Iceland-Faroe Ridge overflow dynamics

55-6 ka BP

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GEOMAR

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Study area and Motivations:

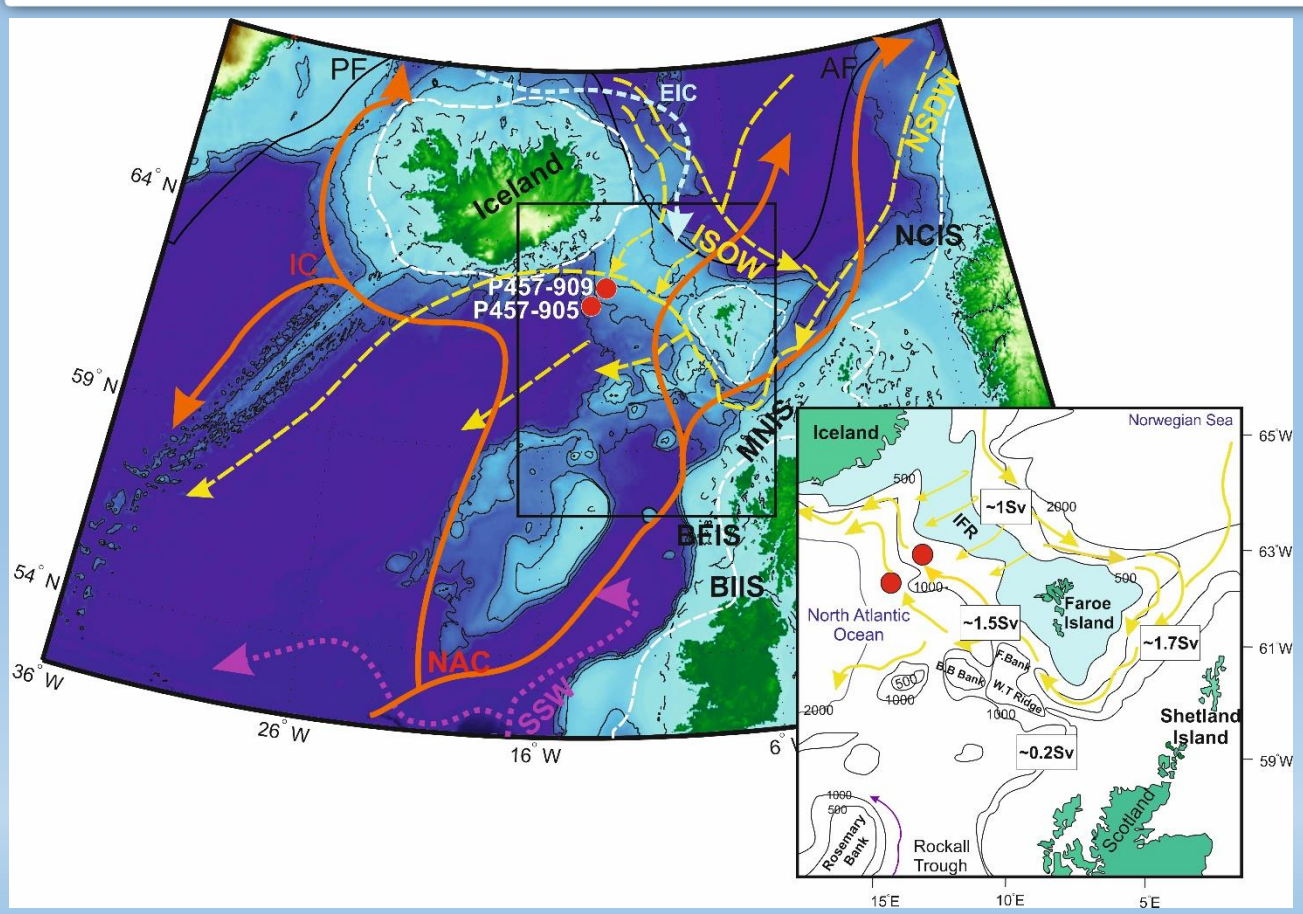
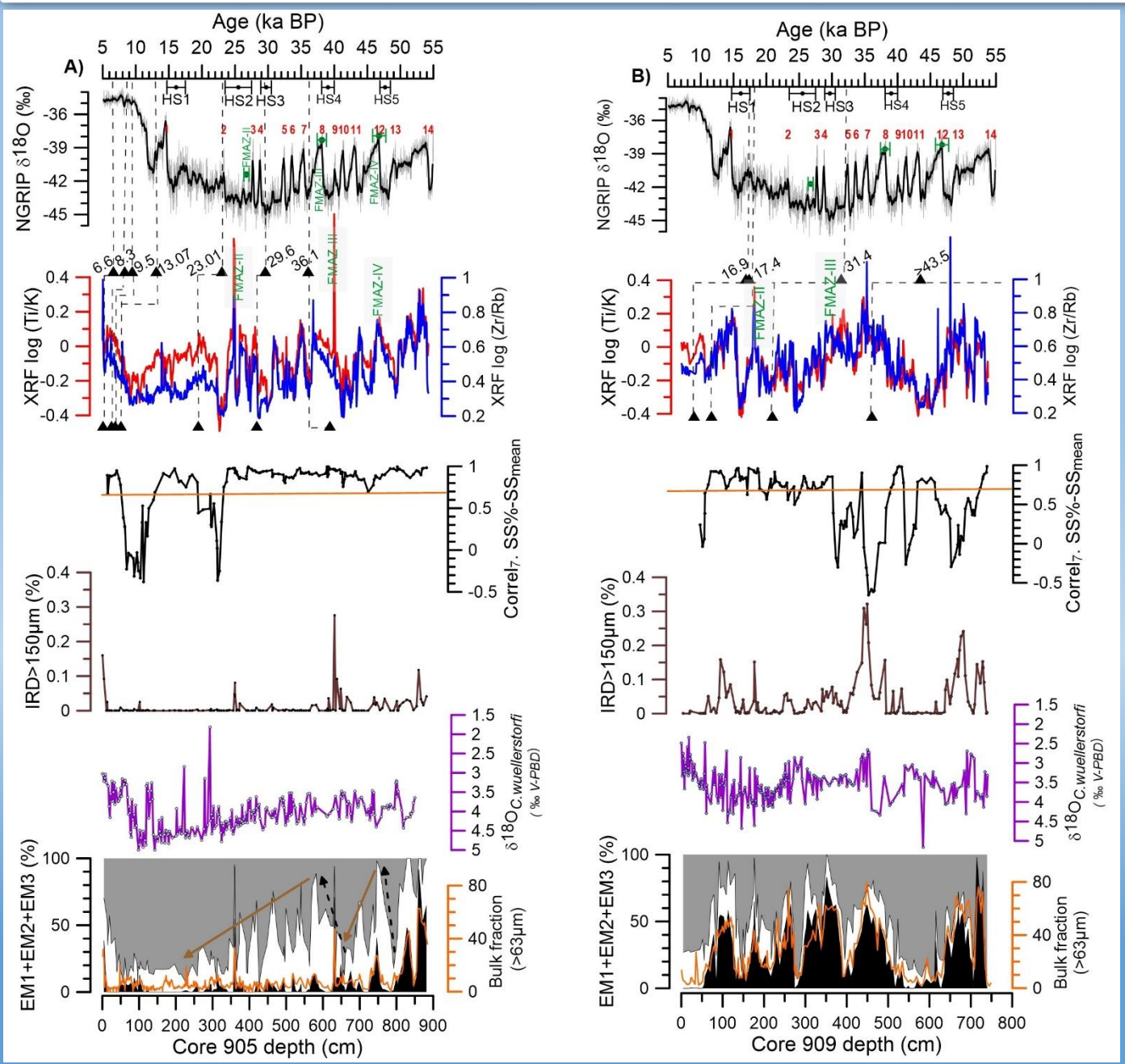


