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Past environmental/climatic changes in the northern part of the South China Sea, input from multi-proxy analysis of core MD12-3432

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In the South China Sea, the magnetic component of marine sediment is a powerful recorder of paleoenvironmental changes linked to the regional and global climate. Based on the knowledge of the sedimentary signature of the potential sources for terrigenous sediments, the composition of marine sediments can be used to decipher the different mechanisms, forcing, and transport vectors.
We report here the analysis of the magnetic properties combined with sortable silt and clay mineralogy of a ∼51 m long sedimentary sequence retrieved from the northern South China Sea and covering the last 400 ka. Magnetic minerals with different coercivities (magnetite, pyrrhotite and hematite) are mixed in the sequence and their relative concentration varies with time.
Glacial low sea-levels reduce the land-site distance and they are illlustrated by higher concentrations in magnetites and iron-sulfides (pyrrhotite) related to the sediments previously deposited on the continental shelf and re-worked by the river. This is accompanied by increasing kaolinite content within the clay assemblage (Pearl River signature) and by coarser grains.
Superimposed to this eccentricity periodicity, hematite content and smectite/(illite+chlorite) ratio present a predominant precession periodicity synchronous with the northern hemisphere summer insolation changes and therefore with that of the East Asian summer monsoon. Events of high hematite content, in phase with finer grains, coincide with precession lows, while smectite/(illite+chlorite) ratio is maximum during precession highs.
Knowing that smectite is mainly produced by contemporaneous chemical weathering intensity in Luzon, we use the smectite/(illite+chlorite) ratio as a tracer for increasing weathering rate in Luzon, in turn related to enhanced East Asian summer monsoon. Hematite is not produced in large amount on adjacent lands and its association with fine sediment grains suggests that its periodic supply is related to the eolian dust transported from the Central China deserts to the studied site. Higher hematite content at this latitude may therefore be used as a tracer for weak East Asian summer monsoon intensity.