

INTERNATIONAL CONFERENCE ON
MOUNTAINS AND CLIMATE CHANGE

Mid-latitude ice core records from high mountains

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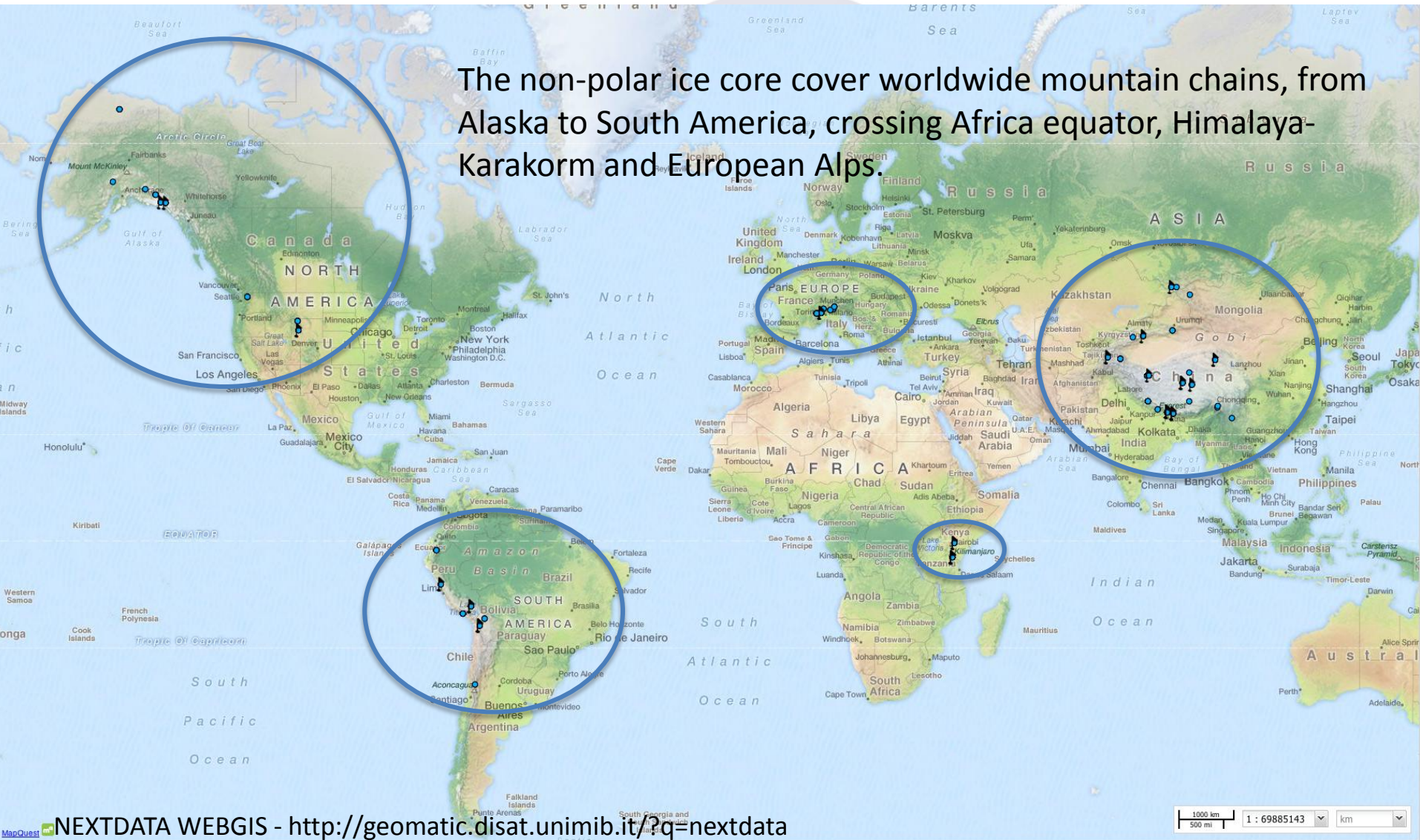


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The non-polar ice core cover worldwide mountain chains, from Alaska to South America, crossing Africa equator, Himalaya-Karakorm and European Alps.



