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Past behaviour of the southern Ocean's atmosphere (SOUTHSPHERE)

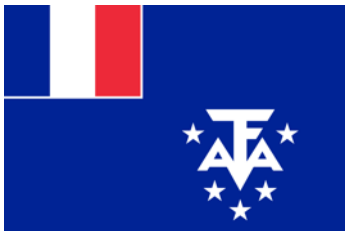
Late glacial and Holocene glacier fluctuations at the Sub-Antarctic Island Kerguelen in the Southern Indian Ocean

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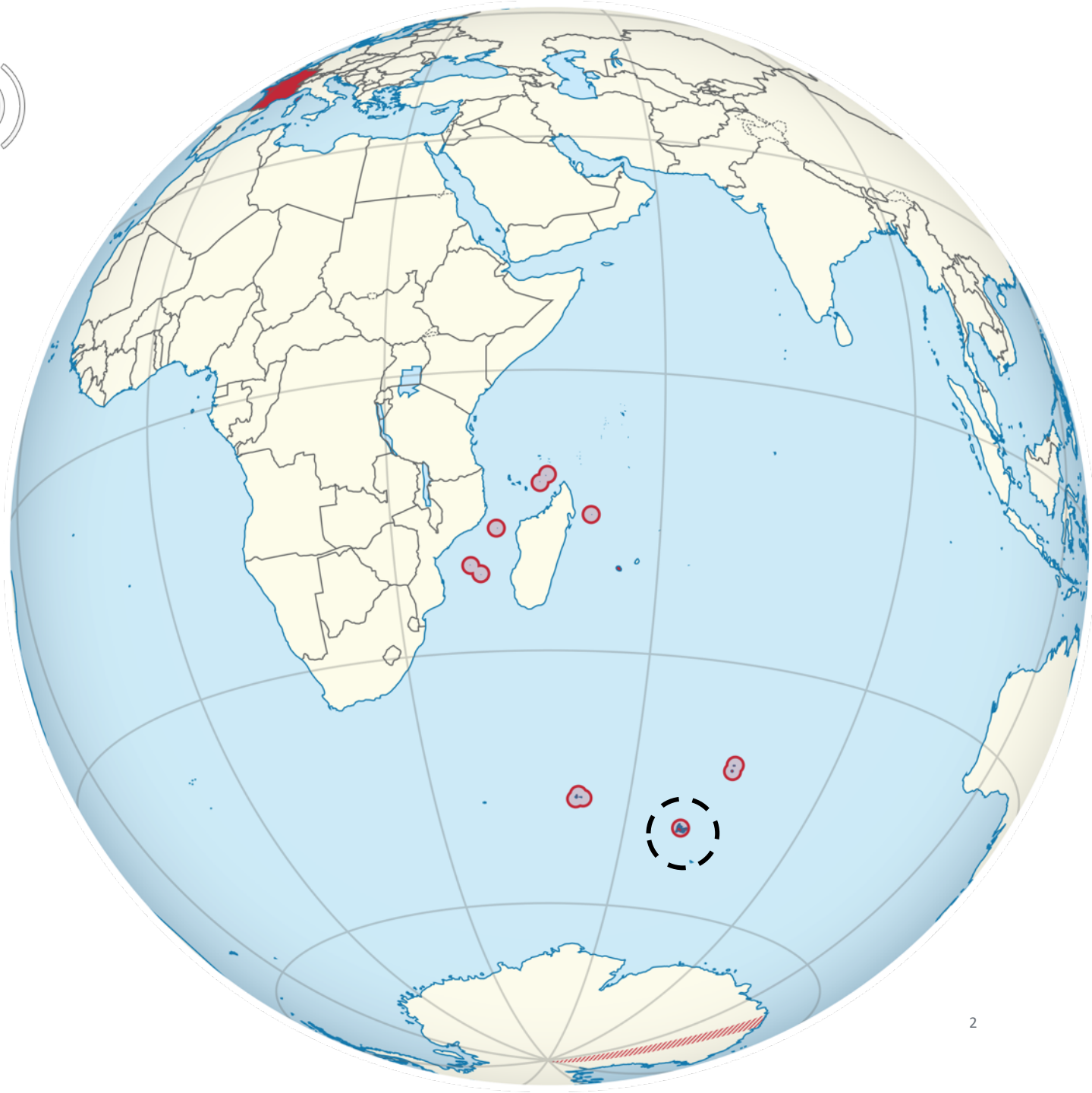


The French Southern and Antarctic Lands (*Terres australes et antarctiques françaises, TAAF*)

Inscribed as a UNESCO World Heritage Site in 2019

- the Scattered Islands
- Crozet Islands
- St. Paul and Amsterdam islands
- Kerguelen Islands (*Archipel des Kerguelen*)

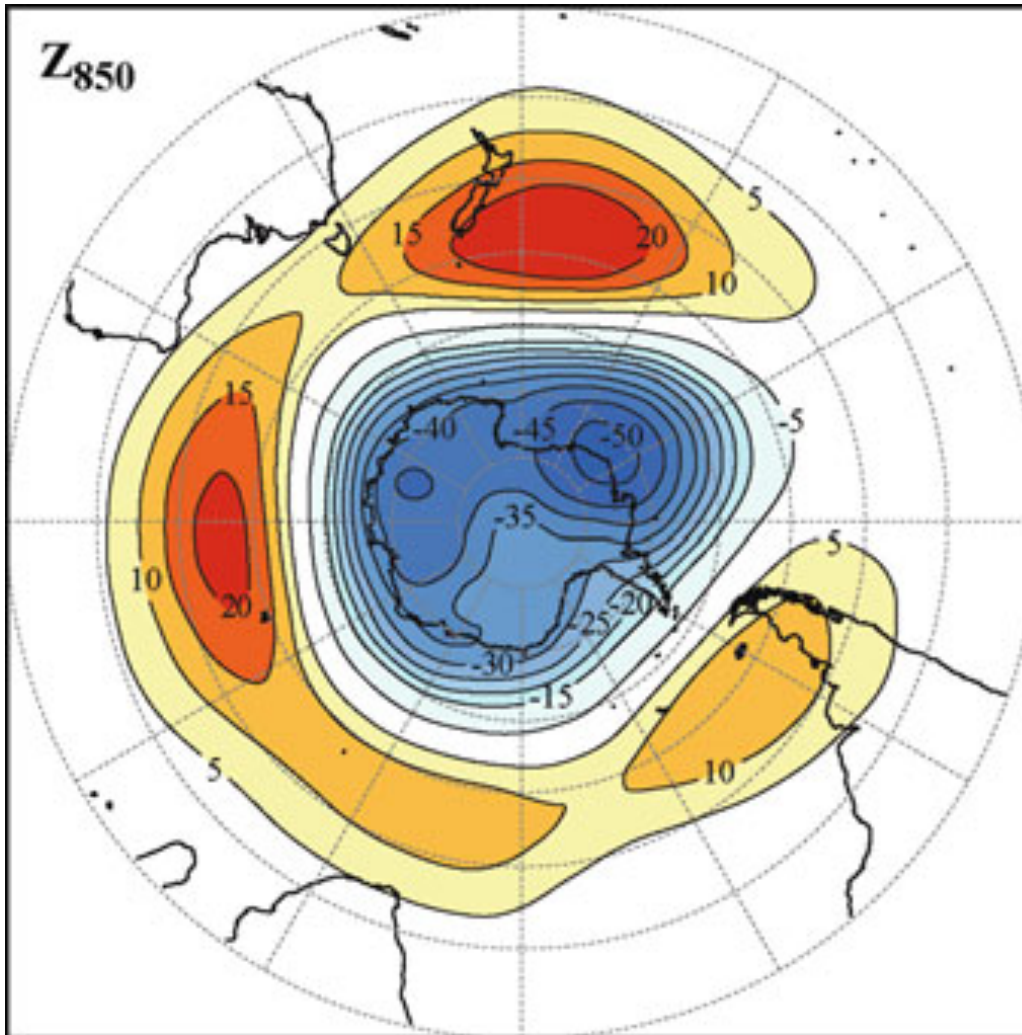
Kerguelen is a group of volcanic islands in the southern Indian Ocean, approximately equidistant between Africa, Antarctica and Australia



