Globally-Gridded Night-Time Marine Air Temperatures

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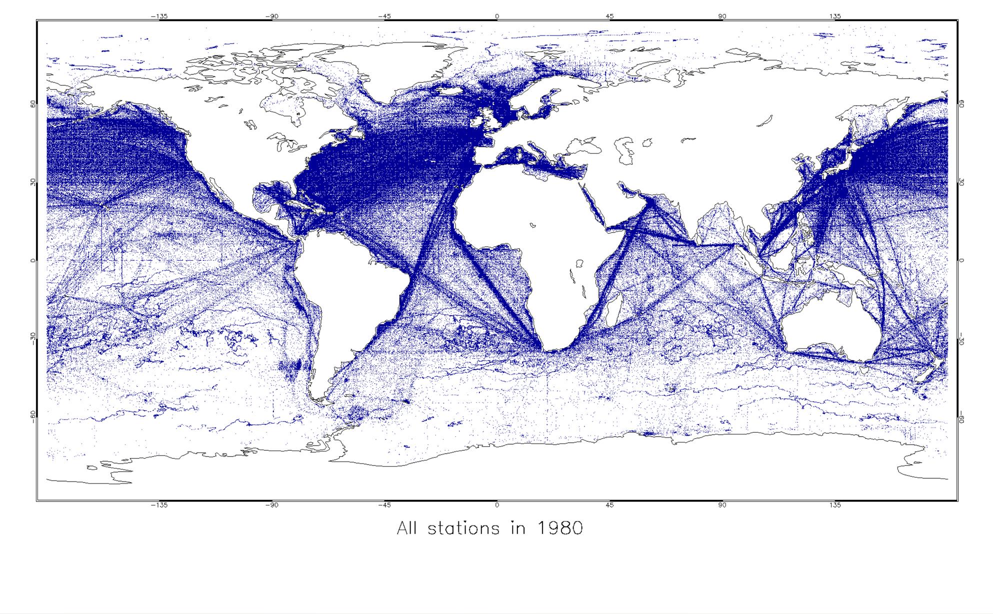
INTRODUCTION

Near surface air temperature over the oceans is a relatively unused parameter in understanding the current state of climate, but is useful as an independent temperature metric over the oceans and serves as a geographical and physical complement to near-surface air temperature over land. Though one other version of this dataset exists (MOHMAT/HadMAT), it has been strongly recommended that various groups generate climate records independently, which is one goal here.
This University of Alabama in Huntsville (UAH) study began with the construction of monthly night-time marine air temperature (UAH-NMAT) values from the mid-nineteenth century through to the present era. This study will present results which quantify the variability and trends and compare to current trends of other related datasets that include HadMAT, sea-surface temperatures (SST) and blended products (land surface air temperature and SST).

