

Climate of UK waters at the millennium: status and trends

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The UK Inter-Agency Committee on Marine Science and Technology (IACMST) has produced a report and website summarizing the present status and trends of marine physical parameters and plankton in UK waters. Parameters included are sea surface temperature, salinity, sea level, waves, plankton, and the weather. Some of these may be indicative of climate change. The report puts recent conditions into the context of longer-term trends and wider factors, for example the North Atlantic Oscillation (NAO), which is a significant factor in the variation of marine parameters in UK waters.

Keywords: chlorophyll, climate, NAO, nutrients, plankton, salinity, sea level, sea temperature, UK waters, waves, weather.

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The effective and sustainable management of the UK's marine environment needs the comprehensive collection and use of marine data in order to assess its present state, identify changes, and meet future forecasting needs. As a first step towards this, data provided by a number of organizations have been used to produce a document (Alcock and Rickards, 2001) for the UK Inter-Agency Committee on Marine Science and Technology (IACMST). This describes the present (1999/2000) status and trends of weather, climate, sea temperature, salinity, sea level, waves, and plankton in UK territorial waters. Some data from adjacent areas are included to provide a regional and global context. There are also some representative data sets of chlorophyll and nutrients. It is intended that this will be the first of a series of ocean climate status and trends reports for UK waters.

This poster presentation summarizes the aims of the report and its conclusions; the latter illustrated by sample time-series plots of temperature (Figure 1) and plankton (Figure 2). The general aim of the document is to demonstrate the value of long-term marine measurements in aiding the effective management of the UK's marine environment, thus encouraging their commencement, their continuation, or their restoration. More specific aims are to:

- 1) stimulate further scientific study of the parameters and their interactions
- 2) increase public awareness of the present status and trends in UK waters
- 3) enhance marine data inventories
- 4) provide reference measurements for the validation of, and assimilation into, operational marine forecasting models (EuroGOOS, 1996)
- 5) enhance the use of marine indicators of climate change (Hulme and Jenkins, 1998; DETR, 1999), whether due to natural variability or as a result of human activity, and
- 6) provide input to a wider study on Environmental Indicators and the State of the Seas by the UK's Marine Pollution Monitoring Management Group.

The main conclusions of the report are:

- 1) Sea surface temperatures at most sites show a warming trend during the 20th century, but with lower values in 1999 and 2000 compared to 1998.
- 2) Salinity (both surface and bottom) records show considerable interannual variation, but do not indicate any overall long-term trend in recent decades. Generally, salinities in 1999 and 2000 were lower than in 1998.
- 3) Mean sea level, relative to the land, rose by about 1.5 mm per year in the 20th century, but is now rising on average less fast than over a base period of 1921–1990. Trends in extreme sea levels match those of mean sea level closely, but there are no significant long-term trends in surge levels.
- 4) Although there is large spatial and temporal variability in wave height, there is evidence of an increase between the 1960s and 1990s.

