NCAR

NSF Climate Data Guide
Community Guidance, Discussion and Information

Climate Data Guide for climate analyses and model evaluation

David Schneider, NCAR

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Climate Data Guide

Community Guidance, Discussion and Information

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- Identify the observational data set that you need for your purpose
- Learn about data set nuances, strengths and weaknesses
- Share your expertise on the data that you use or developed

ICOADS Surface Marine Weather Observations

ICOADS (International Comprehensive Ocean–Atmosphere Data Set) is the most comprehensive archive of global marine surface climate observations available. Variables include SST, SLP, air temperature, wind speed, cloud amount, and others. There is no processing beyond initial quality control. ICOADS data are packaged in several different formats with different time periods, timesteps, and grid resolutions. Scattered observations extend back to 1662, but climate scientists will probably be most interested in the monthly summary statistics that span 1800–2007 on a 2°x2° grid, or 1960–2007 on a 1°x1° grid. Preliminary data since 2007 are also provided until the next major release (This summary is based on Release 2.5).

Key Strengths

- Very long timeseries of several climate variables available in many locations
- Provides "ground truth" of the original measurements from which other, interpolated products are derived (e.g. NOAA ERSST; HadSLP2)
- Statistics such as standard deviations, precentiles, and number of observations are published along with the monthly means

Key Weaknesses

- No corrections (e.g., to account for changes in observing practices or instrumentation) are applied beyond basic quality control
- Data coverage is sparse, and creating comprehensible maps of a given climate variable can take some processing and patience
- As of January, 2012, budget cuts at NOAA have left the further development of ICOADS uncertain (see Technical Notes for more information)

Basic Information

Categories & Variables

Sea surface temperature | Ocean | Wind | Specific Humidity | Sea Level Pressure | Cloud Properties | Air Temperature | Atmosphere

Years

1650

9999

Institution / PIs

NOAA | NCAR |

Input / Data Assimilated

in situ ship and buoy measurements.

Spatial Resolution

2x2 (1800–2007); 1x1 (1960–2007)

Domain

Global |

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– ▸ Basic Information

Expert Contributors (linked to their Climate Data Guide contributions)
Deser, Clara

Expert User Guidance

#General Description

The International Comprehensive Atmosphere–Ocean Data Set (ICOADS) is the most extensive and widely used digital collection of quality–controlled surface weather observations available for the world oceans for studies of marine climate and its variability. The data set begins in 1800, and currently extends through 2007 with updates every several years. The ICOADS includes monthly values each year of sea surface temperature (SST), air temperature, wind, cloudiness, barometric pressure, and humidity, as well as derived variables such as turbulent heat and momentum pseudo–fluxes ("pseudo" because they neglect transfer coefficients). The number of observations and the standard deviation of the individual observations that make up each monthly value are also archived for each

Typical questions addressed by expert guidance:

- Applications of the data set to climate research
- The characterization of uncertainty in the data measurements or methodology
- The nature of spurious trends or jumps in data set timeseries
- Strategies for comparing the data with models
- Key strengths and limitations of the data set and comparison with similar data sets

Why participate?

