Underwater forests – Indicators of change in the Arctic

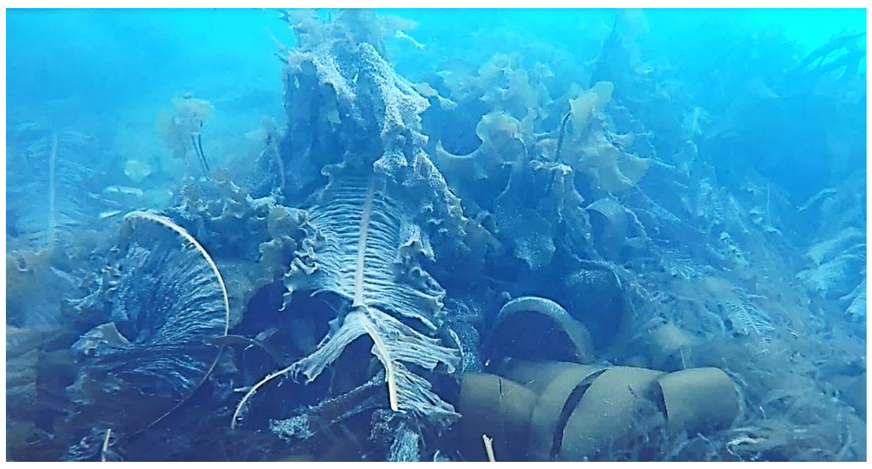
Luisa Düsedau[1,2], Stein Fredriksen[3], Markus Brand[1], Kai Bischof[2], Inka Bartsch[1]

[1]Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Germany

[2]Marine Botany, University of Bremen, Germany

[3]University of Oslo, Norway

Luisa.Duesedau@awi.de, Inka.Bartsch@awi.de

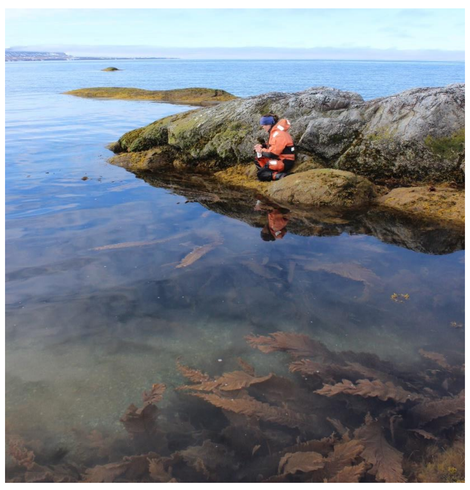


Shallow light-flooded rocky coasts of temperate to Polar zones are densely covered by a series of big brown marine macroalgae species, so called 'kelps' which functionally resemble 'trees' and form biodiversity rich 3-dimensional underwater forests.

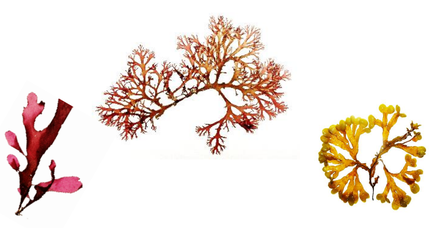
Below the canopy of kelps a diversity of other brown, red and green macroalgae as well as a diversity of small animal species settle – thereby this vegetation functionally corresponds to the bushy vegetation in a terrestrial forest.

After sampling all single individuals are measured (size, biomass, age) to generate quantitative data for comparison with previous studies.

Investigating the kelp forest is possible during low tide or in the permanently submerged zone with the help of divers.



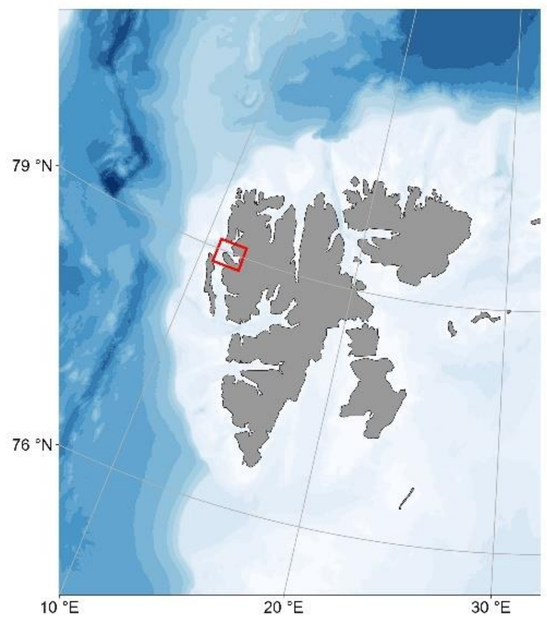
Left: low tide at Hansneset in Arctic Kongsfjorden (Spitsbergen) in summer 2021 where we found a flourishing macroalgal flora.



