EVIDENCE FOR SURFACE WATER WARMING IN THE IRD-BELT DURING HEINRICH EVENTS

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The Heinrich Events of the last glacial cycle are among the most dramatic examples of millennial-scale climate variability [Heinrich, 1988]. During these events the North Atlantic was filled with melting icebergs, which together with the associated melt water pulse lead to severe cooling in the region and a shutdown of meridional overturning circulation [e.g., Bond *et al.*, 1992; McManus *et al.*, 2004]. On the other hand, in the South and tropical North Atlantic Heinrich Events have been suggested to be associated with warming, leading to a thermal bipolar seesaw pattern [e.g., Broecker, 1998; Stocker and Johnsen, 2003]. So far the evidence for a warming of surface waters during Heinrich Events has been limited to a few locations and finding evidence has been complicated by difficulties in accurately correlating inter-hemispheric millennial-scale climate variability. The northward extent of warming surface waters into the North Atlantic therefore remains poorly constrained.

Here we report preliminary results from two sediment cores from within the IRD-belt of the North Atlantic located between 40 and 50 ºN. At both open ocean sites, the Heinrich Events were identified based on the presence of IRD. However, while these IRD-events at the northerly site correspond to surface cooling, at the southerly site the most recent Heinrich Events are associated with a rapid warming of surface waters, possibly as a result of a change in northward transport due to the shutdown in meridional overturning circulation. The presence of IRD leaves no doubt about the simultaneous timing and correlation between rapid surface water warming at the southerly site and Heinrich Events. These results thus for the first time identify a seesaw pattern in the North Atlantic between the subpolar and subtropical gyre during the Heinrich Events. This suggests that the influence of the bipolar seesaw may have been far more widespread than previously assumed, a feature at present not incorporated in climate models and provides new insights in the linkages between the high and mid-latitudes of the Northern Hemisphere.

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