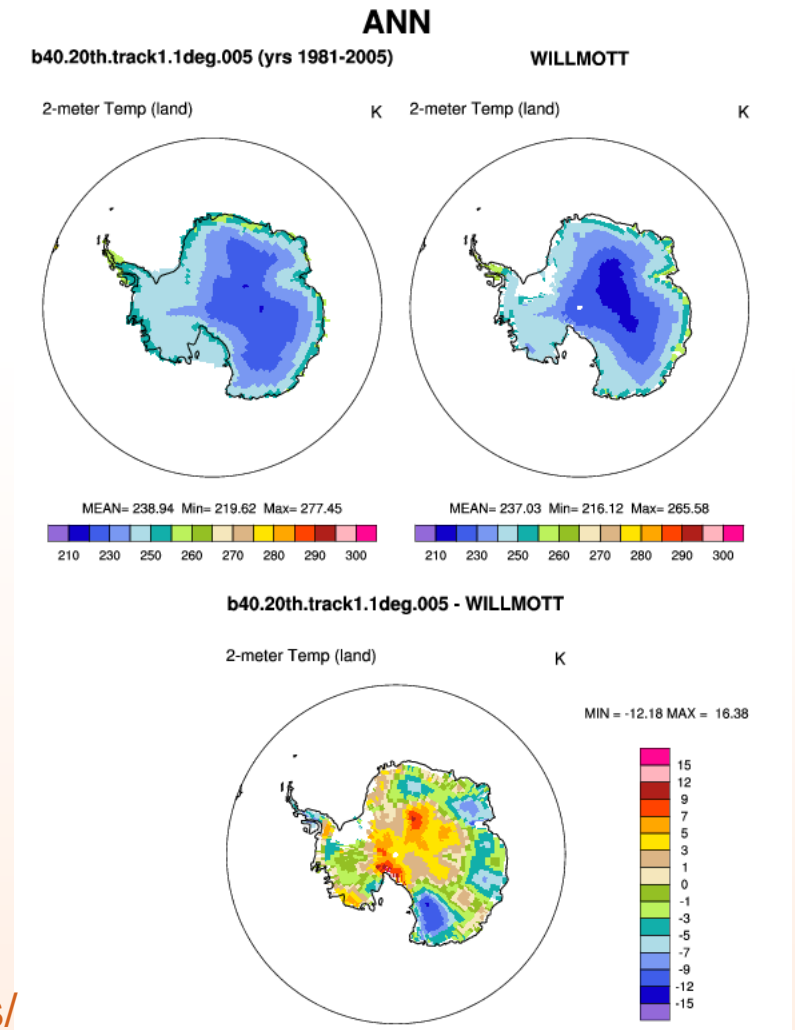
- Reach ~1500 unique visitors per month
- More visibility for your data set or science using someone else's data set
- Make your name known to a broad, international audience
  - Countries from Algeria to Zanzibar in the audience
  - Students and Professionals from academia, industry, government and NGOs are represented
- Recognition for outreach/broader impacts
- Become aware of a wide range of data sets and avoid common pitfalls in data analyses

Collaboration with CESM working groups:

- Document the data sets used in the Diagnostics Packages
- Find these data sets easily via Climate Data Guide
- Example: Atmospheric Model Working Group (AMWG)

AMWG Diagnostics Package

- 600+ plots generated comparing model output with almost 30 observational data sets
- Little documentation



http://www.cgd.ucar.edu/amp/amwg/diagnostics/
http://www.cgd.ucar.edu/amp/amwg/diagnostics/plotType.html
http://www.cesm.ucar.edu/experiments/cesm1.0/