Fig.1. Bathymetric chart of the study area. Studied core sites P457-905 (62°41.13'N 14°21.15'W, 1.610-m water depth), P457-909 (62°50.20'N 12°59.47'W, 755-m water depth) and the modern oceanic circulation pattern. **Surface water: NAC**: North Atlantic Current, **EIC**: East Icelandic Current, **IC**: Irminger Current. **Deep currents: ISOW:** Iceland-Scotland overflow water, **NSDW**: Norwegian Sea Deep Water.
IFR: Iceland Faroe Ridge**. FSC:** Faroe Shetland Channel. **FBC**: Faroe Bank Channel.

- Understanding of the past changes in the critical area of oceanic circulation is beneficial to predict future climate conditions and their related socio-economic impacts.
- The study area is one of the key components of the global climate system.
- The Atlantic Meridional Ocean Circulation (AMOC) brings warm and saline NAC to the North Atlantic Ocean has a strong influence on the past and modern climate of this region.
- NAC cools and sinks in the Nordic Seas, before returning as cold and dense ISOW via the IFR, FSC and FBC.

Methods and Results:



1. Chronostratigraphy of the sediment cores

- AMS ^{14}C Ages
- Tephrostratigraphy (FMAZ-Faroe Marine Ash Zone)
- Benthic foraminifera isotopes