NEXTDATA WEBGIS - <http://geomatic.disat.unimib.it/?q=nextdata>



Alpine ice core drilled in the last 40 years

Monte Bianco Massif

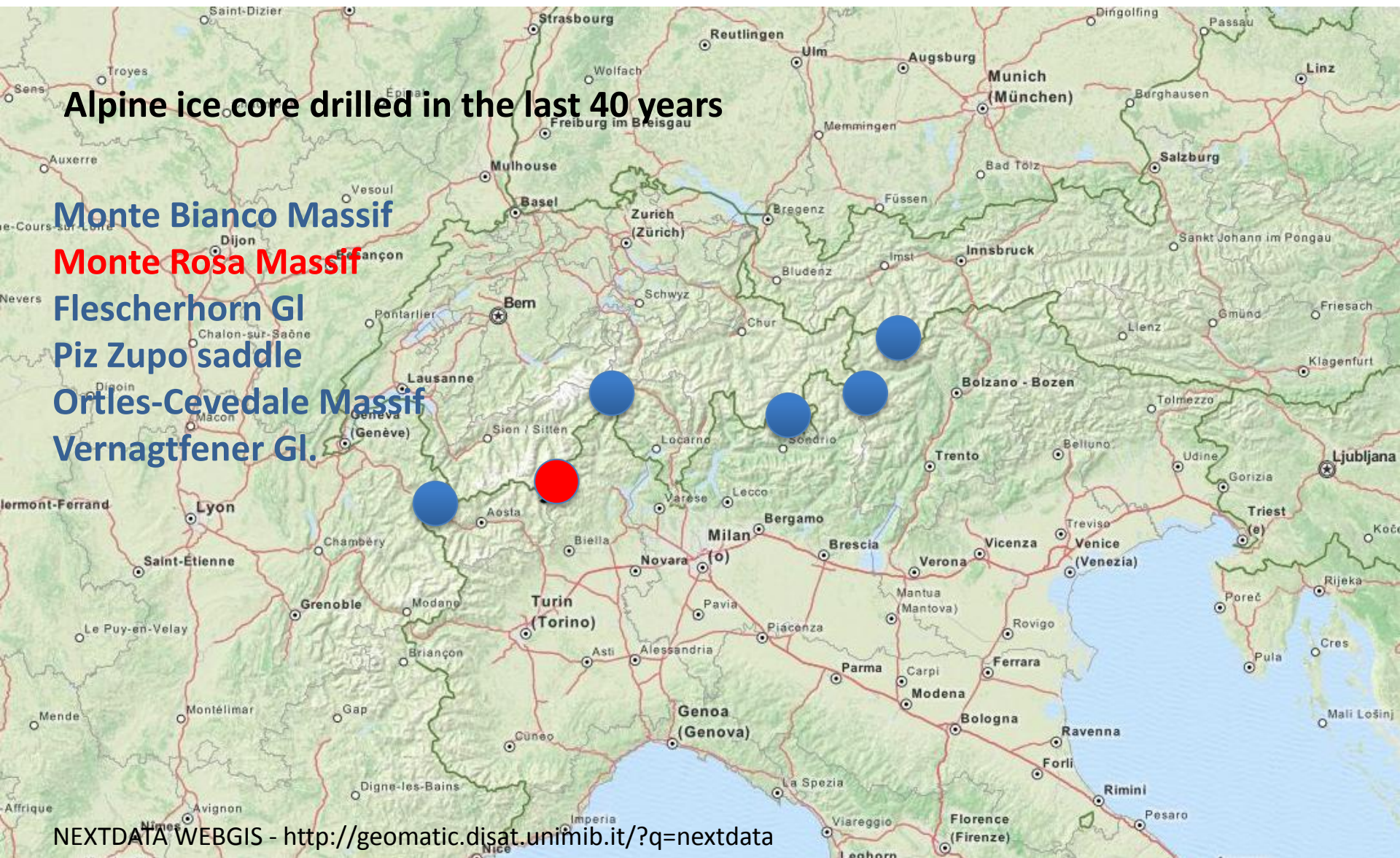
Monte Rosa Massif

Flescherhorn Gl

Piz Zupo saddle

Ortles-Cevedale Massif

Vernagtferner Gl.