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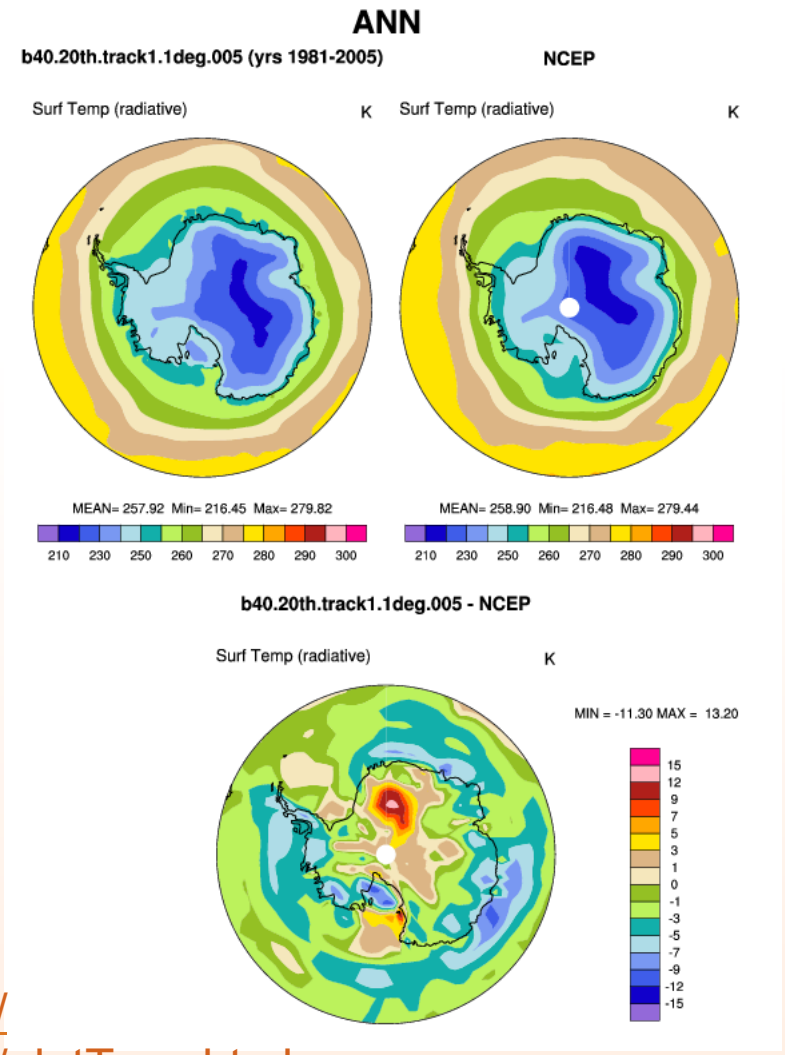

http://www.cgd.ucar.edu/amp/amwg/diagnostics/
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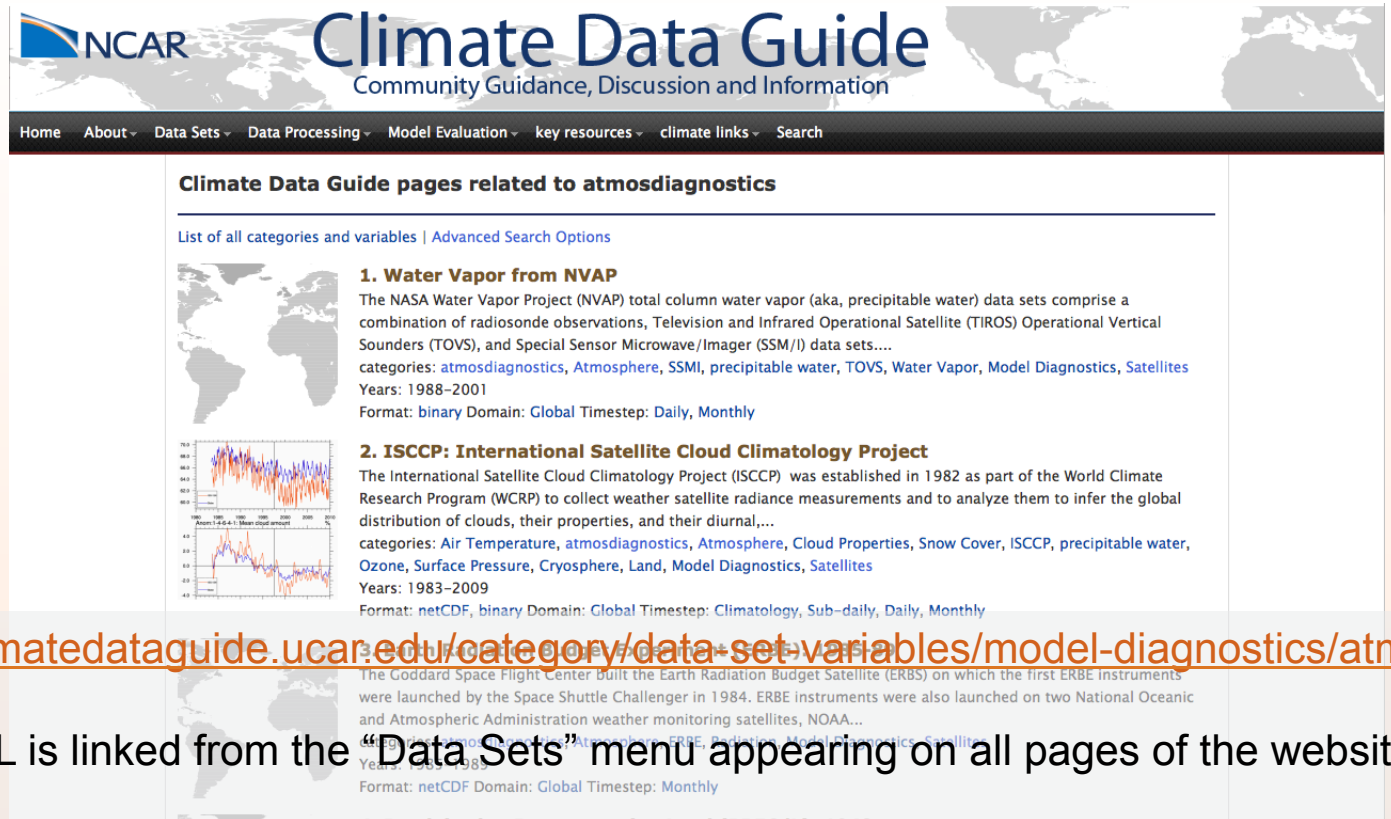
http://www.cesm.ucar.edu/experiments/cesm1.0/

