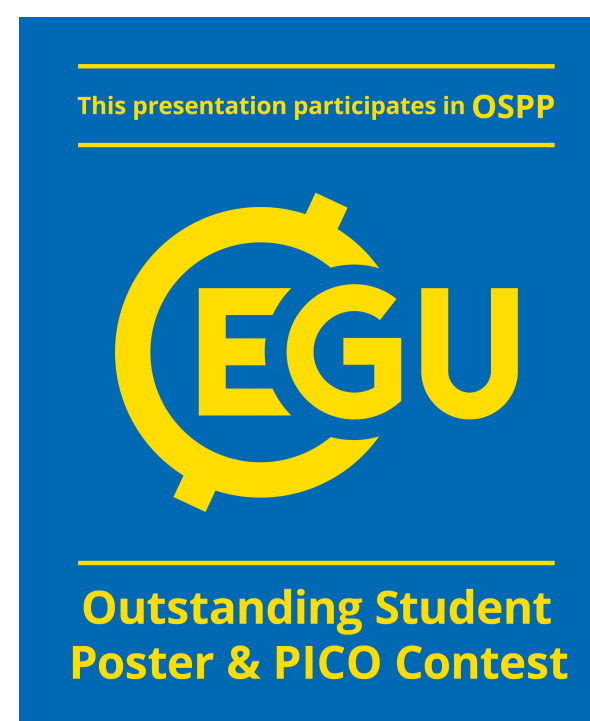


# Assessing linkages between ice sheet calving, subpolar gyre density and deep water ventilation during the last glaciation