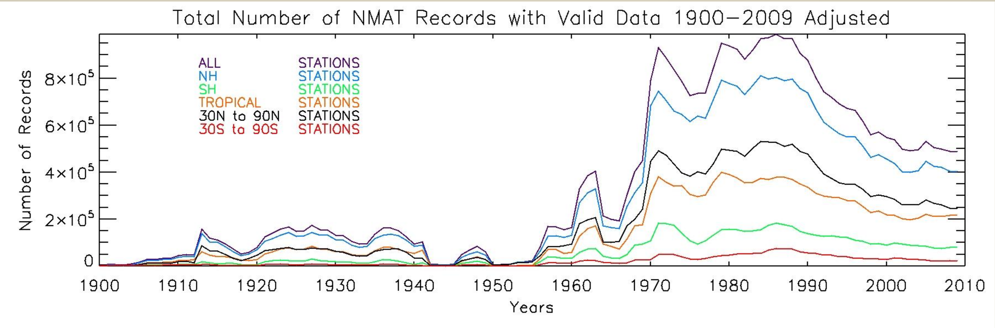
BACKGROUND

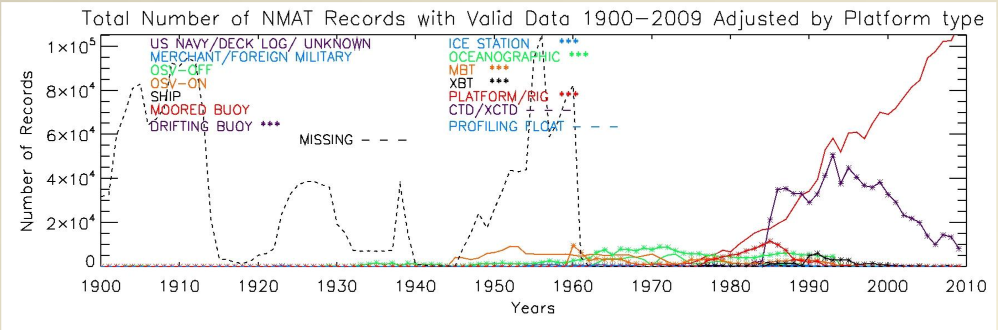
The study by Christy el al published in 2001 in the *Geophysical Research Letters* showed that there is a statistical difference between Sea Surface Temperature (SST) and near surface marine air temperature. Near surface marine air temperature is temperature just above the sea level. The majority of marine air surface observations occur on ships. The solar deck heats during the day which introduces a warm bias during the day. Only night-time marine air temperatures are used for this reason. For the purpose of this study, night is defined as one hour after sunset and one hour after sunrise to mitigate the impacts of the residual heat.

