

RESEARCH FIELD:

Geophysics

RESEARCH TOPIC:

Speleothem magnetism

PARTICIPANTS AND COLLABORATIONS:

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RESEARCH DESCRIPTION:

The research began in 2012 investigating a speleothem (flowstone) from Rio Martino cave (Western Alps). The high quality preliminary results show the reliability of speleothem as archive for investigating the ambient geomagnetic field and its relationships to paleosecular variation and paleoenvironment.

Continuous, precisely dated (500 to 9500 a, dated by U-Th in the Rio Martino case), high resolution magnetic remanence data help to answer some main questions on the fine-scale temporal evolution of submillennial to centennial events of the geomagnetic field, such as geomagnetic and archeomagnetic jerks and geomagnetic intensity spikes (Fig. 1).

Rock-magnetic measurements allow the quantification of relative concentration and grain-size of magnetic minerals, tracking the environmental processes that control the sediment-magnetic record. They have the potential of yielding high resolution reconstructions of regional and local climatic and pedogenetic histories. The magnetic record, moreover, can be directly compared to temperature and precipitation reconstructions based on isotopic and trace elements compositions from the same specimens.

Last but not least a sound investigation of the magnetic remanence and magnetic susceptibility, included their anisotropies, is expected to yield a robust model of the remanence acquisition process in flowstones.

The research units of Torino and Urbino work on magnetic measurements, the Pisa unit on geochronology, isotopic compositions and trace elements.

LABORATORIES OF THE DST IN USE:

Rock preparation laboratory
Alpine Laboratory of Paleomagnetism (Peveragno)

RESEARCH PRODUCTS:

Lanci, L., Zanella, E., 2015. The anisotropy of magnetic susceptibility of uniaxial superparamagnetic particles: Consequences for its interpretation in magnetite and maghemite bearing rocks. *Journal of Geophysical Research Solid Earth*, 120, doi:10.1002/2015JB012255

Zanella, E., Regattieri, E., Zanchetta, G., Isola, I., Tema, E., Lanci, L., (2015). A Holocene High Resolution Geomagnetic Field Record from Rio Martino Cave (Western Alps, Northern Italy). *AGU Joint Assembly, Montreal, Canada, 3-7 May 2015*.

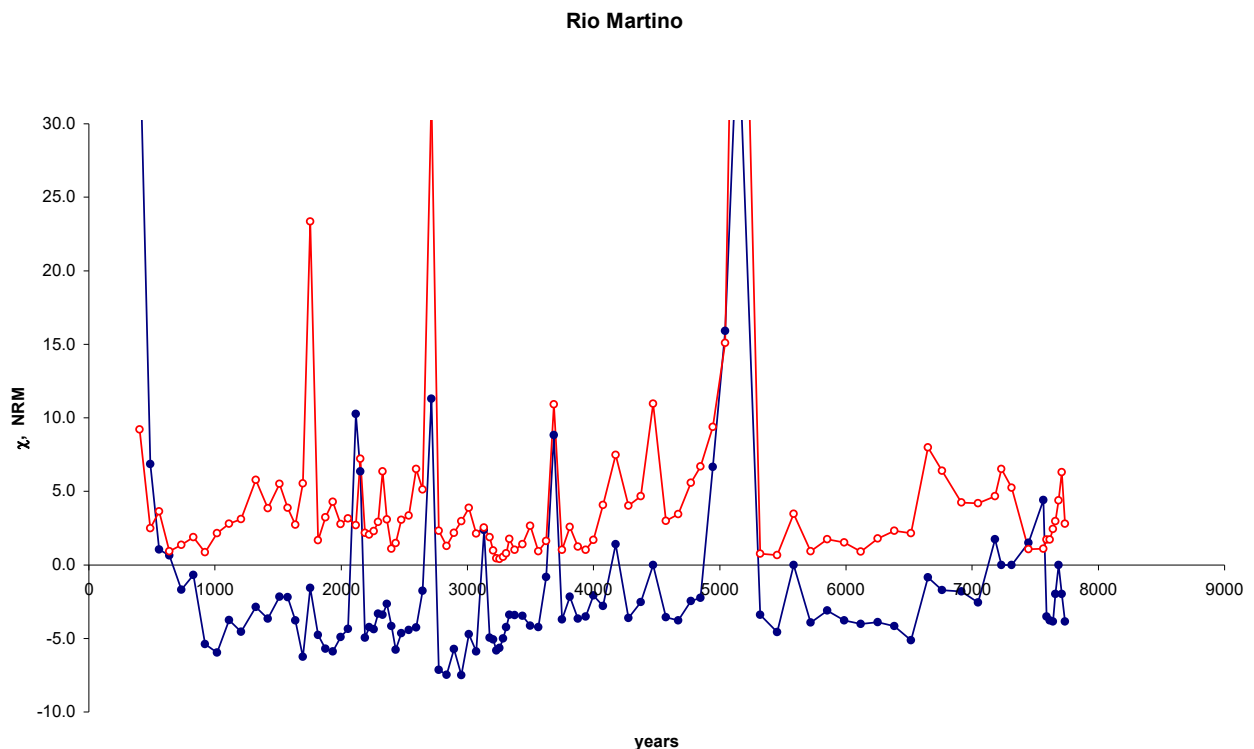


Fig. 1. Variation of the mass-normalized magnetic susceptibility χ ($\times 10^{-9} \text{ m}^3\text{kg}^{-1}$, in blue) and natural remanent magnetization intensity, NRM ($\times 10^{-6} \text{ Am}^2\text{kg}^{-1}$, in red) as a function of the age of the speleothem of Rio Martino

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