2. Lithogenic XRF records

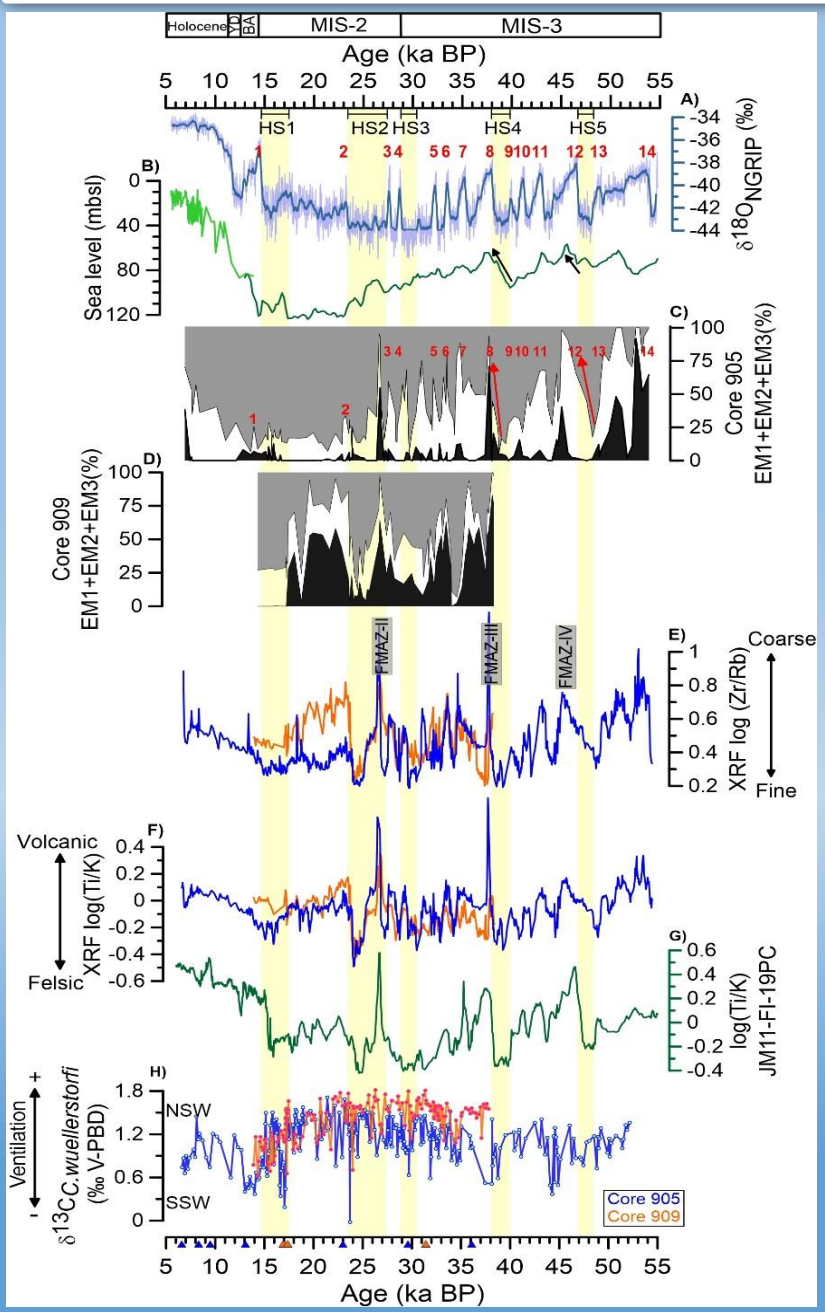
3. Grain size analysis

4. Lithogenic End-Member modelling

- Coarse-Grained Sediment (EM1)
- Fine-Grained Sediment (EM2 and EM3)

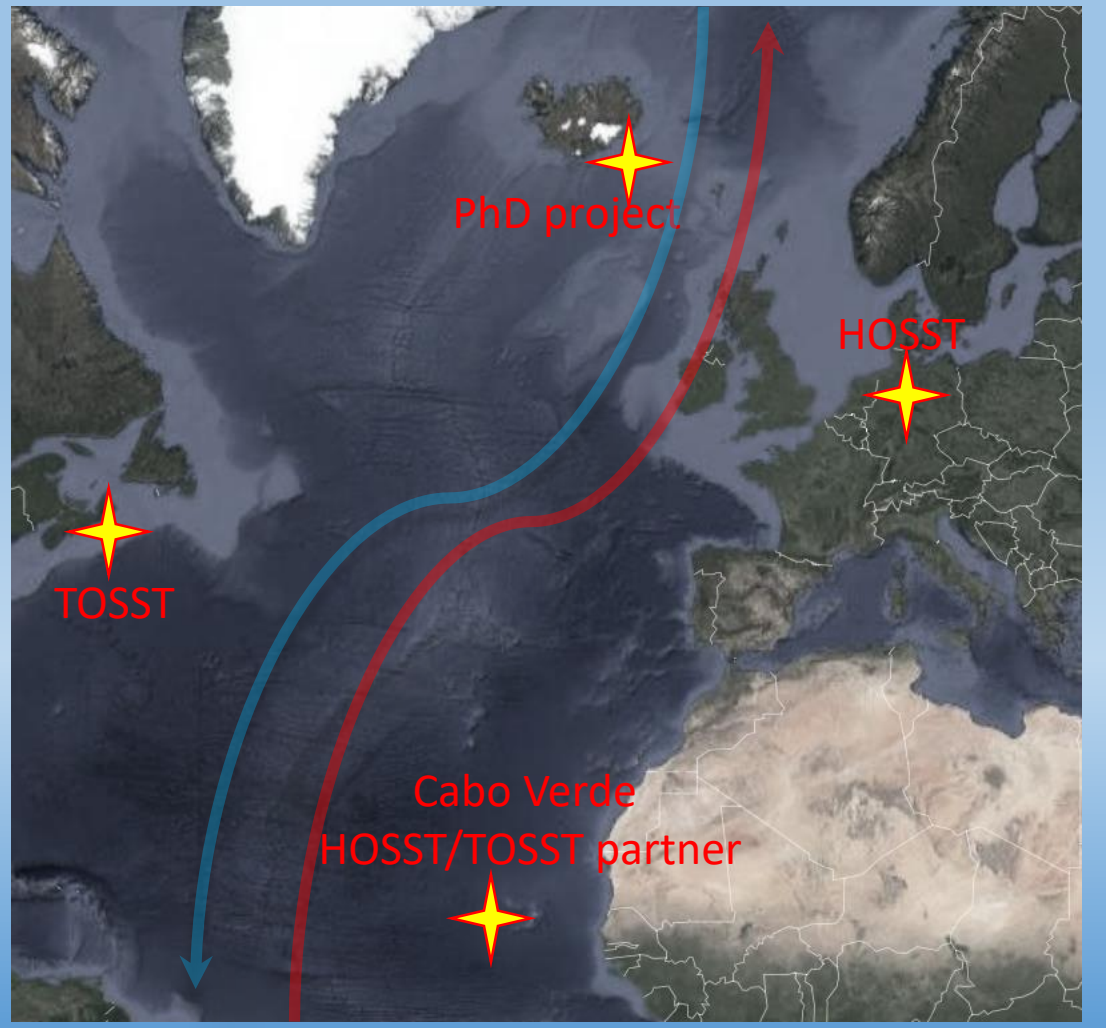
Fig.2. Proxy records of cores 905 (a) and 909 (b) versus core depth in relation to the **NGRIP $\delta^{18}O$** record for reference (Svenssonet al., 2008). **Red numbers** mark Greenland warm Interstadials. Green circles: The position of **ash zones**. Black triangles: **^{14}C** (radiocarbon) ages. The plotted proxy records comprise XRF **log (Ti/K)** ratios, **log (Zr/Rb)** ratios, coefficients of a 7-point down-core correlation of sortable silt (10–63 µm) means, lithogenic fraction >150 µm (i.e., **IRD**), **$\delta^{18}O$** values of benthic foraminifera, EM abundances (EM1 + EM2 + EM3 = 100%; **EM1** = black, **EM2** = white, **EM3** = gray) and size fraction **>63 µm**.

