I CONVEGNO ISTITUTO DI SCIENZE POLARI

Ricostruzione del clima passato e variabilità del ghiaccio marino attraverso lo studio di carote di ghiaccio

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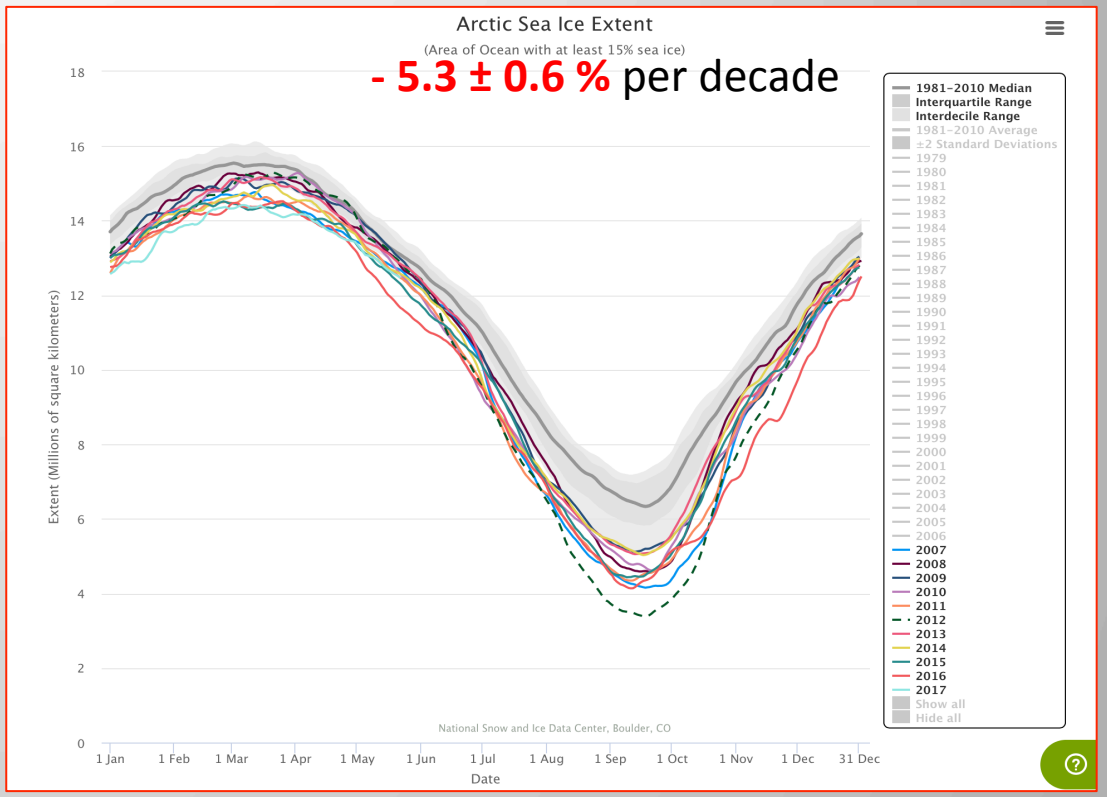
Roma, 22 – 24 settembre 2021

State of the Arctic…

Key concepts:

- **ICE EXTENT**: Arctic ocean region with at least 15% of ice cover.
- **ICE THICKNESS**: First-Year Ice (0.3-3 m) or Multi-Year Ice (5 - 30 m)
- **SEA ICE DYNAMICS**: Forms in fresh open water in autumn, drifted by wind and circulation and discharged to NA mainly trough to Fram Strait.



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Proxies used for paleo-sea ice extent reconstruction

(FOR GEOLOGICAL TIME SCALES)

The ***past distribution of sea ice is recorded in sediments*** preserved on the seafloor and in deposits along many ***Arctic coasts*** as well as in ***terrestrial records*** including ice cores.

