

Sea temperature

What is the issue?

The UN Intergovernmental Panel on Climate Change (IPCC) concluded in its Fourth Assessment report that it is 'likely' that anthropogenic forcing has contributed to the observed warming of the upper several hundred metres of the global ocean during the latter part of the 20th century. Both sea and land surface temperatures in, and bordering, the OSPAR maritime area have increased from 1995 to 2004 at a rate which is well above the global mean (ICES, 2008a).

What has happened and how confident?

In the OSPAR Region II (North Sea) the rate of warming is about 1–2°C over the past 25 years whereas in the western OSPAR Regions the warming is less (0.4–0.8°C) and evidence suggest that summer periods in the North Sea surface waters have become longer and warmer and winters have become shorter and less cold. The increase in temperature in OSPAR Region IV (Biscay and western Iberia) is lower in the south and is also strongly influenced by upwelling (ICES, 2008a).

The strong influence of regional weather patterns (North Atlantic Oscillation (NAO) and NAM, the Northern Annular Mode, a hemispheric scale pattern of climate variability) and ocean circulation (North Atlantic Current) means that the global warming signal is only partly reflected in the temperatures of European Seas (ICES, 2008a) and it is apparent that natural variability is still the dominant forcing factor on temperature change in the European Seas (IPCC, 2007a).

Over a longer timescale, sea surface temperature (SST; Rayner *et al.*, 2003) for the area 45°–60°N, 3°–20°W (the eastern part of Region V and border with Region III) exhibits a linear warming trend of 0.38°C over the 1900 to 2007 period, but very strong warming since the early 1990s, with the warmest years in the record being 2007, 2006 and 2005 (Cannaby and Hüsrevoğlu, 2009).

What might happen?

The IPCC projects future ocean warming to be relatively large in the Arctic, with less warming over the North Atlantic (e.g. Xu *et al.*, 2005). However, changes in SST for the different geographic regions across Europe are difficult to predict as the resolution of the coupled-ocean atmosphere models used is not high enough (EEA, 2008).

Are there any OSPAR regional differences?

The surface waters in all OSPAR regions warmed in 1999–2008 relative to the period 1971–2000 (Figure 3.1.1). In the North Sea, the monthly mean sea surface temperatures (SST) has exceeded the long-term mean since the late eighties. This warm period peaked in 2002, which was the warmest year since the beginning of [area-averaged] SST recordings in 1968.

In Region III (Celtic Seas), work by Cannaby and Hüsrevoğlu (2009) an analysis of a nearshore time-series (Malin Head) exhibits a linear warming trend of 0.85°C over 1958–2006 with the warmest years in the record occurring since 1995. They carefully attribute about half of this warming to anthropogenic climate change.

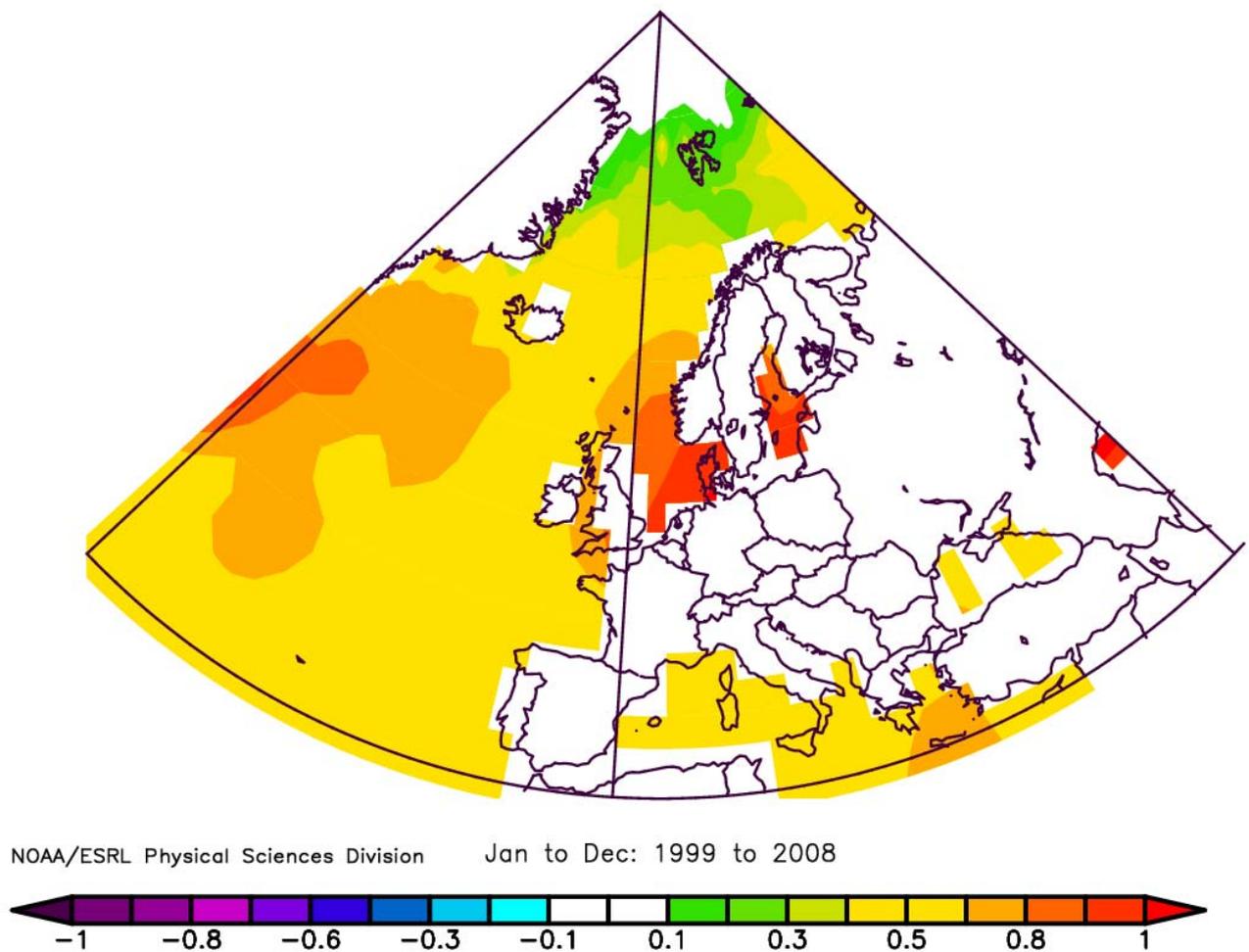


Figure 3.1.1 Annual mean sea surface temperature (SST) anomaly for the OSPAR region, showing the mean of the period 1999–2008 minus the 1971–2000 mean. The plot uses an extended reconstruction of global SST data (NOAA_ERSST_V3 data provided by the NOAA/OAR/ESRL PSD, Boulder, Colorado, USA <http://www.cgd.noaa.gov/>)

➔ [Go to the full QSR assessment report on impacts of climate change \(publication number 463/2009\)](#)

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