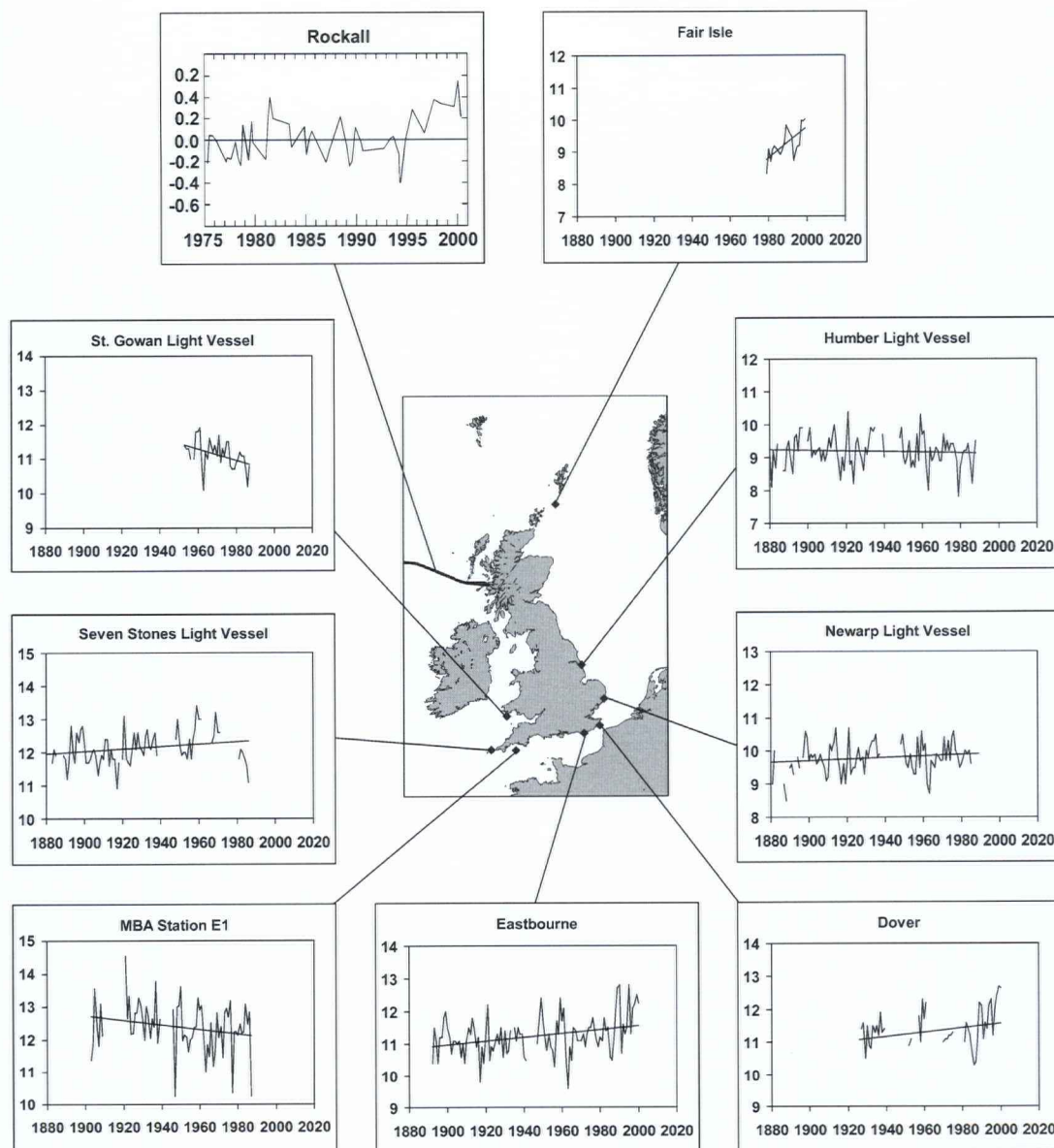


Figure 1. Annual SST °C (with trend line) at sites around the UK. Note: Rockall shows anomalies from de-seasonalized averages over the upper 800 m with no trend line.

- 5) The abundance of the zooplankton *Calanus finmarchicus* has declined in the North Sea and the NW Approaches since the 1960s. Elsewhere, numbers are relatively low and show considerable interannual variability, making it difficult to infer any trends.
- 6) The abundance of phytoplankton shows an upward trend since the 1960s, except in the Irish Sea.
- 7) Any trends in nutrients, metals, or biological parameters are difficult to infer from existing measurements, because of short sampling duration or interannual variability in the longer records.
- 8) There is potential to monitor the status and trends of chlorophyll from the operational SeaWiFS instrument.
- 9) Changes in the North Atlantic Oscillation, and hence the strength of the westerly airflow, are a significant factor in the variation of marine parameters in UK waters.
- 10) Contemporary data for some parameters are not available because measurements have never been made or have been discontinued.