NEXTDATA WEBGIS - <http://geomatic.disat.unimib.it/?q=nextdata>

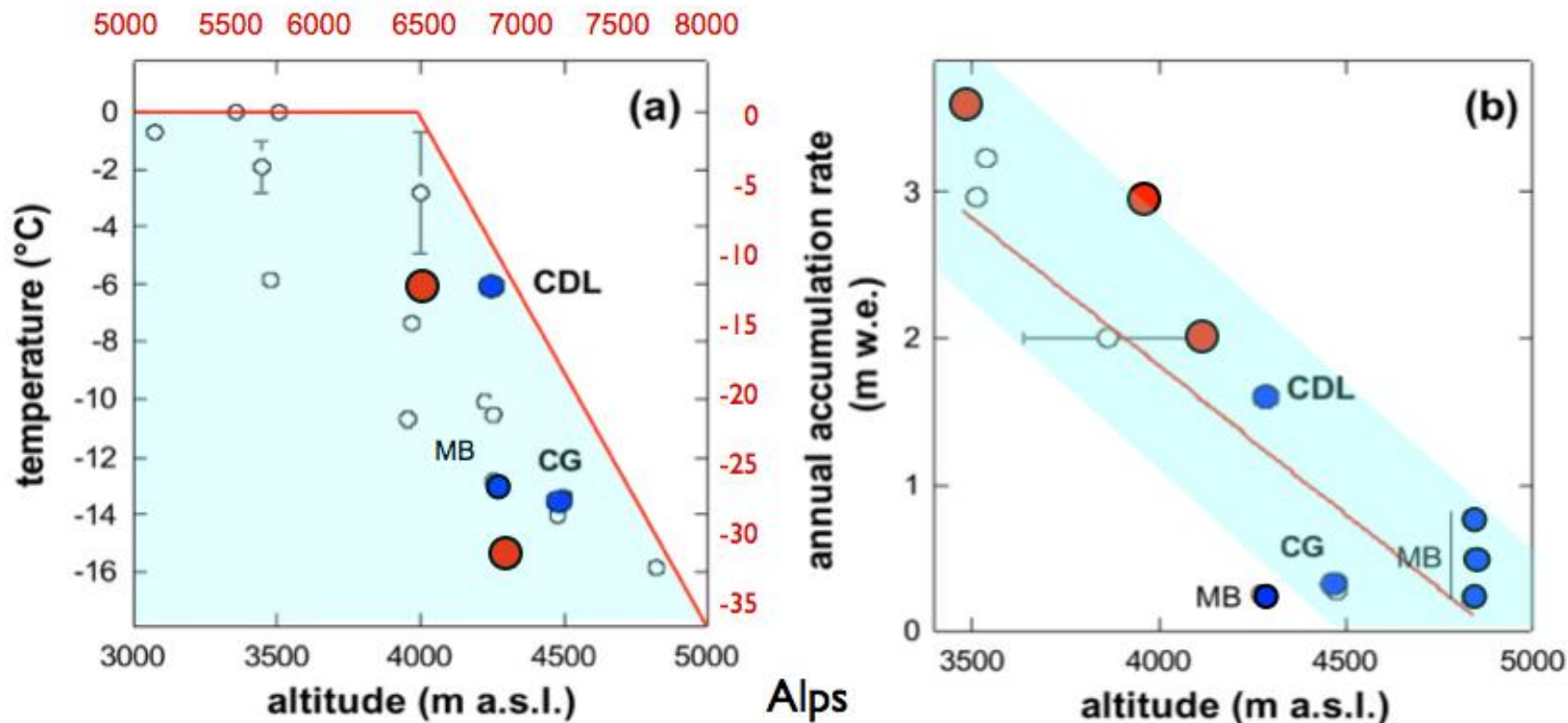


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Himalaya



Relationship between altitude of the drill sites and -10 m temperature (a) and annual accumulation rate (b). CDL: Colle del Lys; CG: Colle Gnifetti; MB: Mont Blanc (from Haeberli, 1983, modify) (Maggi pers. comm.)

Grey circles: alpine old ice cores (from '70 to 2000); blue circles: last 10 of alpine ice core; red circles: 2010-2013 alpine ice cores



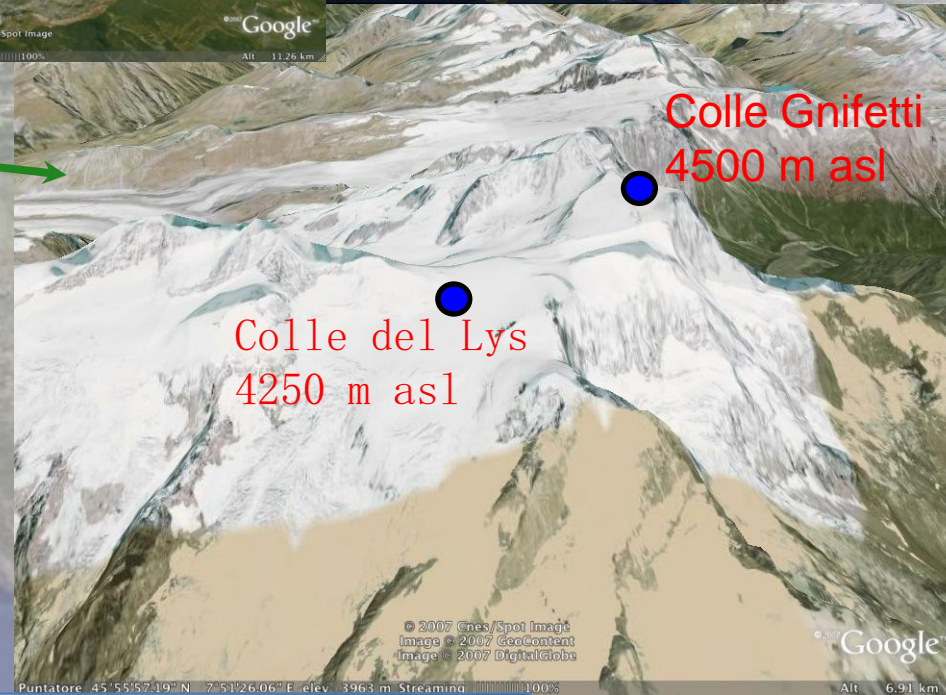
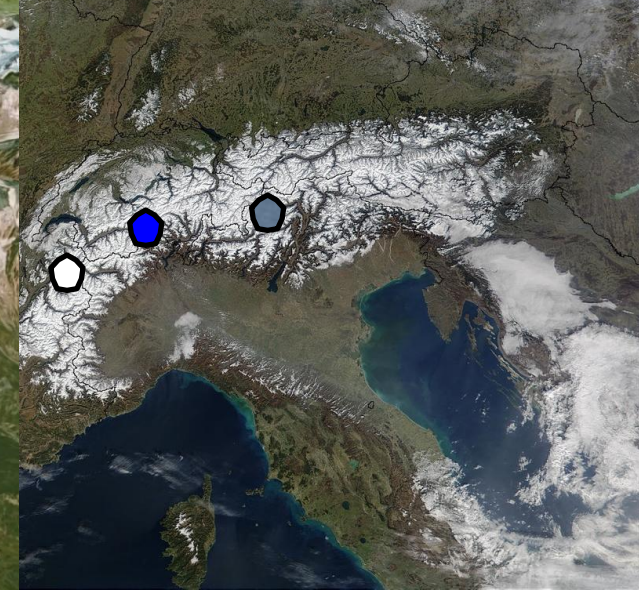
Alpine ice

cores

• Cold glaciers are the best archive for the environmental and climatic studies.

