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Lipid biomarkers in surface sediments from the Gulf of Genoa (Ligurian Sea) and their potential for palaeo-environmental reconstructions

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A series of molecular organic markers were determined in surface sediments from the Gulf of Genoa (Ligurian Sea) in order to evaluate their potential for palaeo-environmental reconstructions. The interest for the Gulf of Genoa lies in its contrasting coastal and central areas in terms of terrestrial input, oligotrophy, primary production and surface temperature gradient. Moreover, the Gulf of Genoa contains a large potential for climate reconstruction as it is one of the four major Mediterranean centres for cyclogenesis and the ultra high sedimentation rates on the shelf make this area suitable for high resolution environmental reconstruction. Initial results from sediment cores in the coastal area indeed reveal the potential for Holocene environmental reconstruction on up to decadal timescales (see Poster "Reconstruction of late Holocene flooding events in the Gulf of Genoa, Ligurian Sea" by Lamy et al.).

During R/V Poseidon cruise P413 (May 2011), ca. 60 sediment cores were taken along the Ligurian shelf, continental slope, and in the basin between off Livorno and the French border. Results based on surface sediments suggest that some biomarker-based proxies are well-suited to reconstruct sea surface temperature (SST), the input of terrestrial organic material (TOM), and marine primary productivity (PP). The estimated UK'37 SST reflects very closely the autumnal mean satellite-based SST distribution, while TEXH86 SSTs correspond to summer SST at offshore sites and to winter SST for the nearshore sites. Using both SST proxies together may thus allow reconstructing past seasonality changes. Proxies for TOM input (terrestrial n-alkane and n-alkanol concentrations, BIT index) have higher values close to the major river mouths and decrease offshore suggesting that these may be used as proxy for the variability in TOM input by runoff. Interestingly, high n-alkane average chain length in the most offshore sites may result from aeolian input from northern Africa. Finally, high concentrations of crenarchaeol and isoprenoid GDGTs in the open basin illustrate the preference of Thaumarchaeota for oligotrophic waters. This study represents a major prerequisite for the future application of lipid biomarkers on sediment cores from the Gulf of Genoa.