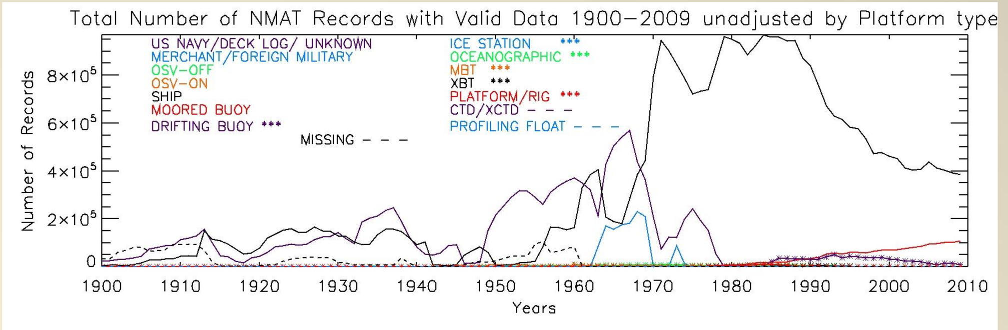


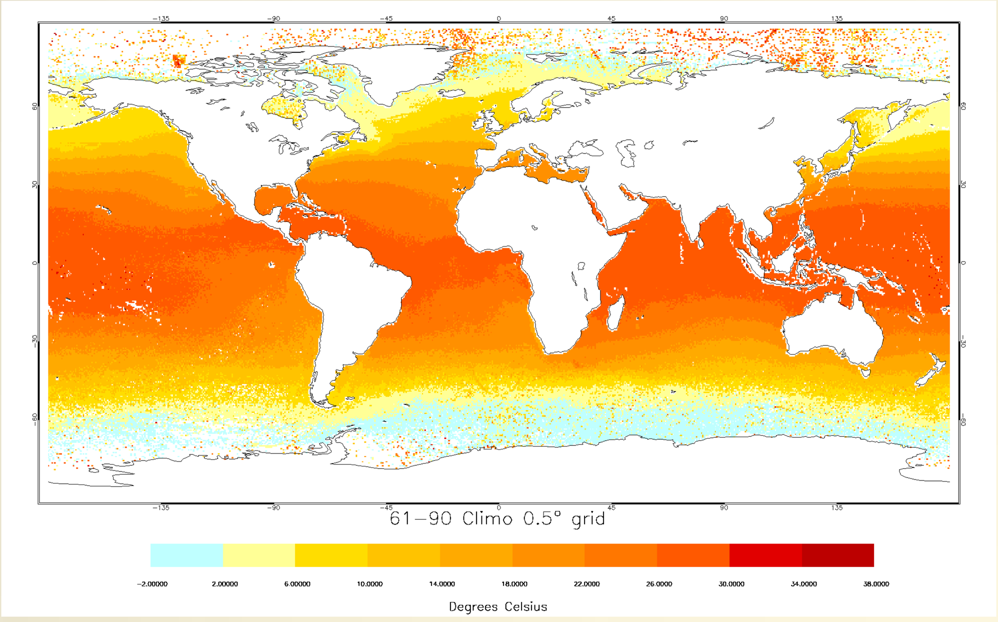
All stations in 1980

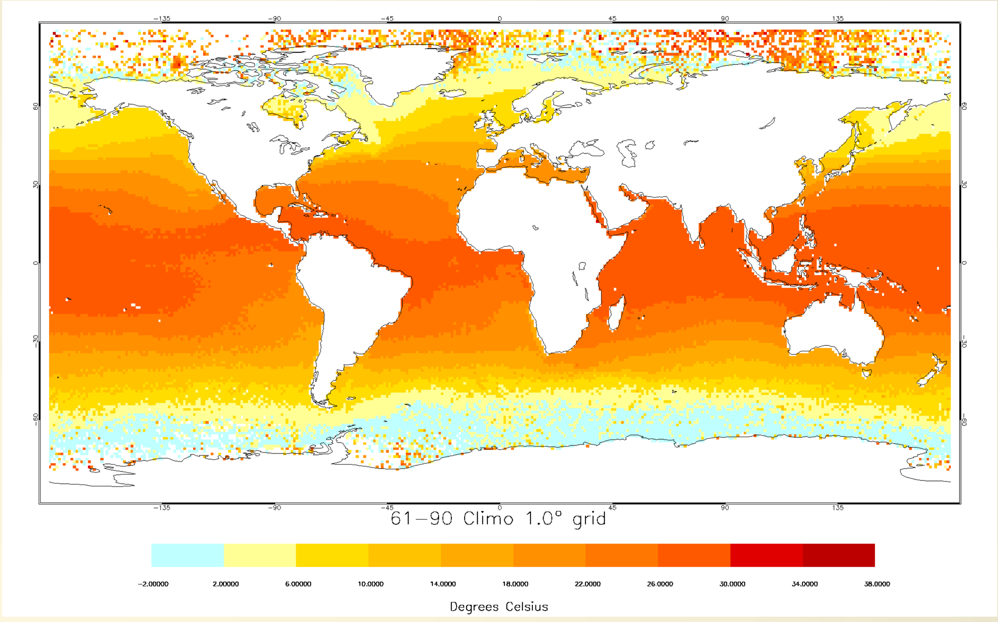
Supplemental images/information can be found at
http://ats.uah.edu/~rjunod/research.html