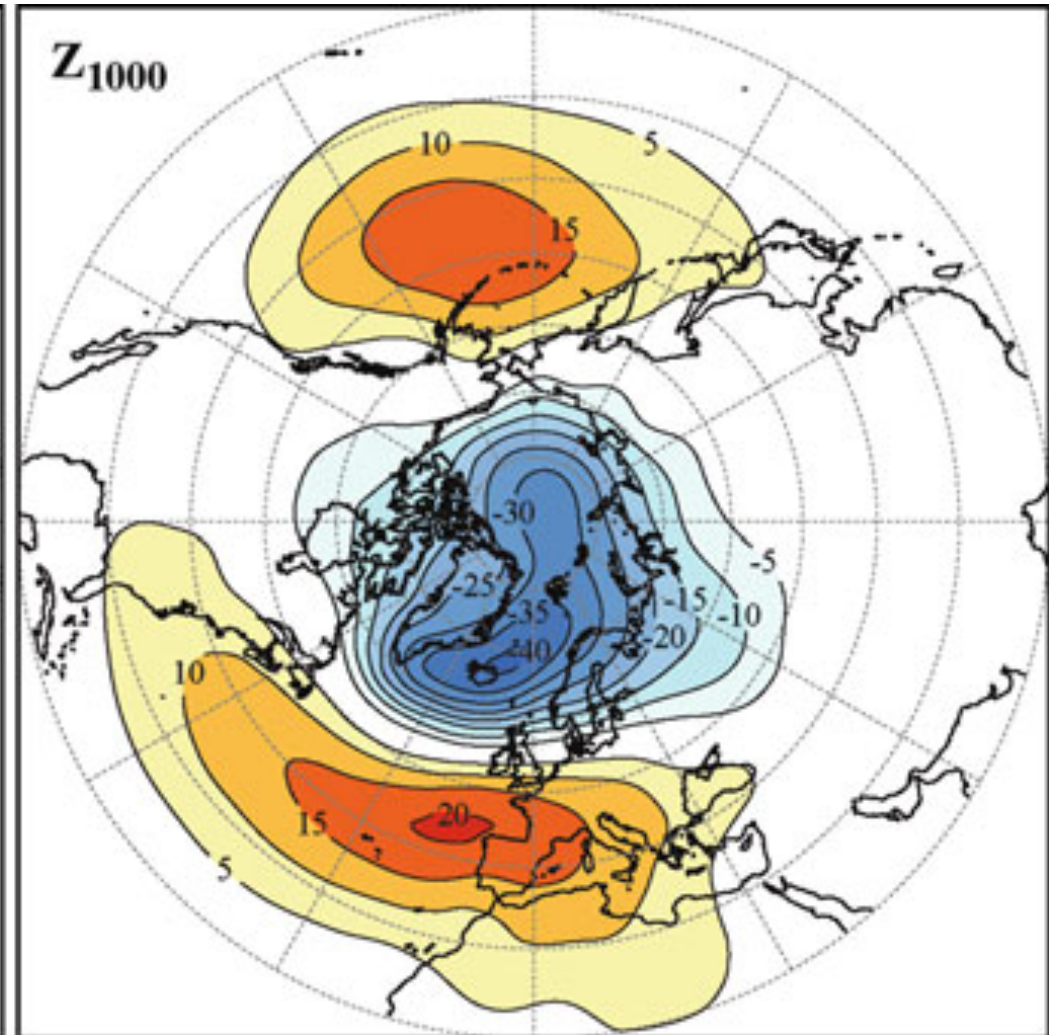


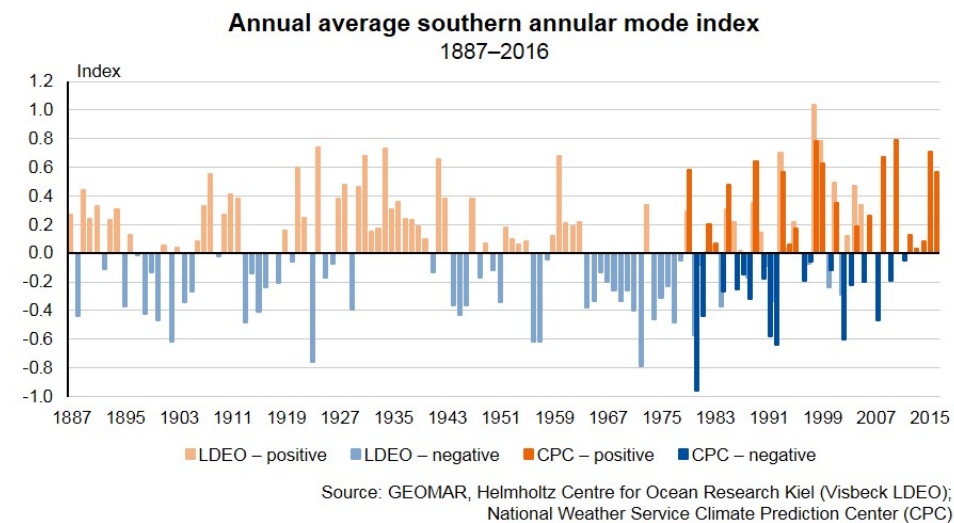
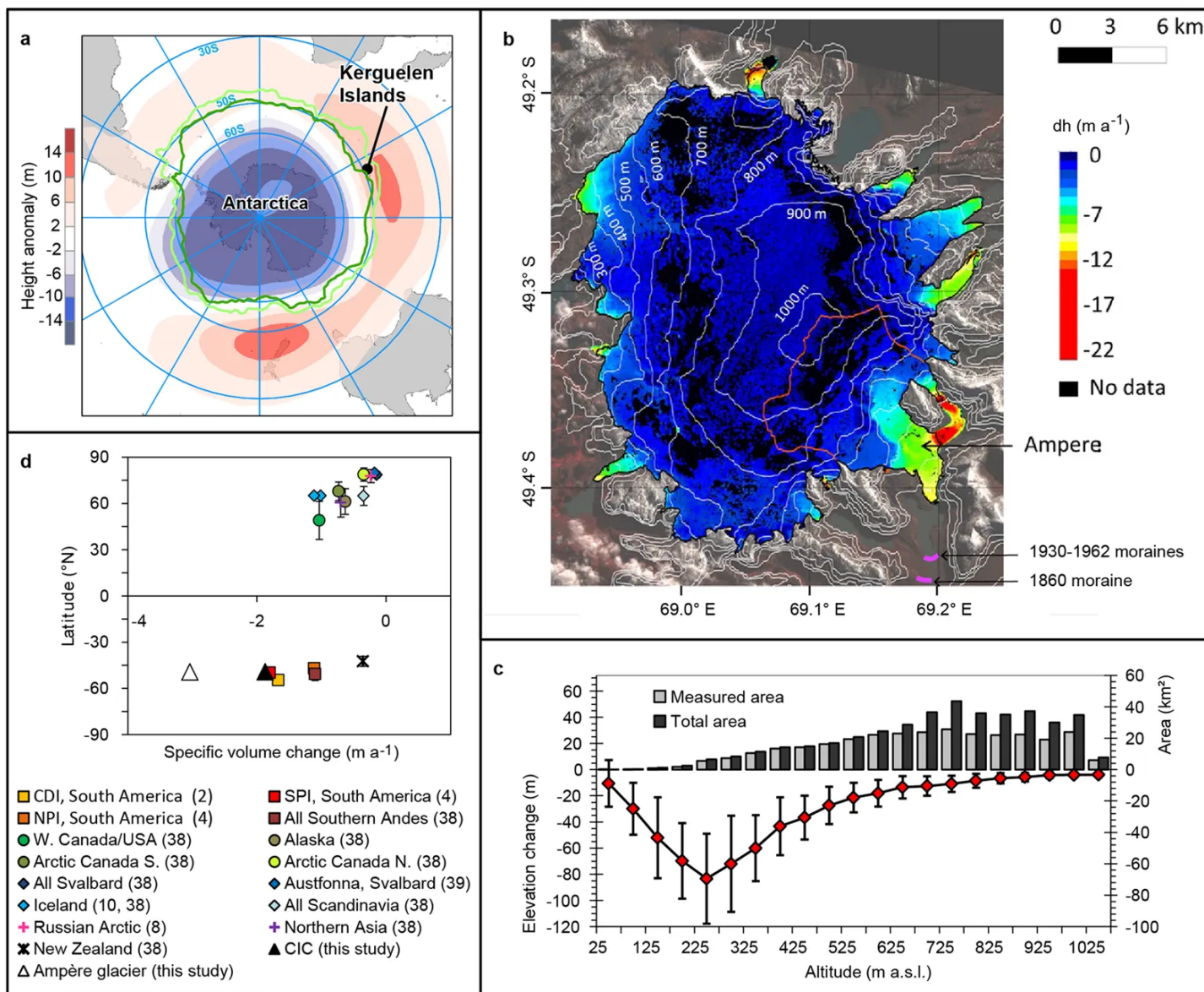


Southern Annular Mode



Northern Annular Mode





OPEN

Atmospheric drying as the main driver of dramatic glacier wastage in the southern Indian Ocean

