

## **An Arctic Ocean freshwater event as the trigger of the Younger Dryas stadial? Answers from Arctic deep-sea sediment cores**

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At ca. 12.8-11.5 ka the northern hemisphere climate experienced a dramatic fall-back to quasi-glacial conditions. Since the late 1980s, a major meltwater ejection to the North Atlantic through the Gulf of St. Lawrence was considered the most likely trigger for this "Younger Dryas event". It may have caused a slowdown of the Atlantic meridional overturning circulation (AMOC) and a diminished heat transport to the northern latitudes. However, field evidence from the potential meltwater route in North America has been discussed controversially in the last years, and the detection of a freshwater signal in marine sediments off the St. Lawrence river rendered difficult. More recently, the idea of an "Arctic route" of meltwater originating from proglacial lake Agassiz was put forward (Tarasov & Peltier, Nature 2005) and has gained further attraction through evidence from radiogenic isotopes (Not and Hillaire-Marcel; Nature Comm., 2012) and through modelling results of Condron and Winsor (PNAS, 2012) which showed that only a freshwater outflow through Fram Strait was capable of triggering a climate perturbation like the Younger Dryas.

Here I present a review of isotopic records from the Arctic Ocean, the Fram Strait, and the Greenland Sea in search of evidence for a strong freshwater event in the Arctic Ocean at the onset of the Younger Dryas, supporting an Arctic origin of the trigger. A number of Arctic cores show a light planktic oxygen isotope spike at 13 ka. For several of them the age model is detailed enough to exclude a confusion with other deglacial spikes. On the central Arctic Lomonosov Ridge there is even evidence for a diminished intermediate/bottom water circulation immediately following the freshwater event. On the other hand, there are many records which do not show a meltwater spike in the critical time interval, most likely because of low temporal resolution, a thick ice cover and/or a habitat change of the planktic foraminifers.

The largest uncertainty is introduced by arguable reservoir corrections which may need to be applied to radiocarbon datings from the last glacial termination. Nevertheless, since isotopic evidence for a freshwater event at ca. 13 ka is found also in the Greenland Sea, support for an "Arctic trigger" weakening the AMOC is accumulating and may add to the establishment of a new paradigm for the origin of the Younger Dryas cold event.