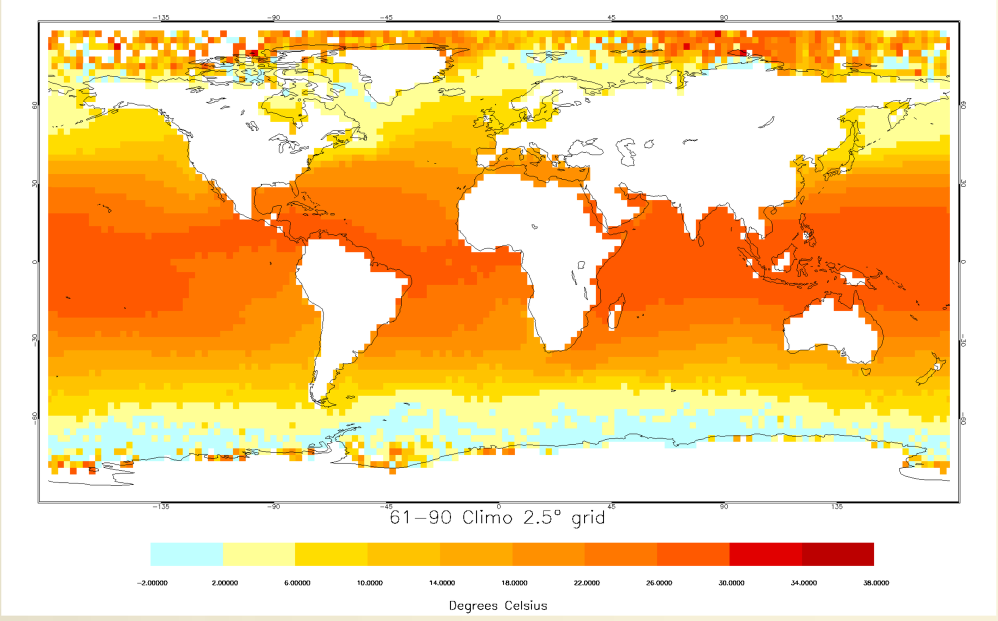


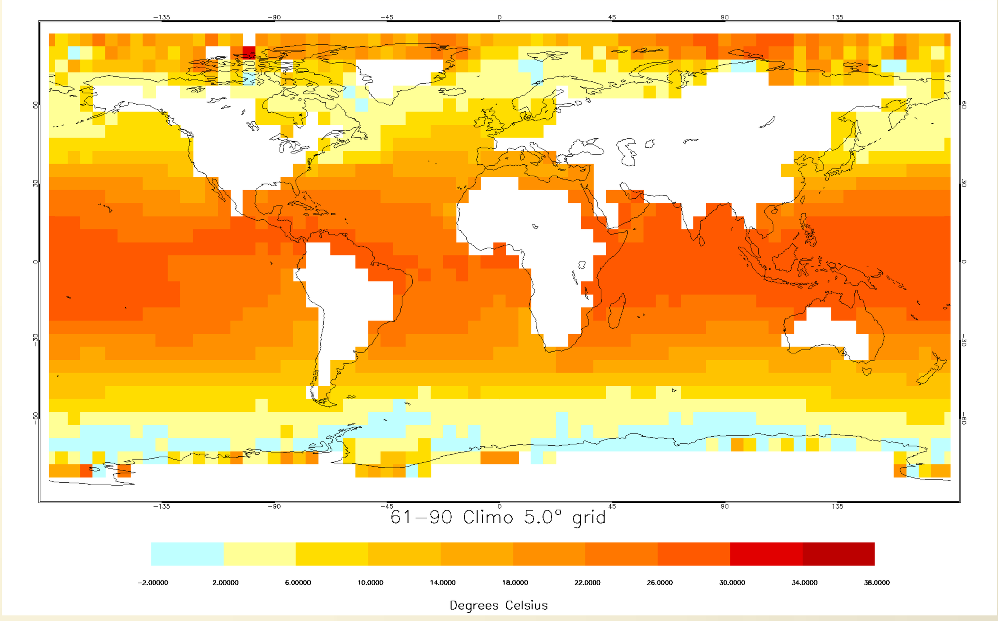


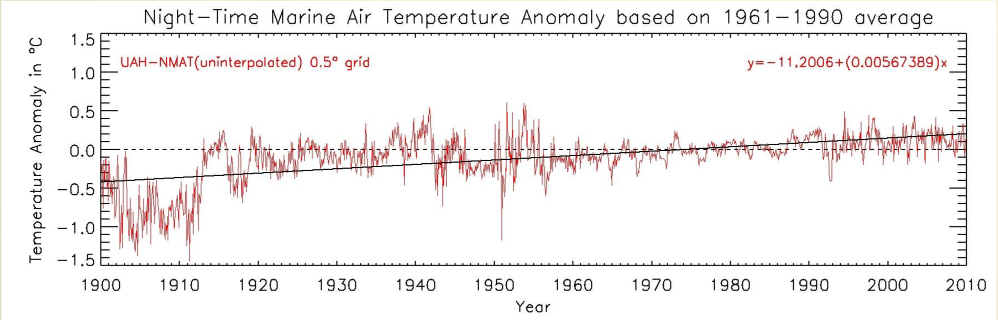


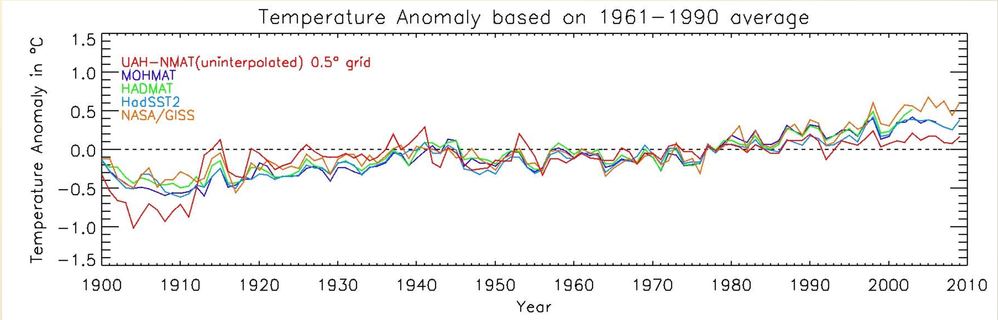


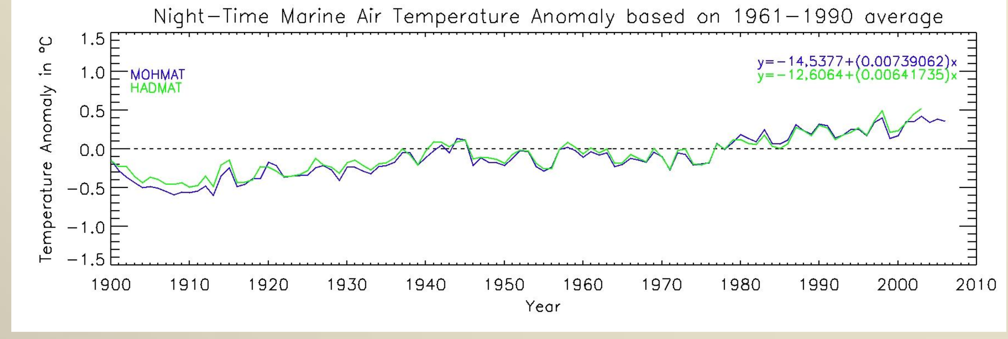


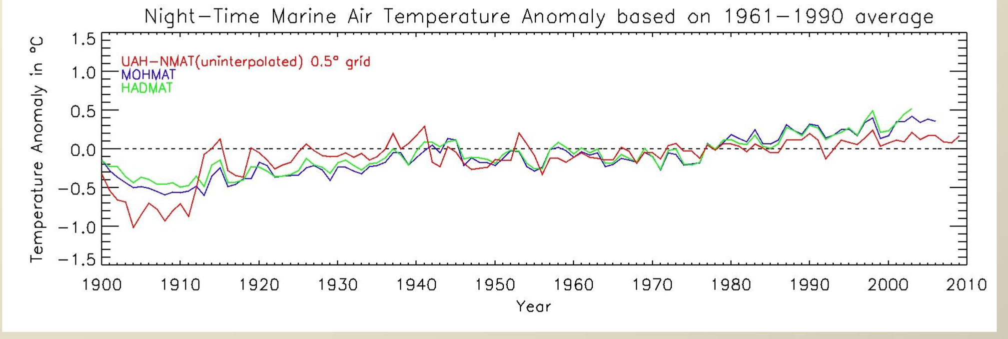


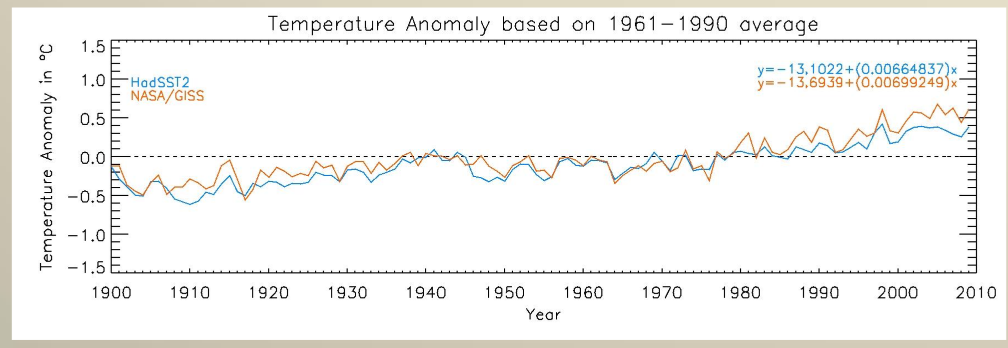


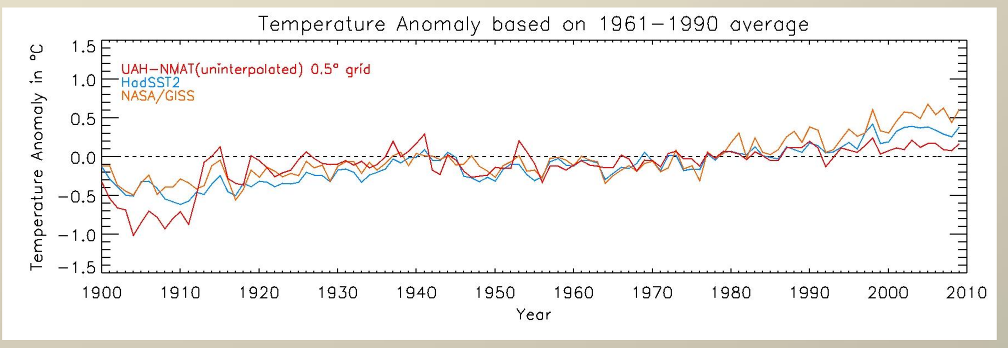












TREND (°C/decade)	1915-END	1900-END
UAH	0.0574	0.0567
MOHMAT	0.0723	0.0739
HadMAT	0.0644	0.0642
HadSST2	0.0665	0.0665
GISS	0.0726	0.0699

METHODS AND DATA

Data from the International Comprehensive Ocean and Atmosphere Data Set (ICOADS) were used to compile a complete time series of gridded UAH-NMAT. ICOADS encompasses all marine based stations from 1662 to the current year. ICOADS includes has several different