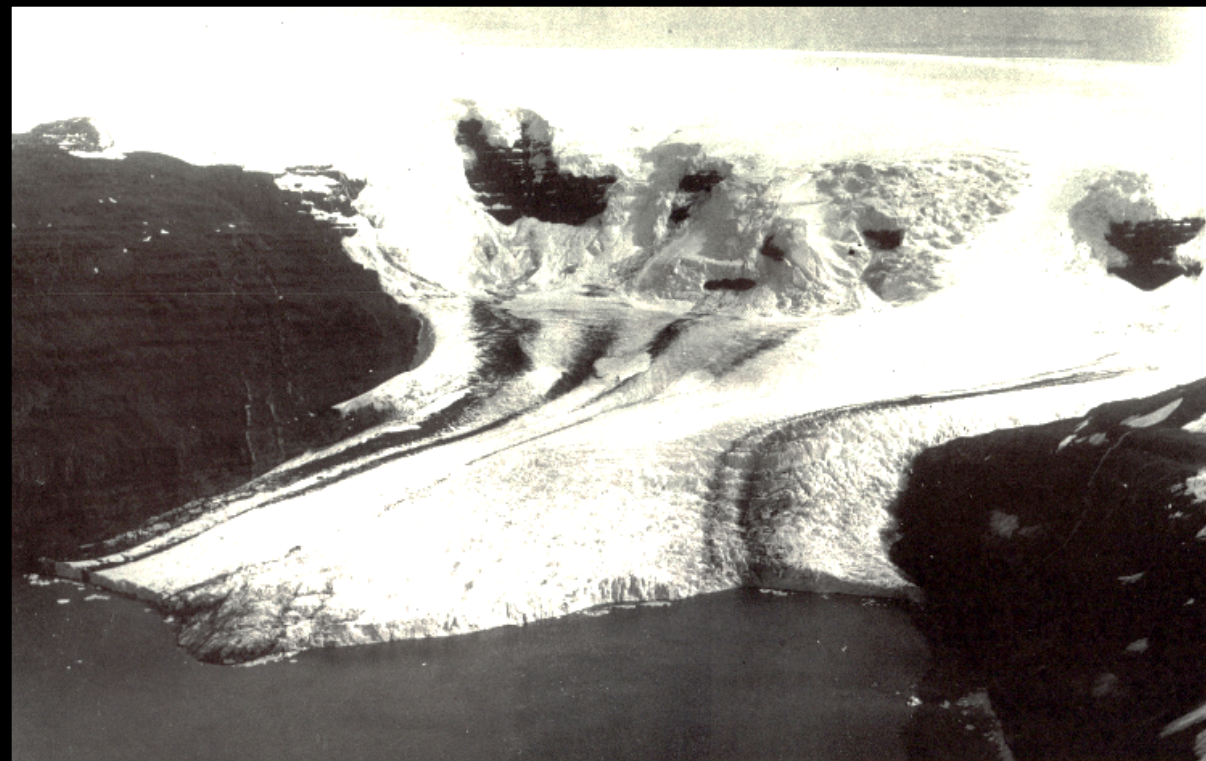
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V. Favier^{1,2}, D. Verfaillie^{1,2}, E. Berthier³, M. Menegoz^{1,2,4}, V. Jomelli⁵, J. E. Kay⁶, L. Ducret³, Y. Malbêteau³, D. Brunstein⁵, H. Gallée^{1,2}, Y.-H. Park⁷ & V. Rinterknecht^{5,8}

Glacier Chamonix – Cook ice-cap - Kerguelen

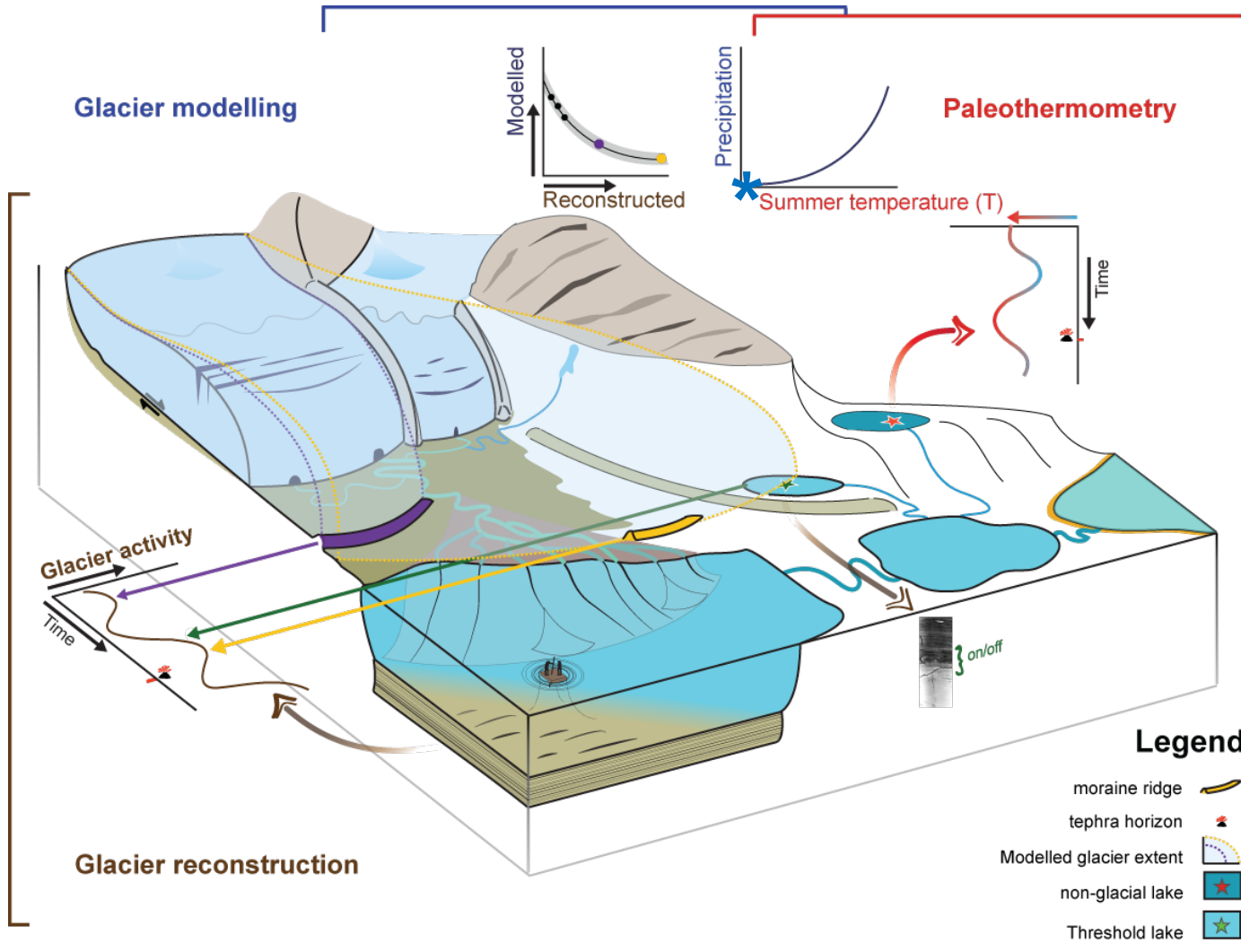


1969



2019

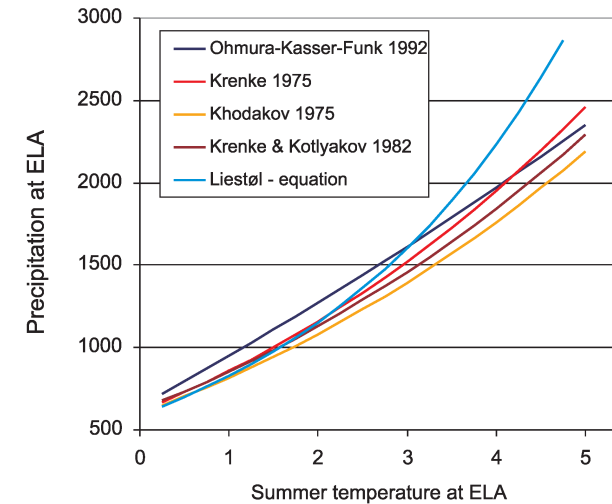
SOUTHPHSPHERE – How?



