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Late Quarternary turbidite activity in the Dakar Canyon: frequency and climate control

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Numerous canyons and channel-systems are known along the continental margin off NW-Africa and act as natural conduit for sediment transport into the deep sea. The Dakar Canyon off Senegal, a deeply incised (up to 500m) non-meandering canyon, extends from the shelf break in SW direction over 120km and run out into the deep-sea basin at water depth around 4200m. During a cruise with the RV Meteor (M65/2) in July 2005, the bathymetry and seismic structure of Dakar Canyon was mapped using hydroacoustic and seismic refection data. A number of gravity cores directly from the canyon axis and the adjacent levees were recovered in order to reconstruct sediment dynamics in the vicinity of the canyon. The sedimentary record displays hemipelagites intercalate with closely spaced turbidite beds at certain intervals. Most of these are several cm thick sandy to fine silty turbidites, easily distinguishable by visual core description and X-ray radiographies. Stratigraphy of the three invested cores based on the ∂^{18}O and accelerator mass spectrometry (AMS) radiocarbon dates for GeoB9612-3. All other cores (GeoB9614-1, GeoB9615-1) were excellent correlatable by their very typical total reflectance patterns.

On the basis of these age model we provide a “stacked” turbidite record of turbidite frequencies in the Dakar Canyon. Higher turbidite activity is recorded around Terminations I and II, linked to the eustatic sea-level rises. During Termination I the highest frequency of turbidites is observed during the interval of Meltwater Pulse 1a when sea-level rose rapidly. Few turbidite events do not correlate with the major climate transitions and thus can not be explained by increasing sediment instability during rising sea-level. However these turbidites are appear to be time equivalent with Heinrich Events in the North Atlantic. During theses rapid climate fluctuations probably a higher dust supply due to increased aridity and dust storm activity in the southernmost

Sahara may be from the continent to the adjacent shelf and ocean occurred. A short term reduction of the vegetation cover in the Sahel zone and savanne and an extension of the Sahara may provide a considerable additional source for this dust. Alternatively, increase of wind strength may be responsible for the extension of the dust plumes over the study area.

In conclusion, since the Late Quaternary the highest frequency in turbidite activity in the Dakar Canyon is clearly confined to the isotopic terminations, they appear to have been triggered by increased sediment mobilisation during early sea-level rise. In addition to this, episodic turbidite events related to Heinrich Events could be explained by a second mechanism, e.g. increased aridity in the hinterland and stronger dust storms during these periods.