# Response of biomarkers to abrupt climatic changes during the last 25,000 years in Western Europe

NINA DAVTIAN[1]*, GUILLEMETTE MÉNOT[2], YOANN FAGAULT[1] AND EDOUARD BARD[1]

[1]CEREGE, Aix-Marseille Université, CNRS, IRD, INRA, Collège de France, Technopôle de l'Arbois, BP 80, 13545 Aix-en-Provence, France (*correspondence: davtian@cerege.fr, fagault@cerege.fr, bard@cerege.fr)

[2]LGL-TPE – Laboratoire de Géologie de Lyon, Terre, Planètes, Environnement, Ecole Normale Supérieure de Lyon, Université Claude Bernard Lyon 1, 69007 Lyon, France (guillemette.menot@ens-lyon.fr)

The Quaternary Period is characterized by the superimposition of climatic variations at the orbital (glacial and interglacial periods) and millennial (abrupt climatic events) time scales. Major fluctuations in global temperatures and ice volume occurred during this period, causing sea level changes of about 100 m at the orbital time scale. However, continuous and high-temporal resolution records derived from natural archives are particularly rare in Western Europe. Here, archaeal and bacterial lipids (tetraethers) are studied in two adjacent sediment cores from the Gulf of Lions over the last 25,000 years. The study site was chosen for its relatively small water depth (presently 300 m) and high accumulation rates during glacial periods (about 1 m/kyr). Following recent analytical developments, one of the two cores was analyzed with two UPLC BEH HILIC columns which offers better separation of individual tetraethers than the conventional single Cyano column method. This setting allows to assess the reliability of the derived indices depending on tetraether separation quality. By evaluating the new records in the context of previously published studies, the response of tetraethers to changes in marine and continental temperatures, to soil pH and to terrigenous inputs was assessed.

The responses observed for the last deglaciation and two abrupt climatic events (H1 and H2) demonstrate the difficulty or even the impossibility of using most of the tetraether-based indices as originally conceived to reconstruct environmental parameters. Some of these complications are related to the sedimentary context of the study site, which is highly dependent on the sea level. Therefore, tetraether-based reconstructions are subject to numerous biases, which have to be carefully assessed. Noteworthy, tetraether-based indices are still in their infancy and the associated biological producers remain poorly known. This study thus represents an opportunity to better understand the genesis of tetraether-based signals in a paleo-prodelta context.