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Climate-controlled multidecadal variability in North African dust transport to the Mediterranean

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High-resolution laser ablation–inductively coupled plasma–mass spectroscopy scanning of resin-embedded laminated sediments is used to detail variability in the composition and magnitude of recent eolian dust deposition in the Eastern Mediterranean. The composition of dust accumulating in the anoxic Atalante basin varies in response to the strength of the summer blocking mode of Mediterranean climate. Dust sources located upwind on the westerly airflow are favored during phases of weaker blocking (hence stronger summer westerlies). This mode is in turn correlated to the pronounced multidecadal oscillation in Mediterranean sea-surface temperature (related to the Atlantic Multidecadal Oscillation), suggesting that coupled ocean-atmosphere dynamics control the large-scale transport of dust in the region. Variable precipitation in dust source regions may also exert an influence on the relative flux of dust from each source, and hence the net composition of dust deposited in the basin. Persistent oscillations in the composition of deeper sediments indicate that the basin offers a high-potential archive for reconstruction of climate-controlled variability in dust transport prior to the instrumental era.