Marine Records:

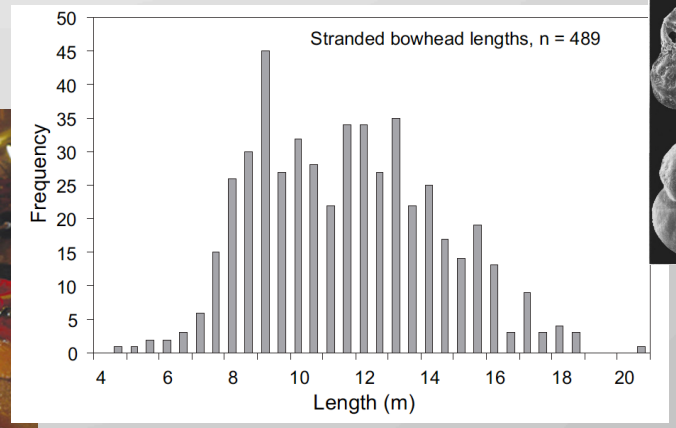
- Marine sedimentary records
- Ice-rafted sediment (IRD)
- Other marine proxies (foraminifers, diatoms, and dinocysts)

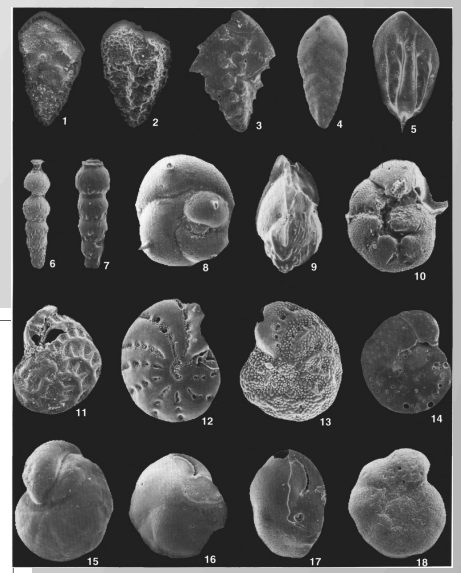
Coastal Records:

- Coastal plains and raised marine sequences
- Driftwood
- Whalebone

Terrestrial Records:

- Vegetation
- Ice cores
- Historical records





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The ice core Bromine approach

Bromine is in the ocean with a **specific Br/Na** mass **ratio** (0.006)

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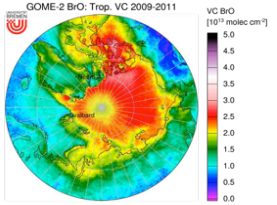
Bromine explosions occur **over *seasonal sea ice during spring***, enriching atmospheric bromine while depleting ozone. (ODE)

Sea Ice Extent



Gas phase Br

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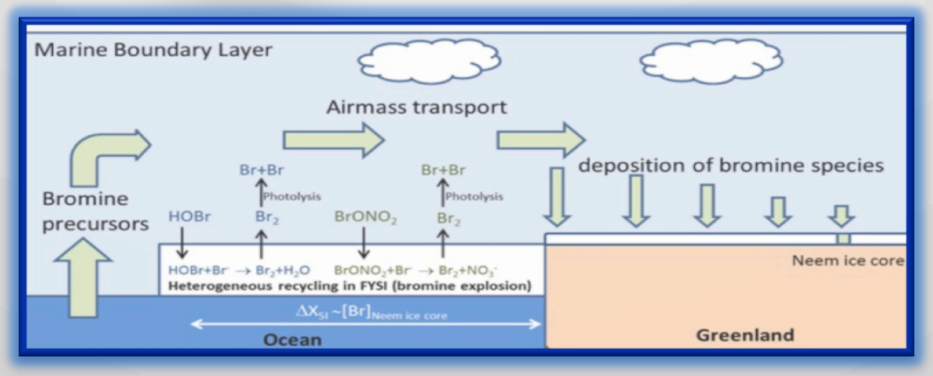
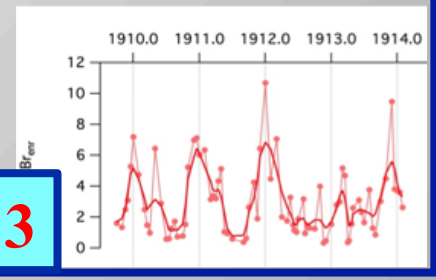


Enriched bromine (Br_{enr}) is detected in the ***surface snow*** and ***ice cores***