Diagnostics data sets via Climate Data Guide

- We are collecting information and expert guidance on numerous diagnostic data sets
- When a data set is added, it is tagged and the list of diagnostics data is automatically updated



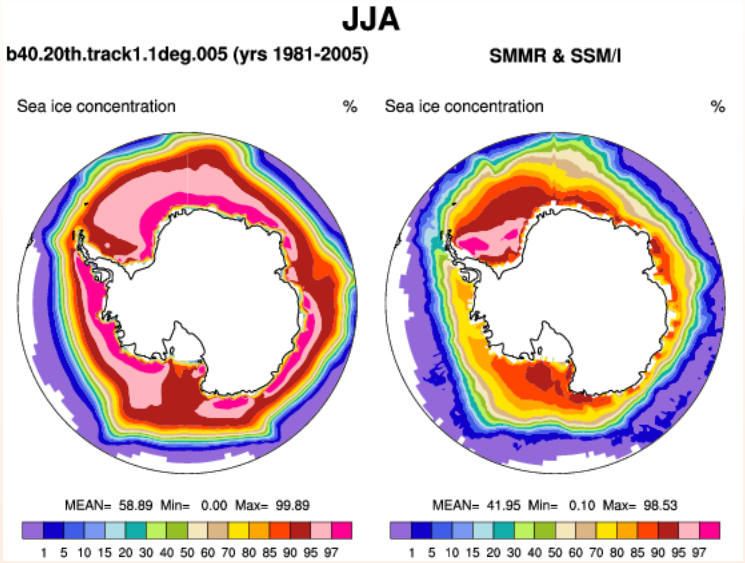
http://climatedataguide.ucar.edu/category/data-set-variables/model-diagnostics/atmosdiagnostics

(this URL is linked from the "Data Sets" menu appearing on all pages of the website)

Quick evaluation of ocean around Antarctica using diagnostics (b40.20th.track1.1deg.005)

- Too much sea ice (vs. SSM/I & HadiSST)
- Too cold (vs. Wilmott & NCEP)
- **Not cloudy enough (vs. ISCCP, Cloudsat, Cloudsat-COSP*, Calipso*)**
- **Too dry (vs. GPCP, NVAP)**
- Downward LW Flux too low (vs. ISCCP)
- Upper Ocean too cold (vs Levitus)

