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Pollen-inferred quantitative reconstruction of the Holocene climate in the central Mediterranean area (Italy)

O. Peyron (1), M. Magny (1), N. Combourieu-nebout (2), S. Goring (3), S. Joannin (4), J.-L. de Beaulieu (5), E. Brugapaglia (6), I. Dormoy (1), R. Drescher-schneider (7), D. Galop (8), E. Ortu (1), and L. Sadori (9)

(1) university of Franche-Comté, UMR CNRS 6249, Chrono-Environnment lab., Besançon, France (Odile.Peyron@Univ-FComte.fr), (2) LSCE, UMR 1572 CEA-CNRS-UVSQ, 91198 Gif-sur-Yvette, France, (3) Simon Fraser University, 8888 University Drive, Burnaby, British Columbia, V5A 1S6, Canada, (4) Université Lyon 1, UMR 5276 LGLTPE, Lyon, France, (5) IMEP, CNRS-UMR 6116, Université Paul Cézanne, 13545 Aix-en-Provence, France, (6) D.di Scienze Animali, Vegetali e dell'Ambiente, Univ. degli Studi del Molise, Campobasso, Italy, (7) Schillingsdorfer Straße 27, 8010 Kainbach bei Graz, Austria, (8) UMR 5602 CNRS – Université de Toulouse II, 5, 31058 Toulouse, France , (9) Dipartimento di Biologia Ambientale, Università di Roma, Piazzale Aldo Moro 5, Roma, Italy

The Mediterranean area is particularly sensitive to short-term climate change due to its intermediate position between the higher-latitude and lower-latitude climate systems. Consequently, future climate change can be expected to be particularly strong in this region and will likely have a strong impact on terrestrial ecosystems. Therefore a growing interest has been focused on the climate study of the last 15,000 years in the Mediterranean area.
This study presents new pollen-based climate reconstructions of Holocene precipitation and temperature for four high-resolution pollen sequences from north to south of Italy:
- Lake Ledro, Northern Italy (Magny et al., 2009; Joannin et al, in prep),
- Lake Accesa, central-Italy (Magny et al., 2007; Drescher-Schneider et al., 2007; Vannière et al., 2008; Peyron et al., 2011)
- Trifoglietti, Southern Italy (Joannin et al., in prep)
- Pergusa, Sicily (Sadori and Narcisi, 2001; Magny et al., 2011)
We aim to reconstruct quantitatively the climate changes in central Mediterranean during the Holocene and distinguish the patterns, trends and main changes along a latitudinal gradient. We also aim to test the reconstruction of the precipitation seasonality which can be validated by independent proxies obtained for same records, i.e. lake-levels, charcoal/fires (Magny et al., 2011; Vannière et al., 2011).
To provide the climatic reconstruction, we use both the Modern Analogues Technique (MAT), and the recent Non-Metric Multidimensional Scaling/Generalized Additive Model method (NMDS/GAM) developed by Goring et al. (2009).
Reconstructed annual and winter precipitations show a Holocene optimum at 9000-6000 cal BP for all sites, and an aridification trend starting around 4500 cal BP. The summer signal is different, underlining different patterns from North to South. Summer temperatures were cool during the Early Holocene and show a trend consistent with previous results for Southern Europe (Davis and Brewer, 2009).

In order to test the reliability of the reconstructed climate, we have compared the results with (1) pollen-inferred climate in the Mediterranean basin reconstructed from marine pollen cores, (2) recent GCMs climate simulations.