Geophysical Research Abstracts
Vol. 20, EGU2018-783, 2018
EGU General Assembly 2018

New estimates of uncertainty in the marine surface temperature record

Giulia Carella (1,2), John J. Kennedy (3), David I. Berry (2), Shoji Hirahara (4), Christopher J. Merchant (5,6), Simone Morak - Bozzo (5), and Elizabeth C. Kent (2)

(1) Le Laboratoire des Sciences du Climat et de l'Environnement, Extremes-Statistics-Impacts-Regionalization, Gif-sur-Yvette, France (giulia.carella@lsce.ipsl.fr), (2) National Oceanography Centre, Southampton (UK), (3) Met Office Hadley Centre, Exeter (UK), (4) Japan Meteorological Agency, Tokyo (Japan), (5) Department of Meteorology, University of Reading, Reading (UK), (6) National Centre for Earth Observation, University of Reading, Reading (UK)

Sea Surface Temperature (SST) represents the marine component of surface global temperature, the indicator underpinning the Paris Agreement. However, lack of reliable observational metadata and poor knowledge of the systematic biases and their uncertainty associated with changes in the observing protocol, limit our confidence in the existing SST gridded analyses. A method will be presented to identify SST measurement practice by comparing the observed SST diurnal cycle from individual ships with a reference derived from drifting buoy observations under similar conditions of wind and solar radiation. Compared to existing estimates, we found a larger number of engine room-intake (ERI) reports post War World II and in the period 1960 – 1980. Differences in the inferred mixture of observations lead to a systematic warmer shift of the bias adjusted SST anomalies compared to previous estimates, while reducing the ensemble spread. Changes in mean field differences between bucket and ERI SST anomalies in the Northern Hemisphere over the period 1955 – 1995 could be as large as 0.5 ˚C and are not fully reproduced by current bias adjustment models. Secondly, building on the improved observational metadata, SST observations from ships in recent years were bias adjusted by modelling their differences from climate-quality satellite data within a Bayesian hierarchical spatial model and as a function of the leading drivers characteristic to the observational biases for each measurement type. A comparison with existing bias adjustments, showed that current SST estimates for the past two decades might be characterized by undetected biases, especially in the ERI record, that could affect estimates of global and regional surface temperature trends.