platform types (ships, drifting buoys, moored buoys, oceanographic, C-MAN, ocean station vessel, and ocean drilling rigs/platforms). Each station has the ability to record different meteorological (air temperature, dewpoint temperature, atmospheric pressure, wind speed, etc.) and oceanographic data (sea surface temperature, sea state, salinity, etc).

For this study, ship and buoy observations were used. The data was sorted by night and day. Once sorted, the data was homogenized to a reference height of 15m by using a lapse rate of 6.5°C/km If the ship height was not known, a linear adjusted was made to the ship data based on the year and data from WMO pub 47 metadata for ships. Once data was homogenized, the data was sorted into a grid box and monthly averages were computed. A 1961-1990 base period was chosen in order to compare to other datasets (MOHMAT/HadMAT).

DISCUSSION/RESULTS

UAH-NMAT follows the general warming trend of MOHMAT and HadMAT. However the trend is slightly flatter. For the 0.5 grid, UAH-NMAT's trend is 0.057°C/decade. In comparison to MOHMAT's trend of 0.074°C/decade and HadMAT's trend of 0.064°C/decade. HadSST2's trend and GISS's trend were also steeper with 0.066°C/decade and 0.07°C/decade respectively.

FUTURE WORK

Further research will focus on the development of a more accurate height adjustment scheme, adding more station platforms (C-MAN, OSV, etc), extending UAH-NMAT to 1850, and blend with land surface air temperature data.

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