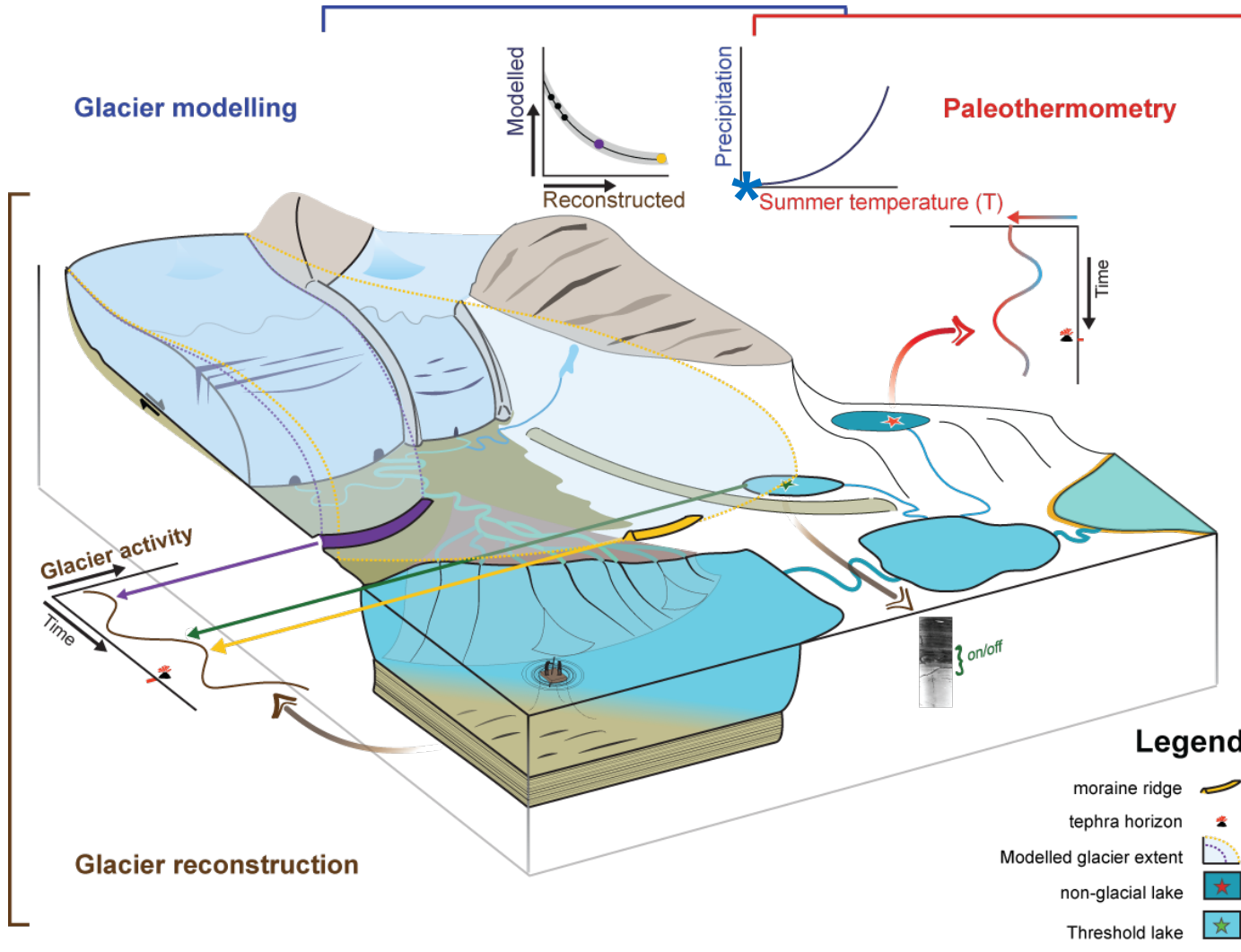
■ Precipitation

Modelling

Glacier
climate
response
driven by
P and **T**



SOUTHPHSPHERE – How?



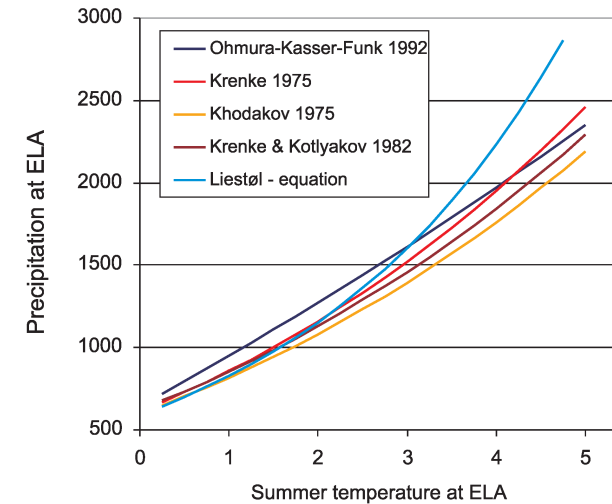
δD
Hydrogen isotope analysis

Implementation

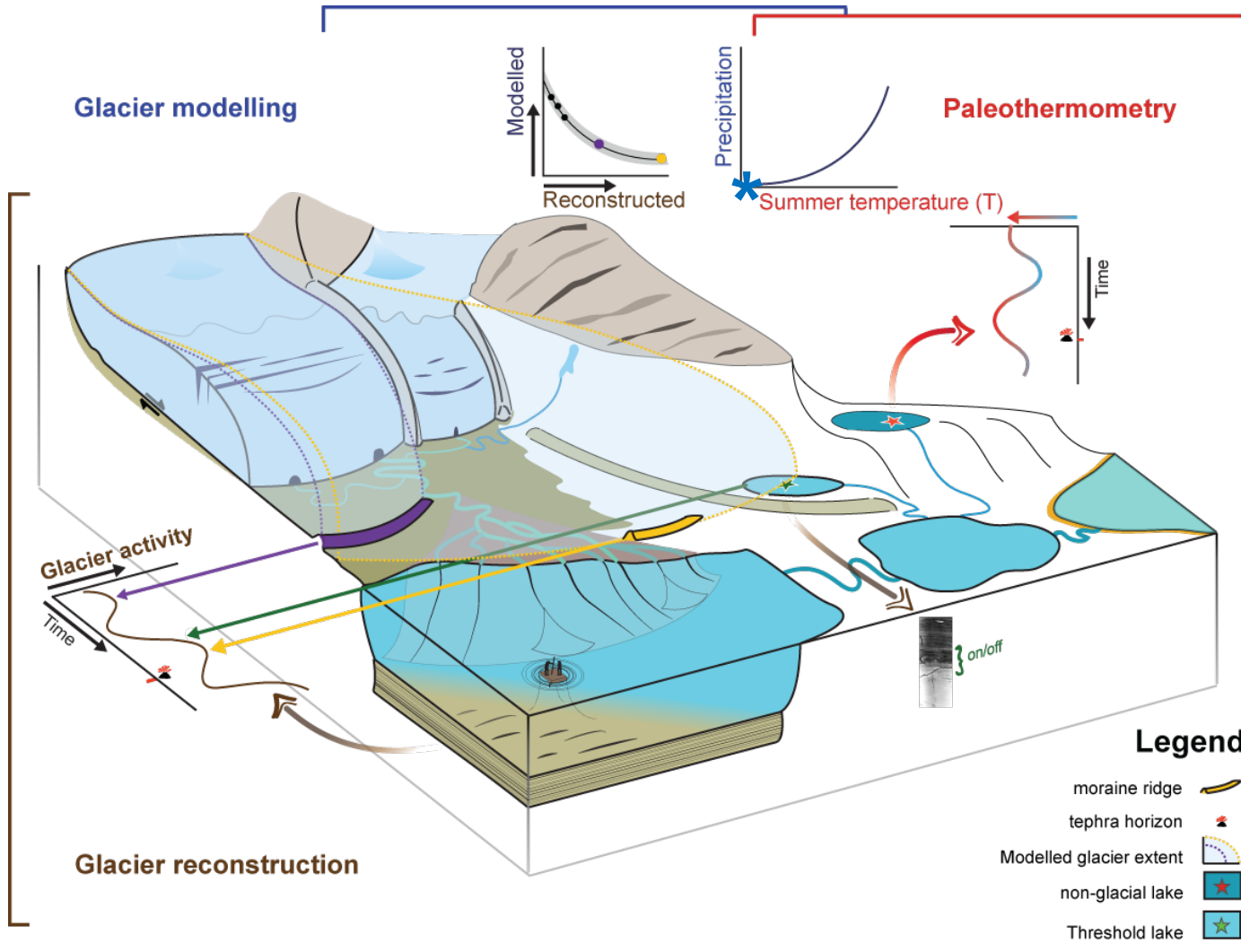
■ Precipitation

Isotope geochemistry

Glacier climate response driven by **P** and **T**



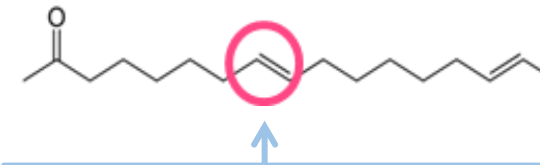
SOUTHPHSPHERE – How?