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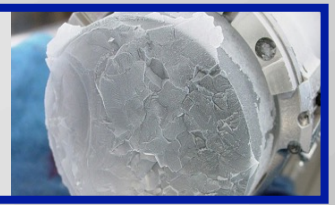
Due to this process **Bromine is *enriched*** compared to seawater abundance ***depending on FYSI extent.***



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The ice core Bromine approach

Bromine (Br) have shown great promise for its use as proxies of polar sea ice extent due to the specific reaction occurring over first year sea ice (FYSI)

SCIENTIFIC REPORTS

OPEN

Canadian Arctic sea ice reconstructed from bromine in the Greenland NEEM ice core

Received: 09 May 2016
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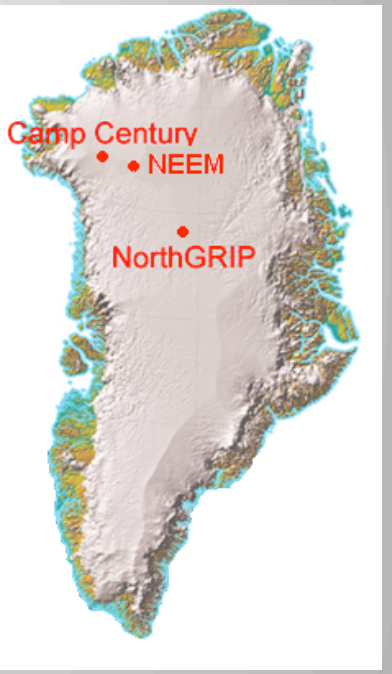