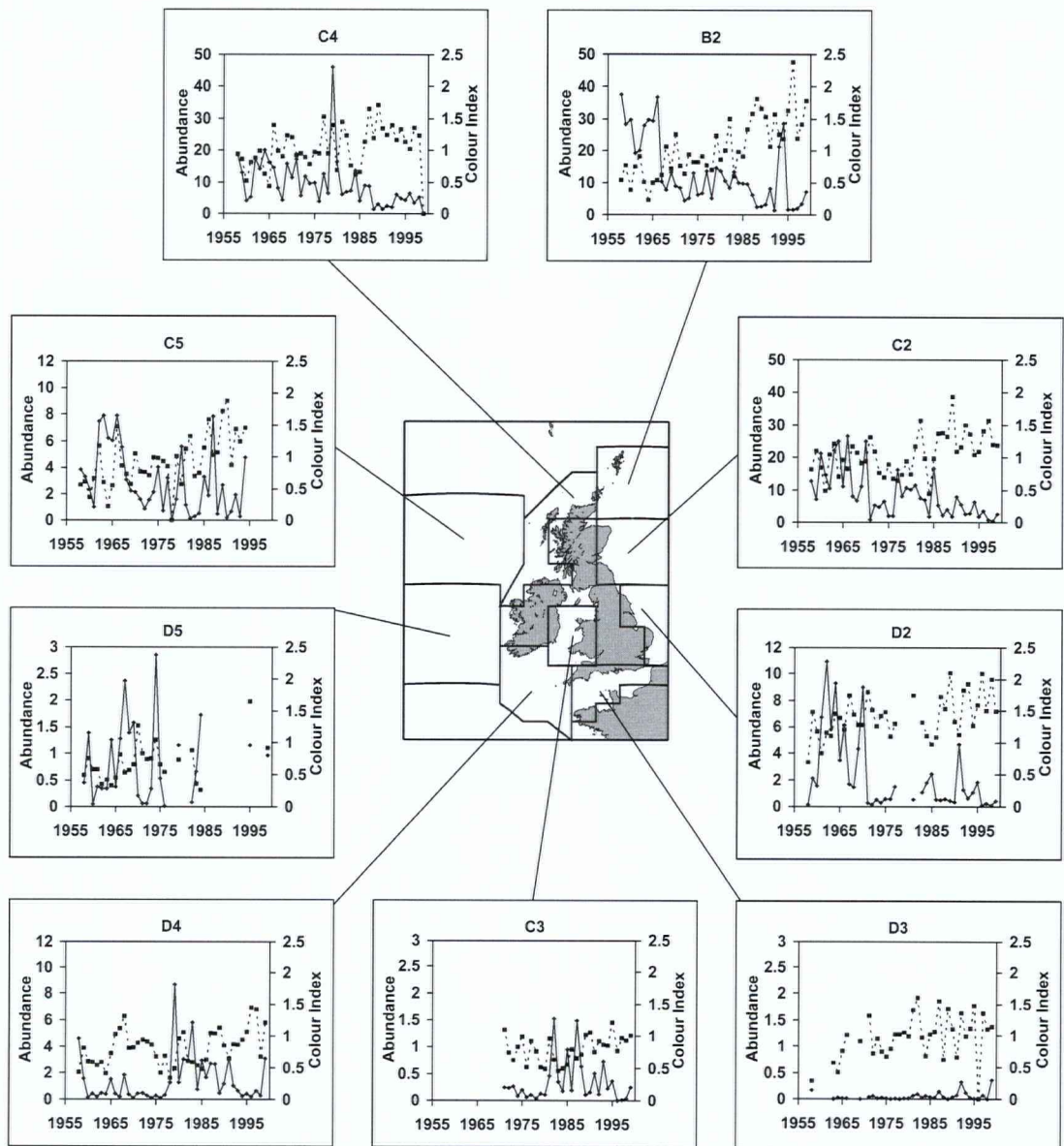


Figure 2. Annual abundance of zooplankton and phytoplankton from the CPR. Dotted lines with squares = colour index, solid line with diamonds = abundance of *Calanus finmarchicus*. Note changes of scale in zooplankton abundance.

- 11) Much better use can be made of existing data, especially if processing methods are standardized and data dissemination improved, including the timely provision of data to users and national, regional, and international data banks.
- 12) The existing observation programmes provide a sound basis for a comprehensive observation, processing, and analysis programme for UK waters. This is needed to assess the present state and trends of the UK's marine environment, as a necessary part of its effective management.

A web version of the document is available (www.oceannet.org/UKclimate-status), together with links to other sites containing marine data and information.

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