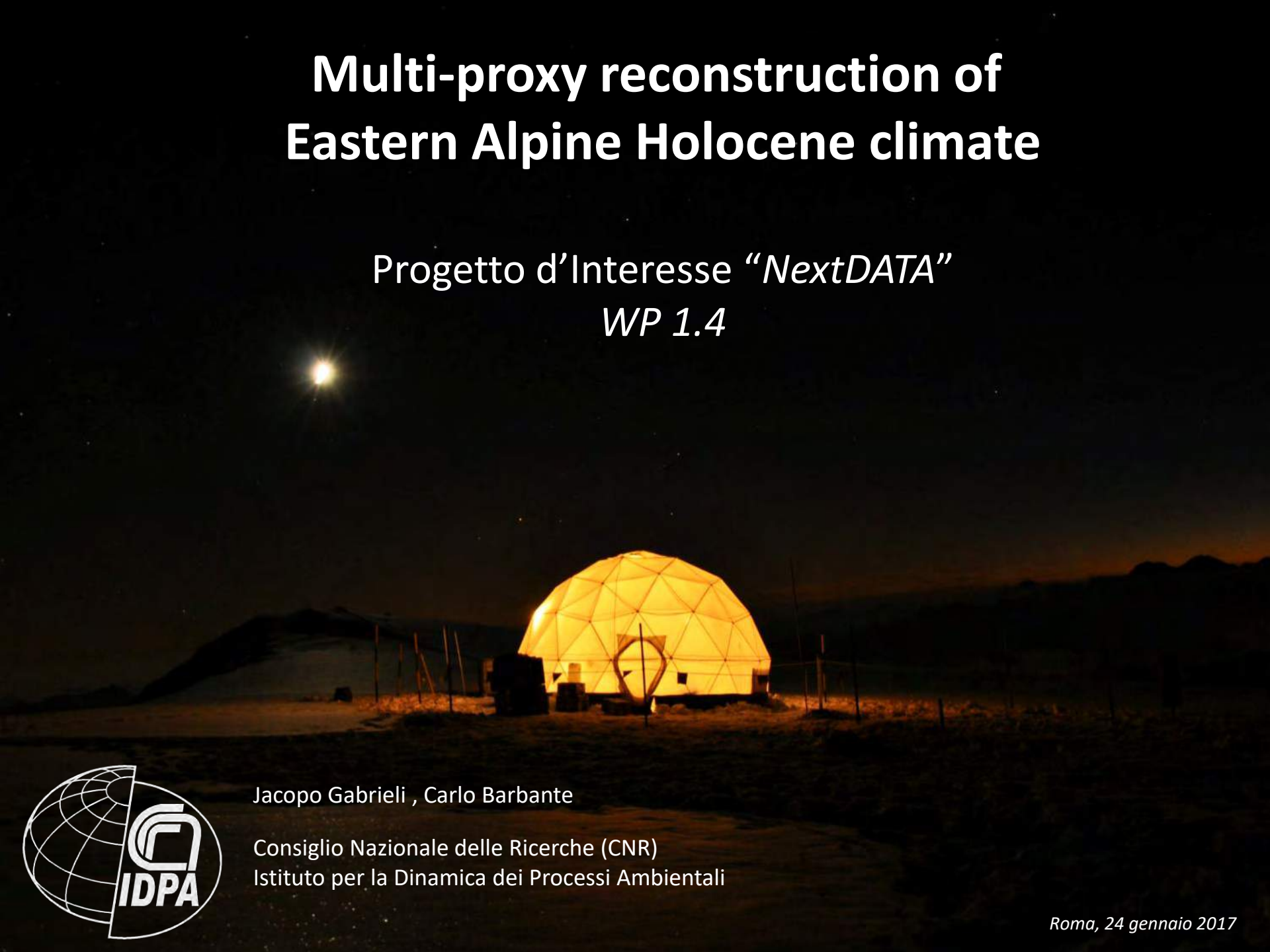
Multi-proxy reconstruction of Eastern Alpine Holocene climate

Progetto d'Interesse "*NextDATA*"
WP 1.4



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Roma, 24 gennaio 2017

Vedretta Alta dell'Ortles

Vedretta Alta

Surface (2006): 105 ha
Maximum elevation: 3905 m
Minimum elevation: 3018 m
Average elevation: 3535 m
Exposure: NW
Average slope: 29°

