



Past and ongoing changes in the North Sea and its interface regions

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This study is part of the North Sea Climate Change Assessment to be published in 2015. The presentation concerns the North Sea itself, for:

temperature, salinity and stratification; currents and circulation; mean sea level, extreme sea levels (contributions from wind generated waves and storm surges); CO₂, pH, nutrients and oxygen; suspended matter and turbidity; sedimentation, morphology and coastal erosion; sea ice; the Wadden Sea. "Past and ongoing" in principle covers a period of 200 years up to the present. For each variable, as appropriate, there will be an outline history, an assessment of evidence and a description of state and trends.

Some conclusions are:

- strong evidence of warming, especially since the 1980s, despite temperature variability on all time-scales; the largest rises have been in the south-east
- shorter-term variations in salinity exceed any climate-related changes
- northern inflow to the North Sea correlates with the North Atlantic Oscillation; otherwise currents are very variable on various timescales of forcing (by tides, winds, seasonal density)
- mean sea level in the North Sea rose by about 1.6 mm/year over the past 100-120 years
- extreme sea levels rose primarily as a result of the rise in mean sea level
- there is net CO₂ uptake from atmosphere
- the North Sea is a net nitrogen sink for the Atlantic
- suspended matter and turbidity are very variable, influenced by river inputs, seasons, tidal resuspension and advection (spring-neap modulation), waves and stratification
- coastal erosion is extensive but irregular; however, some sectors accrete.

Studies attempting to attribute changes to, for example, anthropogenic forcing, are still needed for the North Sea, to assess consistency between observed changes and our expectations and so to inform our level of confidence in projections of expected future.