

Assessing bias corrections in historical sea surface temperature using a climate model

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Time series of sea surface temperature (SST) are strikingly inhomogeneous before 1942 in many parts of the world when compared to those of colocated nighttime air temperatures measured near the ocean surface. Associated with the discontinuity is a sudden change in the assessed annual cycle of SST in many extratropical regions. In the 1990s methods were devised to adjust for the associated inhomogeneities in worldwide SST using an integrated statistical analysis and physical model.

The bias adjustments have been tested using a climate model (HadAM2b) run in ensemble mode forced with two different global time-varying SST data sets, one containing the adjustments and one without. The ability of the model to simulate the global observed land surface air temperature timeseries from 1871 is substantially and highly significantly better with adjusted SST. Many large regions and different phases of the seasonal cycle also show a strong improvement, supporting the use of these adjustments by successive reports of the Intergovernmental Panel on Climate Change. Some differences of behaviour in the new I-COADS data set are mentioned which will require new tests.