Bringing together measurements of sea surface temperature made in situ with retrievals from satellite instruments to create a globally complete analysis for 1850 onwards, HadISST2

John Kennedy (1), Nick Rayner (1), Michael Saunby (1), and Sarah Millington (2)

(1) Met Office Hadley Centre, (2) Met Office

The new version of the Met Office Hadley Centre sea-Ice concentration and Sea-Surface Temperature data set, HadISST2, builds on the successful elements of HadISST1. It brings together satellite and in situ data to create a globally complete, homogeneous record of SST from 1850 to the present and features the following key improvements.

1. Improvements to source data sets: HadISST2 is based on version 2.5 of the International Comprehensive Ocean Atmosphere Data Set (ICOADS), which contains several million more observations than the in situ data set on which HadISST1 was based. Improved AVHRR data from version 5 of the Pathfinder data set are being used, as are SSTs from the ATSR Reanalysis for Climate (ARC) data set. Sea ice data sources have also been updated and extended.

2. Bias corrections: more comprehensive homogeneity adjustments are applied to the in situ SST, AVHRR SST and sea ice retrievals to correct for known biases in the data. The ATSR data come from ARC (ATSR Reprocessing for Climate) which has proven low uncertainty. A large ensemble of in situ SST data sets allows for smooth matching between the in situ and ARC records.

3. Marginal Sea-Ice Zone SST's are now better specified, accounting for climatological differences in salinity.

4. Improved reconstruction techniques allow us to make use of every single observation to inform the estimation of the data covariances and reconstruction. These techniques also mean that we can make a reconstruction of the data at a resolution of 1 degree all the way back to 1850. By separately analysing large and small scale structures, fine scale features that are supported in the data are preserved.

5. Increased resolution: the base SST climatology is now 0.25x0.25 degrees and daily resolution allowing improved representation of features such as the Gulf Stream.

6. Uncertainties: HadISST2 is presented as a set of realisations drawn from the posterior distributions of the analyses. These explore the uncertainty range associated with data biases and analysis uncertainty. Each realisation has realistic and more homogeneous spatial variability that is consistent with the known covariance structure of SST, the available observations and their uncertainties