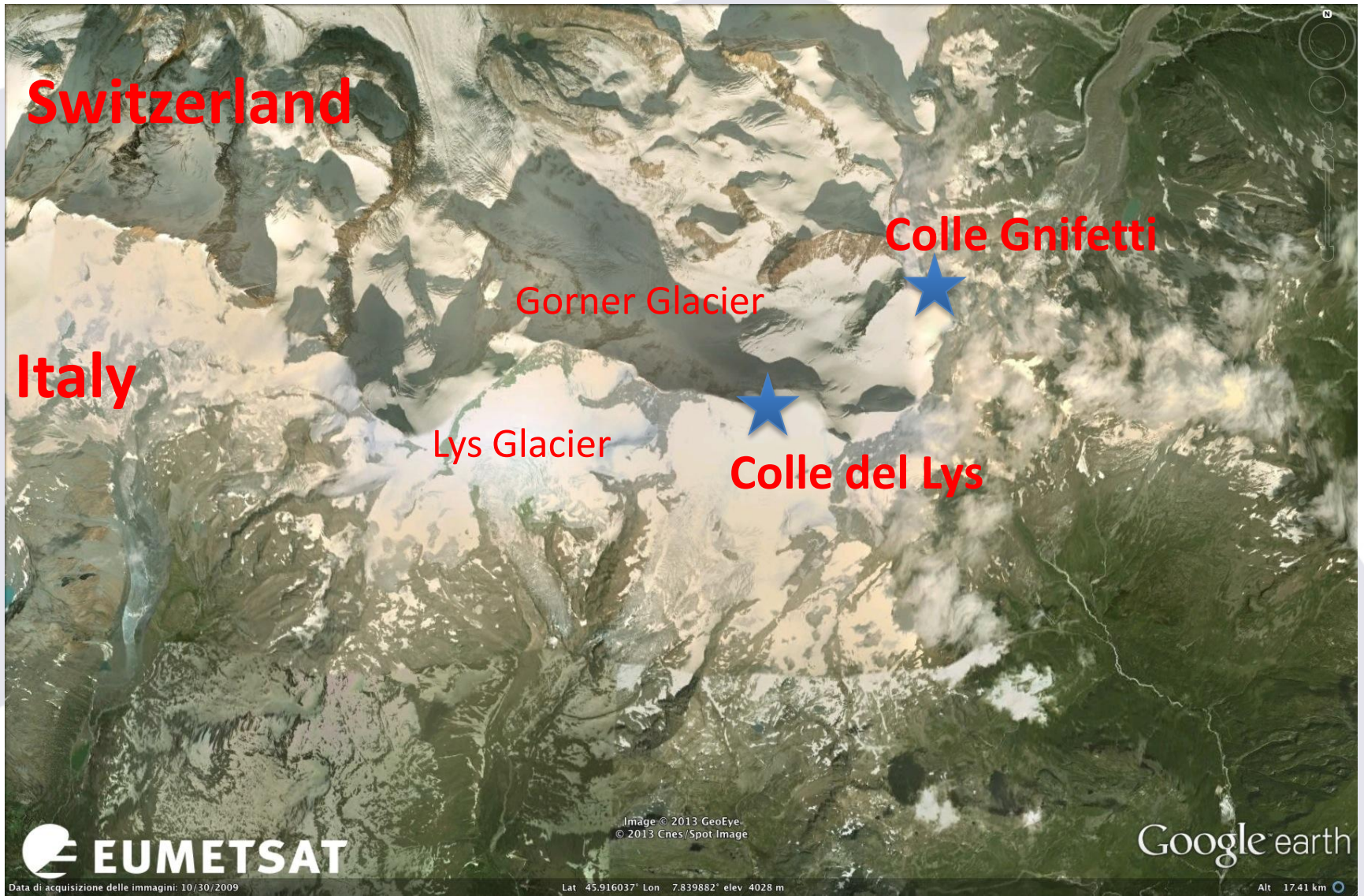
• In Italian Alps the best sites are located in the Western Alps:

- Monte Bianco Group
- Monte Rosa Group
- Ortles-Cevedale Group



The Colle del Lys, a saddle between Lys Glacier (Italy) and Gorner Glacier (Switzerland) at 4250 m asl.

MAAT at 10 m prof. ca -11° C
MA accumulation: 1.3 m w.e.



