EGU2020-140, updated on 16 Jan 2023
https://doi.org/10.5194/egusphere-egu2020-140
EGU General Assembly 2020

A long continuous palaeoclimate-palaeoenvironmental record of the last glacial period from southern Italy and implications for the coexistence of Anatomically Modern Humans and Neanderthals

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Western Mediterranean speleothem palaeoclimate records covering the entire Last Glacial period are extremely rare and discontinuous, because the progressive aridity and temperature decrease inhibited continuous carbonate deposition (Budsky et al., 2019; Perez-Mejias et al., 2019). This lack of high-resolution archives impedes a better understanding of key issues regarding the Late Quaternary, such as: 1) The spatio-temporal teleconnection between the northern latitudes and the Western Mediterranean area during the expansion/contraction of ice sheets related to DO cyclicity and AMOC changes; and 2) the palaeoclimate and palaeoenvironmental conditions during the scarcely known MIS 3, when the first Anatomically Modern Humans arrived on the Italian peninsula about 45.5 ka (Benazzi et al., 2011), sharing the territory with the already settled Neanderthals until the disappearance of the latter around 42 ka.

We present a well-dated continuous stalagmite record from Pozzo Cucù cave (southern Italy, Apulia) spanning from 106.0 $^{+2.8}/_{-2.7}$ to 26.6 $^{+0.8}/_{-0.9}$ ka, with an average uncertainty of less than 1 ka. The age model is based on 27 U-Th dates and about 2600 $\delta^{18}O$ and $\delta^{13}C$ analyses were performed at an average resolution of about 40 years. $\delta^{18}O$ and $\delta^{13}C$ are interpreted as rainfall and soil bioproductivity indicators, respectively, although moisture source possibly had a role in modulating $\delta^{18}O$. The $\delta^{18}O$-$\delta^{13}C$ timeseries is the first western Mediterranean speleothem record duplicating the Greenland ice core record (NGRIP) for MIS 5 to 3, and showing a striking resemblance for most of the DO cycles, especially from DO 22 to DO 16 and from DO 11 to DO 4. Discrepancies exist too, especially during the early MIS 3. Interestingly, the speleothem does not show evidence of many of the most severe climate events affecting the northern latitudes (e.g. Heinrich events). This calls for a re-evaluation of the role of the northern high latitudes in triggering major cooling/drying events across the Mediterranean region.

The oldest remains of Anatomically Modern Humans in Europe were found in Apulia (about 45.5

ka), and Neanderthals are known to have existed there at least until 42 ka. Thus, our new record provides a palaeoclimate-palaeoenvironmental background for the arrival of Anatomically Modern Humans in southern Europe, their coexistence with the Neanderthals, and the disappearance of the latter, which marks one of the most important biocultural transitions in human history (Wolf et al., 2018).

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