

Isotope measurements of the Arctic water cycle and exchange processes between seawater, sea ice, and snow during MOSAiC

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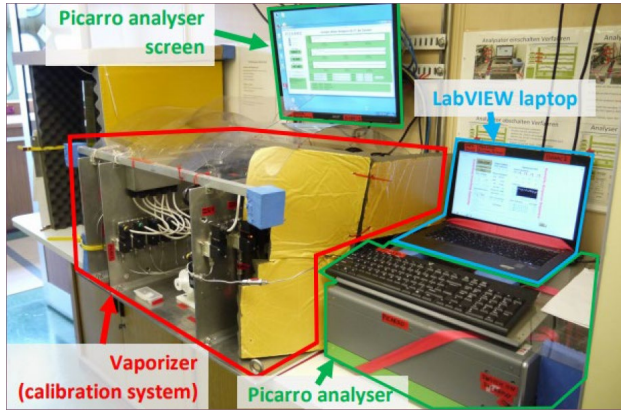


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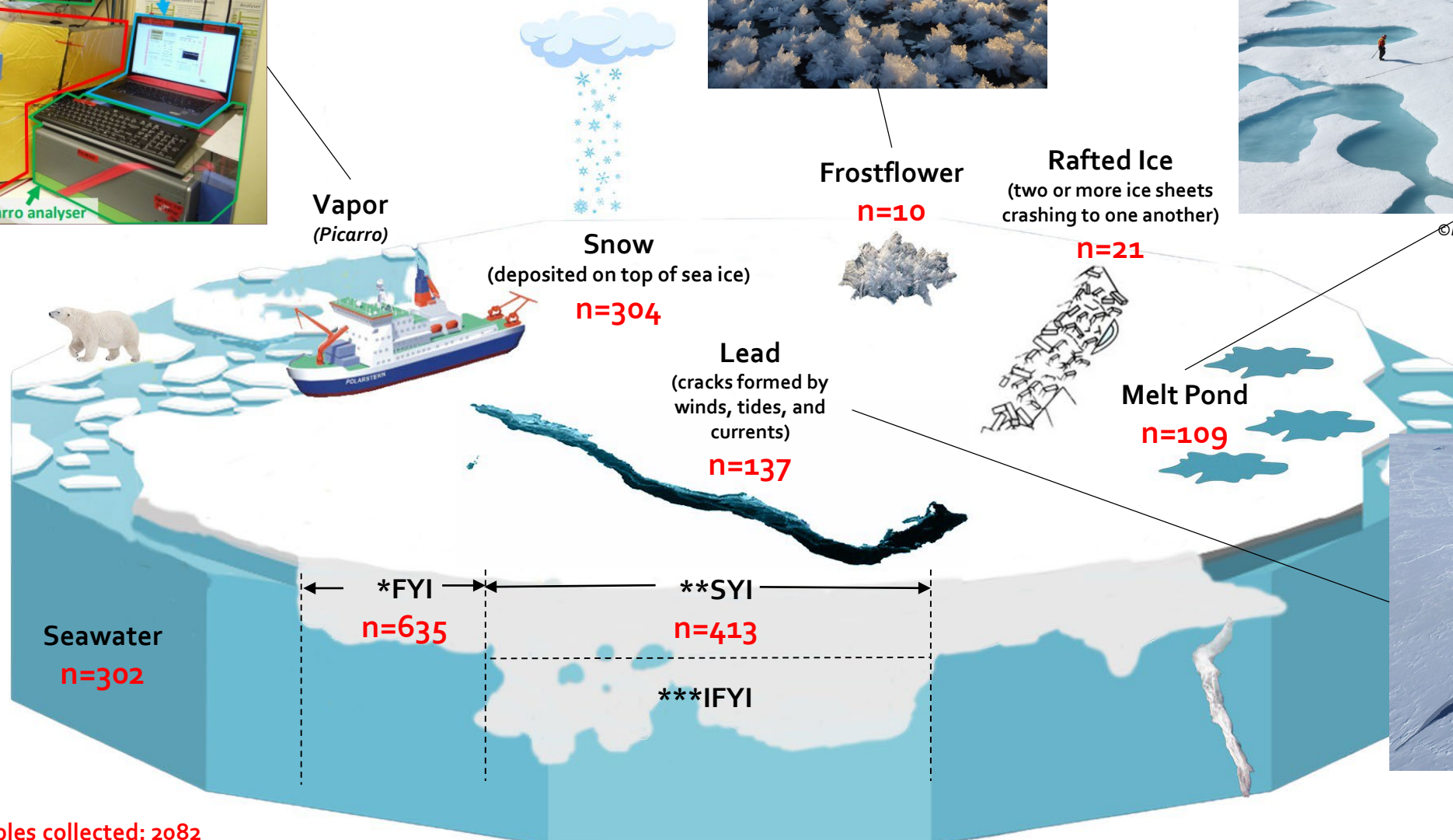
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Arctic water compartments