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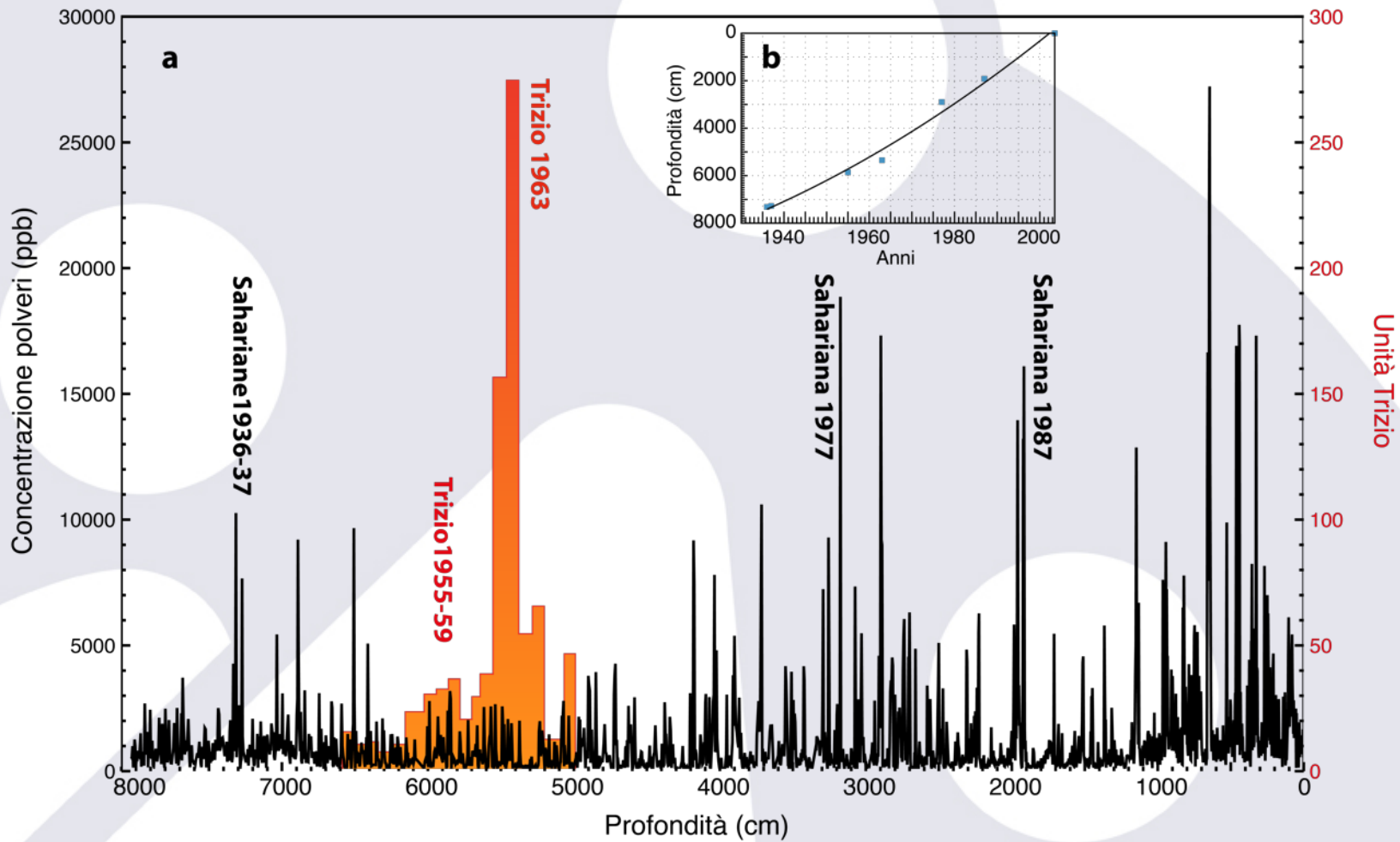
Colle del Lys ice core field camp



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Maggi et al., in prep.

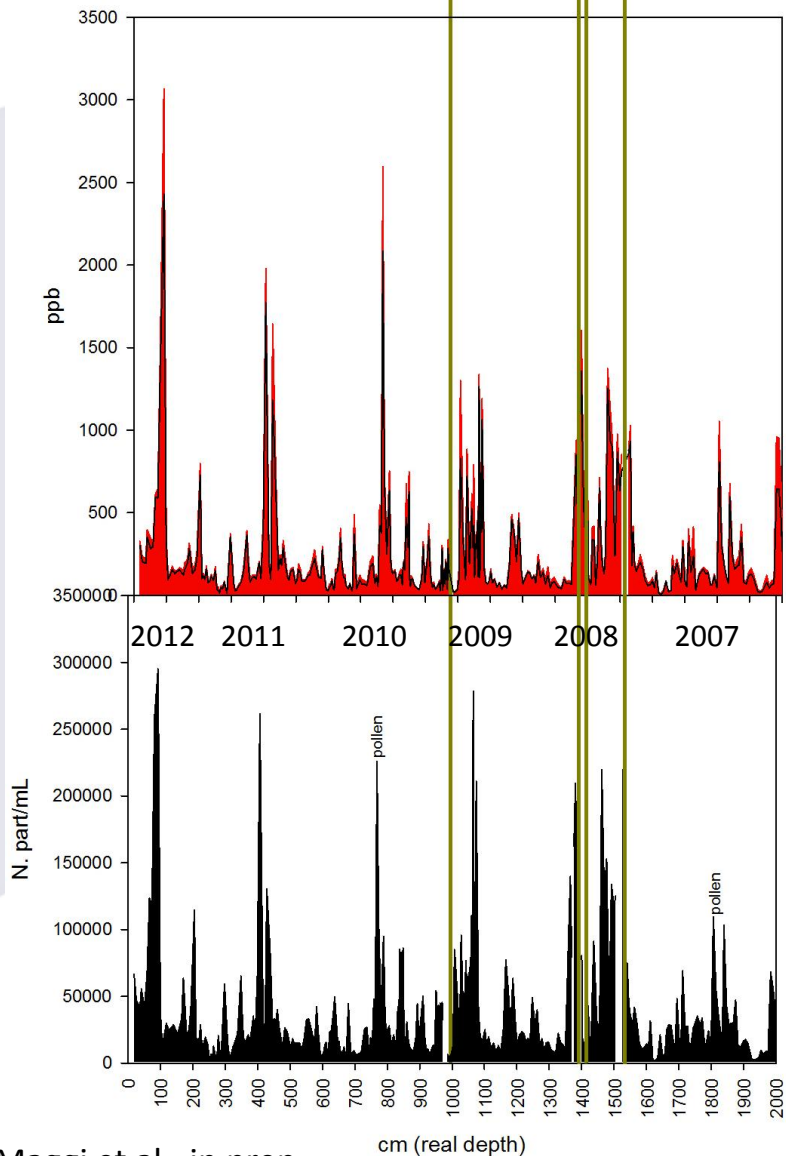


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LYS12



Maggi et al., in prep.

The upper 20 m of 2012 Colle del Lys ice core of mineral dust record.

