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Estimating global warming and natural variability signals in the ocean south of Iceland

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The temperature in the Atlantic waters south of Iceland has increased by about 1°C since 1995 with most of the rise occurring before 2000. A similar rise in air temperature in Iceland was observed simultaneously and the rise in temperature is often interpreted as being caused by global warming. Many effects of this in the ocean and on land such as changed distribution of marine species in the area as well as melting of glaciers in Iceland have been attributed to this rising temperature. However, it is unlikely that this rapid increase in temperature was solely due to global warming, especially since it was accompanied by an increase in salinity. It is more likely that there was a change in the ocean circulation in the area leading to more sub-tropical water entering the sub-polar gyre causing a shift in temperature and salinity. A similar increase in temperature and salinity was observed earlier during 1930-1964 in this area. Between the two warm periods the waters were dominated by lower temperature and salinity. These changes have been related to the Atlantic Multidecadal Oscillation. By comparing the water mass properties in the two warm periods it is possible to estimate the relative contribution from natural variability and global warming for the recent warm period. It will be shown how the retreat and advancing of glaciers in Iceland are in harmony with the changes in water mass properties in the waters south of Iceland. It is important that decisions about how to adapt to coming climate change are based on how much of the observed change is due to natural variability and global warming respectively. This is a method that can be used in other areas of the northern North Atlantic.