- **Too cloudy (vs. Warren)**
- **Too wet (vs Modis)**

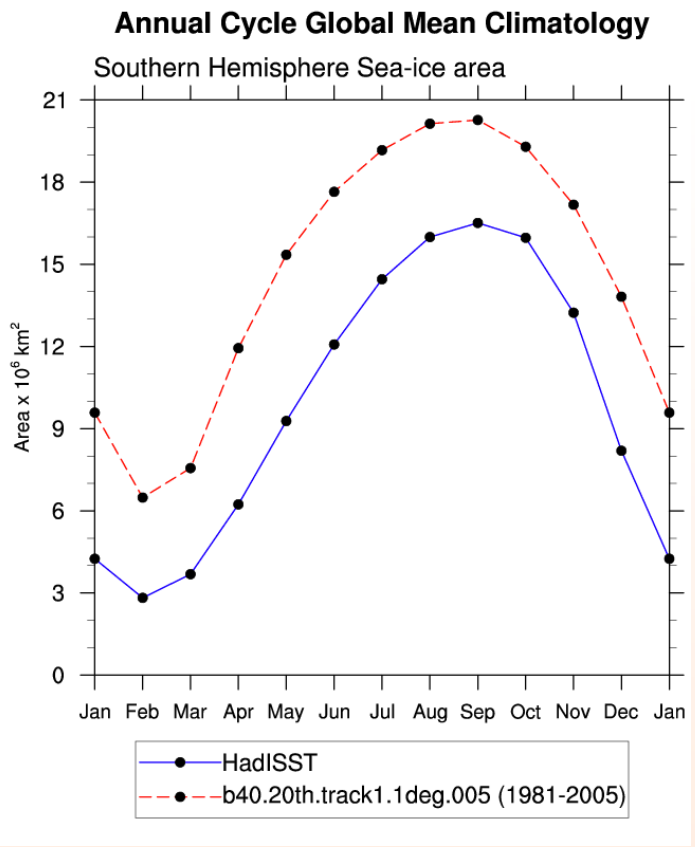


*based on AMIP simulation – Jen Kay

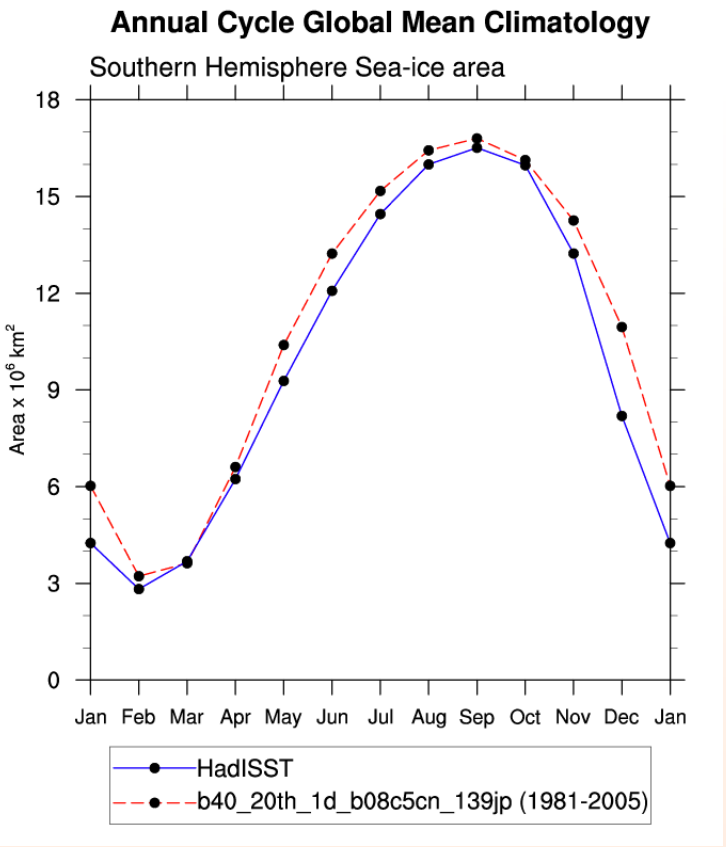
see Landrum, L., M. Holland, D. Schneider, and E. Hunke, 2012: Antarctic sea ice Climatology, variability and late 20-th Century change in CCSM4, J. Climate, accepted.