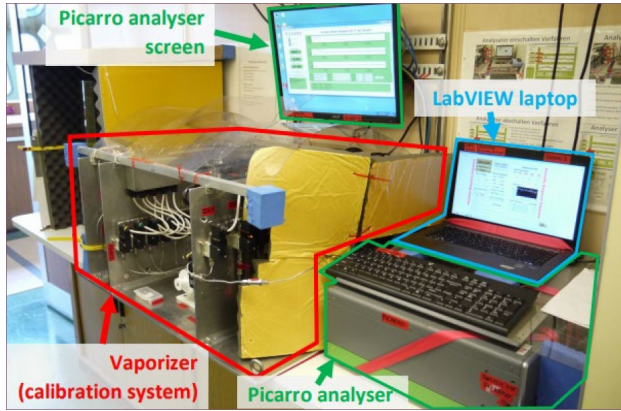
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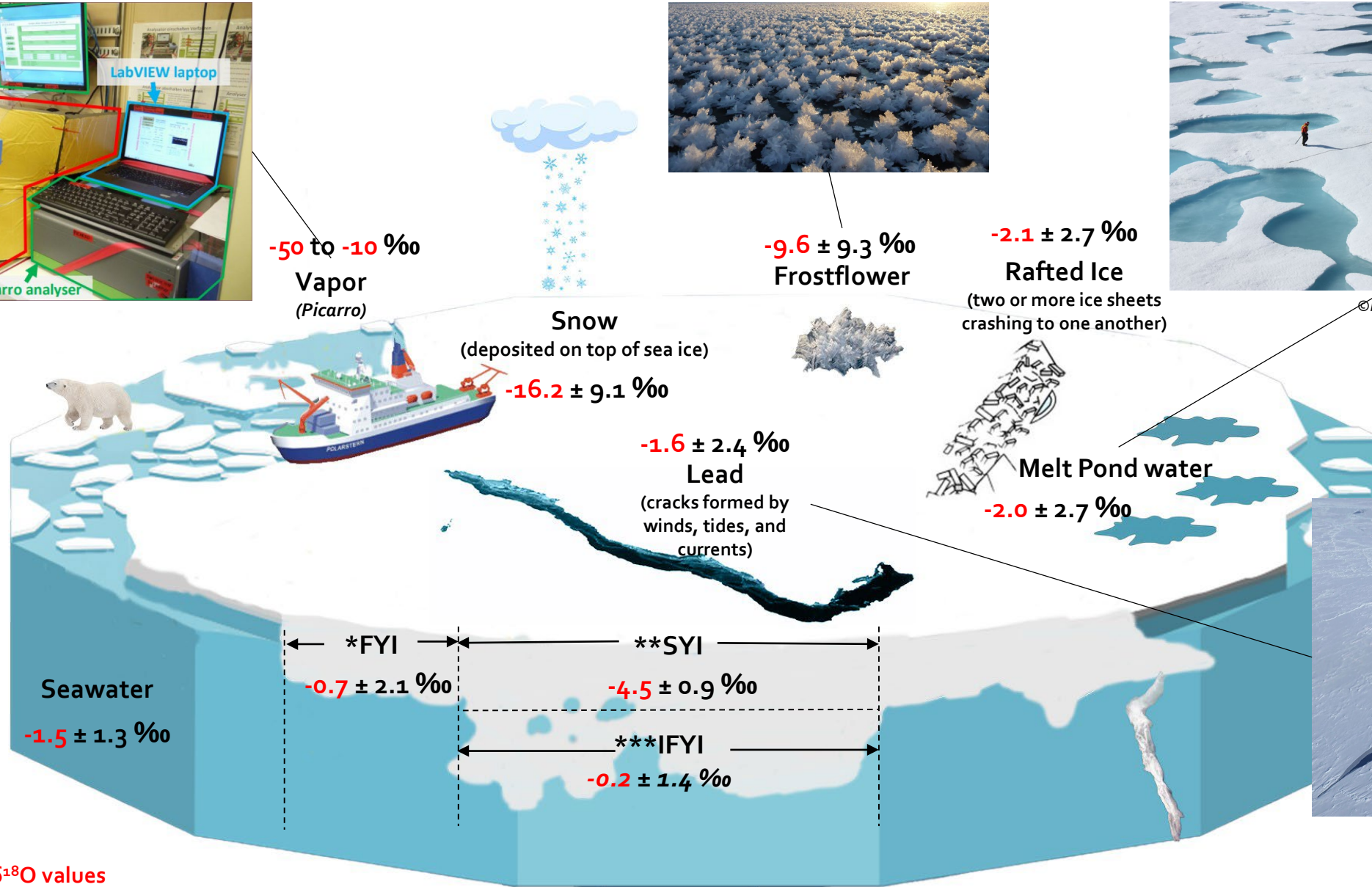
Total number samples collected: 2082

