

[Home](#)[Online Library CP](#)[Recent Final Revised Papers](#)[Volumes and Issues](#)[Special Issues](#)[Library Search](#)[Title and Author Search](#)[Online Library CPD](#)[Alerts & RSS Feeds](#)[General Information](#)[Submission](#)[Review](#)[Production](#)[Subscription](#)[Comment on a Paper](#)Impact
Factor
2.542ISI
indexed[Volumes and Issues](#) [Contents of Issue 4](#) [Special Issue](#)

Clim. Past, 5, 571-583, 2009

www.clim-past.net/5/571/2009/

© Author(s) 2009. This work is distributed under the Creative Commons Attribution 3.0 License.

A few prospective ideas on climate reconstruction: from a statistical single proxy approach towards a multi-proxy and dynamical approach

J. Guiot^{1,2}, H. B. Wu³, V. Garreta¹, C. Hatté⁴, and M. Magny⁵¹CEREGE, CNRS/Aix-Marseille Université UMR 6635, BP 80, 13545 Aix-en-Provence cedex, France²ECCOREV, CNRS/Aix-Marseille Université FR 3098, BP 80, 13545 Aix-en-Provence cedex, France³Institut des Sciences de l'Environnement, UQAM, Montréal PQ, H3C 3P8, Canada⁴LSCE, CNRS/CEA UMR 1572, Domaine du CNRS, 91198 Gif-sur-Yvette, France⁵CNRS, UMR 6249, Laboratoire Chrono-Environnement, UFR des Sciences et Techniques, 16 Route de Gray, 25030 Besançon, France

Abstract. Important progresses have been made in palaeoclimatological studies by using statistical methods. But they are in somewhere limited as they take the present as an absolute reference. This is particularly true for the modern analogue technique. The availability of mechanistic models to simulate the proxies measured in the sediment cores gives now the possibility to relax this constraint. In particular, vegetation models provide outputs comparable to pollen data (assuming that there is a relationship between plant productivity and pollen counts). The input of such models is, among others, climate. The idea behind palaeoclimatological reconstructions is then to obtain inputs, given outputs. This procedure, called model inversion, can be achieved with appropriate algorithms in the frame of the Bayesian statistical theory. But we have chosen to present it in an intuitive way, avoiding the mathematics behind it. Starting from a relative simple application, based on an equilibrium BIOME3 model with a single proxy (pollen), the approach has evolved into two directions: (1) by using several proxies measured on the same core (e.g. lake-level status and $\delta^{13}\text{C}$) when they are related to a component of the vegetation, and (2) by using a more complex vegetation model, the dynamic vegetation model LPJ-GUESS. Examples presented (most of them being already published) concern Last Glacial Maximum in Europe and Africa, Holocene in a site of the Swiss Jura, an Eemian site in France. The main results are that: (1) pollen alone is not able to provide exhaustive information on precipitation, (2) assuming past CO_2 equivalent to modern one may induce biases in climate reconstruction, (3) vegetation models seem to be too much constrained by temperature relative to precipitation in temperate regions. This paper attempts to organise some recent ideas in the palaeoclimatological reconstruction domain and to propose prospectives in that effervescent domain.

[Final Revised Paper](#) (PDF, 3219 KB) [Discussion Paper](#) (CPD)

Citation: Guiot, J., Wu, H. B., Garreta, V., Hatté, C., and Magny, M.: A few prospective ideas on climate reconstruction: from a statistical single proxy approach towards a multi-proxy and dynamical approach, *Clim. Past*, 5, 571-583, 2009. [Bibtex](#) [EndNote](#) [Reference Manager](#)

[Search CP](#)Library Search [»»](#)Author Search [»»](#)[News](#)

- [Two Editors of Climate of the Past among EGU 2009 medalists](#)
- [Publications by EGU Medalists](#)
- [Online textbook in climatology available](#)
- [TWO editors of Climate of the Past funded by ERC](#)

[Recent Papers](#)

01 | CP, 01 Dec 2009:
Pollen-based biome reconstructions for Latin America at 0, 6000 and 18 000 radiocarbon years ago

02 | CP, 27 Nov 2009:
Corrigendum to Preface "Climate change: from the geological past to the uncertain future – a symposium honouring André Berger" published in *Clim. Past*, 5, 707–711, 2009

03 | CPD, 27 Nov 2009:
Mountain uplift and the threshold for sustained Northern Hemisphere