Implementation

■ Temperature

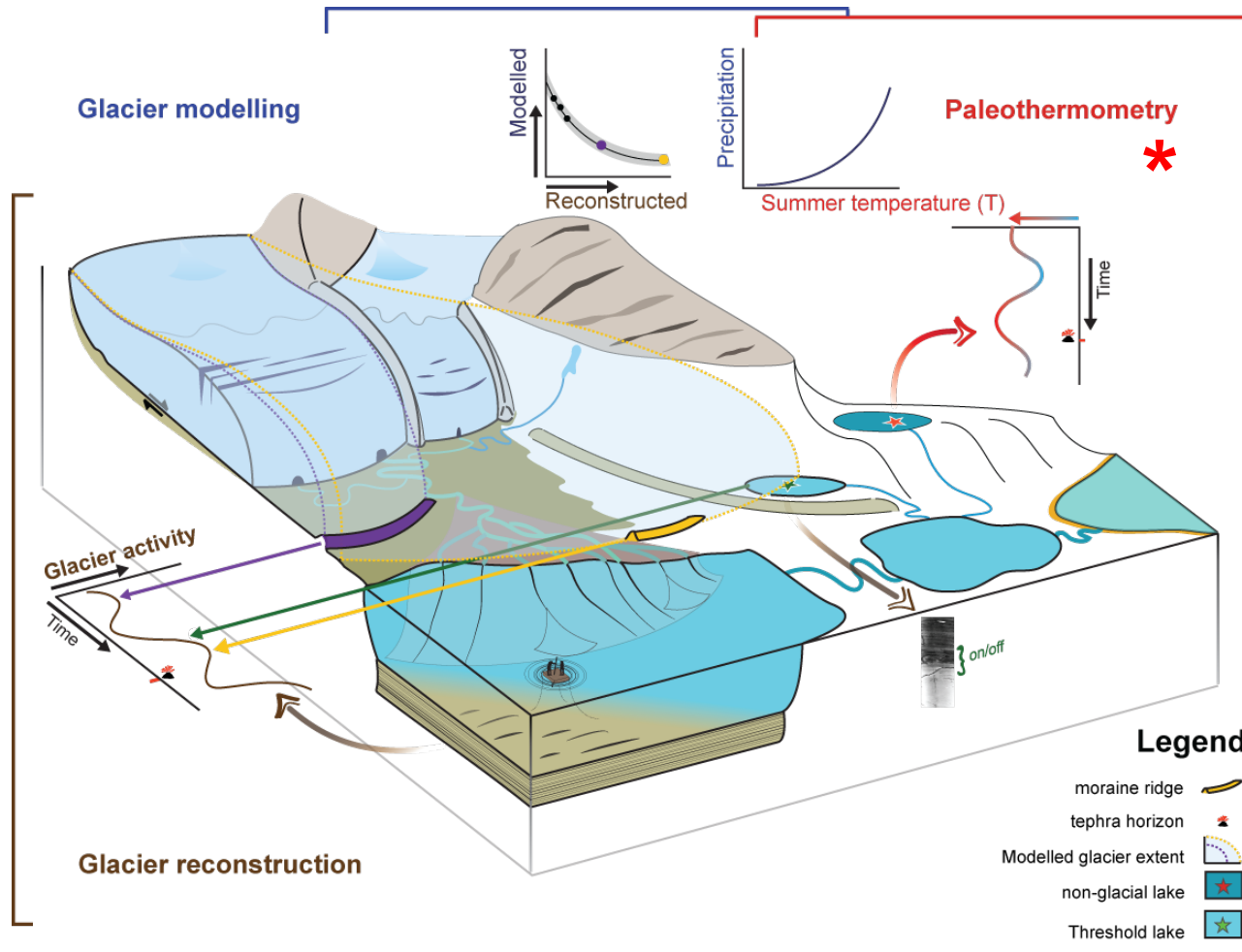
Lipid biomarkers



Saturation: constant viscosity under changing temperatures

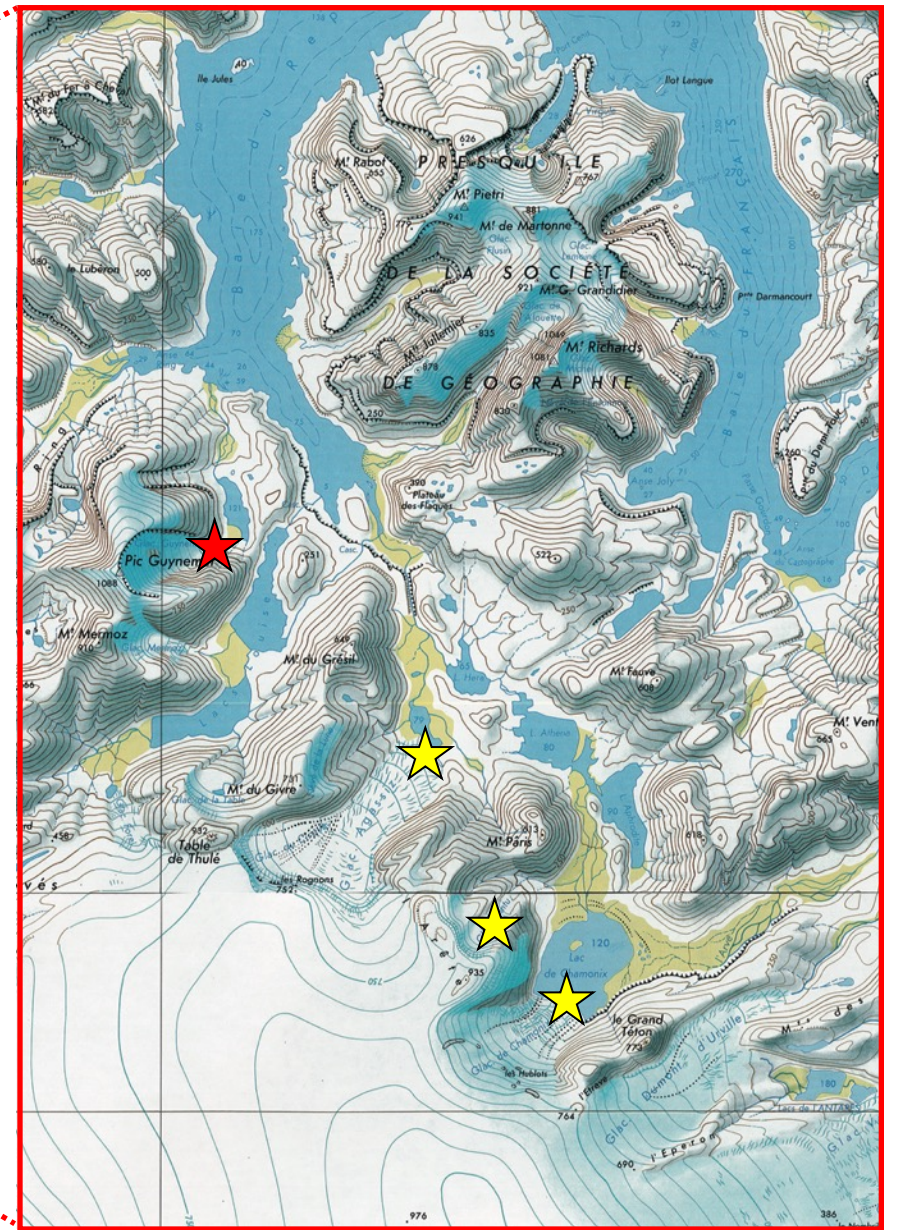
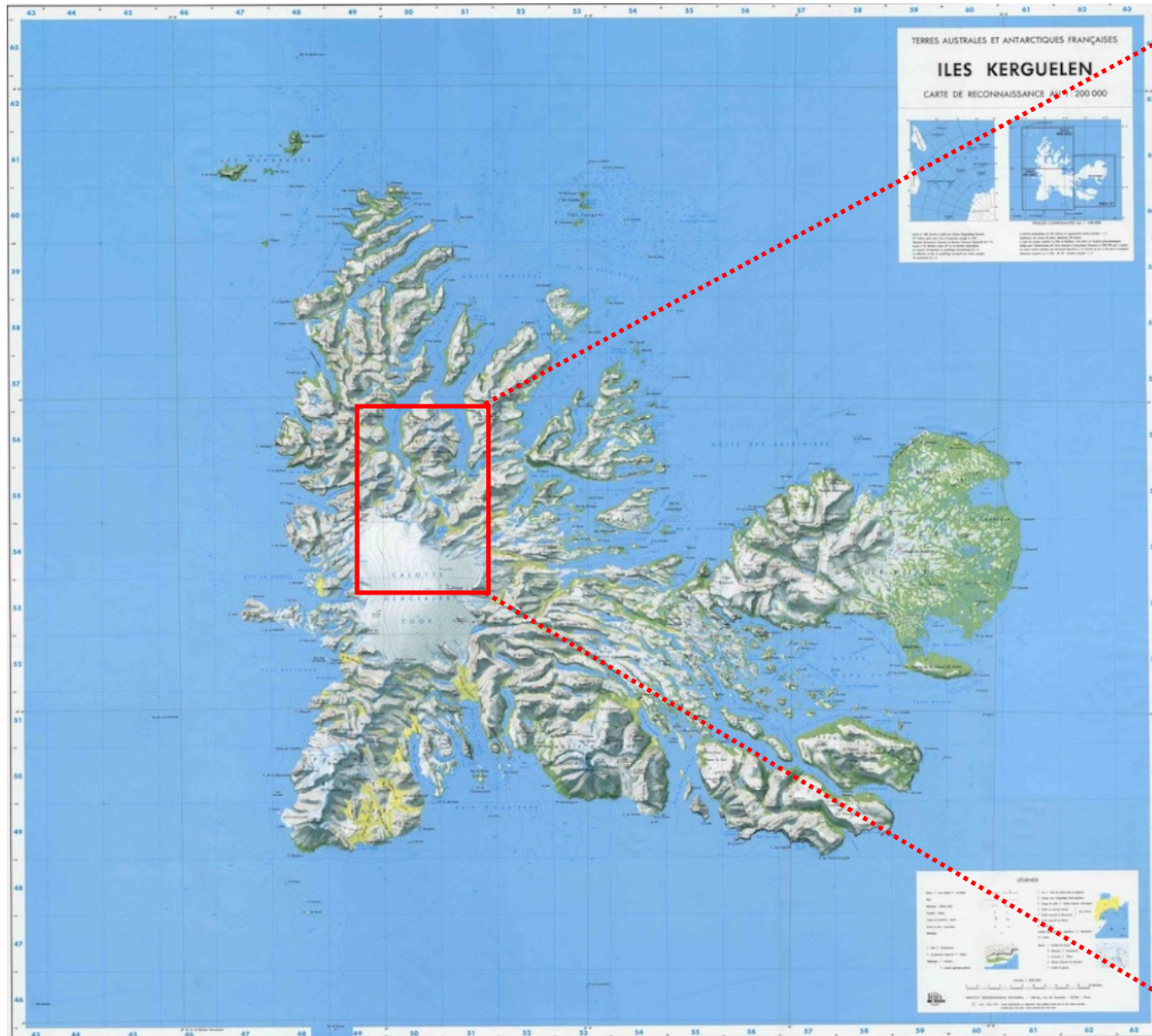