Climatology

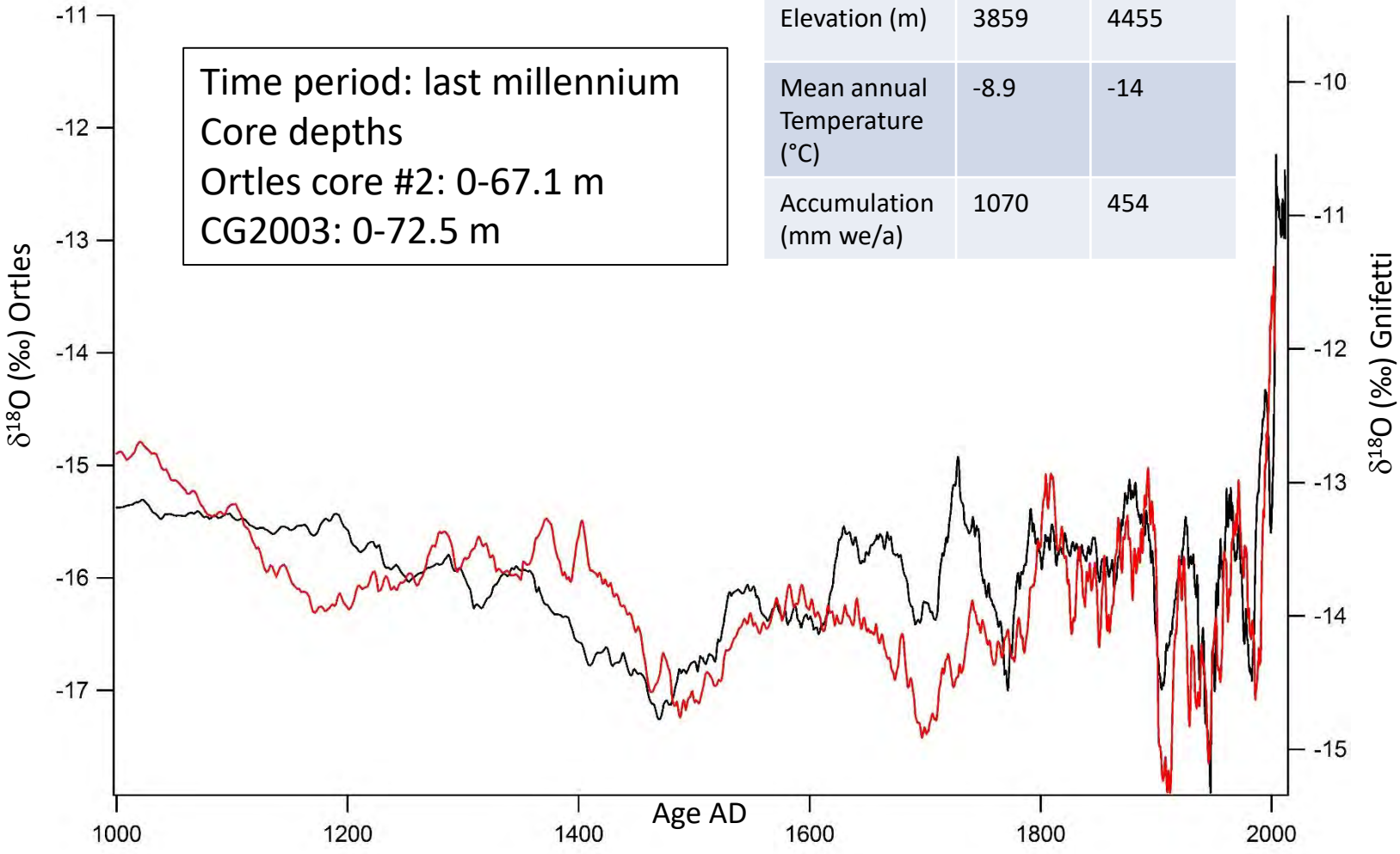
Precipitation (valley floor, 1900 m): **750 mm y^{-1}**
Annual air temperature (3850 m): **-9° C**

$\delta^{18}O$ ORTLES vs $\delta^{18}O$ COLLE GNIFETTI

100-point moving average
Ortles $\delta^{18}O$: black line
CG2003 $\delta^{18}O$: red line

Time period: last millennium
Core depths
Ortles core #2: 0-67.1 m
CG2003: 0-72.5 m

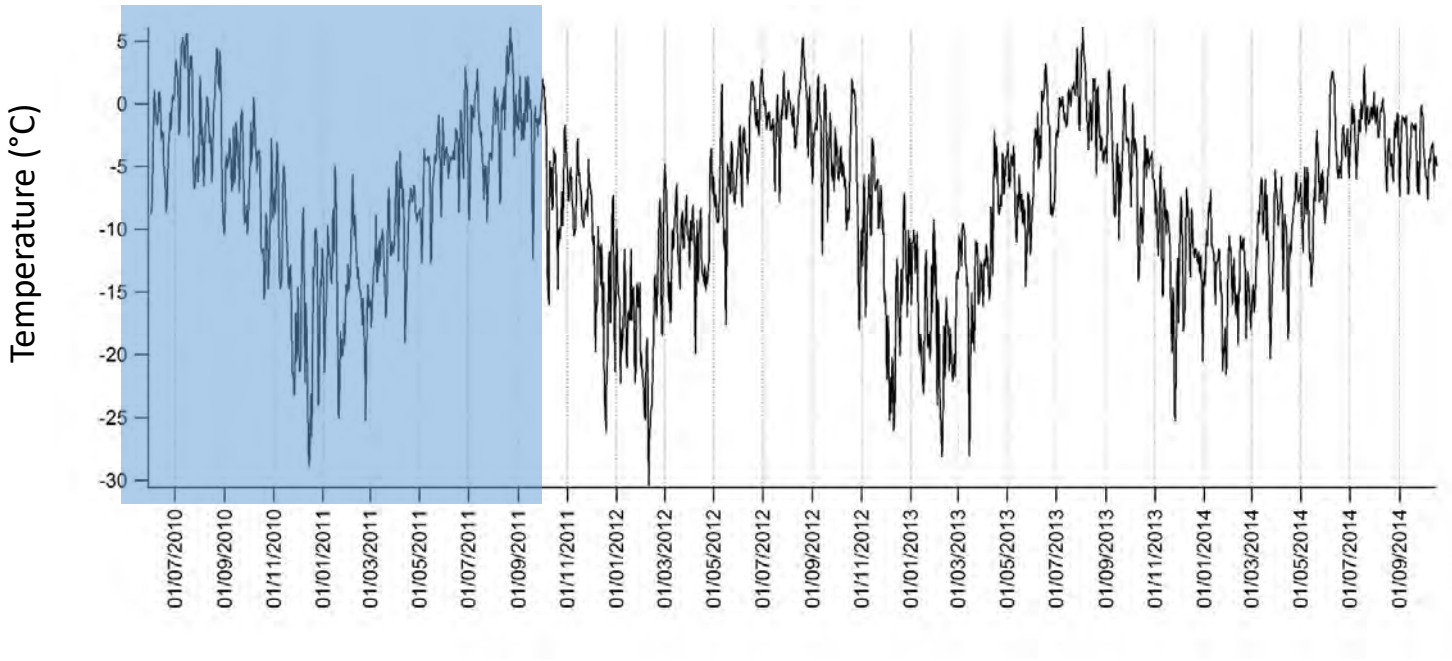
	Ortles	Colle Gnifetti
Coordinates	46°30' N 10° 32' E	45°55' N 7°52' E
Elevation (m)	3859	4455
Mean annual Temperature (°C)	-8.9	-14
Accumulation (mm we/a)	1070	454