*FYI = First Year Ice
**SYI = Second Year Ice
***IFYI = Insulated FYI

Arctic water compartments



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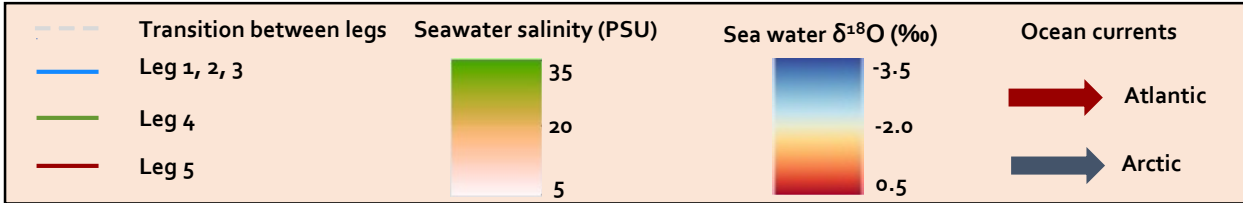
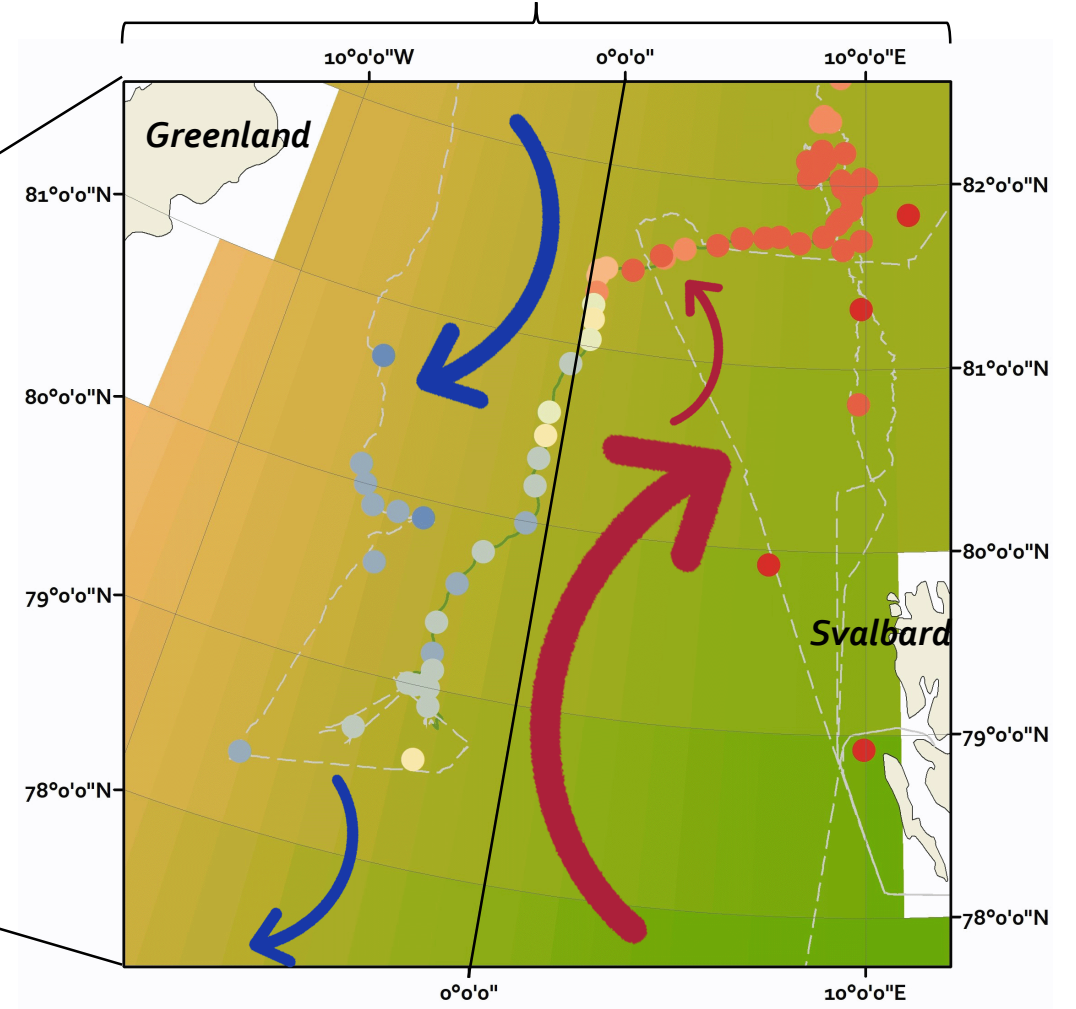
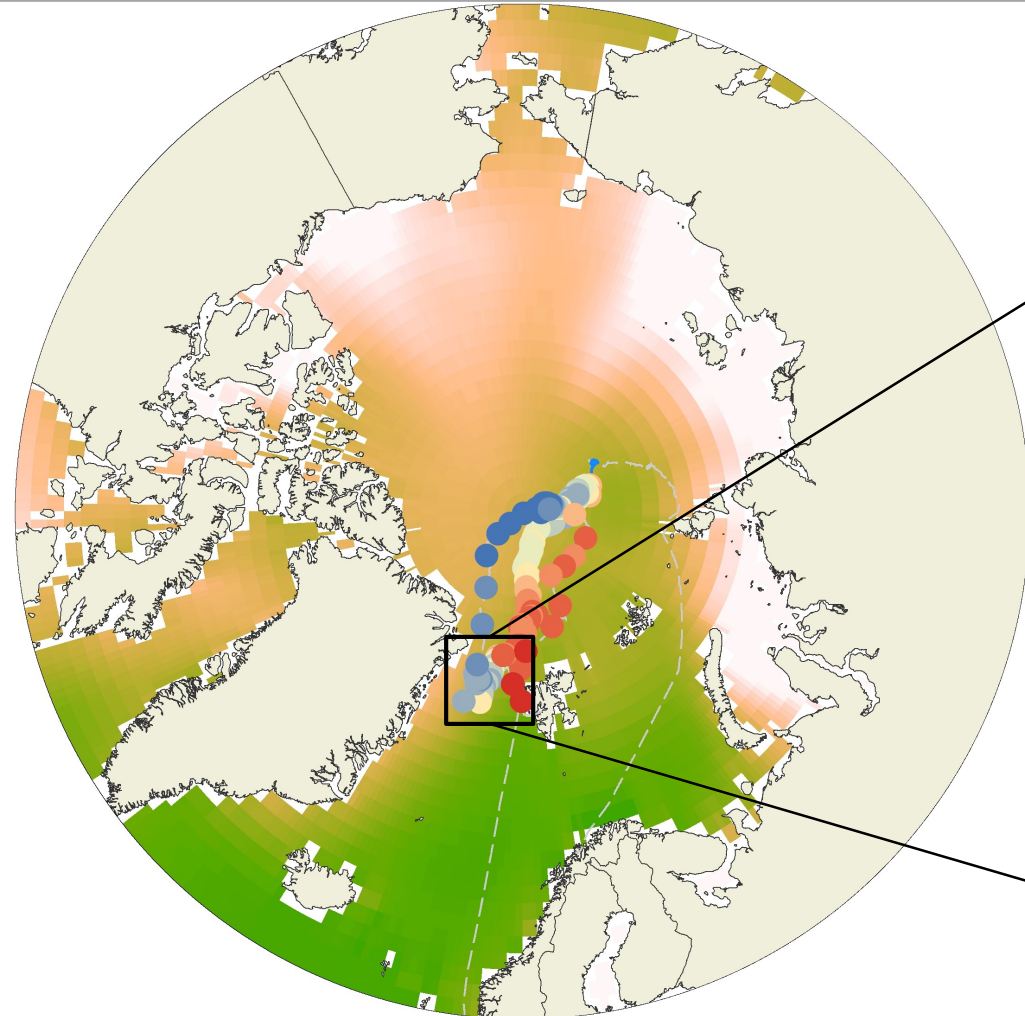


