# Paleoenvironmental evidence from sedimentological and palynologic data of the late Quaternary cave-fills in the Buca dell'Onice (Massa, Italy)

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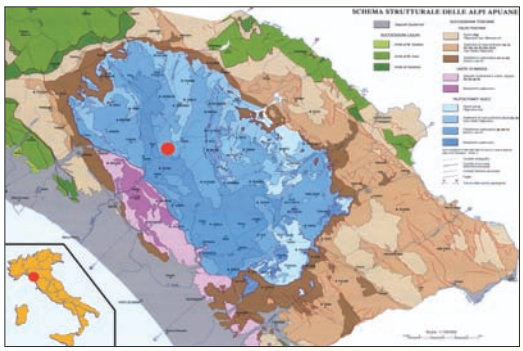
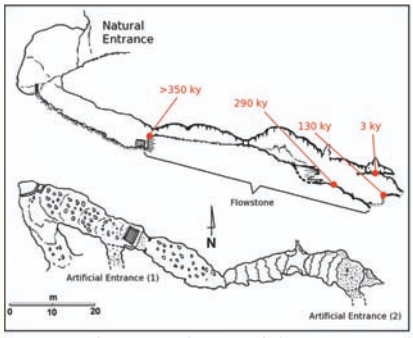


Schematic map of Apuane Alps and cave location (Carmignani et al., 2000)

**Buca dell'Onice** is a small cave located in the Frigido river basin (Alpi Apuane, Massa) at an elevation of 570 m a.s.l..

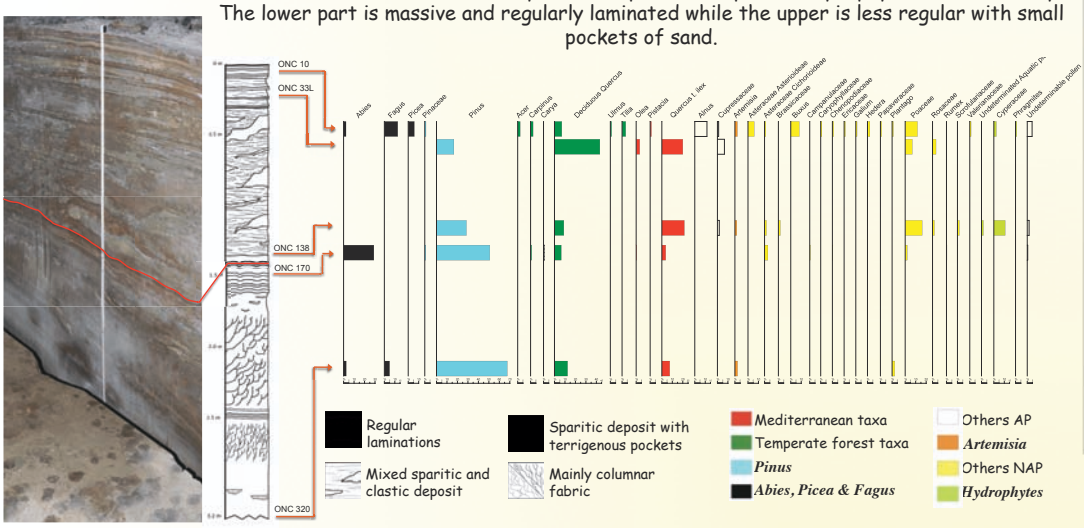
Inside the cave a flowstone more than 3m thick is well exposed. A small stalagmite above flowstone was dated at 290 (+85/-55) ka, whereas the top of the flowstone is older than 350 ka.

In the lower part the flowstone is buried by a 5-6 m thick deposit of carbonate silt and sand, divided in two deposition cycles by a calcite crust dated at 120±10 (Piccini **et al.**, 2003).




Planimetry and section of the cave (Gr. Speleologico Fiorentino, 1966)

The flowstone is divided in two cycles of deposition, separated by a physical discontinuity. The lower part is massive and regularly laminated while the upper is less regular with small pockets of sand.



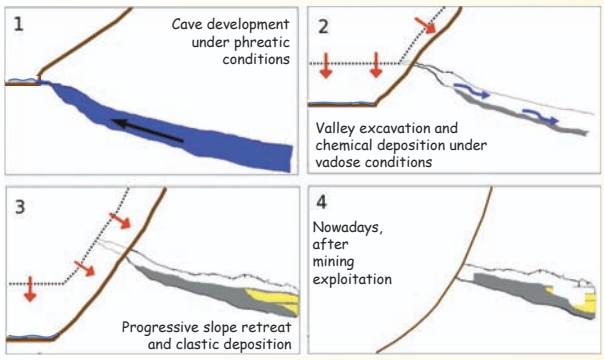

The clastic deposit of the cave (carbonate silt and sand)

Flowstone and clastic deposits were sampled for pollen analysis (12 samples). The three clastic samples were barren in palynomorphs. On the contrary pollen diagrams of flowstone samples are shown above.

Arboreal taxa, such as ***Pinus, Abies, Fagus, Quercus ilex*** and deciduous ***Quercus***, dominate the assemblage whereas herbaceous plants, represented mainly by ***Poaceae***, are subordinate.

The pollen record shows that the physical discontinuity lies between the beginning of a glacial phase (increase of ***Abies*** related to a decrease of temperature but still humid conditions) and the start of the interglacial cycle (increase of ***Quercus ilex-coccifera*** attesting an increase of temperature). Because of the hiatus, pollen record lacks the glacial acme phase (minimum values of temperature and humidity) and in fact no expansion of open vegetation has been observed.

In conclusion preliminary sedimentological and palynological results allow to point out some paleoenvironmental evidences from these late Quaternary cave-fills:




- Hypothesis of cave evolution is inferred by sedimentological data. The transition from mainly chemical (2) to mainly clastic deposit is probably the result of the reduction of the infiltration feeding (3), due to the progressive erosion of the rock volume over the cave, which was formed as a phreatic, water filled tube at the base level (1) and then uplifted at 400 m above the present river bed (4).
- The analysis of vegetational assemblages permits to evidence some climatic changes (glacial/interglacial cycle) during flowstone deposition.
- In particular deposition of flowstone doesn't seem documented during glacial acme phases. Such glacial condition probably induced a stop in the water feeding of the cave and in the flowstone deposition, or a change from over-saturated to unsaturated waters, as usually happens when the soil is removed from the epikarst during a cold stage.

Such results promote high resolution pollen analyses, integrated with geochemical and petrographic studies and new datings, in order to better precise the environmental and climatic history of this late Quaternary cave

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GR. SPELEOLOGICO FIORENTINO (DONATI S., SALVATICI L., UTILI F.) (1966) - **Rilievo della grotta Buca dell'Onice di M. Girello (MS)**. Catasto Grotte Reg. Toscana, N 334/T.

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