



PROJECT DELIVERABLE

Work package 3: Earth system observations

Deliverable D3.15: HadISST2 updates

Type: Other

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Notes: See description of dataset updates on the following page.
The updated HadISST2 dataset has been received by ECMWF.
Preliminary assessments are satisfactory.



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Updates to the pentad-derived HadISST.2.1.0.0 fields were made to resolve a problem in the Arctic in periods of low sea ice extent; this resulted in HadISST.2.1.1.0, which was delivered in April 2015. In addition, the SST analysis has been completely revised for the development of HadISST.2.2.0.0 using new data sources (ESA CCI SST AVHRR retrievals), new methods of quality control and use of ship data and the updates to the analysis technique developed for HadISST.2.1.1.0.

Local-scale interpolation is now based on angular distances, rather than actual distances on the ground. This makes the estimation of the length scales and the local interpolation numerically more stable, which means that larger areas can now be used in the local interpolation. The large scale reconstruction was made globally complete using inverse distance weighting and the marginal ice zone temperatures were added in as “pseudo-observations” for the local scale interpolation. This resolves the problem seen in the Arctic during the summer of 2007 (in HadISST.2.1.0.0) and ensures that the reconstruction is consistent with the marginal ice zone temperatures at all other times.

The bias adjustment of the in situ data is based on improvements to HadSST3 made in preparation for the next release, HadSST.3.2.0.0. Buoys are now used as the baseline for all adjustments which means that the in situ and satellite data sets are easier to reconcile. Fewer realisations of the in situ bias adjustments are needed to find a good match to ARC. In addition, a broader range of historical bias adjustments are now incorporated into the ensemble, which should give a greater coverage of historical uncertainty than previously. In the modern period, improved ship adjustments are available estimated using differences from drifting buoys.

In some cases, it is now possible to estimate biases for individual ships. Biases are estimated for all identifiable ships, based on a very low resolution (5° monthly) pre-analysis which incorporates our best understanding of the in situ error covariances. In many cases, the posterior distribution of the estimated bias is similar to the prior, but in others, usually where a ship is making measurements in sparsely observed regions, we get an improved posterior estimate of the bias. The estimated biases are used to adjust ship and buoy observations on a month-by-month basis, reducing the effect of “ship tracks” particularly early in the record.

The AVHRR bias adjustment was modified to account for the different character of the SST CCI data. The SST CCI data has lower uncertainties than the Pathfinder data used previously, but there are some days for which the data are strongly biased. A latitudinal correction was applied to each pentad field based on differences between the ARC or in situ data and the SST CCI AVHRR. Once this latitudinal difference was removed, the differences were reconstructed as before, using an EOF based analysis. In a first run through, some strongly biased drifting buoys were identified in the South Atlantic, Tropical Pacific and Indian Ocean, which affected the AVHRR adjustments. These were removed by hand.

There are also some minor changes made to processing of HadSST and HadISST so that they are more consistent in the way that they handle gridding, uncertainty and bias estimation.

Changes have been made to the sea ice in HadISST.2.2.0.0 compared to version 2.1.0.0 in both the Northern (NH) and Southern (SH) Hemispheres.

The NH passive microwave data (November 1978 onwards) are now a little more extensive (i.e. ice is now found in some grid boxes that previously contained open water). New bias adjustments have now been calculated and applied for the period 1972-1978, which have increased the concentrations/extents for these months compared to HadISST.2.1.0.0.

The SH fields prior to 1973 are based on two different periods (1929-39 and 1947-62) for which we have monthly climatologies. The transitional periods between these climatologies



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and the post 1972 data (based on the SH NIC charts and passive microwave data) have been extended and a new method to calculate fields during these gaps has been implemented. This has resulted in a smoother time series of concentrations/extents with more gradual changes through time.



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