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Arctic Freshwater Forcing of the Younger-Dryas Cold Reversal

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Recent analyses of the routing of freshwater runoff from the continents during the last glacial-interglacial transition (Tarasov and Peltier, Nature 435, 662-65, 2005)has suggested that the Younger-Dryas cold reversal was most probably triggered by an intense pulse of meltwater through the McKenzie River outlet into the Beaufort Sea of the Arctic Ocean. This pulse is suggested to have begun at approximately 12,800 years before presen at the time of Y-D onset and to have had a meximum intensity of approximately 0.2 Sv. We have investigated the impact of such a freshening event on the strength of the Atlantic MOC by performing a series of "water hosing experiments" using the NCAR CSM v1.4 coupled climate model. Our analyses suggest that the impact upon the strength of the MOC is essentially identical to that produced by freshening over the North Atlantic itself (Peltier et al., GRL, in press, 2006). Furthermore, the coupled model predicts an air temperature response at the Summitt, Greenland location that is in very close accord with the latest inference of the Y-D related temperature anomaly inferred on the basis of isotopic measurements from the Summit deep ice cores.