ORTLES – ricostruzione temperature

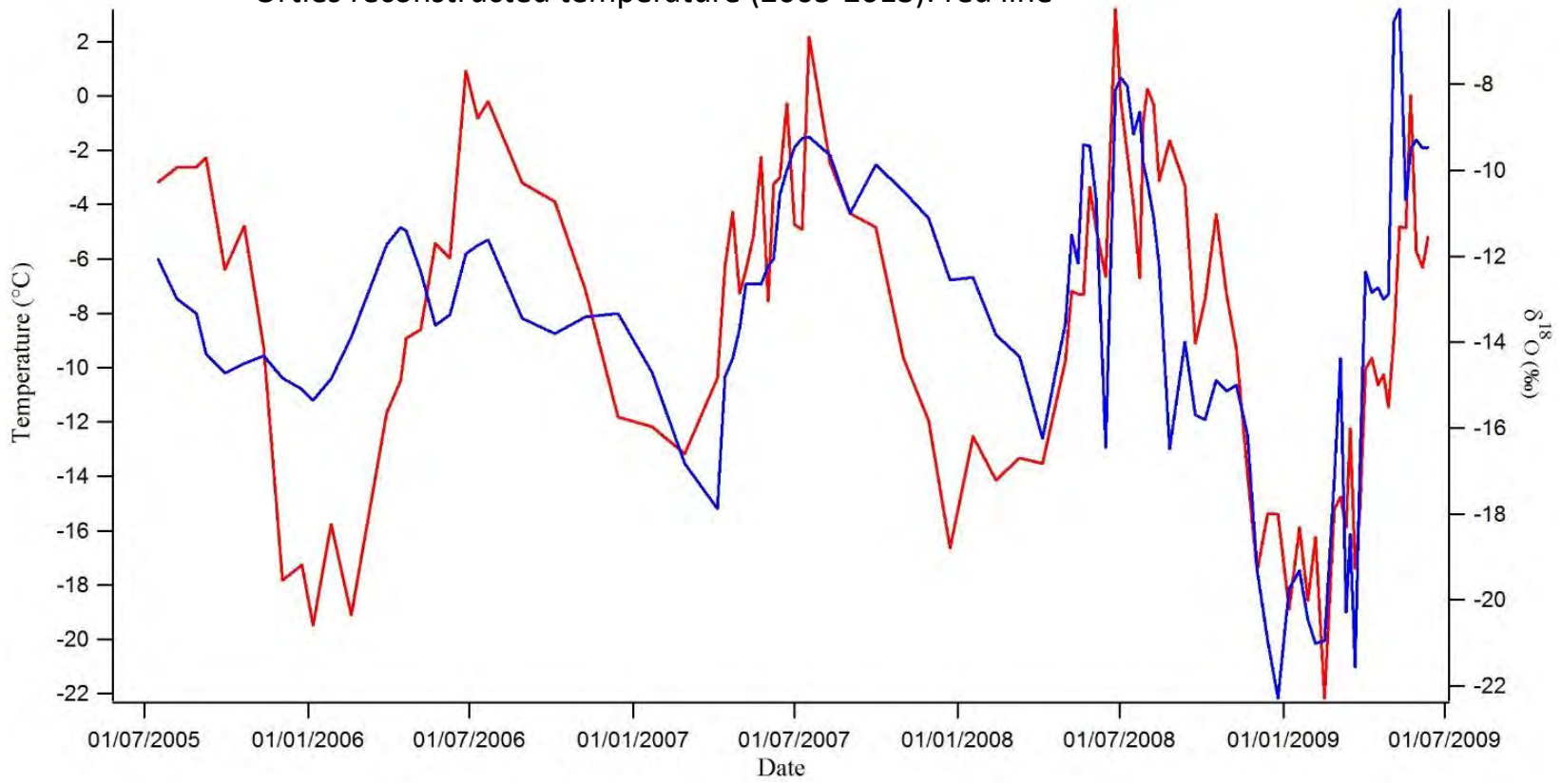
Meteorlogical Stations	Period	Source	Correction
Ortles reconstructed I	1864-2009	Säntis (1864-1958) Careser diga (1959-2009)	• Lapse rate between Careser and Cima Beltovo • Linear regression between Säntis and Careser
Ortles reconstructed II	2005-2013	Careser diga	Lapse rate between Careser and Ortles AWS
Ortles AWS	2011-2014	Ortles AWS	None