*Measured mean $\delta^{18}\text{O}$ values

*FYI = First Year Ice
**SYI = Second Year Ice
***IFYI = Insulated FYI

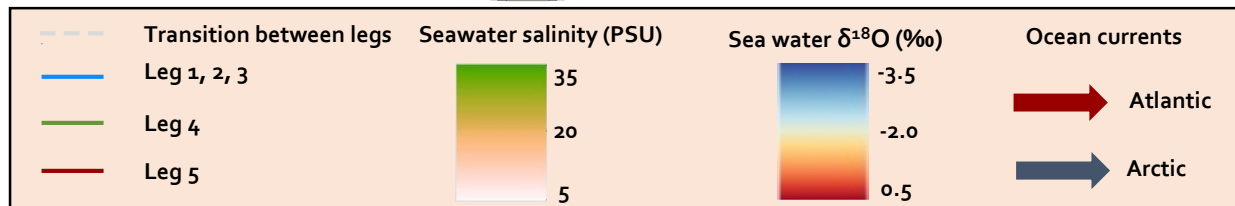
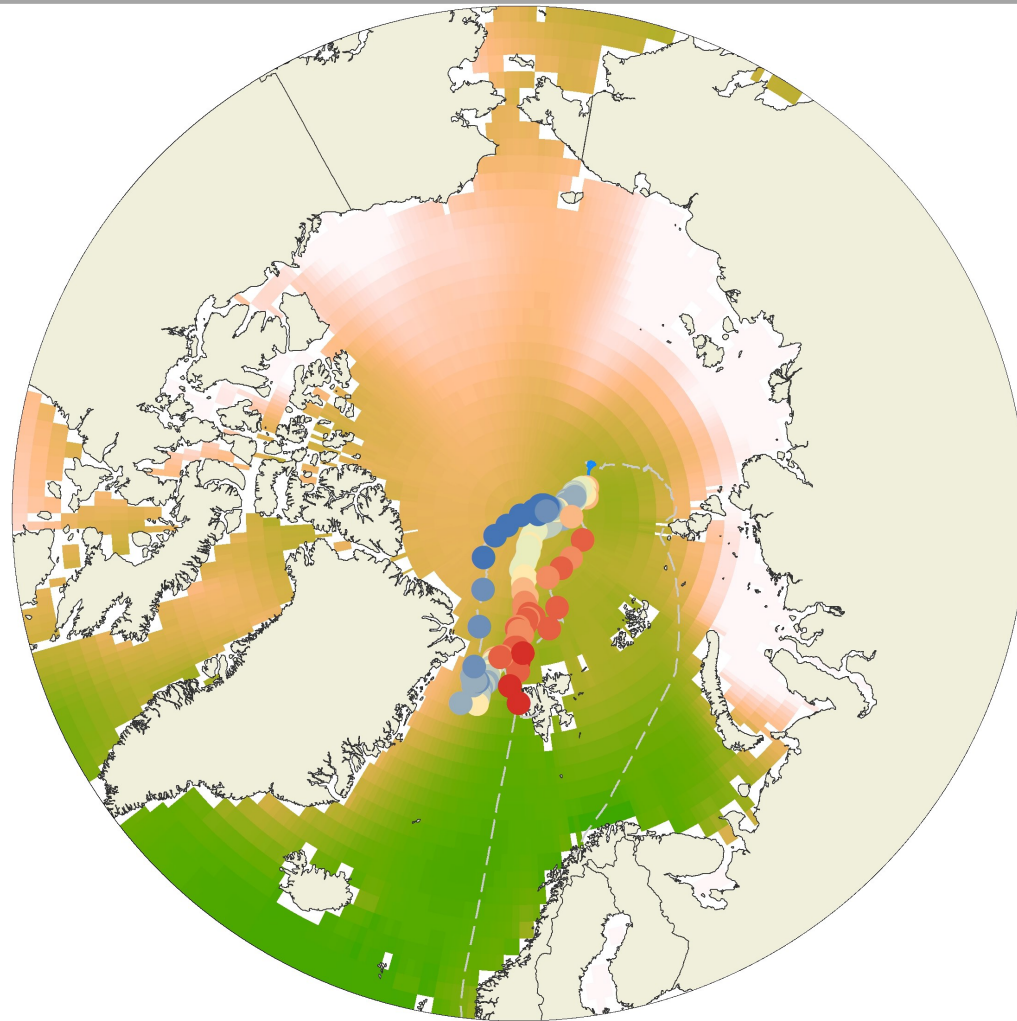
Seawater $\delta^{18}\text{O}$ and salinity

