



Glaciological setting and subglacial conditions at Little Dome C: the site for Beyond EPICA – Oldest Ice Core

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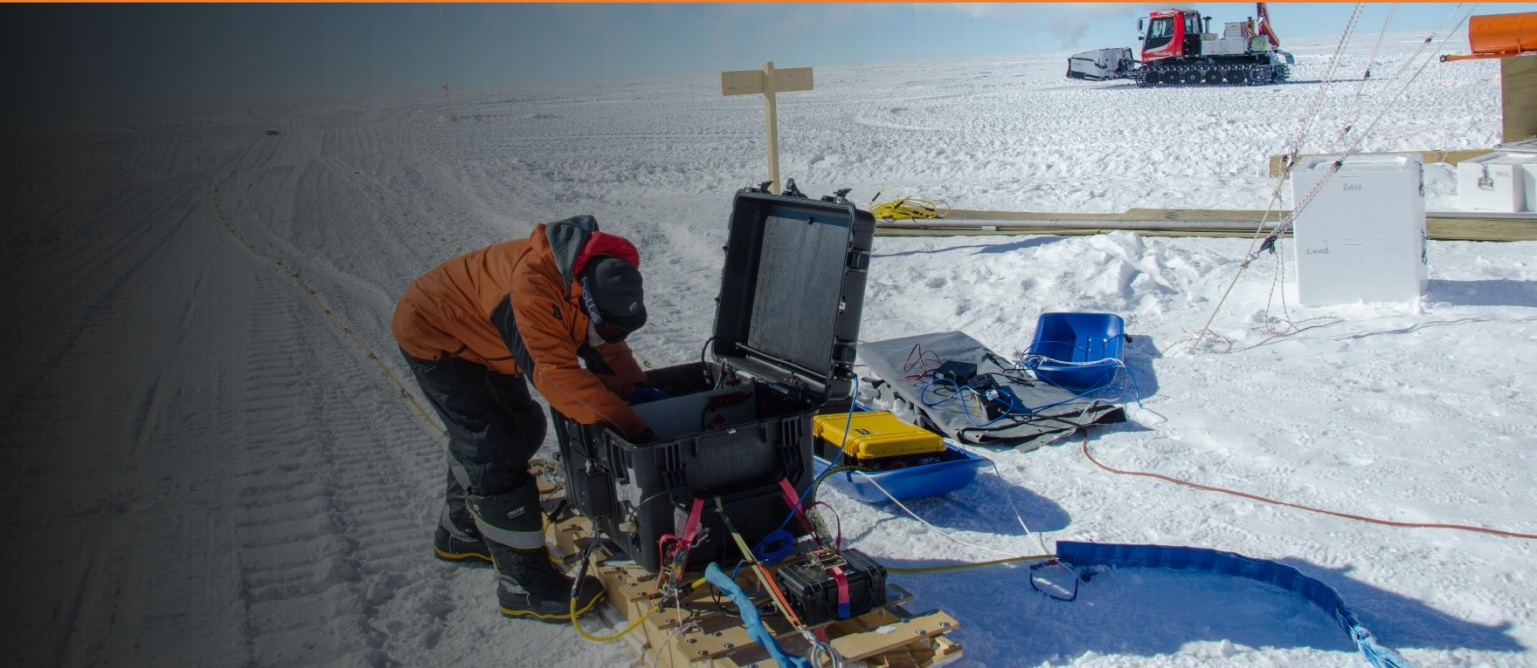
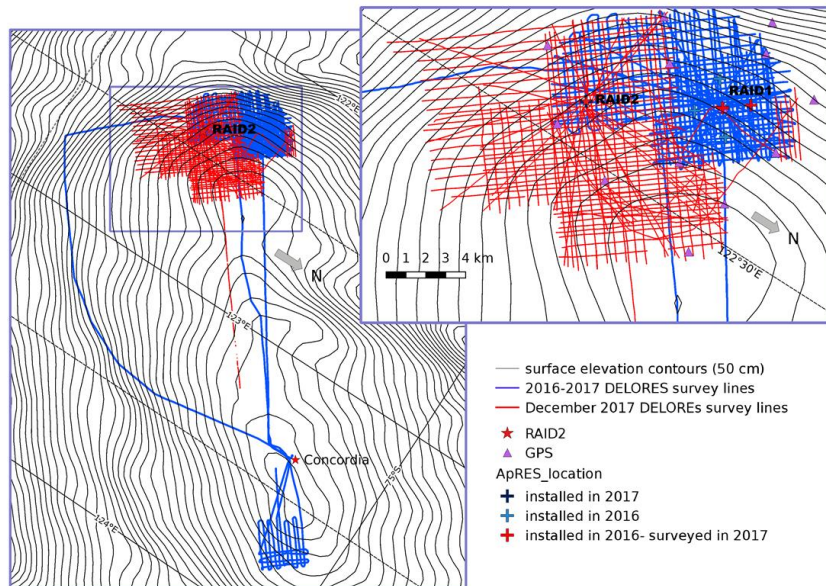


