



Winter temperature and productivity in the Gulf of Taranto (Italy) and their possible relation to solar forcing

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To assess the extent and nature of human-induced climate change, we need to understand natural climate variability. This heavily relies on proxy-based climate reconstructions, calling for excellent understanding of the conditions represented by the proxies. Here we report on an alkenone-based (UK'37) sea surface temperature (SST) proxy record originating from south Italian marine sediments, and covering 1305 AD to 1975 AD with a 3.87 years resolution. On the basis of comparison with historical and satellite-derived climate and productivity data we conclude that UK'37 reflects mainly winter SST and is modified by variation in magnitude of winter alkenone production and timing of peak production on the seasonal temperature cycle. Comparison of the UK'37 record with the record of atmospheric radiocarbon activity curve, a proxy for solar energy variability shows a high correlation ($r^2 = 0.82$) for the period before human interference with the ^{14}C record by combustion of fossil carbon and the release of radioactive isotopes by nuclear tests. This suggests a strong centennial-scale solar forcing. We propose that wind-induced mixing resulting from Mediterranean climate dynamics plays a crucial role in translating solar activity to alkenone productivity and winter SST.