Fram Strait

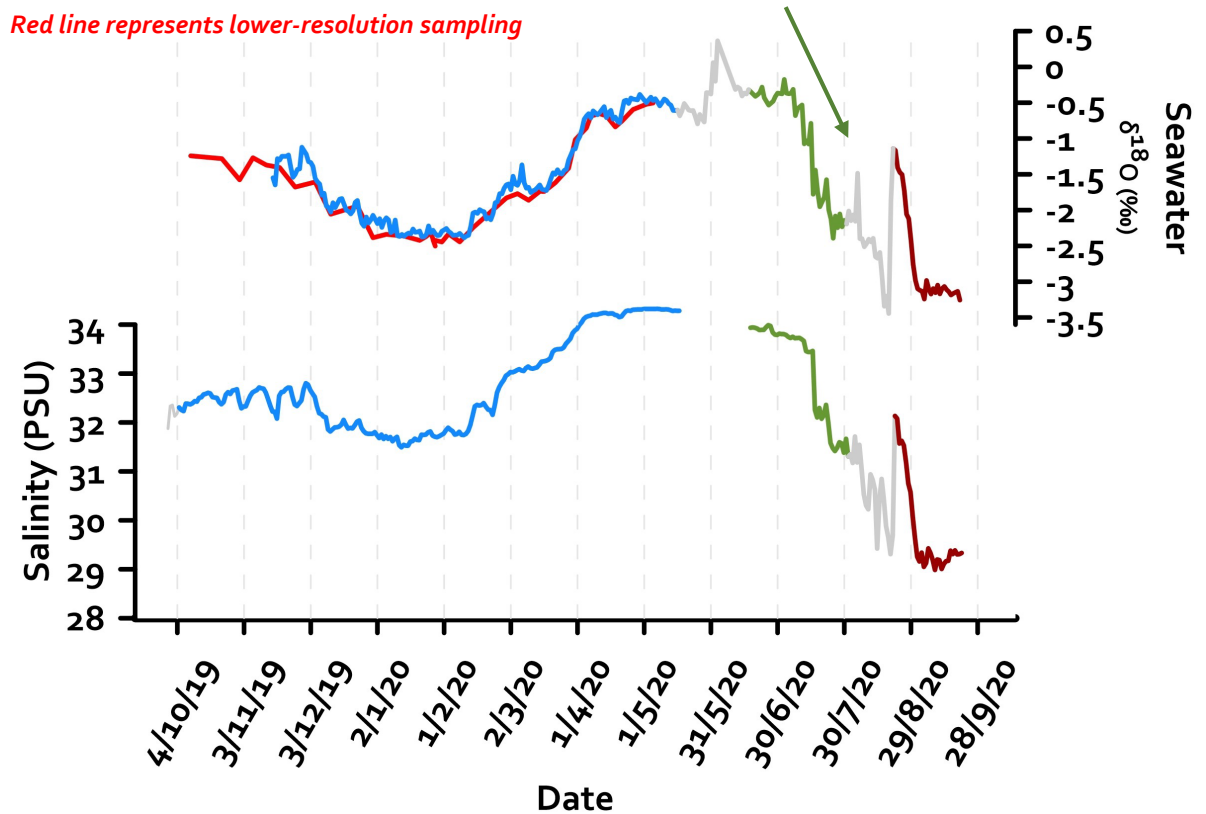


The input from different ocean currents and freshwater sources can be traced by $\delta^{18}\text{O}$ in seawater.