DEep LOoking Radio Echo Sounder

16 x 12 km search area at Little Dome C

- 2400 line km of over-snow radar
- Line spacing 250 or 500 m

DELORES radar




Example radar profiles



Surface



Internal layers



Bedrock

Base of ice sheet shows deep incised
valleys with melting in the deepest

Bedrock depth (m)

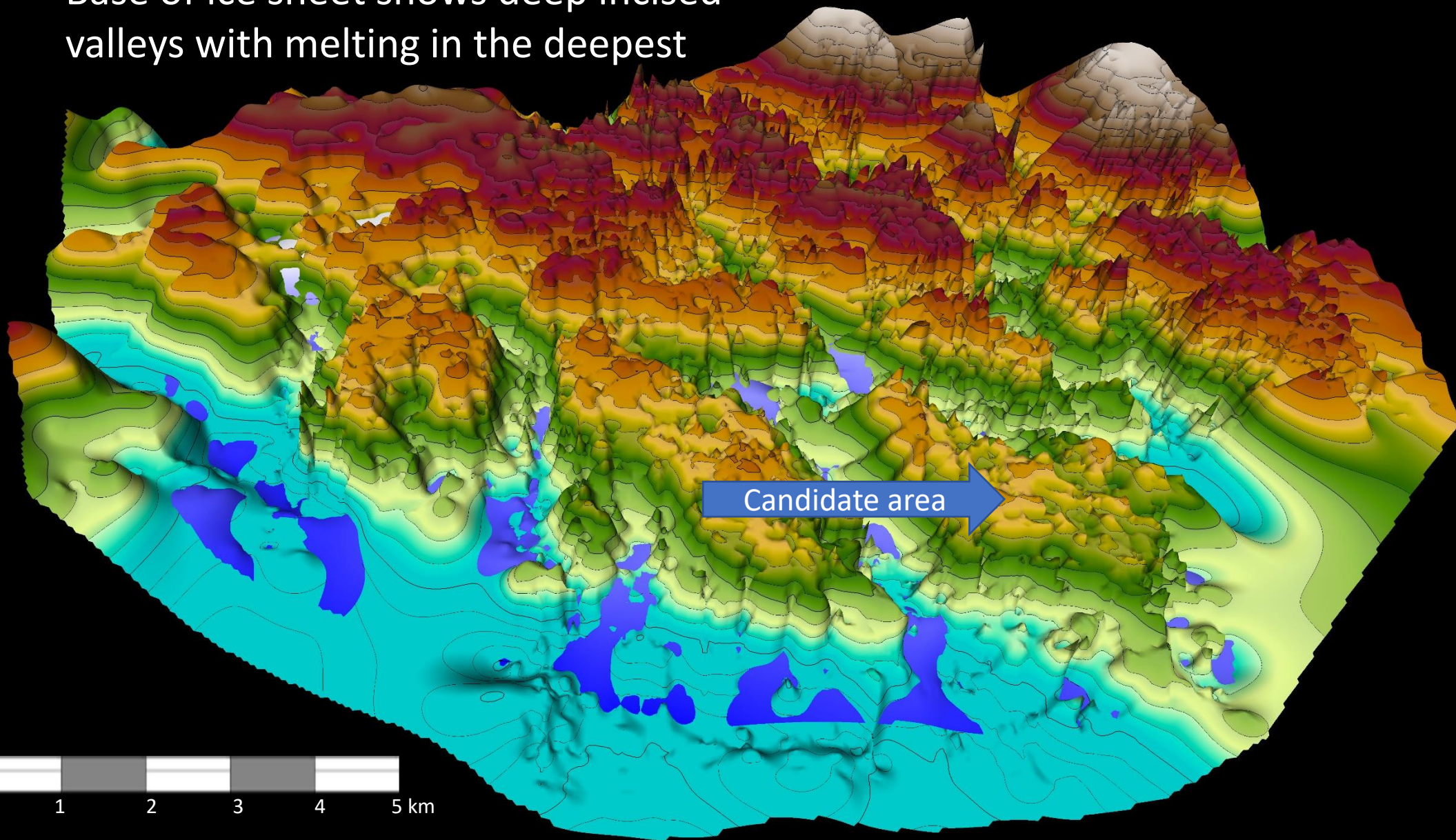
-2500.00
-2550.00
-2600.00
-2650.00
-2700.00
-2750.00
-2800.00
-2850.00