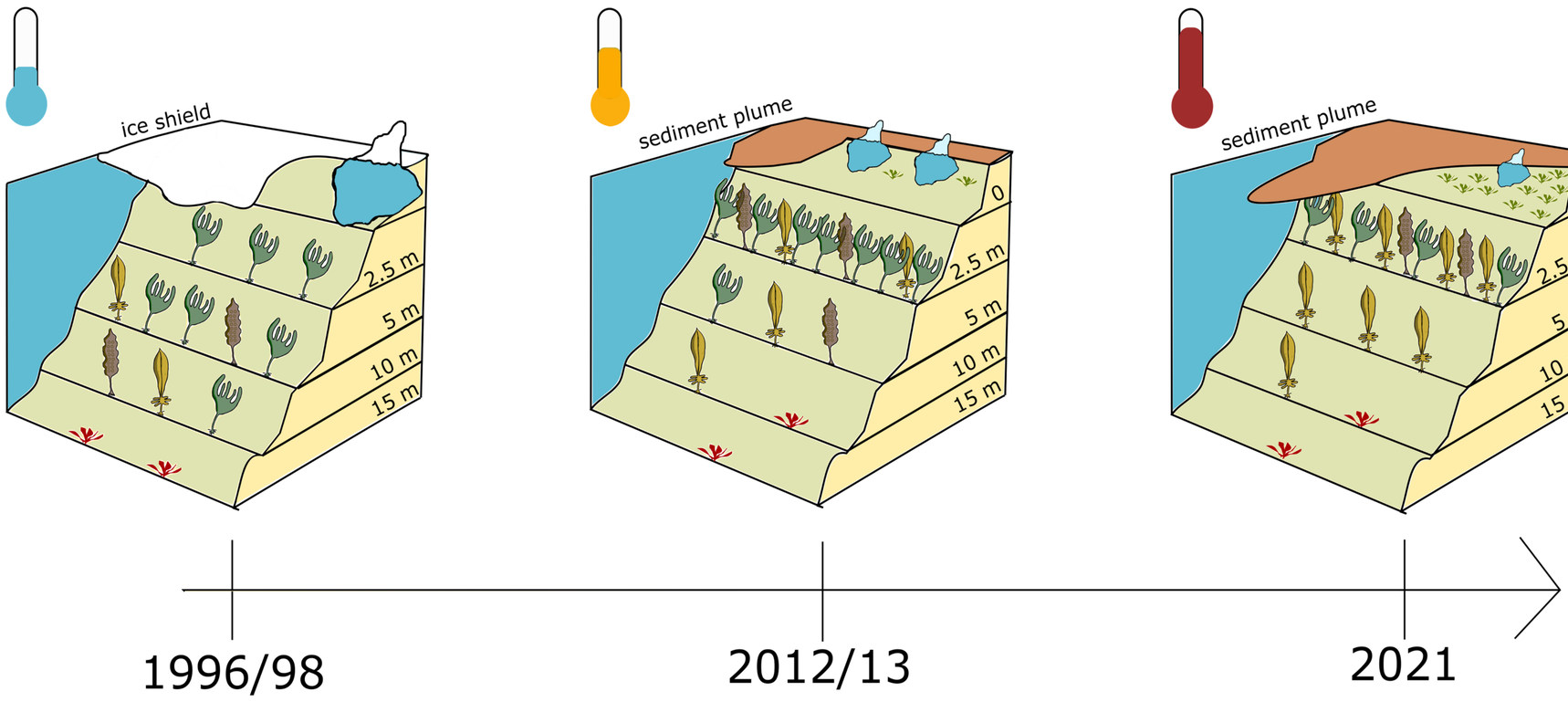
The size and density of brown kelp species can be impressive. We found up to 96 adult kelps per 1 m^2 of up to 1 kg and 2-3 m length.

Change of the kelp forest in Arctic Kongsfjorden over time

Over the past 25 years there was an upward shift in dominant macroalgal species resulting in changing kelp abundances and benthic community structure and an overall reduced primary productivity in the shallow subtidal.



Study location: Kongsfjorden in western Spitsbergen, located at 79° N



Macroalgae are major primary producers and ecosystem engineers along the rocky shores of the Arctic. With Svalbard being a hotspot of global warming, the overall retreat of the yearly ice cover and increase in turbidity through glacial melt have altered the light availability, disturbance regimes and nutrient supply for Arctic seaweeds.

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