- Sea ice biases are reduced in CAM5
- Is the model within the observational uncertainty?

CAM4



CAM5

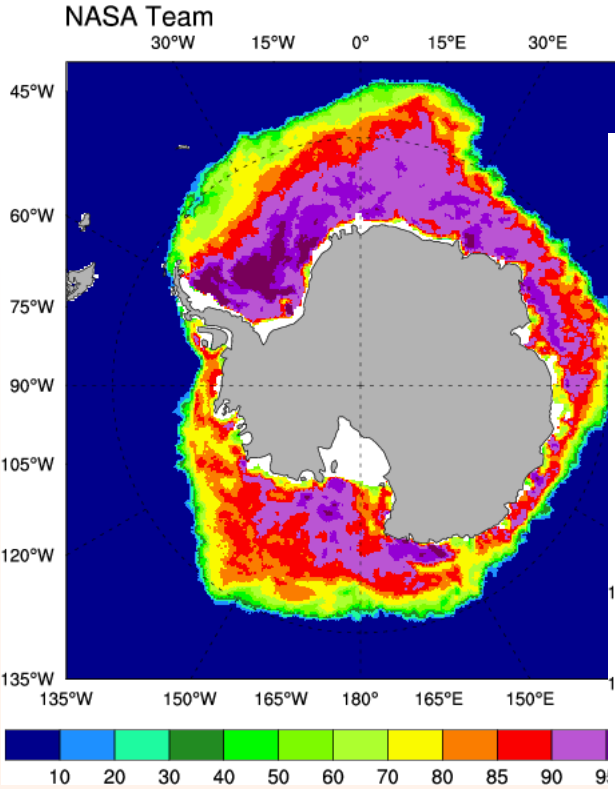


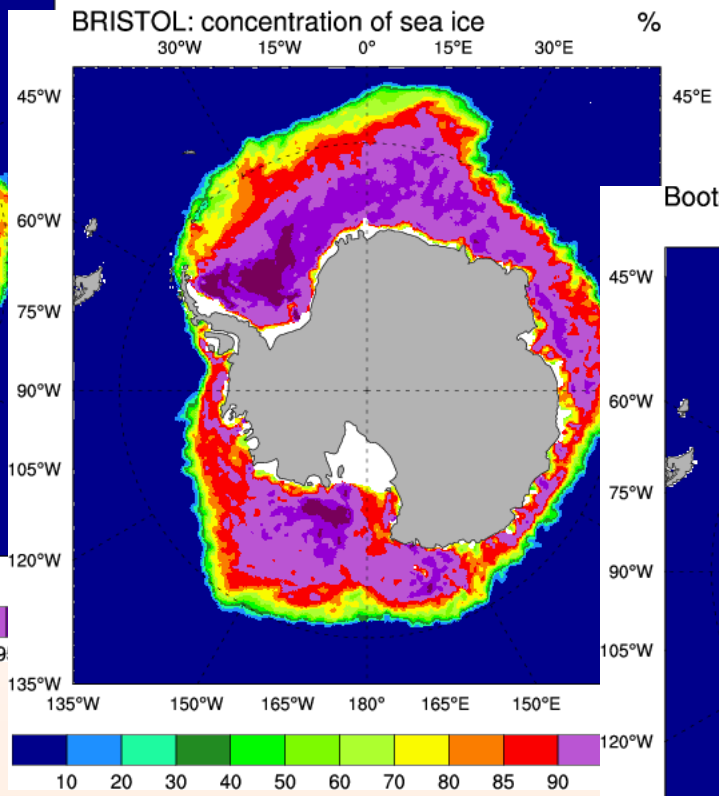
http://www.cesm.ucar.edu/experiments/cesm1.0/