Water layer (m)

-2750.00
-2775.00
-2800.00
-2825.00
-2850.00
-2875.00
-2900.00
-2925.00
-2950.00

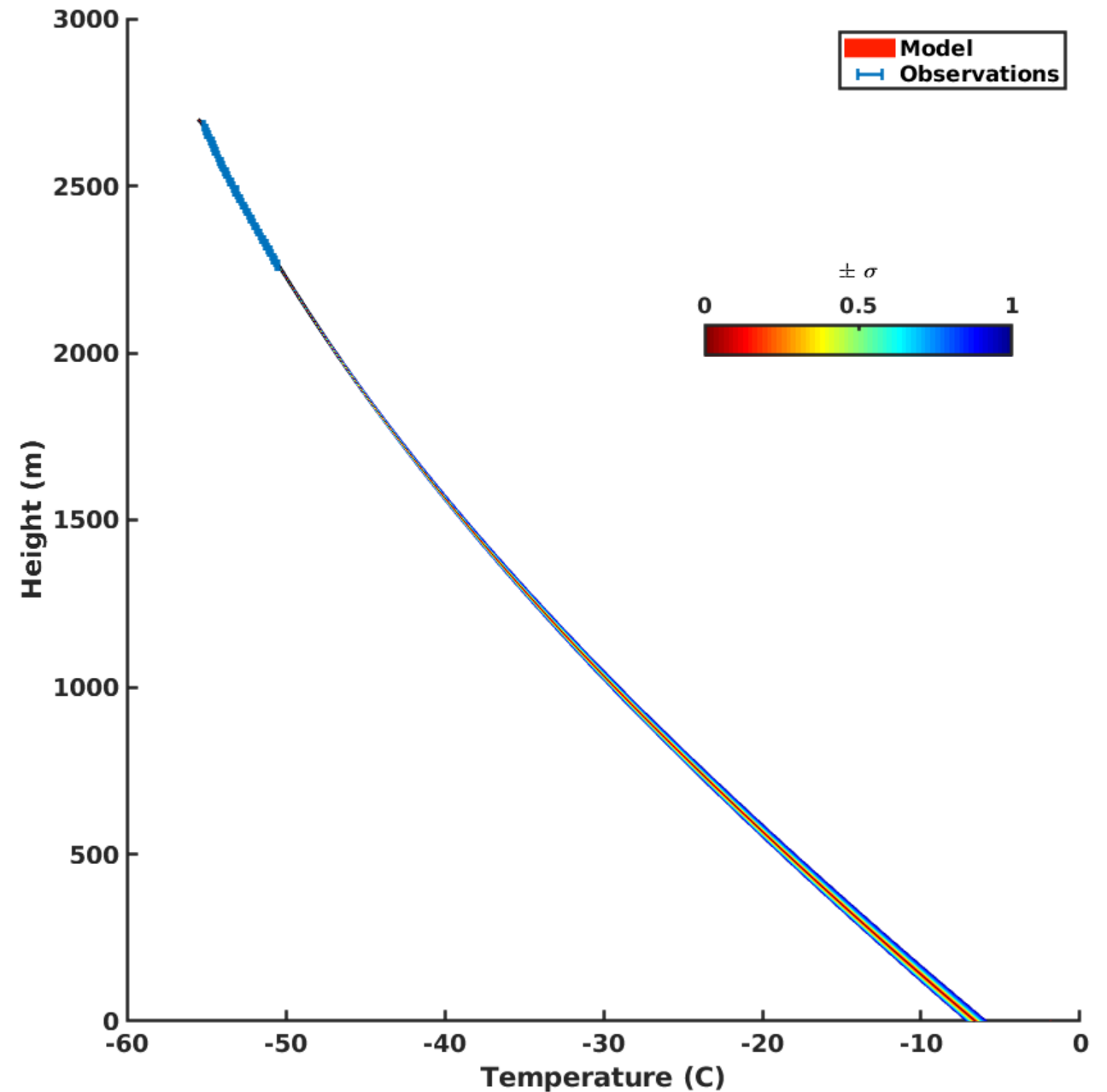
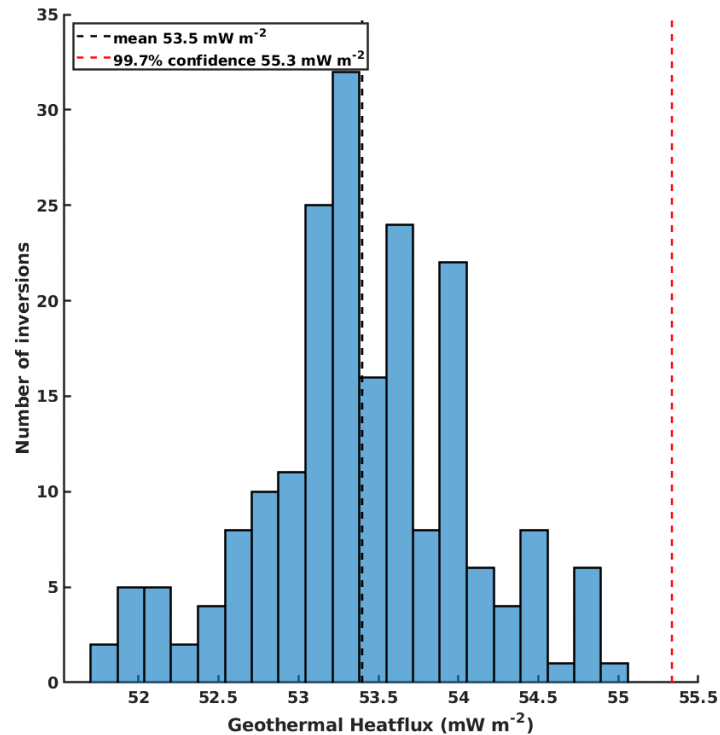
0 1 2 3 4 5 km