SOUTHPHSPHERE – How?



Implementation

- Biodiversity changes
DNA
- Pollen
Excotic pollen – wind drift
- Macrofossil

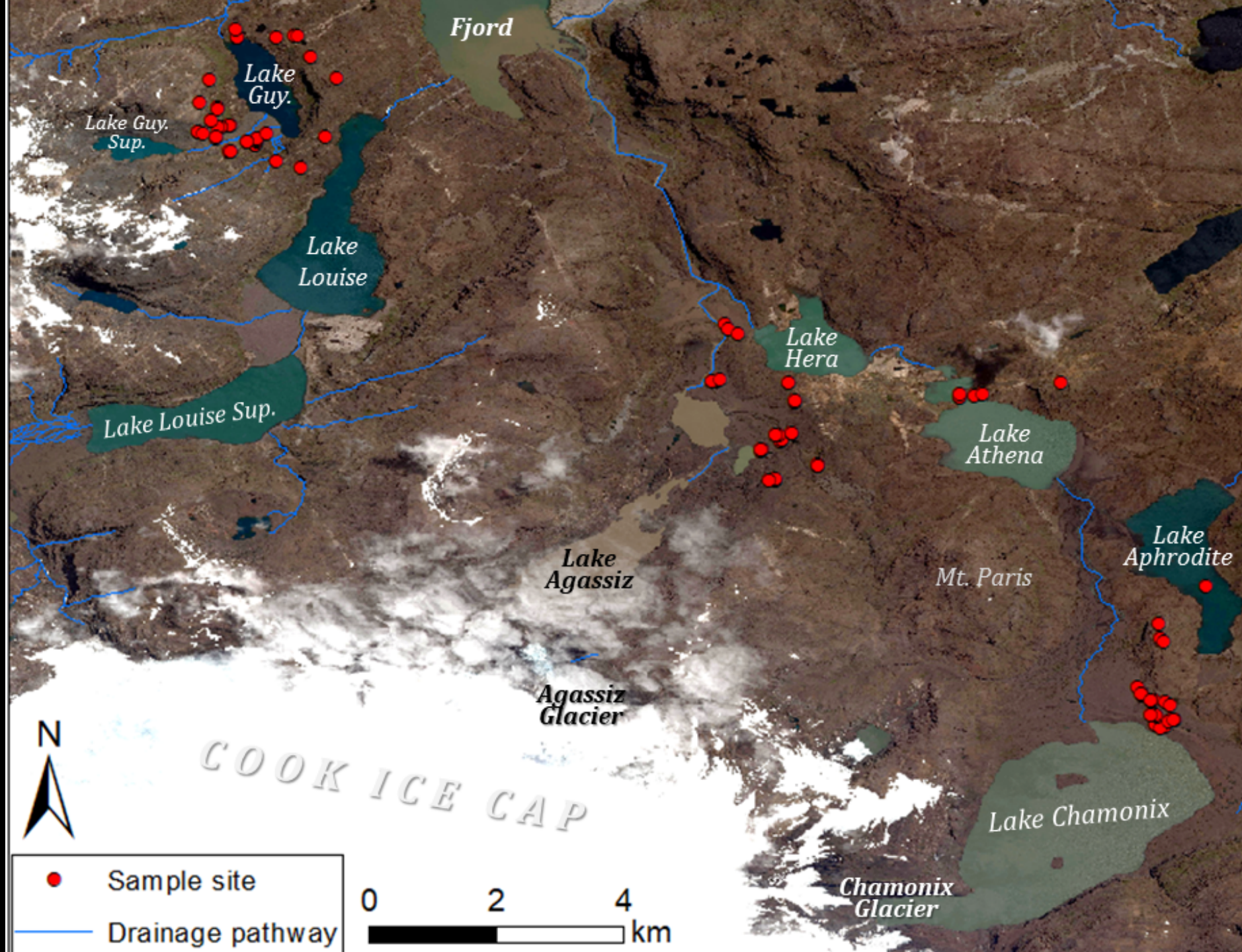












Coring campaign of the century!



