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Climate and thermohaline circulation relationships in a glacial world: a modelling study with the IPSL model

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Numerous records show that glacial climate instabilities are not only confined to the North Atlantic and Greenland areas, but can also be found in many other places around the globe, such as in monsoon regions, the tropical Atlantic or Antarctica. These instabilities, observed far from the zones in which Heinrich and Dansgaard-Oeschger events are defined, raise the question of the relationships between climatic events observed in distant regions: are they connected? By which mechanism(s)?

We have performed three simulations of the glacial climate with different fresh water fluxes in the North Atlantic, resulting in Atlantic Meridional Overturning Circulations (AMOC) of different strengths: 18, 15 and 3 Sv (i.e. nearly off) respectively. We study the differences between the climates of these three simulations and analyse the mechanisms for these differences for several regions: around the North Atlantic (North America, Europe), in the monsoon region and in the tropical Atlantic.