Candidate area



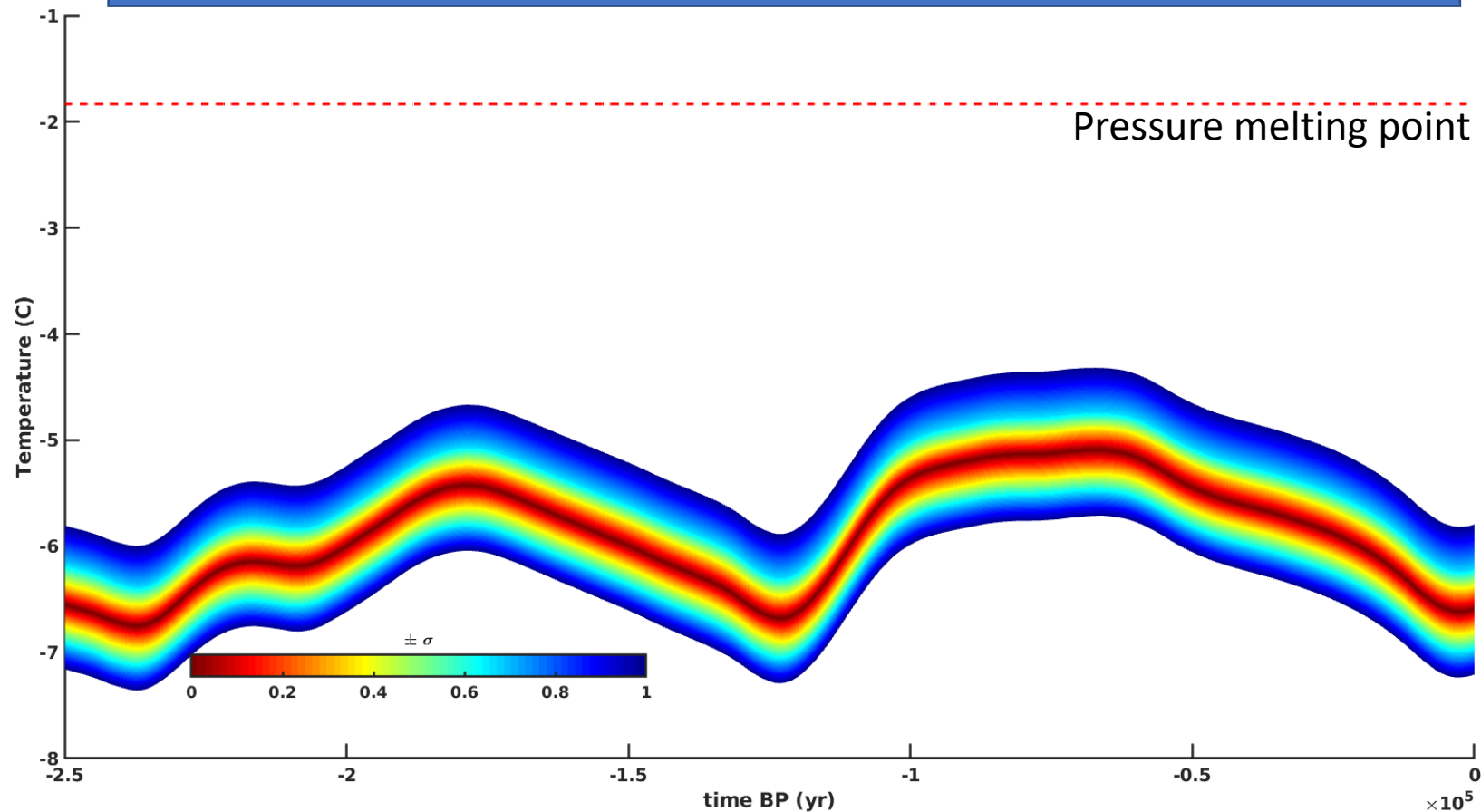
Temperature profile in borehole close to candidate Oldest Ice drill site

- Present day basal temperature is $\sim -6.5^{\circ}\text{C}$
- Geothermal heat flow $\sim 55 \text{ mW m}^{-2}$

