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Modelling changes in ice-rafted debris sources through Heinrich Event 2 and Heinrich Event 1 on the NW European continental slope using environmental magnetic, radiogenic isotope and X-ray diffraction analysis of marine sediments.

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The composition of marine sediment cores on the NW European continental slope has been examined using environmental magnetic analyses. The data suggest three magnetic end-members can be identified associated with particular sources of ice-rafted debris (IRD). These compositional behaviours are confirmed by Nd and Pb isotope analysis, and X-ray diffraction of end-member samples and suggest that both British ice-sheet (BIS) and Laurentide ice-sheet (LIS) IRD are present. The third end-member represents a background of ambient marine sedimentation. On the basis of the end-members identified, a sediment source unmixing model is constructed using the magnetic properties of the core samples. The model output suggests that IRD demonstrating typical LIS magnetic properties only occur over limited timespans (300-800 years) representing Heinrich Event 2 (H2) and H1. The timing of the supply of BIS IRD suggests that this source may be driven by processes other than those triggering the IRD supply from the LIS. While the relationship between IRD deposition and ice-sheet dynamics is a complex one, the semi-quantitative estimates of BIS IRD productivity obtained by unmixing models based upon high temporal resolution environmental magnetic analysis may provide useful insights into the development of the BIS through the last glacial maximum.