High-resolution multi-molecular records from North Atlantic drift sediments (ODP Sites 980, 984) reflecting Late Quaternary/Holocene climate and ocean dynamics

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The North Atlantic plays an important role as the source region for northern component waters of thermohaline circulation. The hydrological system is highly sensitive to climatic changes. Underlying drift sediments record both, changes in the hydrological system (lateral advection) and in 'direct' material input from surface waters (primary production and eolian supply), and therefore represent excellent archives for past ocean and regional climate variability. The composition of the organic matter (OM) in these sediments is closely coupled to the dynamics of the environment.

Two sediment cores from North Atlantic drift sediments were taken during ODP Leg 162 (Site 980, Feni Drift and Site 984, Bjørn Drift). Both sites exhibit exceptionally high sedimentation rates and thus enable reconstruction of climate-related changes within the North Atlantic with high temporal resolution (< 100 years for Holocene sections).

This study seeks evidence for rapid climate changes through development of multi-molecular records of the sedimentary OM using GC and GC-TOF-MS analysis of total lipid extracts (fatty acids, *n*-alcohols, *n*-alkanes, alkenones as marine and terrigenous biomarkers), elemental analysis (C_{org}, $CaCO_3$, N_{tot}), and stable isotopes ($^{13}C_{org}$, $^{15}N_{tot}$).

Marine biomarker fluxes document past changes in marine productivity depending essentially on nutrient supply and surface water temperature. Variations in the degree of saturation of alkenones ($U^{K}_{37}{}'$) are used to reconstruct varying sea surface temperatures (SST). Vascular plant lipids, transported and deposited over the oceans as aerosols or via bottom currents, are interpreted in terms of eolian or advective terrigenous OM fluxes. Grain size analysis detects changes in bottom current speed and thus in lateral sediment transport. Finally, we compare ^{14}C AMS ages of bulk OM and plankton-derived alkenones to those of planktonic foraminifera in order to examine current-driven OM redistribution and lateral advection.