Seawater $\delta^{18}\text{O}$ and salinity



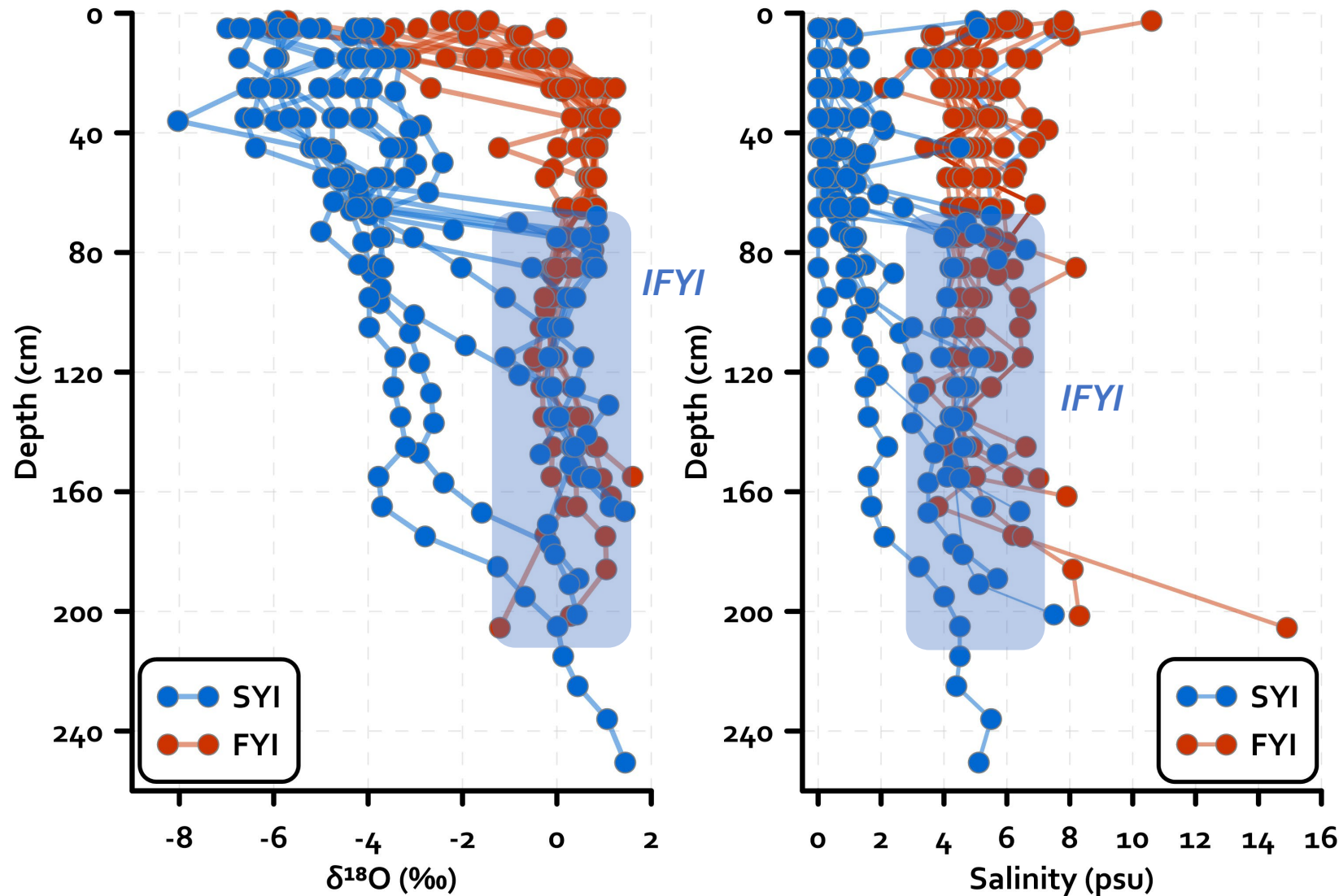
Red line represents lower-resolution sampling



- $\delta^{18}\text{O}$ and salinity decrease progressively when PS passed through Fram Strait during leg 4 (arrow), possibly due to contribution of sea ice melt water as well as Greenland ice sheet melt.
- During leg 5, after a drastic drop in $\delta^{18}\text{O}$ and salinity in the first few days, the values are more consistent at around -3 ‰, at positions close to the north pole.

Sea ice $\delta^{18}\text{O}$ and salinity

Dark Sector stations (DS_FYI & DS_SYI)

