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# Modelled abrupt climate change under persisted freshwater hosing

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With the use of a state-of-the-art climate model in high and coarse resolutions over the North Atlantic subpolar region, we perform hosing experiments with 0.1 Sv freshwater input over the IRD belt under LGM climate state. Both experiments are able to show a weak mode of AMOC in the beginning of the meltwater pulse. However, after 550 model years, high-resolution experiment produces an abrupt warming over the Northern Hemisphere, accompanied by an overshoot of AMOC. Such abruptness lies on the warming occurred at sub-surface sea water in the North Atlantic. This warm salty water (WSW) layer, situated beneath the colder surface freshwater, generated ocean convective available potential energy (OCAPE). At one point the accumulation of OCAPE was released abruptly into kinetic energy of thermobaric cabbeling convection, resulting in the warmer salty waters getting to the surface and subsequently surface warming. We also illustrate that only high-resolution models have potential ability to present the abrupt warming. With low resolution, no overshoot of AMOC happens, instead, a slight recovering trend is detected. Our results provide an implication for the abrupt climate changes in the past (for example the DO events and Bølling-Allerød warming) and rise our attention to the importance of resolution in simulating climate system.