



## **Abrupt climate changes during the last millennium: evidence from high resolution sea ice reconstructions.**

**G. Massé (1), S. Belt (1), M.-A. Sicre (2) and S. Rowland (1)**

(1) SEOES, University of Plymouth, UK.

(2) LSCE, CNRS, France.

Polar sea ice, by its influence on the heat exchanges between the oceans and the atmosphere and its contributions to oceanic processes is a key component of the Earth's climate system. It is therefore essential to improve our knowledge of historical sea ice fluctuations, at a high spatial and temporal resolution, in order to refine future climate change models and improve predictions.

Recent investigations have demonstrated the potential of a C<sub>25</sub> mono-unsaturated Highly Branched Isoprenoid alkene (IP<sub>25</sub>) as a proxy of sea-ice cover in the Arctic (with a novel).

In this study, we have performed a detailed analysis of a sediment core (MD99-2275) collected from the North Icelandic Shelf. The very high sedimentation rates together with well documented occurrences of volcanic tephtras have enabled us to document sea ice cover at an unprecedented sub-decadal resolution and to make comparisons with historical data of the past sea ice extending back to the early days of Icelandic colonization (ca. 1080 BP). We demonstrate strong correlations between documented sea ice occurrences and the IP<sub>25</sub> proxy and provide new sea ice data for periods where historical sources are scarce or absent. We have also compared IP<sub>25</sub> data with diatom-based sea surface temperature reconstructions, confirming that the Icelandic climate was relatively mild, and that little sea ice occurred in the region from 800 to 1300 AD, corresponding to the end of the Warm Mediaeval Period (MWP). In contrast, both reconstructed sea ice and sea surface temperatures show that the climatic conditions around northern Iceland worsened during the second part of the millennium with

cooler sea surface temperatures and larger amounts of sea ice. More detailed correlations exist throughout the entire record, and also provide evidence for a succession of abrupt climate changes in Iceland during the latter part of the record, corresponding to the Little Ice Age (LIA, 1300-1900 AD). Finally, our sea ice record also shows strong correlations with hemispheric-scale temperature reconstructions, indicating that climatic conditions over Iceland were representative for at least the last millennium.