SOUTHSPHERE field campaign - in numbers

6 lakes/ 14 coring locations

127 m sediment cores/ 110 rock samples

27 days the field/ 8 scientists

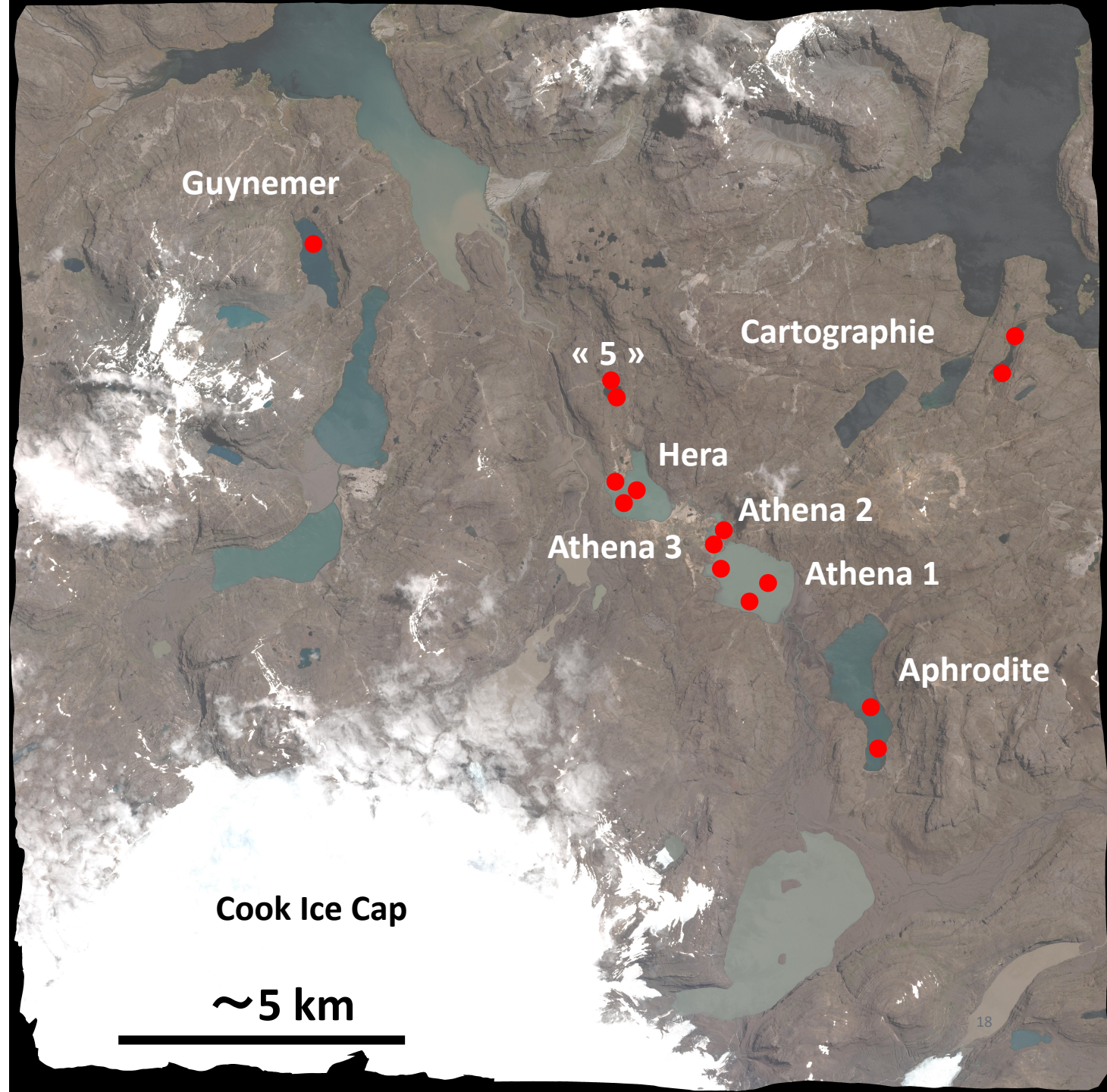
2 base camps

6 Drop Zones for helicopter

4 tons of scientific equipment

3 PhD students, one post doc

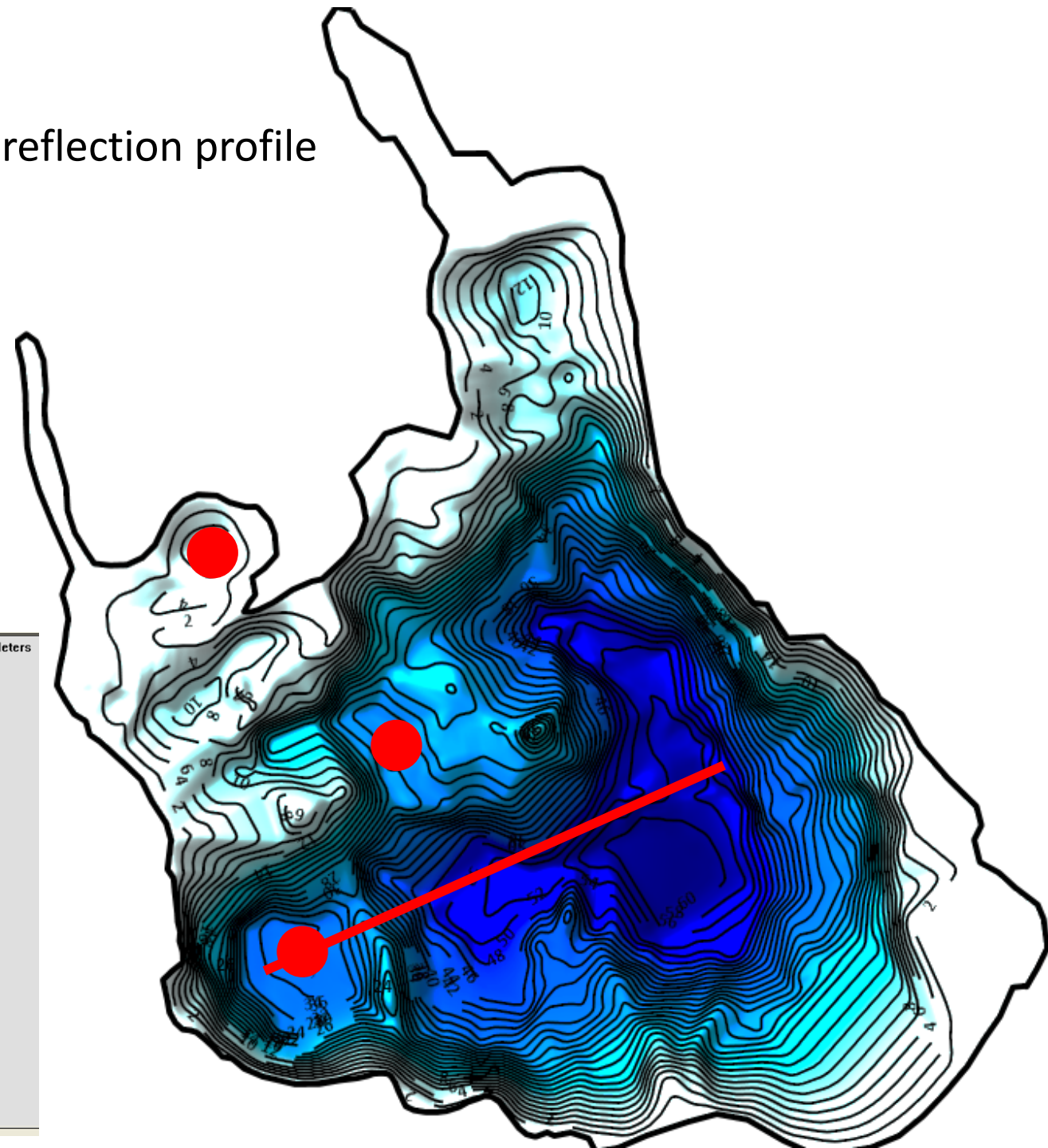
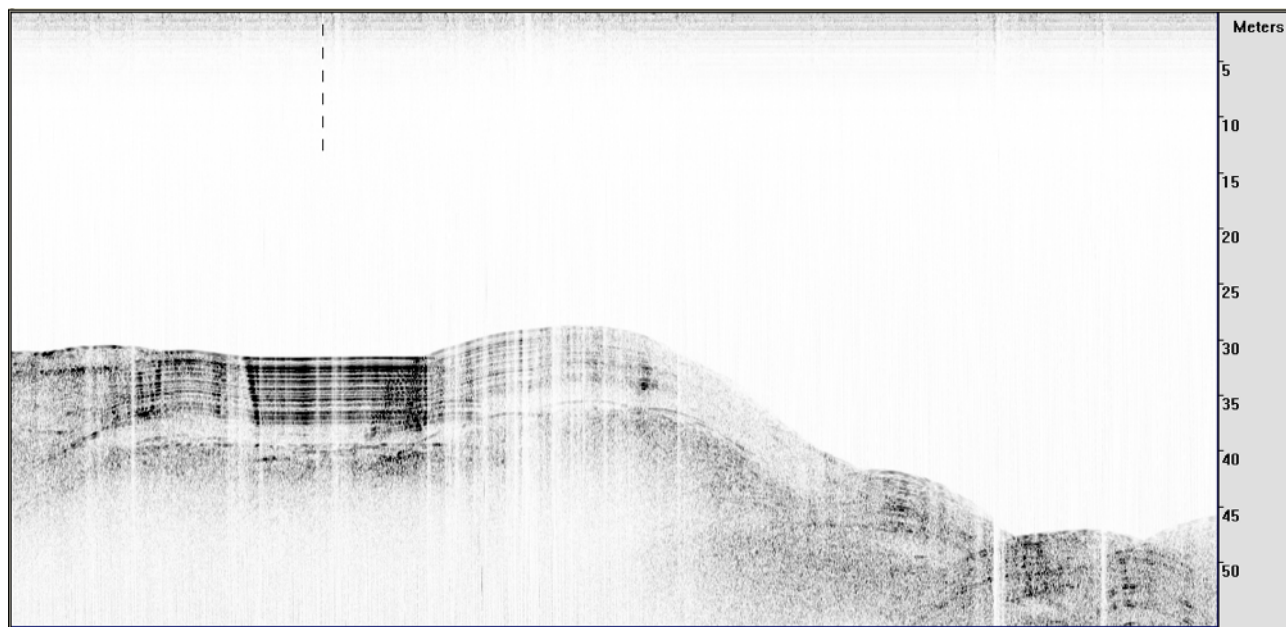
**Coring campaign of the century – work for the
next 10 years.....**





