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Last Interglacial δ13C variability in the North Atlantic - a model study

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The variability of δ13C in watermass can be used to infer changes in ocean circulation, watermass ventilation and changes in biological carbon pump, among others. New high resolution proxy reconstructions reveal that during the Last Interglacial (125-115ka) the variation of δ13C in the North Atlantic is not homogeneous both in space and time. Previous studies revealed that during this period the reconstructed δ13C trend was different from one sediment core site to the other (Gardar Drift IODP site U1304 vs Eirik's drift MD03-2664) highlighting the sensitivity of the watermass in these locations to modifications in the ocean circulation, ventilation, or biogeochemistry. In addition, abrupt changes of δ13C have also been clearly shown, suggesting deep and fast changes of these watermass properties over short time window. In this study, using an Earth System Model of intermediate complexity (iLOVECLIM), we analyze the changes in δ13C at these two sediment core sites by performing a set of transient simulations, with varying external forcings that could contribute to watermass property changes in the region. Under the preindustrial climate, the model reproduces fairly well the observed δ13C distribution. In our last interglacial simulations, we vary the fresh water input, which is presumed to impact the ocean circulation and ventilation, and therefore the δ13C. The fresh water is introduced in different regions for each experiment: (1) the Labrador Sea and (2) at the Ruddiman belt over the Eemian period (125ka-115ka). In addition, abrupt and fast changes of fresh water input will also be tested by performing an 8.2 event scenario.