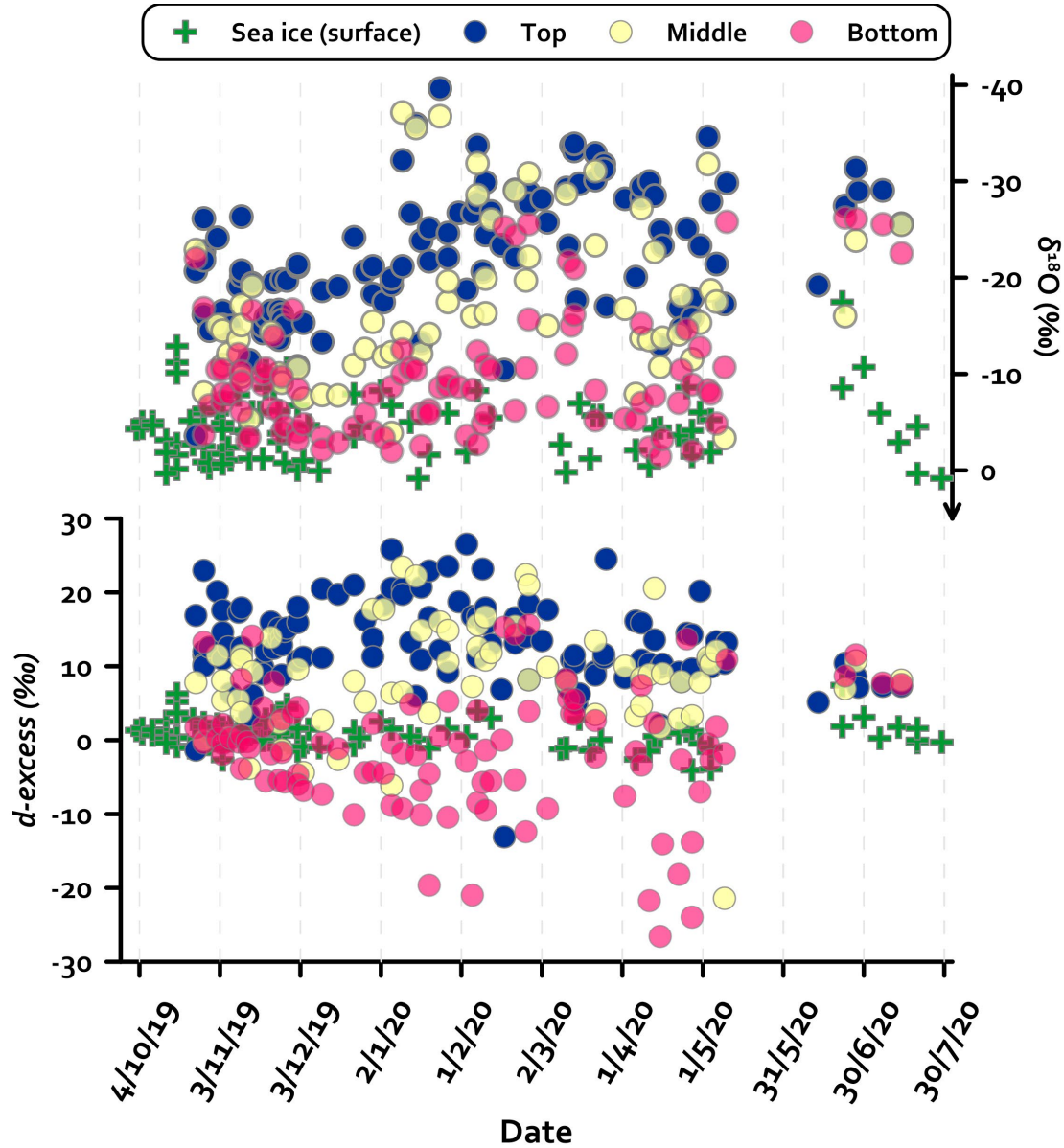


Sea ice growth is apparent in isotope composition as the younger ice has a more enriched isotopic signature (closer to seawater signal) compared to older ice with more depleted $\delta^{18}\text{O}$ values at the upper layers.

Under SYI, new ice (IFYI, blue area) forms in exchange with seawater which is similar in $\delta^{18}\text{O}$ to FYI.

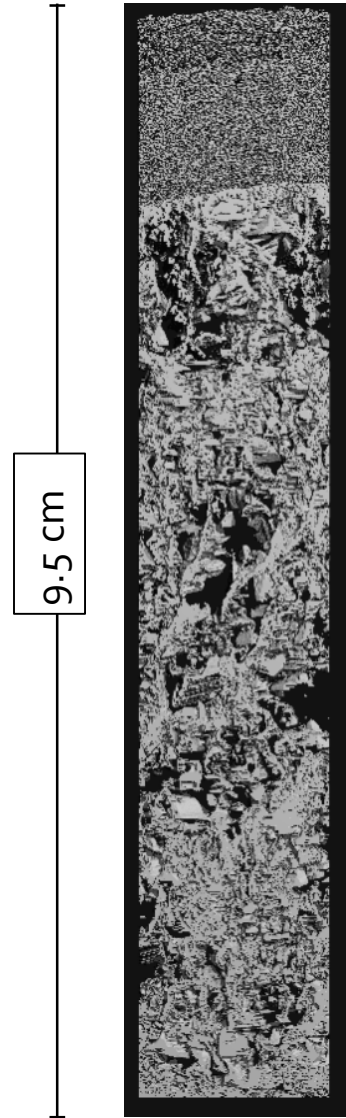
This signifies that a subdivision between younger ice and older ice is possible with isotopes.

Snow



The offset in $\delta^{18}\text{O}$ values from surface to bottom is indicative of mixing processes between sea ice and snow. The surface snow has a lighter signature, as it is expected from atmospheric-sourced compartments.

At the bottom the more enriched values point out to exchange processes within snow profiles.



Snow structure from microCT (15 April, Ardnt)

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Thank You!