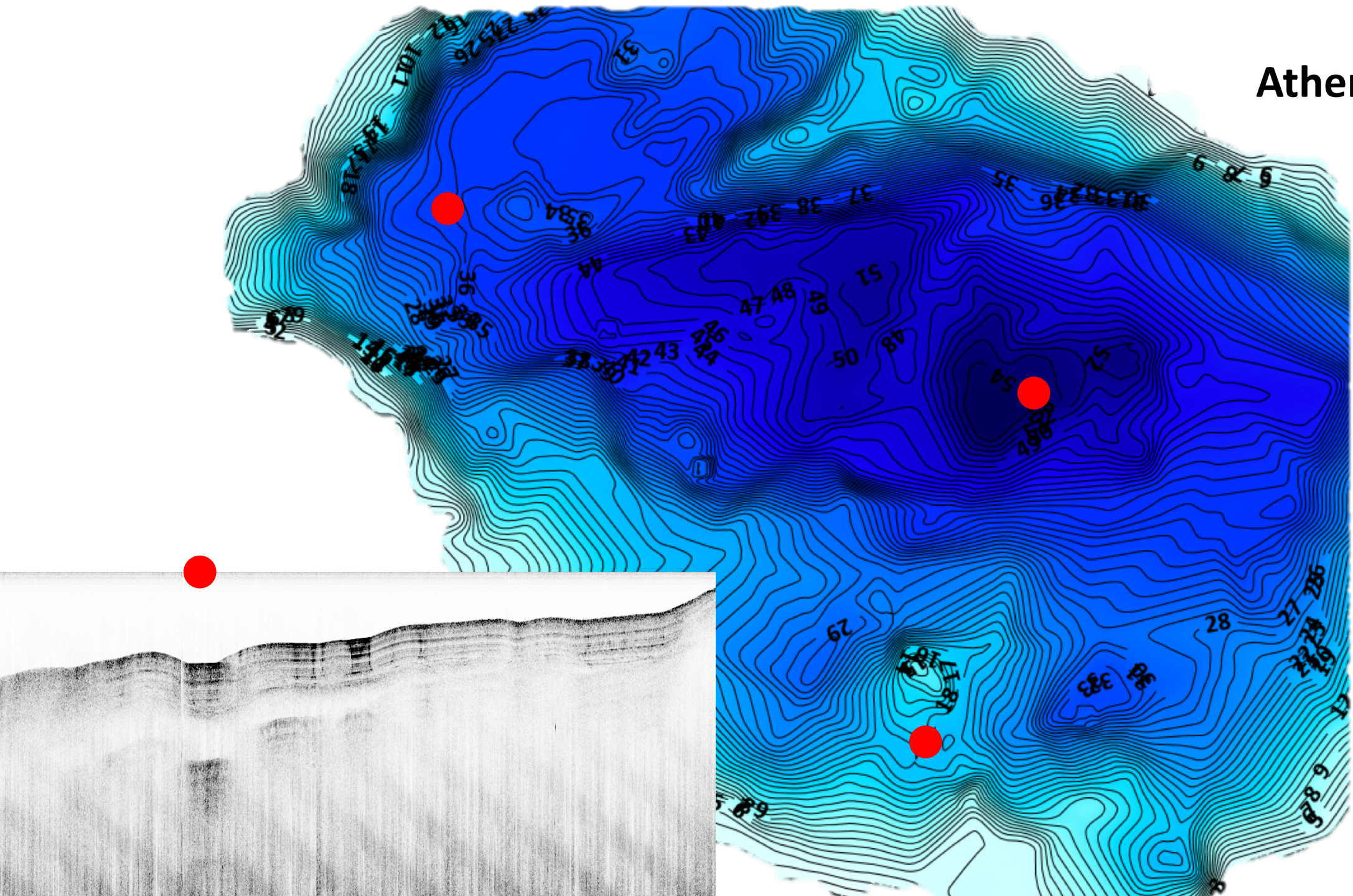
reflection profile

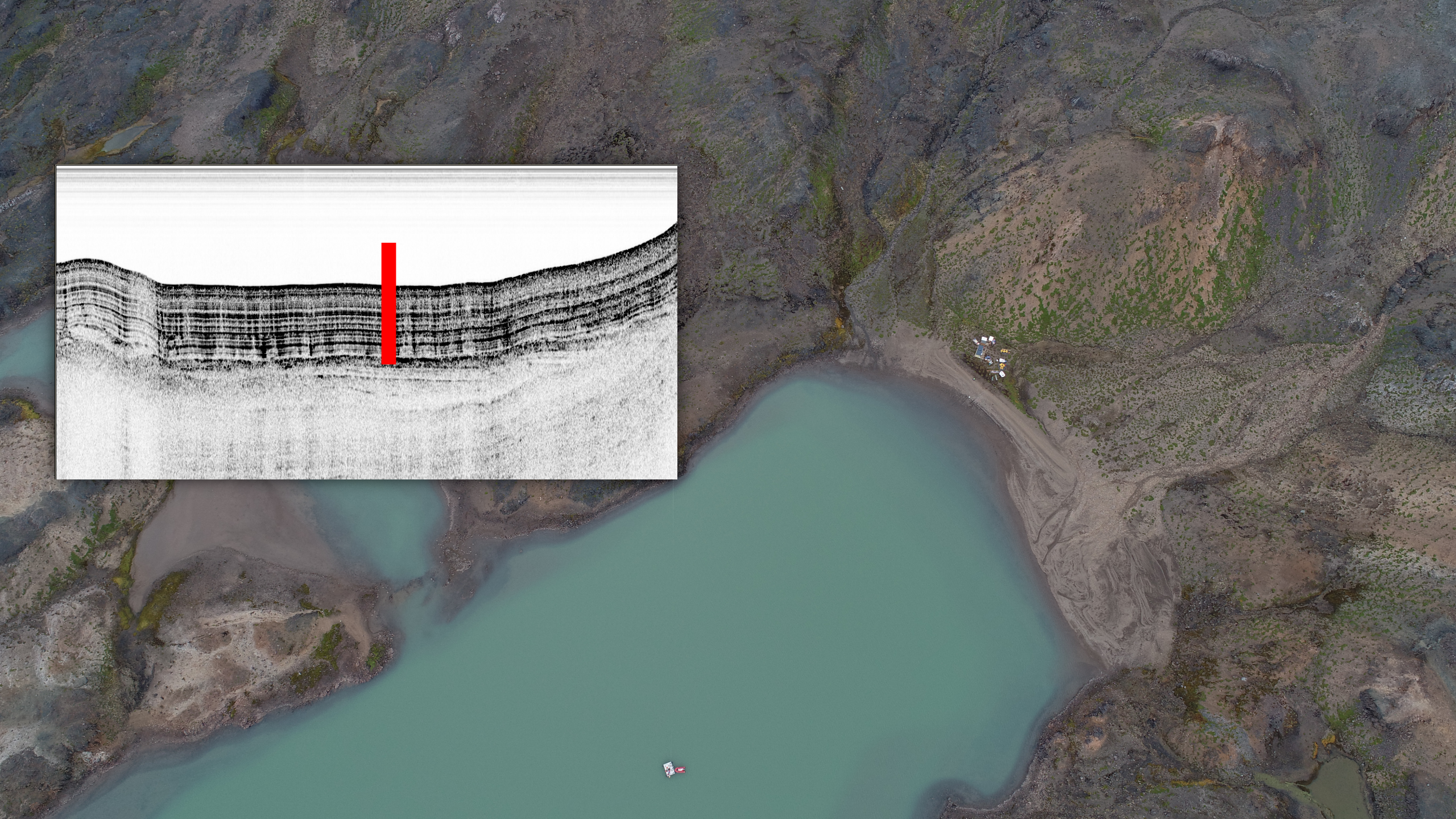
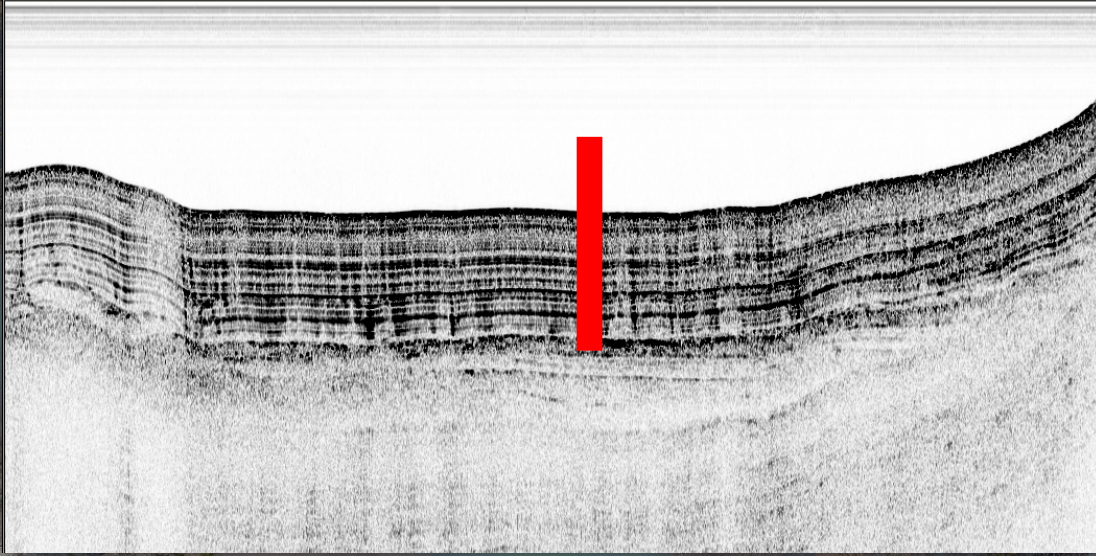
Seismic-reflection profile





Athena





The SOUTHPHERE project / PALAS 2019 expedition

