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Mid-Pleistocene changes in sedimentation patterns of the Nordic seas region

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Sediment core data from a site in the central Nordic seas suggest that during the Mid-Pleistocene Revolution (MPR) this region has experienced a systematic change in its overall oceanographic and climatic conditions. First distinct changes occur around 1 Ma and reveal the beginning of a shift in climate periodicity from stronger 41-ka cycles towards a dominant 100-ka cyclicity. Most pronounced are the changes at the study region between about 700 ka and 420 ka, when parallel to the evolution of large 100-ka cycles a distinct decrease in the input of magnetic particles is observed. Also, for this interval an intensification of glacial conditions is indicated by a marked increase in the accumulation rates of ice-rafted debris (IRD) during marine isotope stages 16 and 12. The observed mid-Pleistocene changes were likely due to a gradual shift from a more zonal behavior of the coupled ocean-atmosphere system at high northern latitudes prior to the MPR to more meridionality thereafter, a shift that affected both the patterns of ocean circulation and ice drift in the Nordic seas region. Accordingly, the subsequent MPR-related changes of these two climate parameters should be responsible for the decrease in the concentration of magnetic particles at the study site after 700 ka. With the mid-Pleistocene strengthening of the Nordic heat pump the mode of deep-water production and the flow of bottom currents changed at high northern latitudes, which led to an increased export of magnetic particles from basaltic source regions around Greenland and Iceland into the subpolar North Atlantic. Consequently, less magnetic material was deposited in the Nordic seas than before the MPR when

water mass exchange between the Nordic seas and the North Atlantic was more restricted. In addition, the large Late Pleistocene expansions of glacial ice caps on the eastern margin of the Nordic seas led to a major change in the composition of IRD material in the study area, with more material originating from the Scandinavian and Barents Sea shelf regions, which ultimately caused a dilution of the magnetic signal.