



# Morocco



National Contact: Brahim Damnati  
Abdelmalek Essaadi University; b\_damnati@yahoo.fr

Morocco is the eastern-most country in the Mediterranean basin, extending from 28°N to 36°N latitude and from 2°W to 12°W longitude. Located in the very northwest of Africa, Morocco is bordered to the north by the Strait of Gibraltar and the Mediterranean Sea, to the south by Mauritania, to the east by Algeria and to the west by the Atlantic Ocean. Climatically, the country lies between the Mediterranean climatic belt and the Saharan subtropical desert, with high mountain ranges introducing an altitudinal climatic gradient that overlies the latitudinal gradient. Recent paleoclimatic reconstructions in Morocco are based on studies of the regional prehistory, of dunes and paleodunes, of paleosoils and other Quaternary deposits, and of the marine sediments cored along the Moroccan coast.

### National Science Highlight:

Changes in climate and vegetation in Morocco during the Holocene are well documented through studies of diatoms, sedimentology, geochemistry and pollen analysis (Lamb et al., 1995, 1999). Quantitative climate reconstructions from the pollen record of Lake Ifrah indicate that winter temperatures during the Last Glacial Maximum were lower than present by ~10-12°C. The annual rainfall during the same period did not exceed 400 mm/yr compared to modern values of ~800 - 900 mm/yr. Sediment cores from Lake Tigalmamine (Fig. 1) provided a 10,000 year old record, which indicated that very wet climatic conditions existed in this region between 9600 and 8000 yr BP. Conversely, relatively dry conditions occurred between 2500 and the present day (Fig. 2).

Cheddadi, R., et al., 2004: Climate changes since the last glacial maximum in Morocco and predicted impact on the Mediterranean ecosystems. In: Leroy S. and Costa P. (Eds) *Environmental catastrophes in Mauritania, the desert and the coast*, Atar, Mauritania, 39-43.  
Lamb, H., et al., 1995 : Relation between century-scale Holocene arid intervals in tropical and temperate zones, *Nature*, **373**: 134-137.  
Lamb, H., et al., 1999: *Journal of Paleolimnology*, **21**: 325-343.

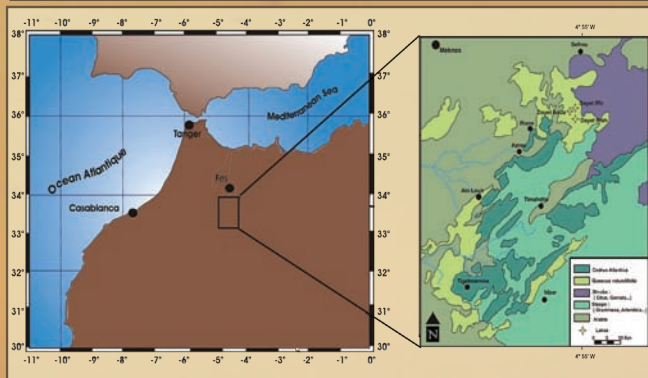


Figure 1: Location of lake core sites.

### Research Institutions:

- Institut National de Recherche Agronomique: [www.inra.org.ma](http://www.inra.org.ma)
- Institut National de Recherche Halieutique: [www.inrh.org.ma](http://www.inrh.org.ma)
- Centre National de la Recherche Scientifique et Technique: [www.cnr.ac.ma](http://www.cnr.ac.ma)
- Ministere de la Recherche: [www.minrecherche.gove.ma](http://www.minrecherche.gove.ma)
- Ministere de la sante: [www.sante.gov.ma](http://www.sante.gov.ma)
- Centre National d'Énergie, Sciences et Techniques Nucleaires: [www.cnesten.org.ma](http://www.cnesten.org.ma)
- Centre Royal de Teledetection Spatiale: [www.crts.gov.ma/](http://www.crts.gov.ma/)

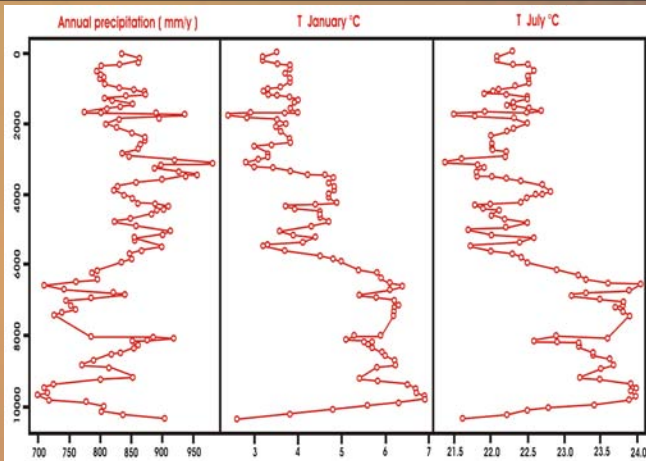


Figure 2: Climate reconstruction from Lake Tigalmamine

### Funding Agencies:

- [www.foundation.org.ma](http://www.foundation.org.ma)
- French-Moroccan cooperation: [www.egide.asso.fr](http://www.egide.asso.fr)
- French-Moroccan cooperation, French Embassy, Rabat: [www.ambafrance-ma.org](http://www.ambafrance-ma.org)
- Islamic Education, Scientific and Cultural Organisation, Rabat: [www.isesco.org.ma](http://www.isesco.org.ma)
- United Nation Educational, Scientific and Cultural Organisation, Moroccan Office: [www.unesco.ma](http://www.unesco.ma)