



## **Global trends in significant wave height and marine wind speed from the ERA-20CM**

Ole Johan Aarnes and Øyvind Breivik  
Norwegian Meteorological Institute, Bergen

The ERA-20CM is one of the latest additions to the ERA-series produced at the European Center for Medium-Range Weather Forecasts (ECMWF). This 10 member ensemble is generated with a version of the Integrated Forecast System (IFS), a coupled atmosphere-wave model. The model integration is run as a AMIP (Atmospheric Model Intercomparison Project) constrained by CMIP5 recommended radiative forcing and different realizations of sea-surface temperature (SST) and sea-ice cover (SIC) prescribed by the HadISST2 (Met Office Hadley Center). While the ERA-20CM is unable to reproduce the actual synoptic conditions, it is designed to offer a realistic statistical representation of the past climate, spanning the period 1899-2010.

In this study we investigate global trends in significant wave height and marine wind speed based on ERA-20CM, using monthly mean data, upper percentiles and monthly/annual maxima. The aim of the study is to assess the quality of the trends and how these estimates are affected by different SST and SIC. Global trends are compared against corresponding estimates obtained with ERA-Interim (1979-2009), but also crosschecked against ERA-20C - an ECMWF pilot reanalysis of the 20th-century, known to most trustworthy in the Northern Hemisphere extratropics.

Over the period 1900-2009, the 10 member ensemble yields trends mainly within +/- 5% per century. However, significant trends of opposite signs are found locally. Certain areas, like the eastern equatorial Pacific, highly affected by the El Niño Southern Oscillation, show stronger trends. In general, trends based on statistical quantities further into the tail of the distribution are found less reliable.