Geophysical Research Abstracts,
Vol. 10, EGU2008-A-06284, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-06284
EGU General Assembly 2008

Calibrating the response of Mediterranean sedimentation to interdecadal climate variability by high resolution scanning of recent laminated sediments

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Finely laminated, ^{210}Pb-dated sediments from the Atalante basin provide an archive of interdecadal variability in Eastern Mediterranean sedimentation over the last two centuries. Time series of sediment composition and density are generated from high resolution μXRF and laser ablation ICP-MS scanning of embedded sediment blocks. These are then compared with the instrumental record of dominant regional winter and summer climatic modes, and with time series of specific climatic phenomena such as precipitation in the Sahel region, dust transport from the Sahara, and sea surface temperature (SST) in the Eastern Mediterranean. Interpretation of deeper sections of the archive is thus calibrated by reference to the instrumental era.

We show that variability in sedimentary 'marine biogenic' versus 'terrestrial' elemental composition correlates on interdecadal timescales with an Alpine ice core record of dust transport from the Sahara to Southern Europe, implying a summer-dust transport (rather than winter-productivity) signal in composition of the aggregated sediment ballast. The magnitude of Saharan dust transport is in turn related to interdecadal rainfall anomalies in the Sahel, and by extension to SST anomalies in the tropical Atlantic and the Eastern Mediterranean itself.