Clearly is possible to observe the seasonality related to the opening of the planetary boundary layer during the spring-summer season with an increase of mineral dust concentration.

Large spikes, with more than 2-3 ppm, are related to transport of northern Africa (Saharian) dust that reach the Europe seasonally.

The light brown continuous lines underline visible layers in ice core, related to very high concentrated saharan dust events.



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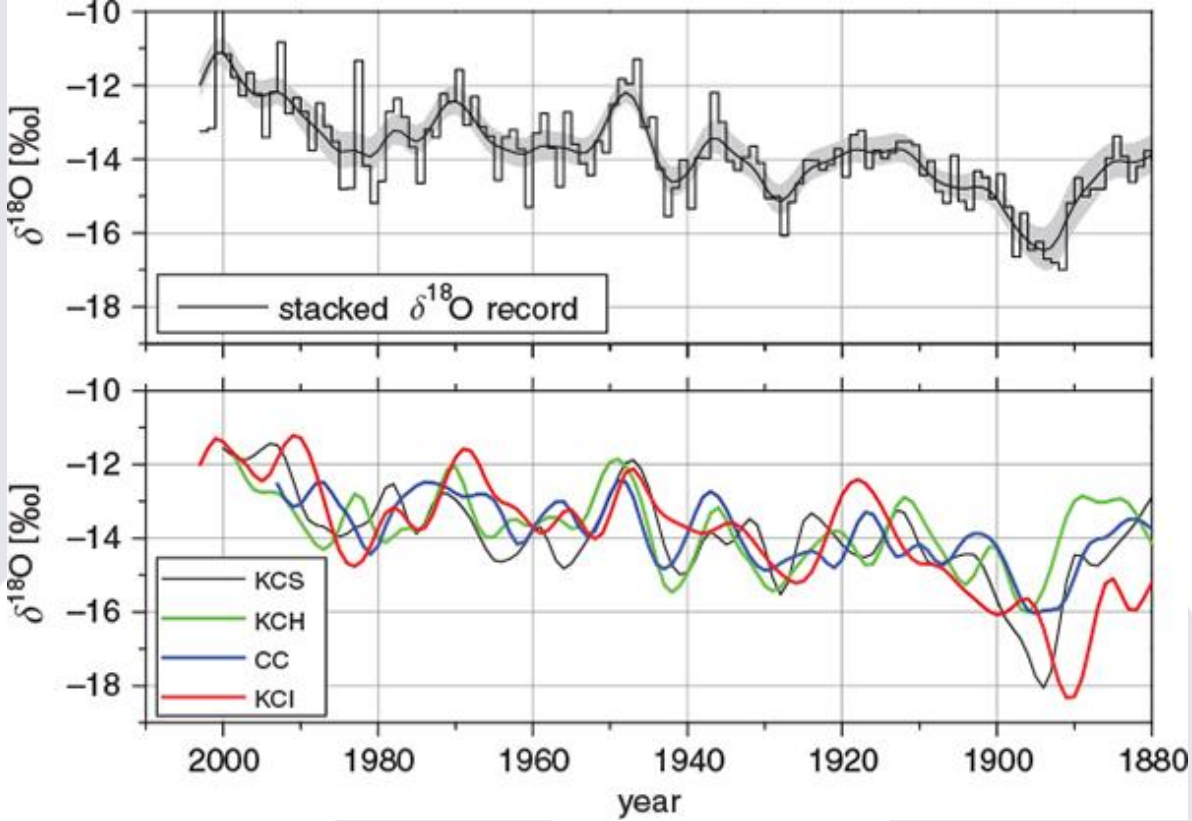


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The colle Gnifetti ice Core records covers normally more than 2 centuries of climatic history

The low accumulation do not permit to reach the seasonal resolution.

Otherwise long time records will be provide.