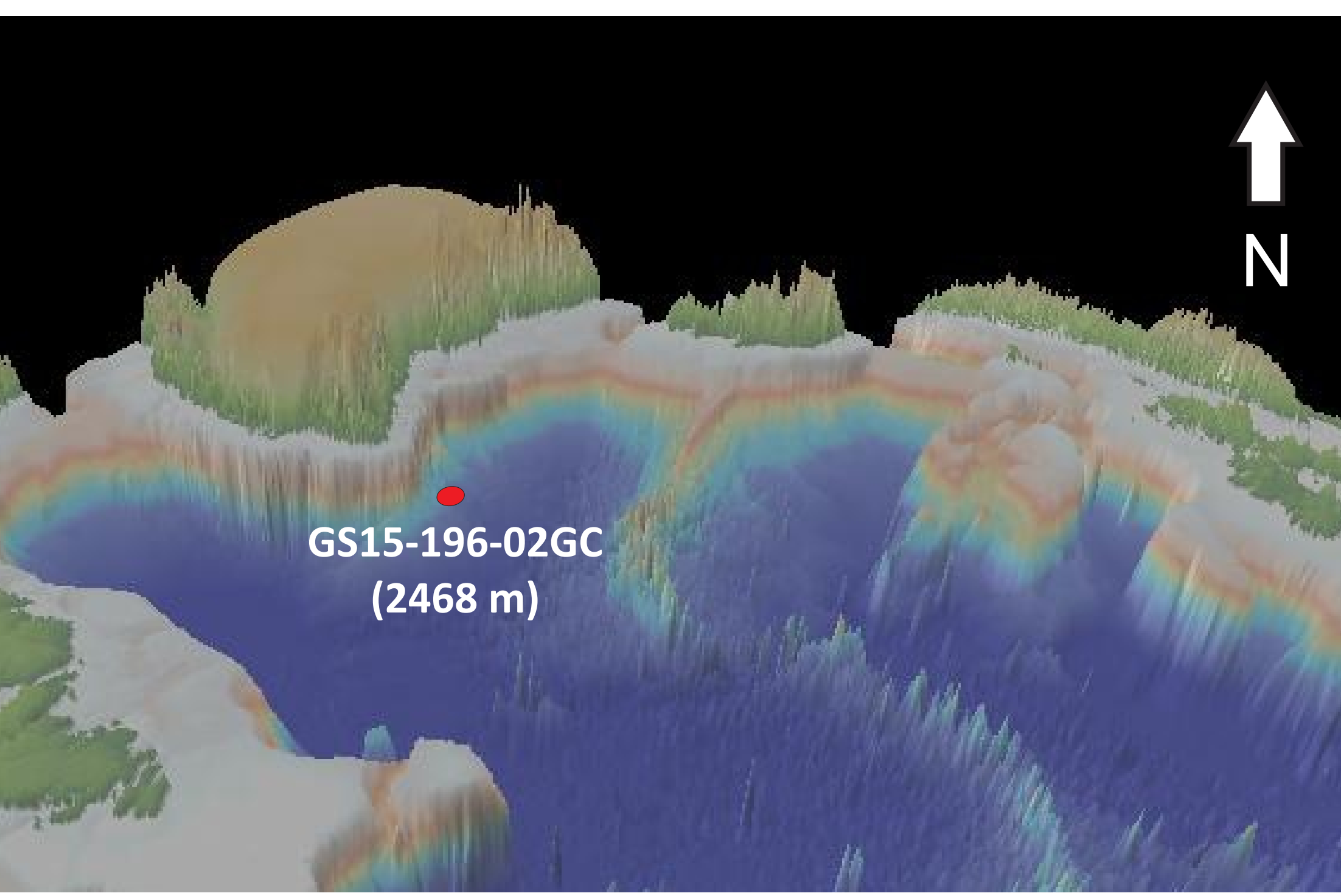


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## Introduction

Deep ocean circulation plays an important part in the Earth's climate system and is postulated to be closely linked to ice sheet dynamics and abrupt climate oscillations. However, the nature of this coupling remains unclear. Iceberg and freshwater pulses have been hypothesized as both the trigger for, and the response to, reduced AMOC. Here we assess the relative timing and linkages between iceberg discharge, surface water physical properties in the subpolar gyre and NADW ventilation using proxy records co-registered in the same sediment core GS15-196-02GC taken in the Irminger basin (59°37.1 N, 40°44.25 W, 2468m water depth)