Ortles reconstructed annual temperature (1864-2009)



ORTLES – calibrazione temperatura

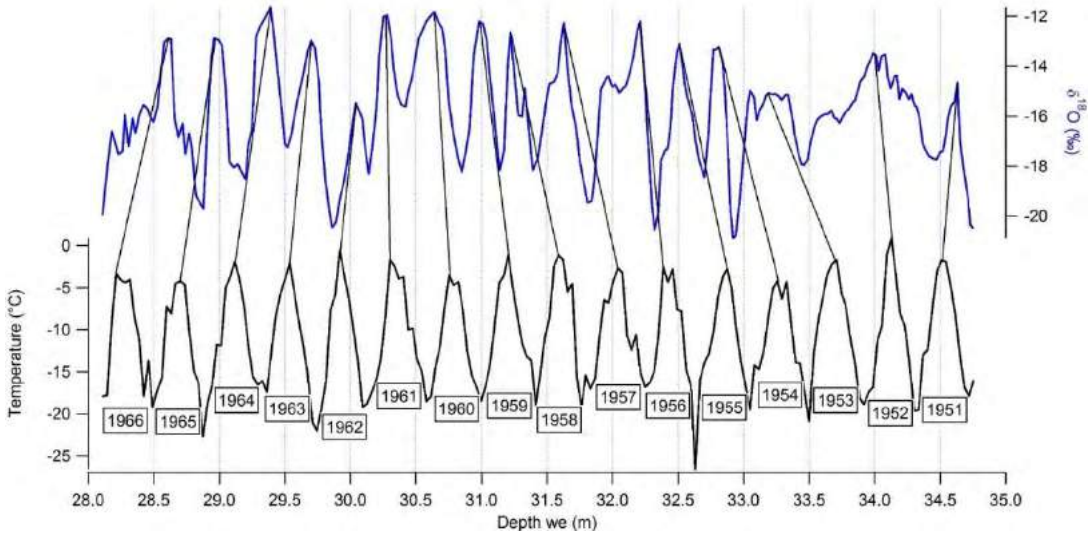
$\delta^{18}O$: blue line
Ortles reconstructed temperature (2005-2013): red line

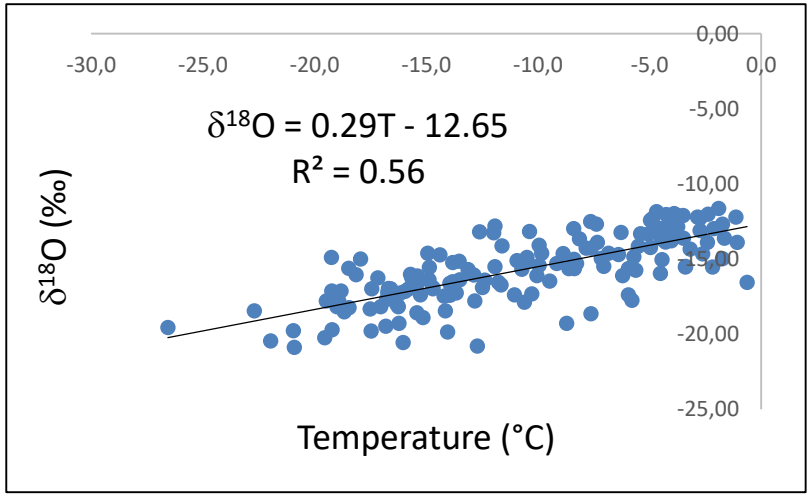


ORTLES – calibrazione temperatura

Dating (monthly resolution) in proximity of the triutium absolute age marker of 1963
This glacier portion is cold and well preserved

