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Holocene instabilities in GIN sea overflows based on mineralogical and Nd/Pb isotopic sedimentary records

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Grain size measurements, clay mineral assemblages, Nd and Pb isotope compositions of fine fractions from core MD99-2322 from the Irminger Basin (67˚8'N, 30˚50'W, 714 mbsf) are used to document relative contributions from the proximal Denmark Strait (Denmark Strait Overflow Water, DSOW) and distal overflows from the Iceland-Faroe-Scotland sill (North East Atlantic Deep Water, NEADW) to deep current transport during the Holocene. Sortable silts indicate instability in current velocity, especially between 7000 and 2500 yr. cal. BP. Since 7000 yr. cal. BP., lower smectite/illite ratio records higher illite-rich supplies, probably from proximal Greenland. On an isotopic Pb and Sm/Nd mixing diagram, i) Mid-Atlantic Ridge basalts (MAR), ii) Greenland Panafrican Crust (GPC) and iii) European Panafrican Crust (EPC) sources represent the major end-members. Most Nd-Pb signatures are explained by a mixing of the three end-members. According to previous investigation, GPC constitutes the isotopic fingerprint of DSOW, EPC of NEADW. From 7000 years BP onwards, we note an increase of the GPC attributed to a gradual contribution of the DSOW within

the deep circulation. A few "isotopic excursions” occur in addition. Those pulses are made by a sharp increase of GPC contribution ($\sim$70%), with no EPC contribution. These pulses are observed in phase with Bond’s Holocene ice-export events in the NE Atlantic: they indicate a total collapse of NEADW production. During the last 2500 yr cal. BP, relative GPC contribution reaches 40%. It can be concluded that since 2500 yr cal BP DSOW represents the major northern deep water source within NADW. Therefore establishment of modern oceanic deep circulation occurs during the Late Holocene. Our data highlight a close relation between Holocene climate variability and deep oceanic circulation.