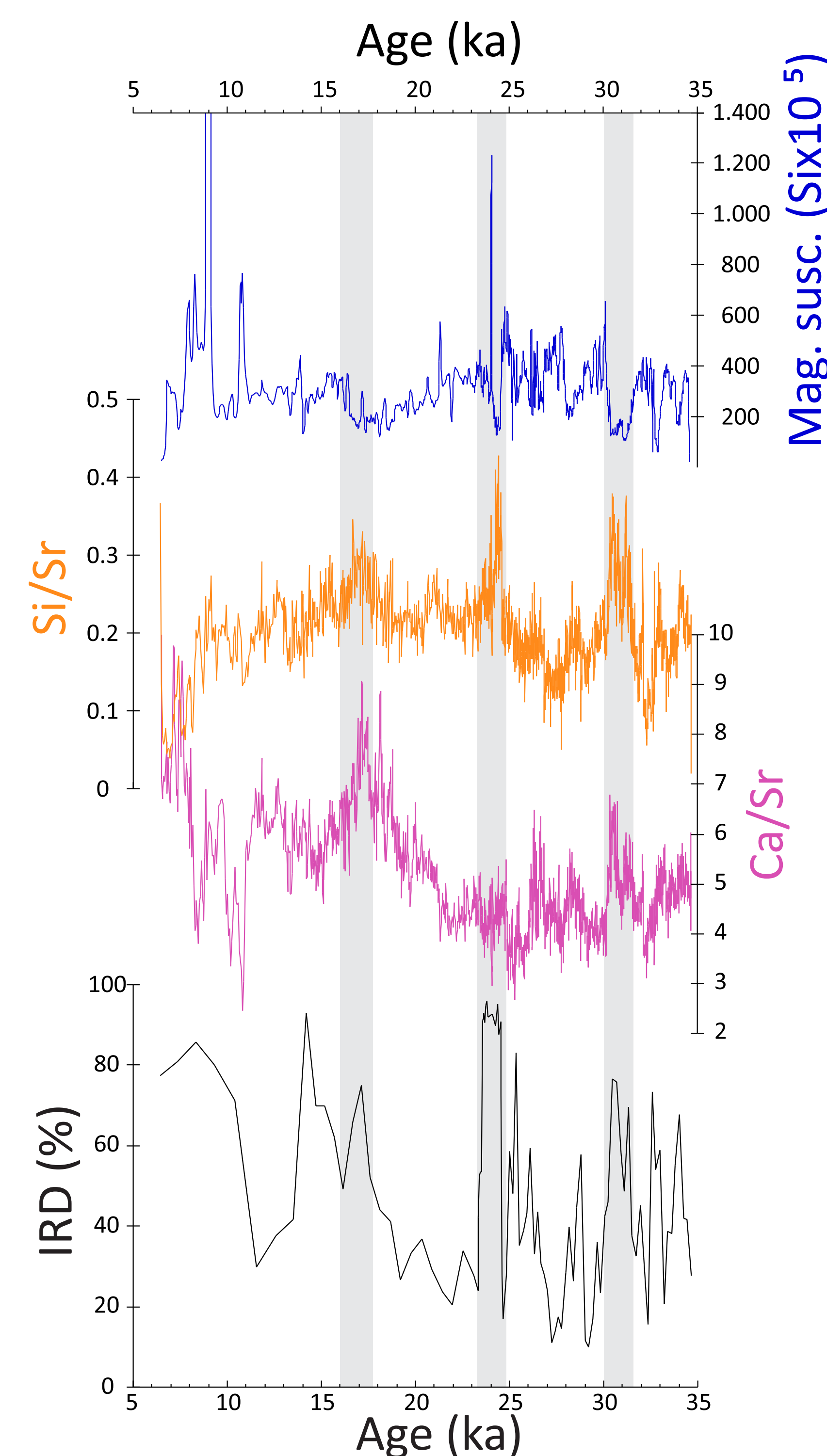


## Methods

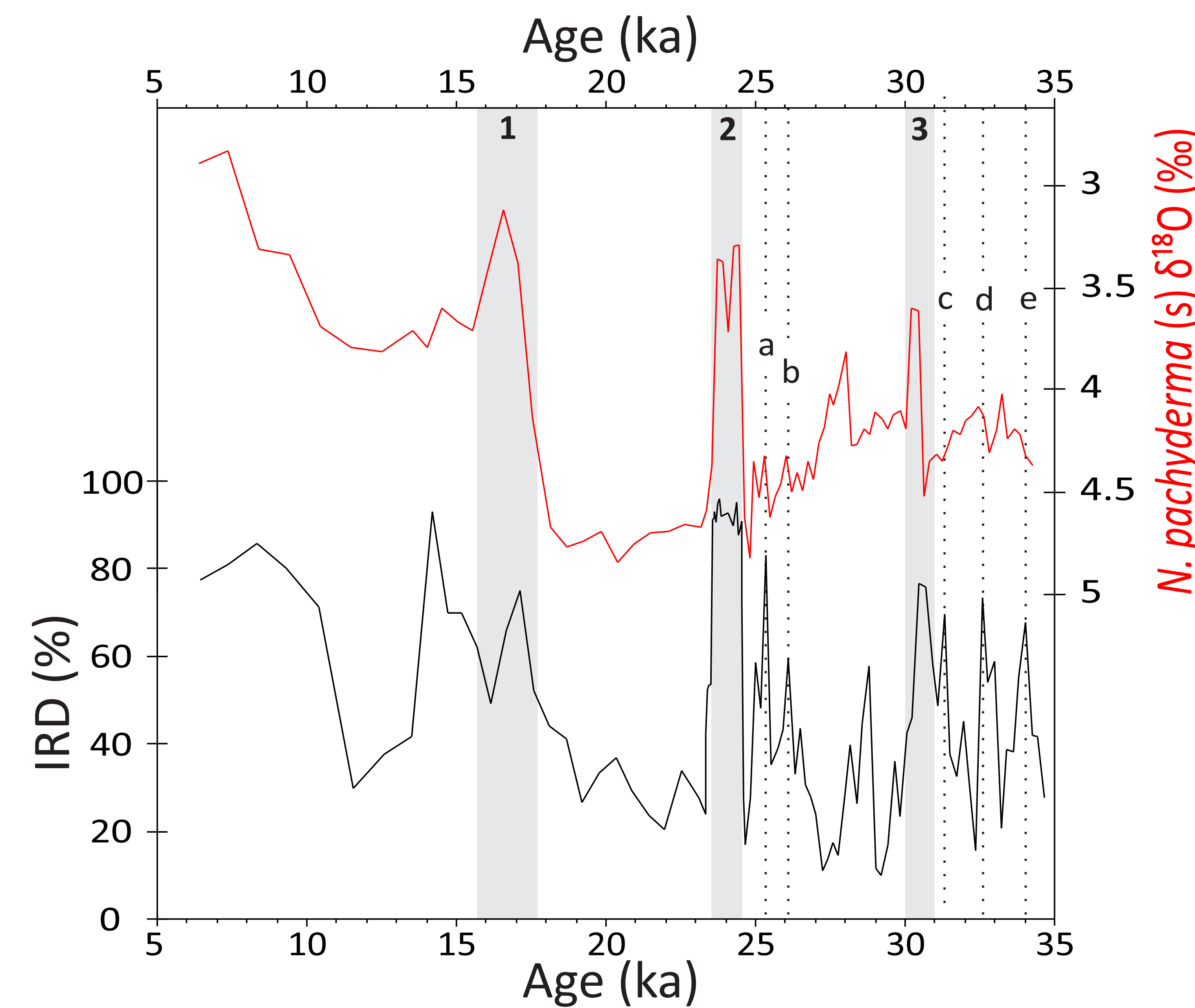
- Stable isotopes: *N. pachyderma* (*s*)  $\delta^{13}\text{C}$  &  $\delta^{18}\text{O}$ , *C. wuellerstorfi*  $\delta^{13}\text{C}$  &  $\delta^{18}\text{O}$
- XRF (Ca/Sr and Si/Sr)
- Magnetic susceptibility
- Ice rafted debris

## 1. Extra-Laurentide IRD events associated with H-events

IRD events coincident with H1-H3, show no/small increases in detrital carbonate (Ca/Sr). Instead increases in detrital silicates (Si/Sr) are found, pointing towards an European/Icelandic/Greenland source