Temperature correlation



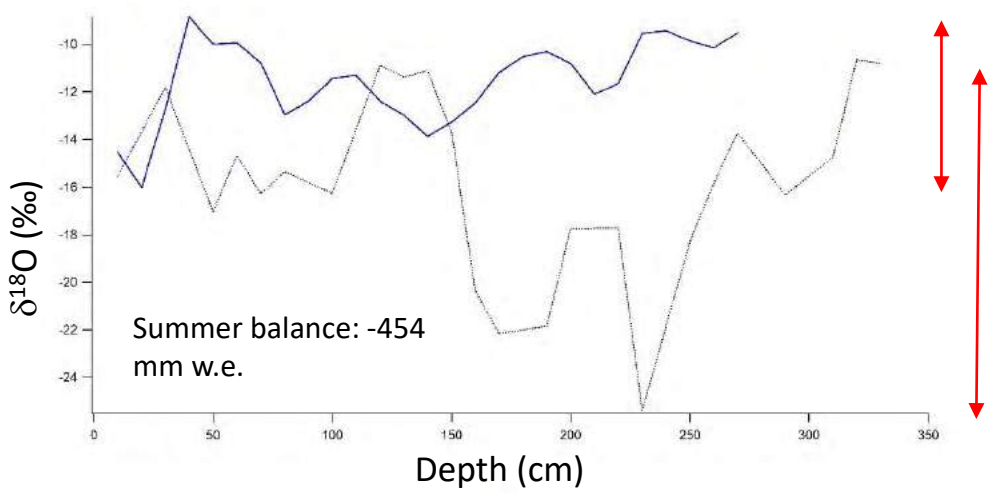


1953-1965

Linear correlation between $\delta^{18}O$ and reconstructed Ortles temperature

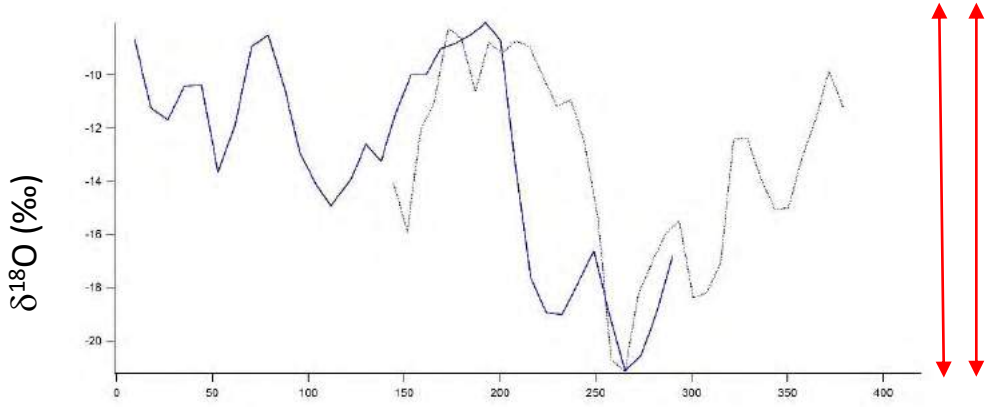
ORTLES – calibrazione temperatura

2 snow pits, same site
July: dotted line
September: continuous line



2013: $\delta^{18}O$ summer smoothing

Summer post-depositional processes caused an enrichment of $\delta^{18}O$ in the September 2013 snow pit, limiting the isotopic variability



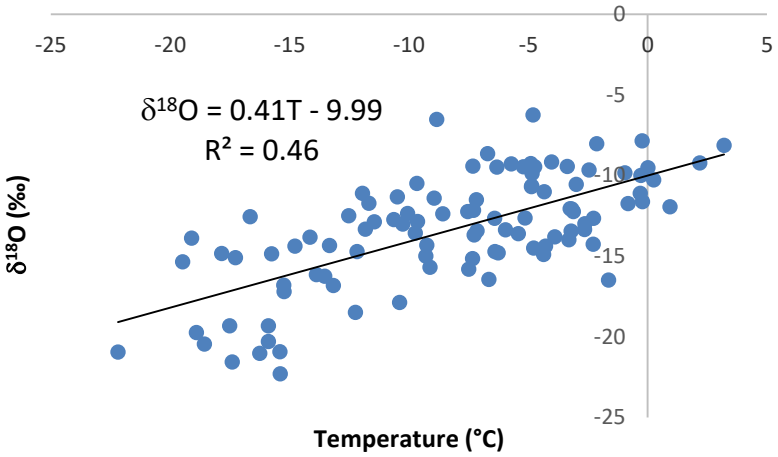
Summer 2014: no smoothing

Early (July) and late (September) summer snow pits show the same isotopic variability (very limited post-depositional processes)

