

**TITLE:** ARCSS Surface Air Temperature (ARCSS-SAT) Analysis

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**DATA SET OVERVIEW:**

The Arctic has long been considered a harbinger of global climate change since increases in surface air temperature (SAT) over the globe are amplified in the Arctic. These increases in SAT have a profound impact on many other aspects of Arctic climate and ecology. For example, the thinning and decrease in area of Arctic sea ice has been attributed to increases in SAT, and many plant and animal species have been migrating further north.

In order to better understand these processes, accurate fields of SAT are required, but as of yet, a robust gridded data set of SAT of sufficient length is not available over the entire Arctic, e.g. the trends in SAT over the Arctic from 1954 – 2003 shown in the ACIA (2004) report exhibit a “data void” in SAT over the Arctic Ocean. The data sets that are currently available that provide estimates of SAT over the Arctic Ocean begin in 1979 with the increase in buoy observations (Rigor et al. 2000) and satellite derived surface temperatures (e.g. Chen et al 2002; Comiso 2003). However, there are also some discrepancies between the *in situ* and satellite derived data sets, e.g. the satellite estimates of trends show cooling over the Arctic during winter where the *in situ* estimates show that temperatures have warmed.

This analysis is our best estimate of SAT over the Arctic Ocean. Briefly, the gridded fields are based on *in situ* observations from manned drifting stations, and buoy observations that have been stringently quality controlled. These quality controlled observations were then optimally interpolated, following the procedures of Rigor et al. 2000, using the NCEP/NCAR Reanalysis 1 (R1) as a first guess field. In areas far (beyond the correlation length scale) from the *in situ* observations in the Arctic, the original SAT estimate from R1 is provided. This analysis adjusts a warm bias exhibited by R1 in comparison to manned drifting station data over the Arctic Ocean, and improves the IABP/POLES SAT analysis.

- ***Time period covered by the data:*** 12-hourly gridded fields of Surface Air Temperature (SAT) from 1979-2008.

- ***Physical location of the measurement or platform:*** Global. We have interpolated this new analysis to the same grid as the NCEP/NCAR Reanalysis 1 (R1) DS90.0 grid. There are 94 latitudes and 192 longitudes. These 18048 positions are given the file SAT\_GRID.txt.

#### **DATA FORMAT**

Data are provided for each year with the names SAT\_YYYY.txt Each file has columns for year, month, day, hour, followed by 18048 values for each grid point in degrees Celcius. This is a preliminary analysis pending submission and review of the manuscript describing this analysis and our findings in more detail. These data were submitted on January 7, 2011.

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