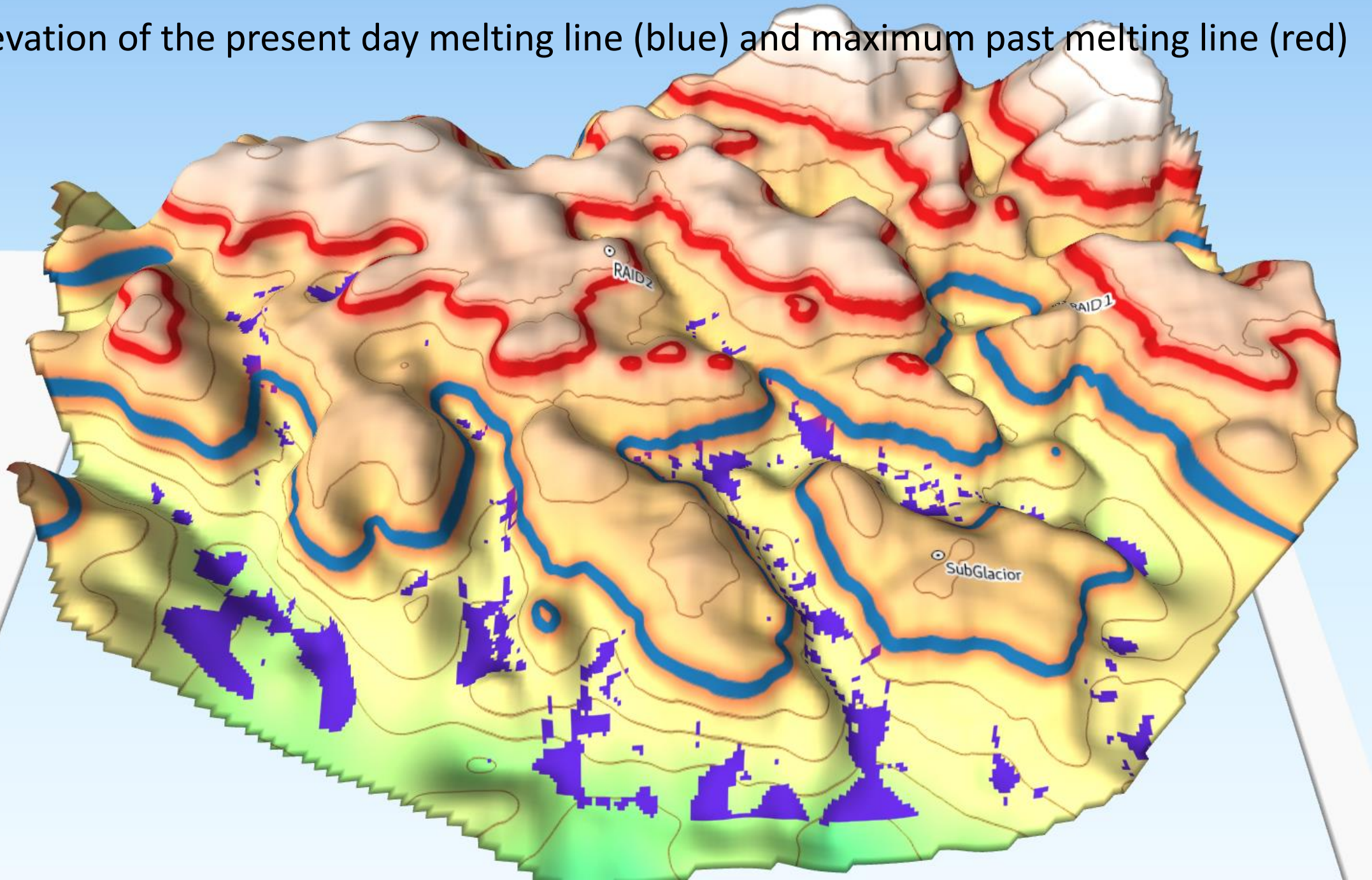


Taking the borehole thermometry, the vertical ice velocity from phase-sensitive radar, and the climate history from the EPICS Dome C ice core, we model the basal temperature through the past 250,000 year.

- Evolution of basal temperature follows, but lags climate
- The base of the ice sheet has not reached pressure melting point