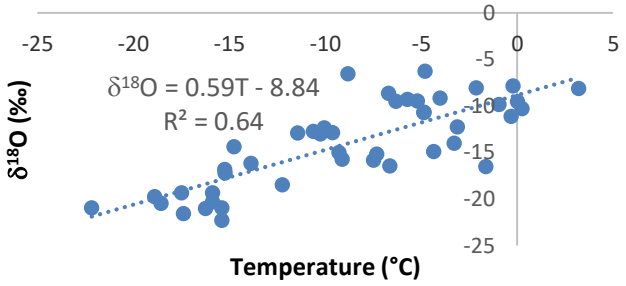
ORTLES – calibrazione temperatura

Linear correlation between reconstructed Ortles temperature and $\delta^{18}O$

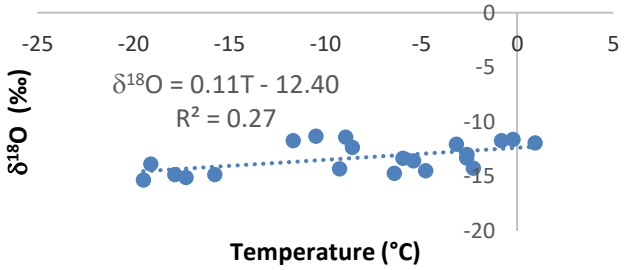
July 2005- June 2009



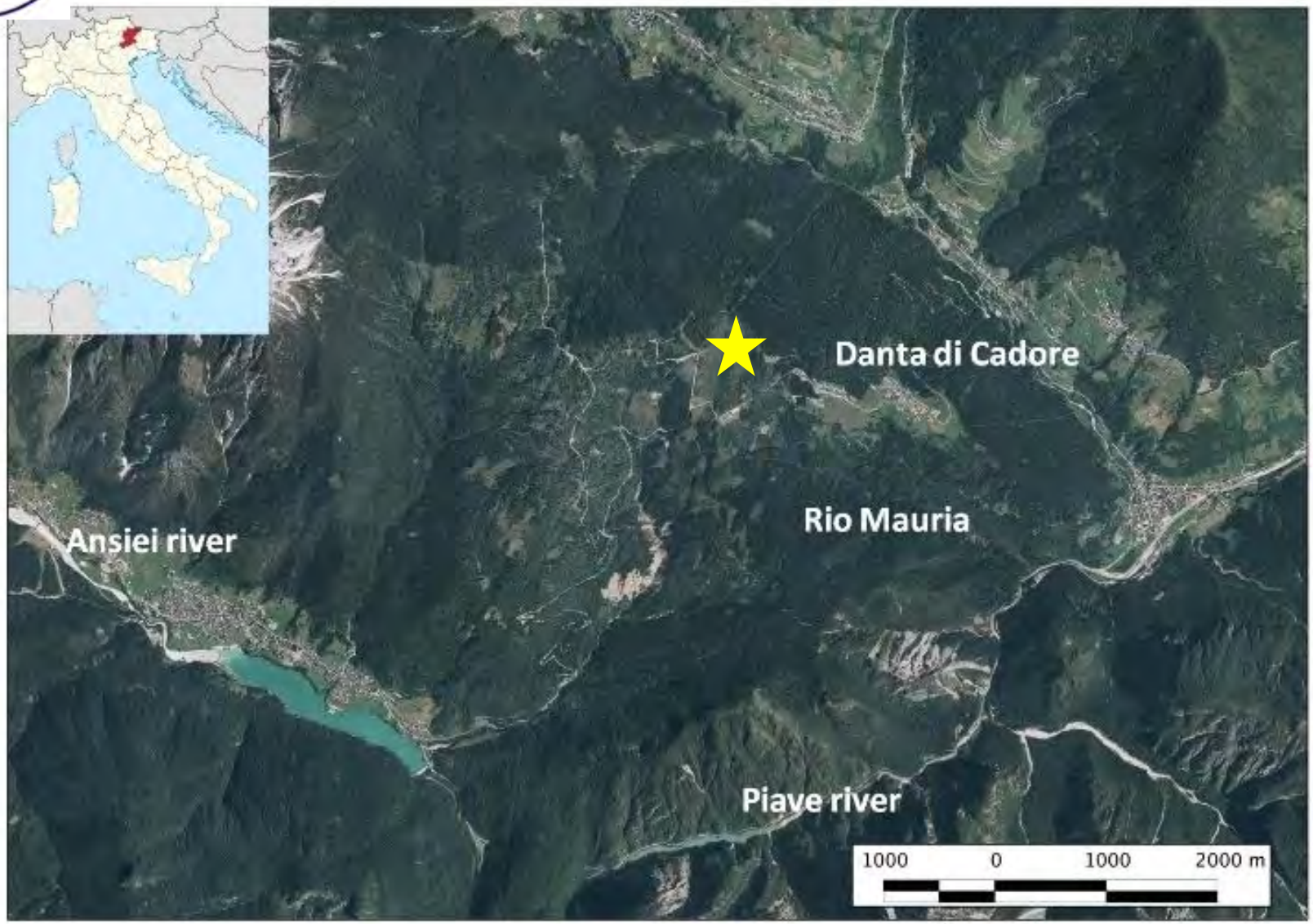
June 2008-June 2009: the correlation increases and the slope too



