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Organic geochemical evidence for Eastern Mediterranean/North African paleoclimate and Nile River discharge changes during the last 26 kyrs

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In this study, multiple organic-geochemical proxies are examined from sediment core GeoB 7702-3 located off the Nile River to investigate the paleo-environmental history of the North Africa/Eastern Mediterranean region during the past 26 kyrs. Situated at the interference of tropical and mid-latitude climate systems, this location is highly sensitive to climatic disturbances originating either in tropical or high latitudes. Sea-surface temperatures (SSTs) were reconstructed using both the TEX86 and alkenone paleo-thermometers. Both SST records exhibit similar glacial-interglacial trends and only show significant deviations during millennial-scale events, such as Heinrich Event 1 (H1) and deposition of sapropel S1. The recently developed Branched vs. Isoprenoid Tetraether (BIT) index, differentiating between marine and terrestrial inputs of glycerol-dialkyl-glycerol-tetraethers (GDGTs), closely tracks changes in bulk C/N ratios. Except for the interval of S1 deposition, contributions of marine-derived GDGTs were generally low, suggesting that observed variations were mainly driven by soil discharge changes. Higher terrestrial organic inputs are noted for the last Glacial and the Younger Dryas (YD), whereas soil contributions during H1 and the Holocene were low. Apparently thus, soil organic matter discharge by the Nile was not primarily related to freshwater runoff, which should have been lowest when the sources of both the Blue and White Nile were severely reduced or desiccated, such as during the last Glacial. Reconstruction of soil temperatures using the newly-developed MBT

proxy suggests air temperature changes of more than 8 degC. High air temperatures are suggested for the Early to Mid-Holocene, while lower air temperature estimates are reconstructed for the Glacial and the Late Holocene. However, also for H1 and the YD relatively high air temperature estimates are found, indicating source area changes of Nile-transported soil organic matter.