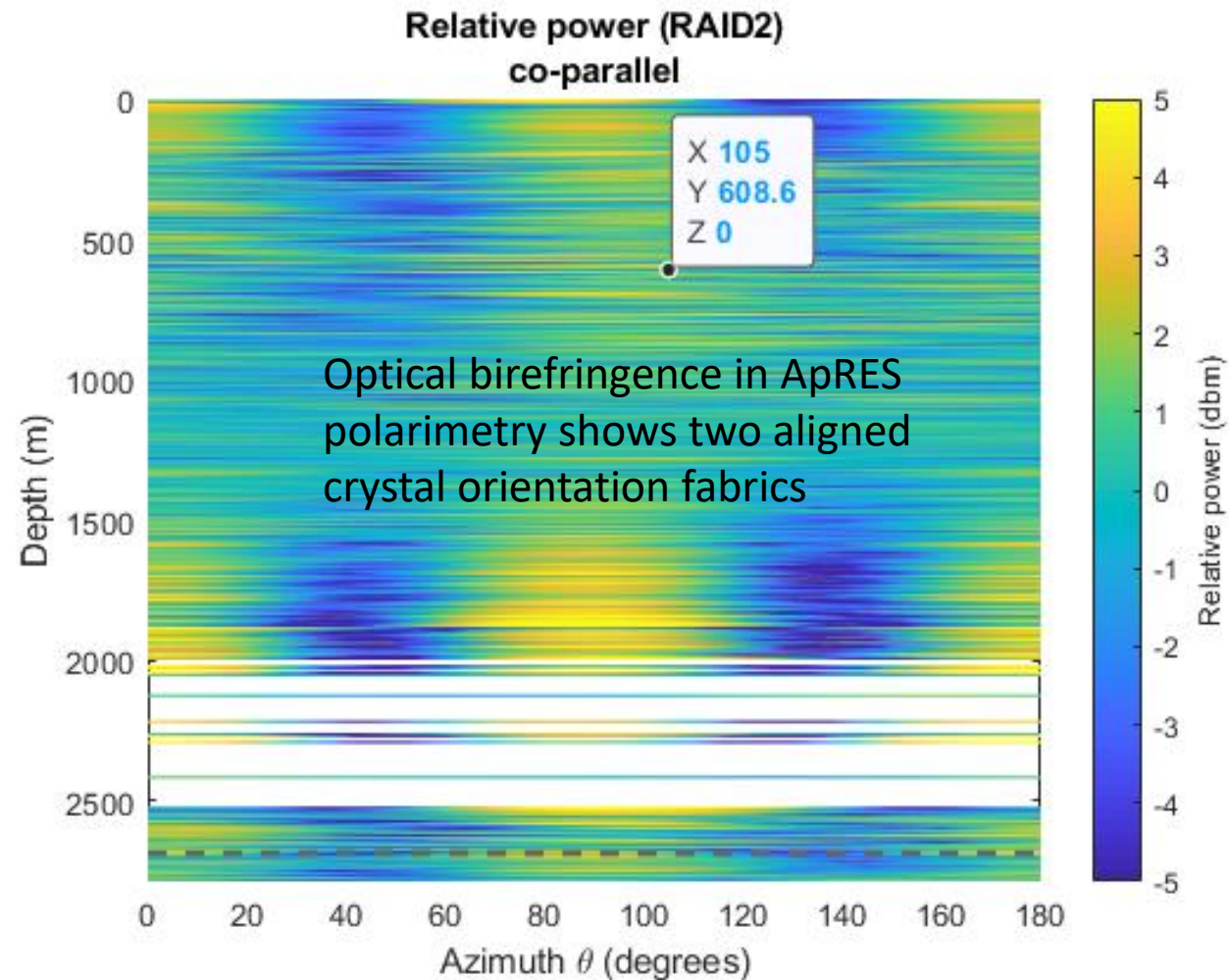
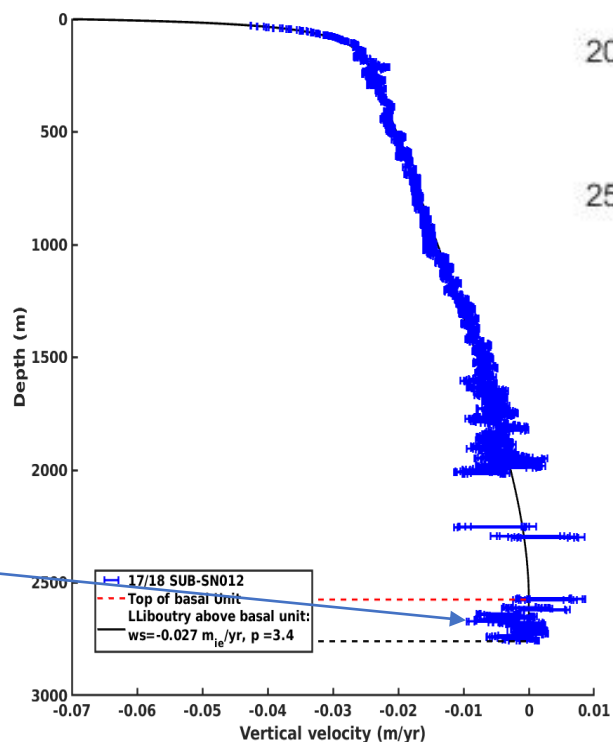
Elevation of the present day melting line (blue) and maximum past melting line (red)