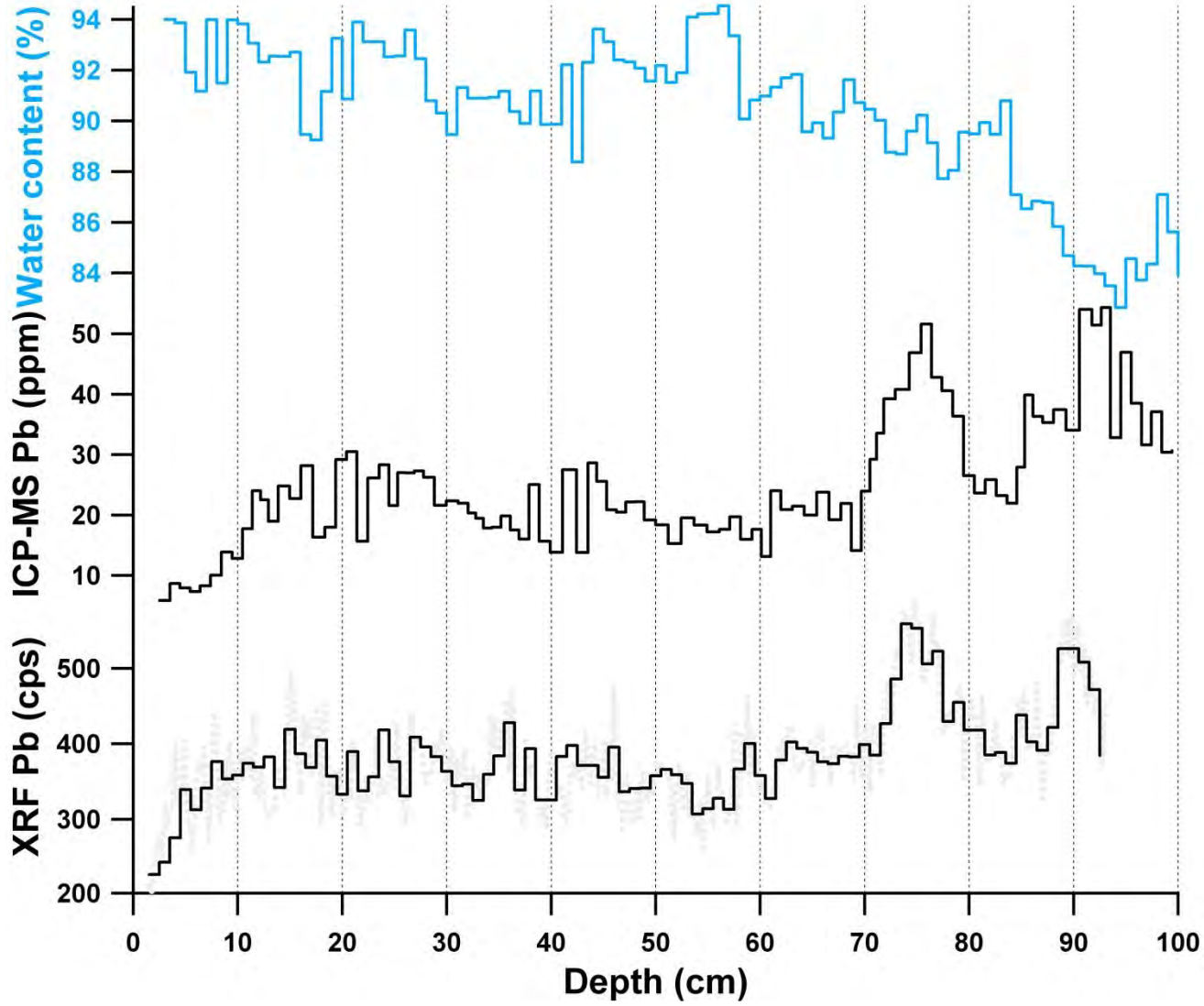
July 2005-July 2006: the correlation significantly decreases and the slope too