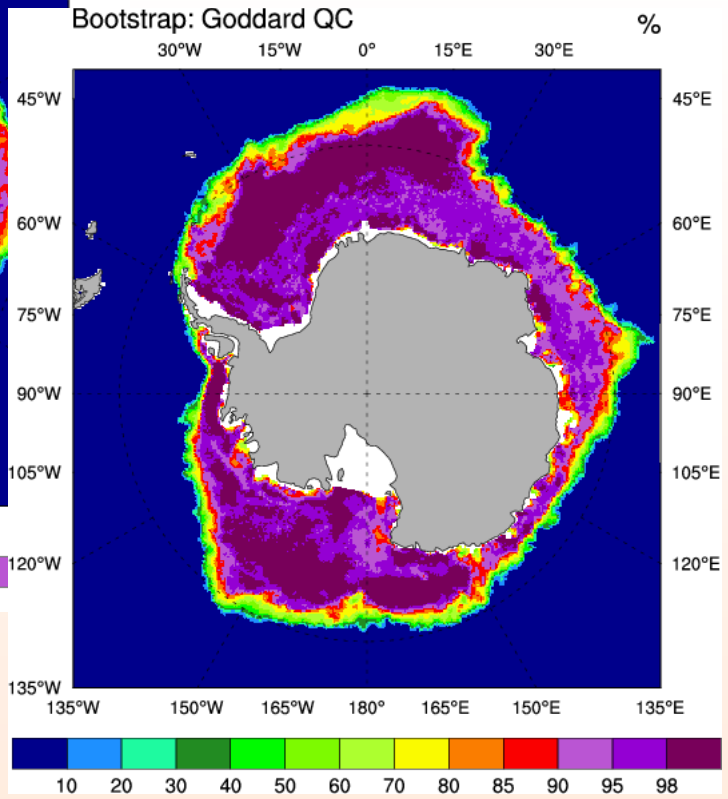
Sea ice climatology -

- Many data sets to choose from; some combine different satellite sensors and use different algorithms over time