## Results



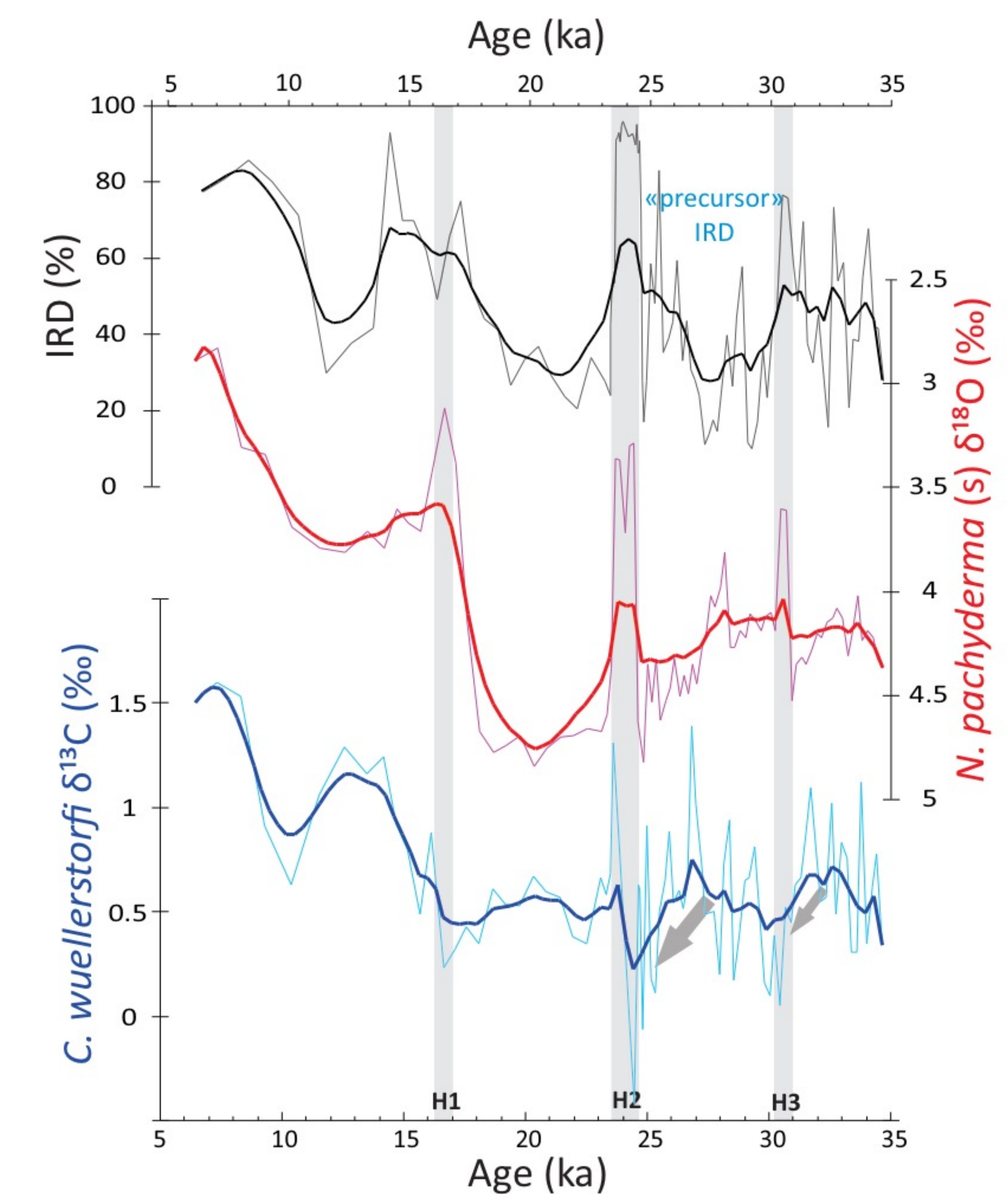
## 2. "Precursor" IRD events

IRD events deposited prior to Heinrich events with no associated freshwater anomaly are derived from extra-LIS sources (e.g. GIS). The large  $\delta^{18}\text{O}$  anomalies (SPG freshening) associated with H1-H3 indicate large freshwater input (e.g. from the LIS); providing a local proxy for LIS input (H-events). Most IRD peaks have no freshening, but largest coincident with SPG freshening (H-events) and lead peak freshening.

*Could precursor events and/or related  $\Delta$  THC trigger H-events?*

## 3. Timing of deep ventilation changes and extra-Laurentide IRD events

Initial decreases in benthic  $\delta^{13}\text{C}$  associated with reduced deep water formation in the northern North Atlantic are closely coupled to increases in extra-Laurentide sourced IRD



## Conclusions

- "Precursor" IRD events derived from GIS/Europe/Iceland identified in close timing with Hudson Strait H-events.
- Initial deep water ventilation reduction associated with enhanced presence of SOW and reduction in NADW occurs prior to H2-H3 freshening
- Initial decreases of deep water formation in the northern North Atlantic are closely coupled to increases in non-Laurentide sourced IRD—suggesting close coupling between ventilation and extra-LIS activity.