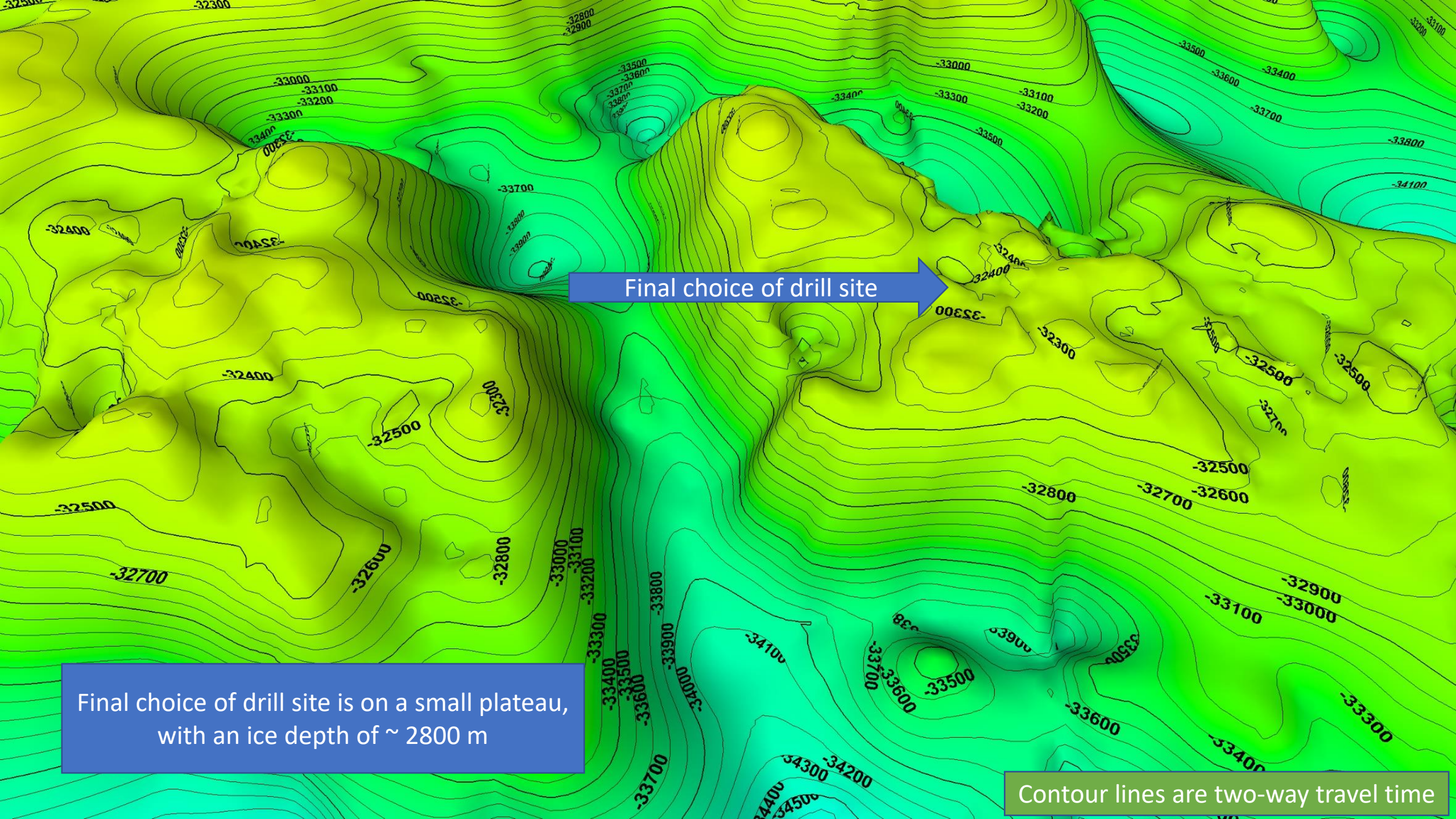


ApRES Autonomous phase-sensitive Radio Echo Sounder



Vertical strain rate from ApRES shows p is ~ 3.4 and stagnant basal unit of ~ 200 m





Final choice of drill site

Final choice of drill site is on a small plateau,
with an ice depth of ~ 2800 m

Contour lines are two-way travel time

2017-18 season

Julius Rix, Catherine Ritz, Massimo Frezzotti,
Saverio Panichi, Robert Mulvaney, Michele Scalet

*Thank you to our
colleagues in the field*

2016-17 season

Mario Quintavalla, Fabrizio Frascatti, Robert Mulvaney,
Luca Vittuari, Massimo Frezzotti