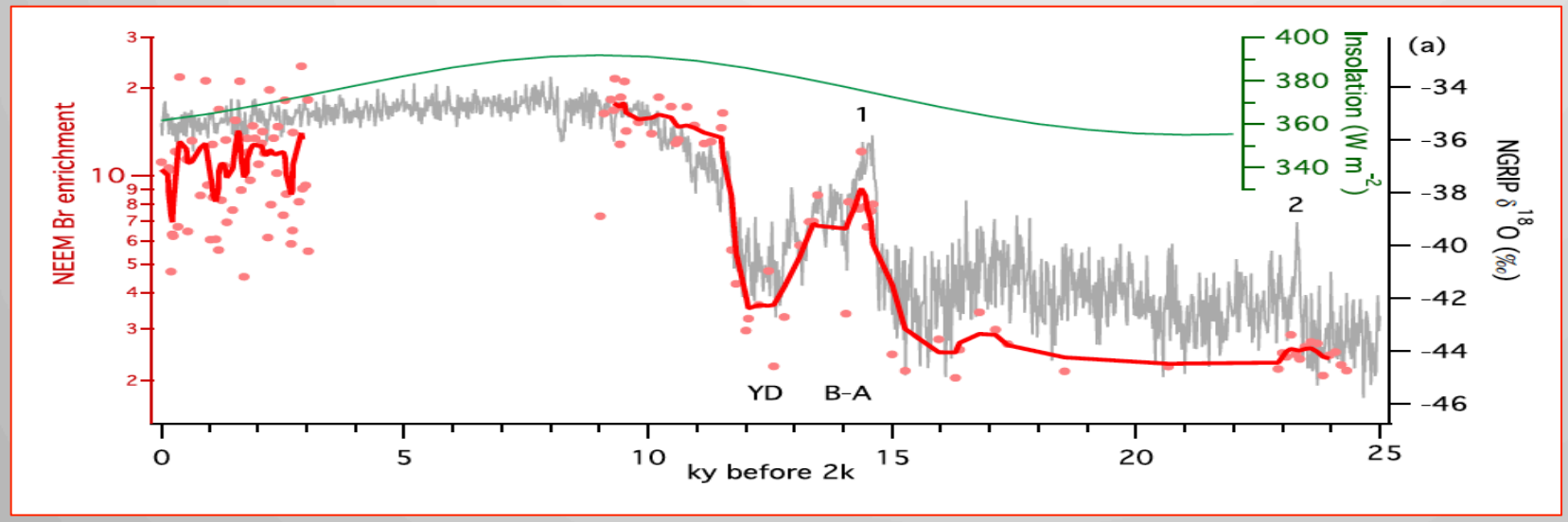

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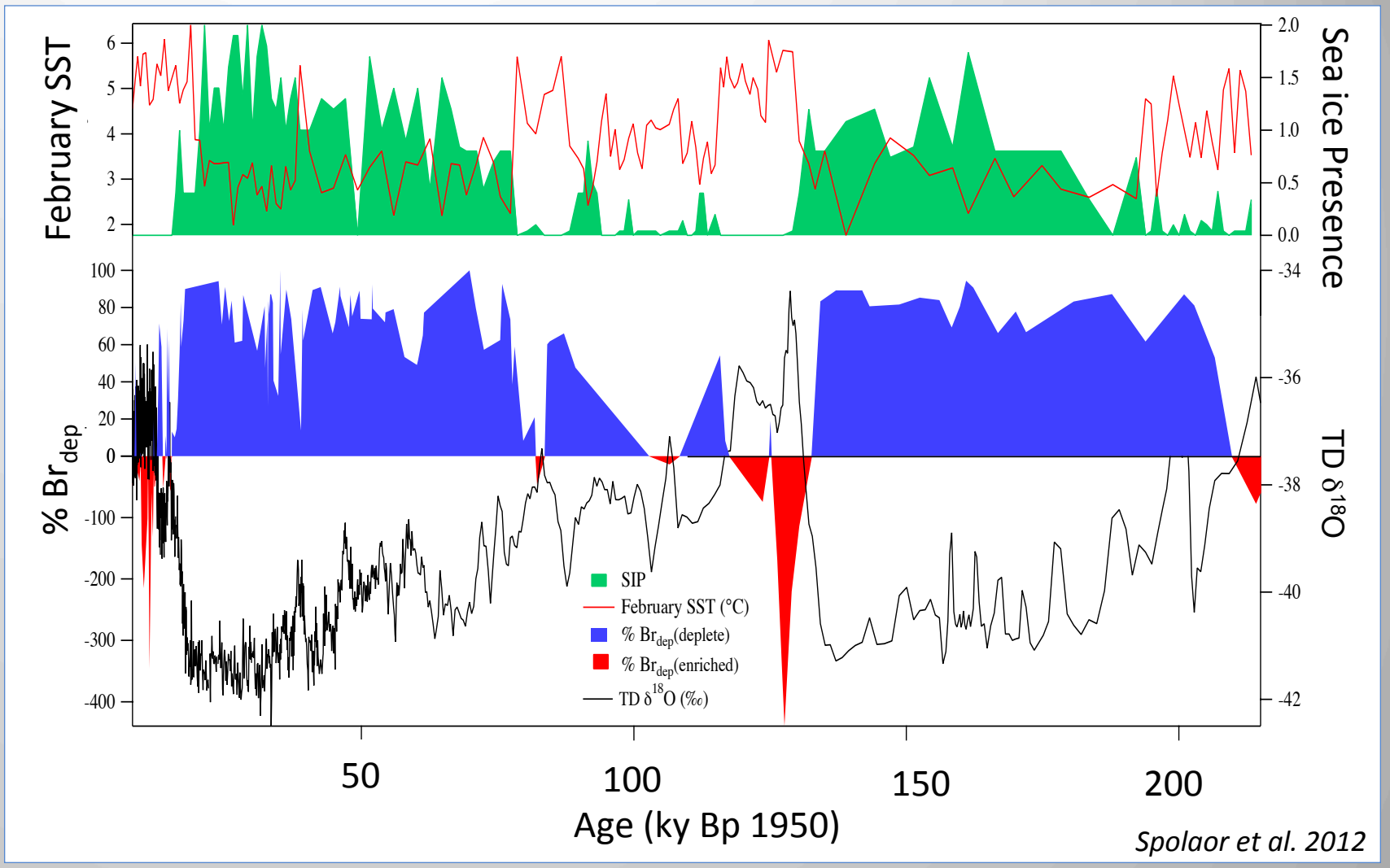
Extract from: *A.Spolaor* "Sea-ice tracers in ice cores" - Ocean-Ice interactions Workshop (Bologna, 17-18 Oct 2016)

The ice core Bromine approach

Talos Dome Ice core



Spolaor et al. 2012

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