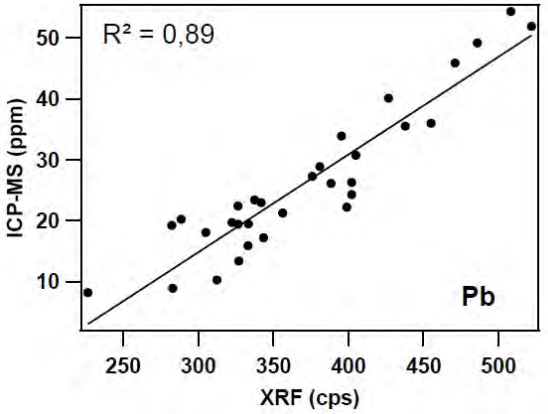


Torbiera di Danta di Cadore



Calibrazione XRF-scanner / ICP-MS

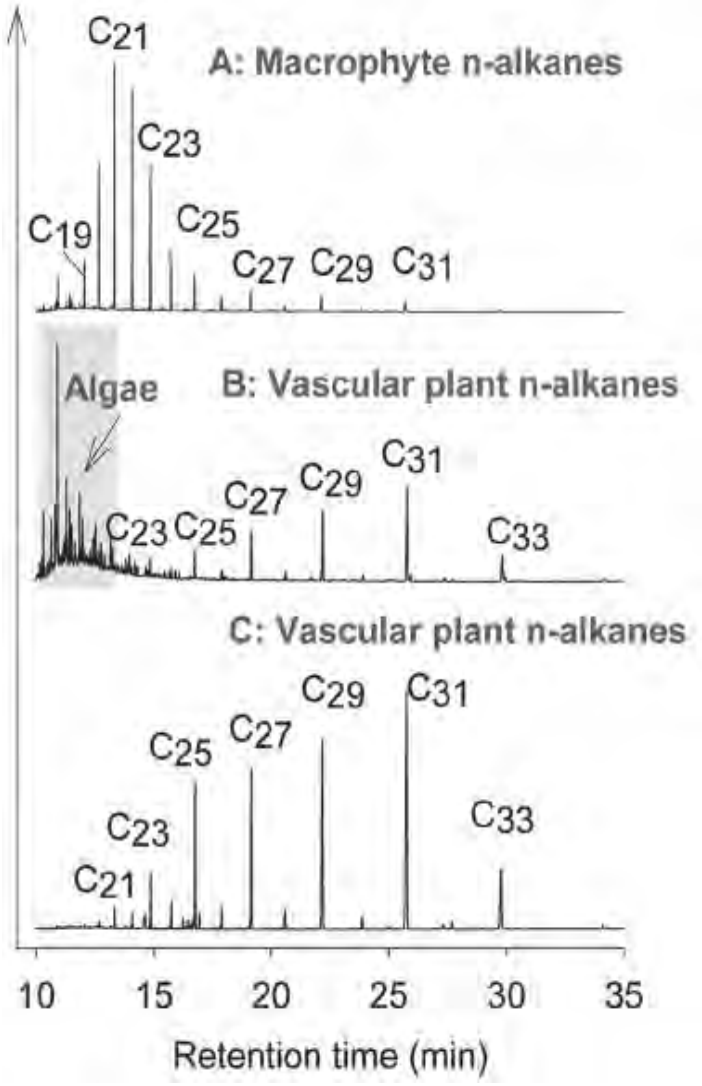




One of the most widely used biomarkers for paleoclimatological studies are long-chain aliphatic compounds such as ***n***-alkanes that are produced by higher plants as leaf waxes

Surface of a abaxial leaf of a pea (5000x magnified), clearly showing the presence of epicuticular waxes

Surface of a wax-free abaxial leaf of a beetroot (4000x magnified)

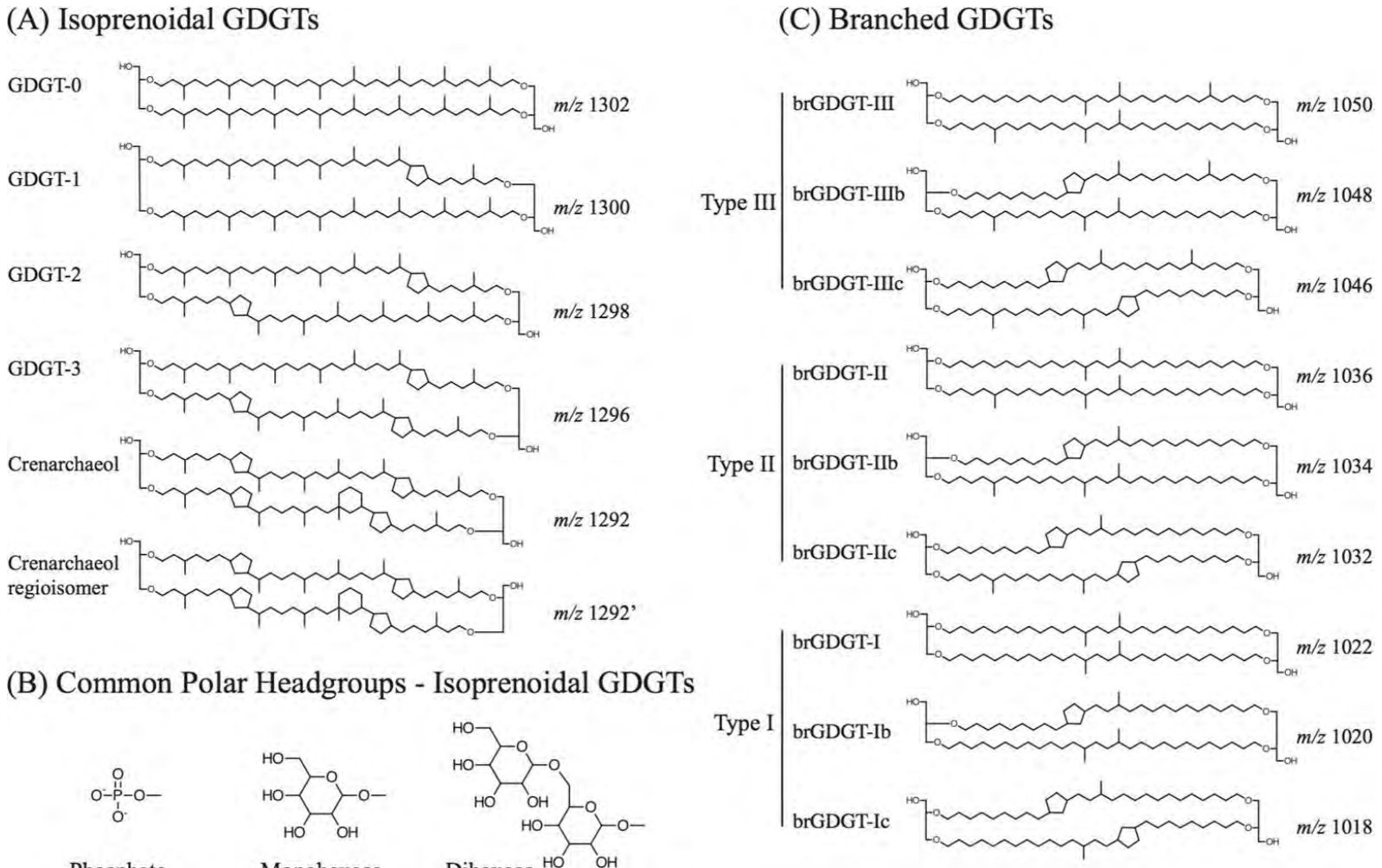


C_{17} - C_{19} algae

C_{23}-C_{25} submerged aquatic plants and *Sphagnum*

C_{25}-C_{31} especially C_{27} and C_{29} leaf waxes of terrestrial higher plants

Glycerol dialkyl glycerol tetraether (GDGT) lipids are membrane-spanning lipids




GRAND COMBIN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Grazie per l'attenzione!

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