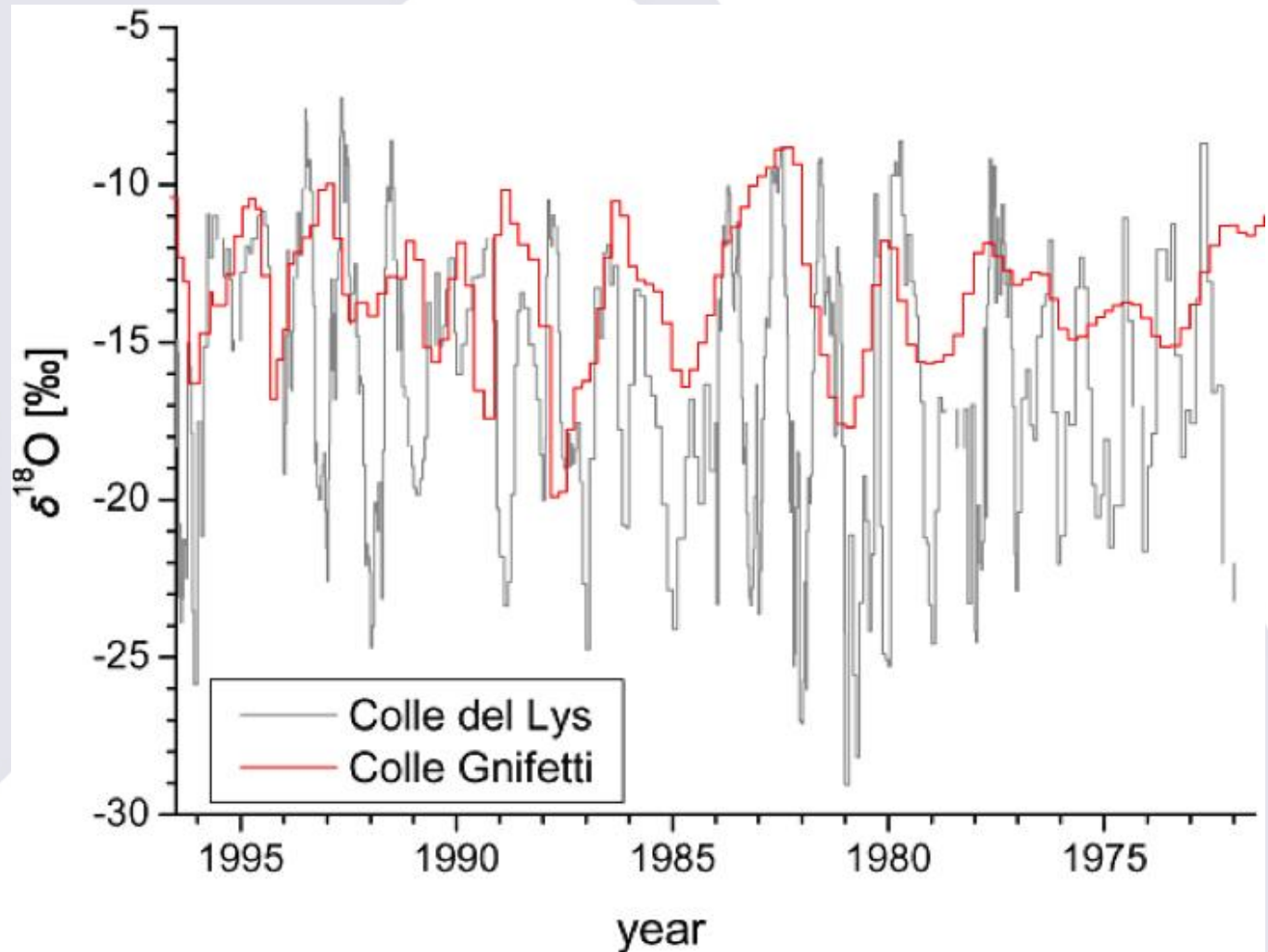


Comparison between two Monte Rosa Group ice cores

Despite the Colle del Lys and Colle Gnifetti are close (less than 1 km apart), exist a strong differences between the two sites.

High accumulation on the CdL permit seasonal resolution bur short time records (decades, centuries).

Low accumulation due to the winter wind erosion on CG, reduce the resolution but permit long tim records (centuries, millennia)



Focul Viu ice cave Monti Apuseni Romania

EXOGENOUS ICE:

- 1) Firn – accumulation of snow in cave traps
- 2) Intrusive ice – glacier ice intruded into caves

ENDOGENOUS ICE:

- 3) Drip or flowstone (congelation ice)
- 4) Lakes freezing
- 5) Sublimation ice
- 6) Ice in clastic sediments

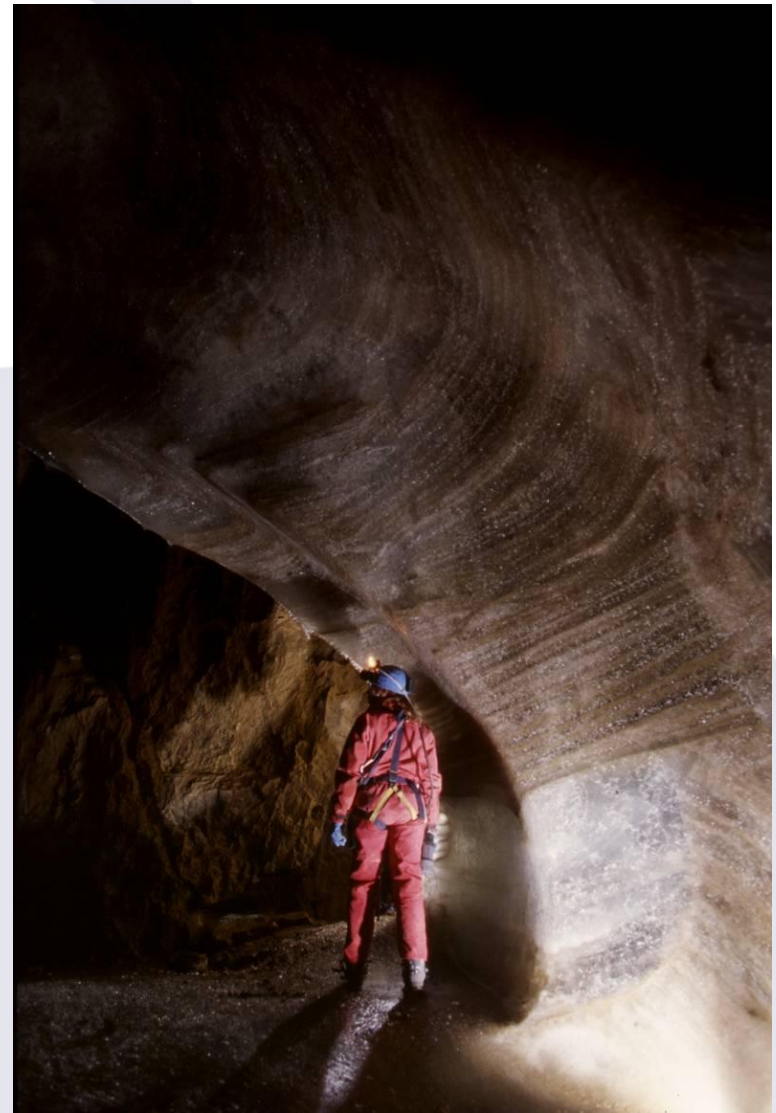
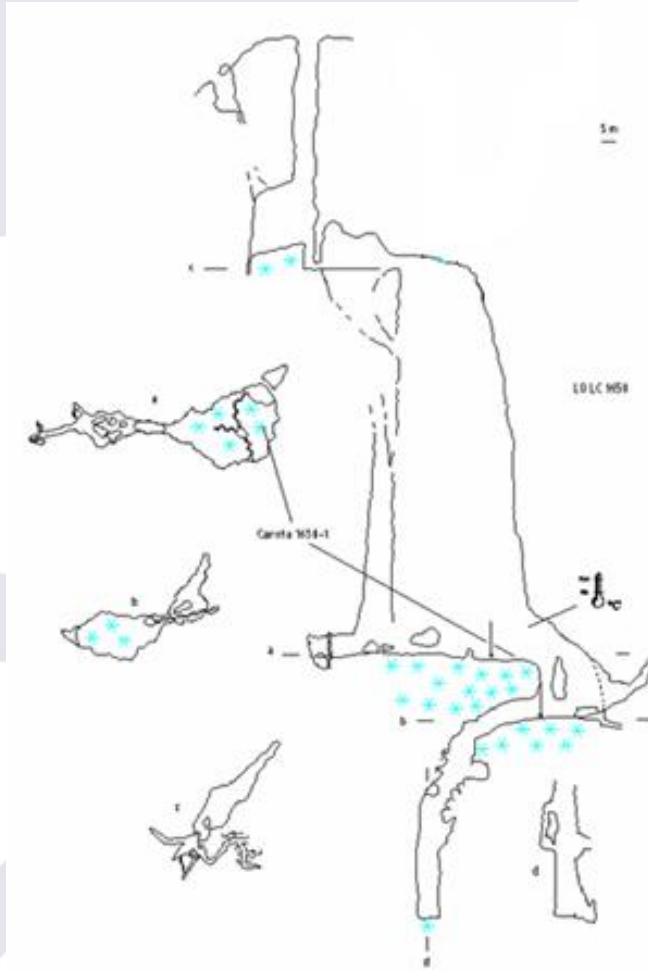


