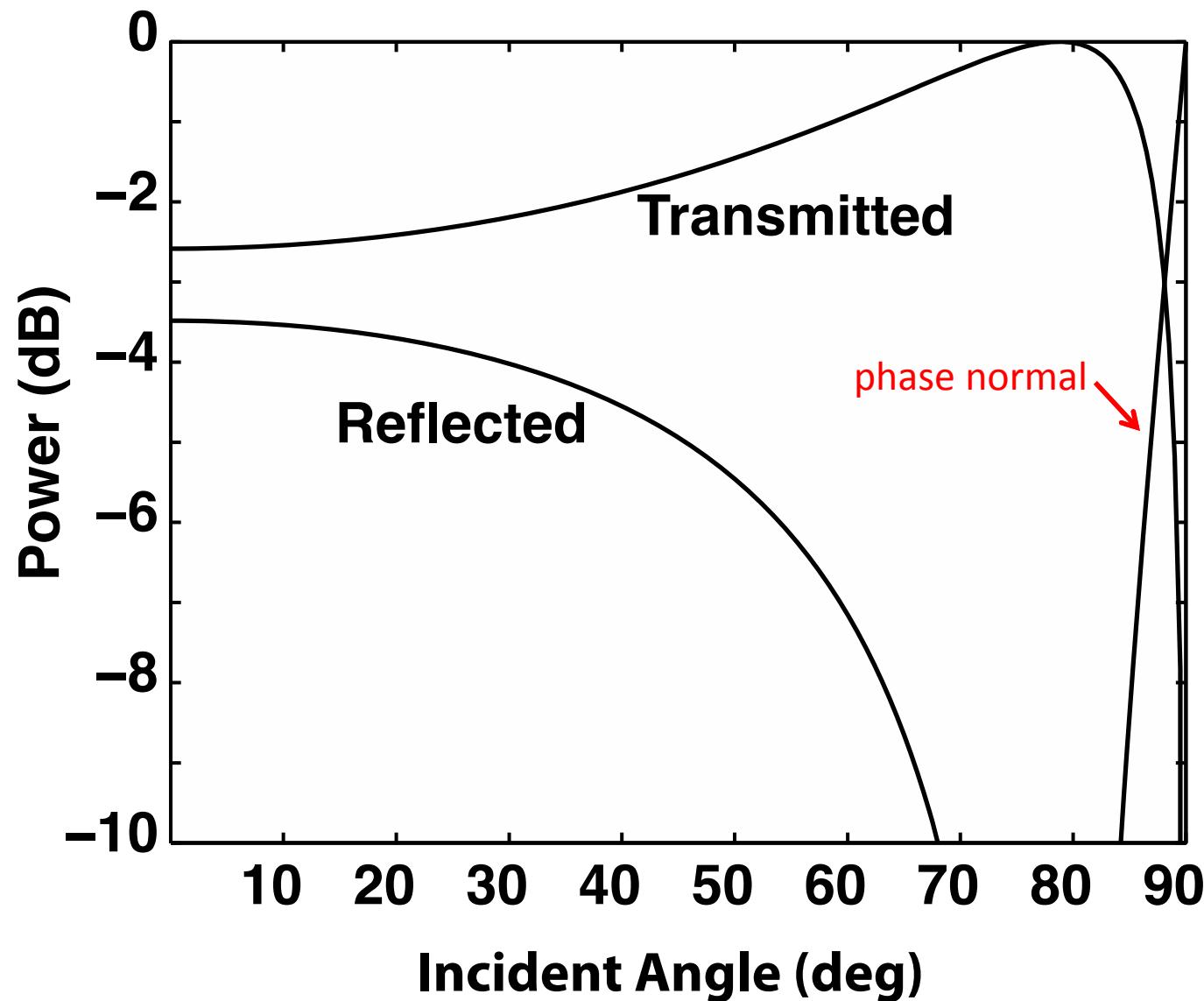




Fresnel Amplitude Ice-Water



Fresnel Power Ice-Water Interface



Mirror image of basal crevasse

