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Millennial-scale changes in abyssal mud wave migration at the Bahama Outer Ridge during the last 40000 years: implications for the variability of the Deep Western Boundary Current

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An extensive field of fine-grained sediment waves is located in a water depth of about 4750 m at the western flank of the Bahama Outer Ridge (BOR). These abyssal mud waves developed under the influence of the Deep Western Boundary Current (DWBC) and subbottom profiles show that the waves migrated with time. Models show that enhanced upcurrent wave migration is expected as bottom flow speed increases because currents on the downcurrent flank approach the critical shear stress for deposition before those on the upcurrent flank. If individual sediment layers can be dated and followed across a wave it is thus possible to infer the current regime history. The degree of wave migration can be expressed as the ratio of sedimentation rates (SRR) on the downstream to upstream sides. Here we present a millennial-scale resolution SRR record for ODP Site 1062 (Leg 172) where eight holes were drilled into both flanks and the crest of a selected mud wave at the base of the BOR. High resolution (2-cm interval) measurements of chemical element intensities (Ca, Ti, Fe) obtained with an X-ray fluorescence scanner allow a detailed correlation of layers between the upstream and downstream wave flanks and the wave crest. Furthermore Ti/Ca ratios show strong similarities with Greenland ice core records and were used to construct high resolution age models that are in agreement with an AMS-^{14}C chronology for a nearby piston core. The resulting SRR record indicates fast upcurrent wave migration for each Heinrich event in the studied interval, which implies an intensified bottom current that was likely caused by a stronger flow of Antarctic Bottom Water during times of weak North Atlantic Deep Water production.