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LOLC1650 ice cave in Moncodeno, Grigna Settentrionale, Lecco



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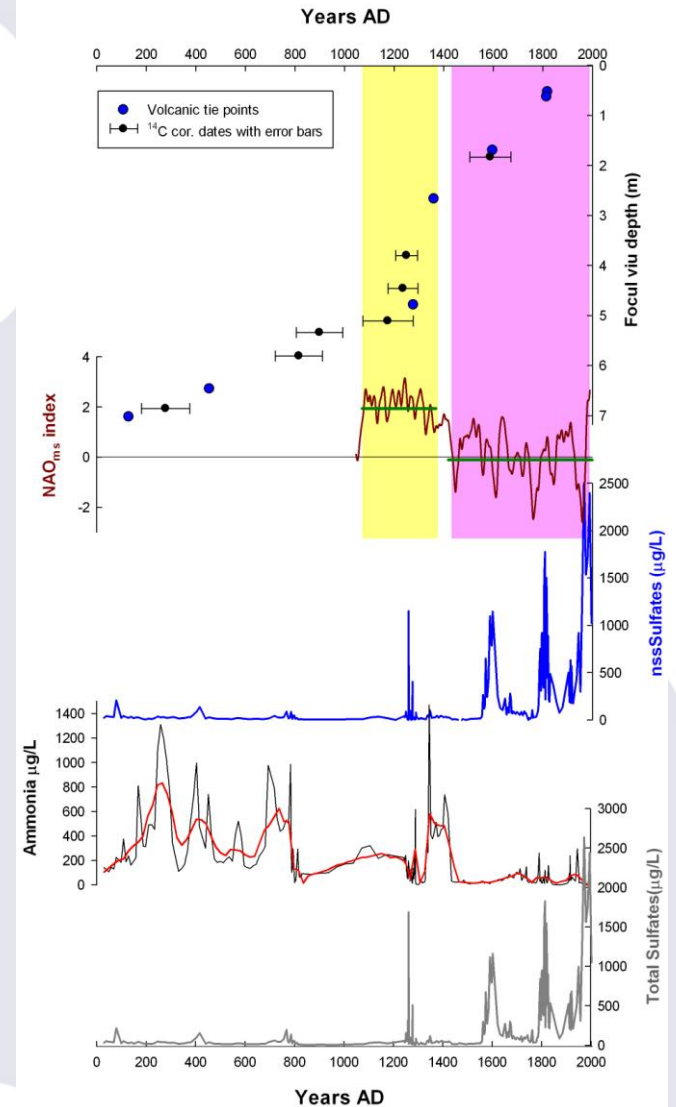
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Focul Viu ice core

The differences in accumulation rate can be related to a differences in snowfalls amount between Middle-Age, 80 cm/century, and Renaissance to Modern ages (LIA), 19 cm/century.

Total Sulfates and nss-Sulfates permit to evaluate the industrial impact from the XIX century. Before that both the signals are flat with only volcanic spikes.

The Ammonia, normally related to biomass burning, indicate an important phases during the Roman and Post-Roman periods, were the forest was more expanded and a decrease from the lower Middle Age when the deforestation will start. The lack in historical information create some difficult in term of data interpretation.



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Thank You!



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