Discussion:



- Strong changes in bottom current dynamics related to the ISOW has a strong influence on the past and modern climate of the North Atlantic region.
- Both grain-size and XRF bulk chemistry reveal prominent Dansgaard-Oeschger sedimentary cycles reflect substantial changes in near bottom current strength and sediment transport/deposition.
- Bottom currents and the transport/deposition of local basaltic (Ti-rich) silts reinforce throughout warm Greenland Interstadials (GIs) like modern ocean circulation pattern.
- Bottom currents sharply declines toward Greenland stadials (GSs). Fine grained felsic (K-rich) sediments were deposited during GSs.

Conclusions:



- The northern limb of AMOC intrinsically linked with climate change, shifting its mode of operation frequently during the last glacial period.

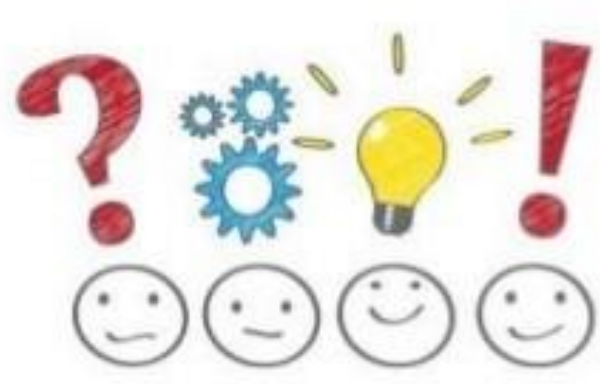
- Our marine sediments cores under the pathway of ISOW are ideal candidates to reconstruct past changes in the variability of near-bottom circulation patterns and current velocities.

- Climate change is an interdisciplinary field of research, **HOSST-TOSST TransAtlantic interdisciplinary program** provides the unique opportunity for constructive communication and collaboration among scientists with different skills.

- Interdisciplinary programs at early stages in an academic career is necessary to move and encourage the new generation of the scientific community toward a broad-scale interactions.

Thank You

Questions, Thoughts, Comments



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