Three different 'SSMI' data sets: weekly average for Oct 1-7, 2007

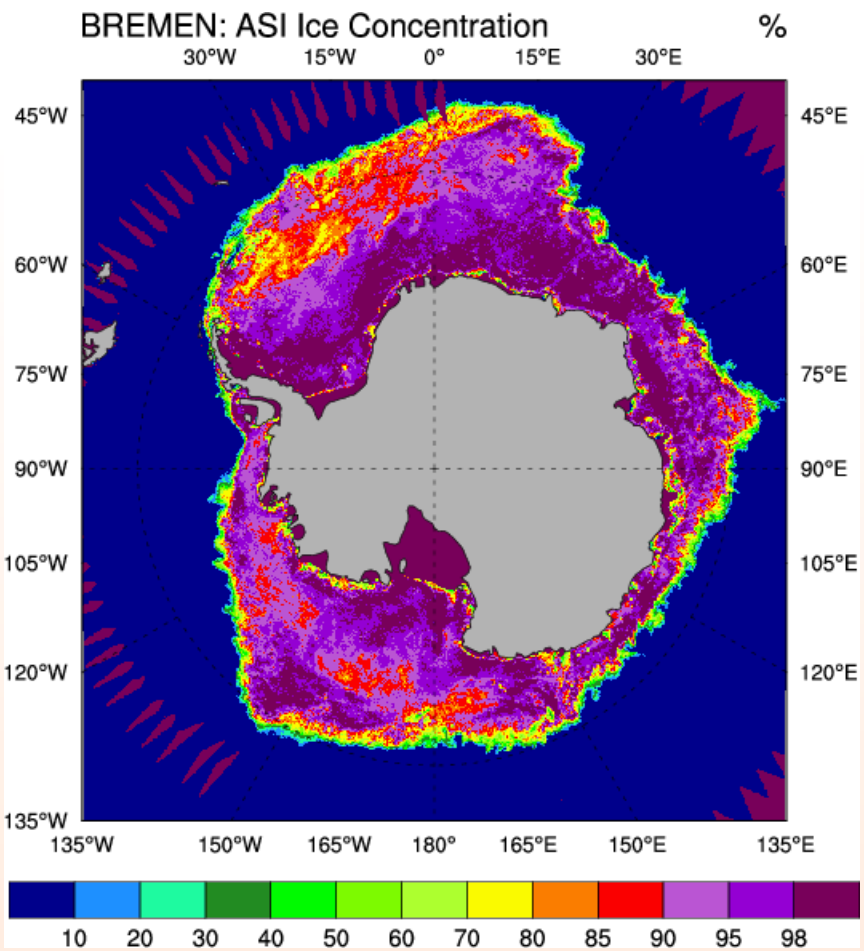




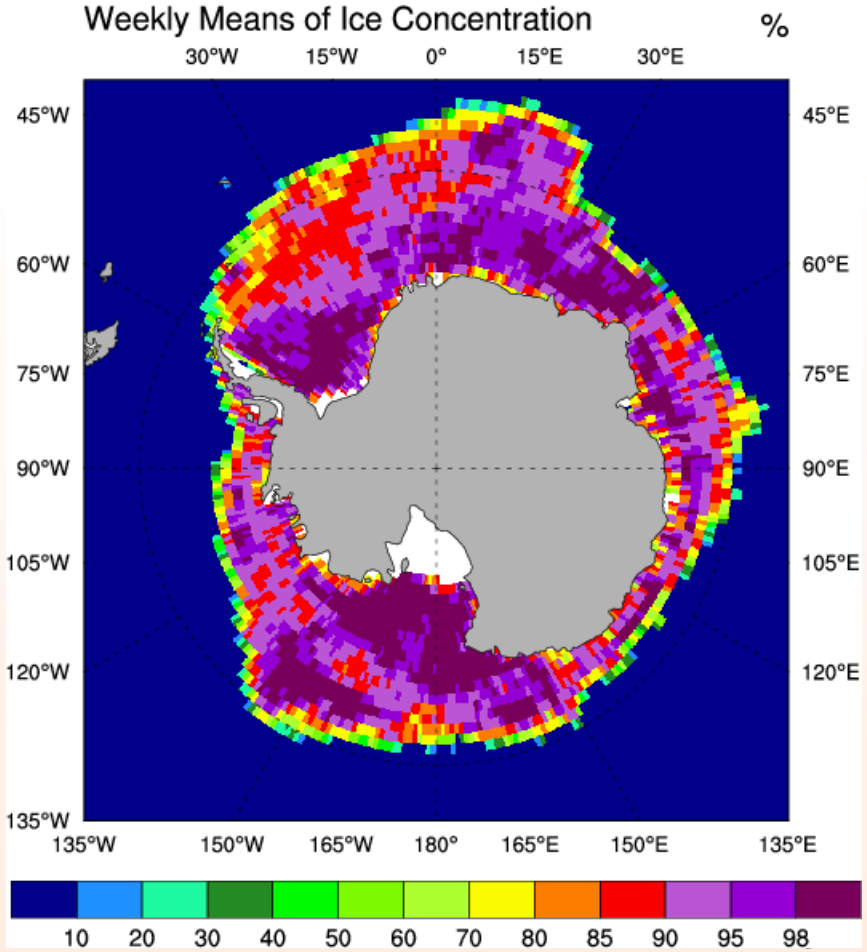


High and low resolution data sets

Sea ice retrievals from AMSR-E



NOAA OIv2/ HadiSST



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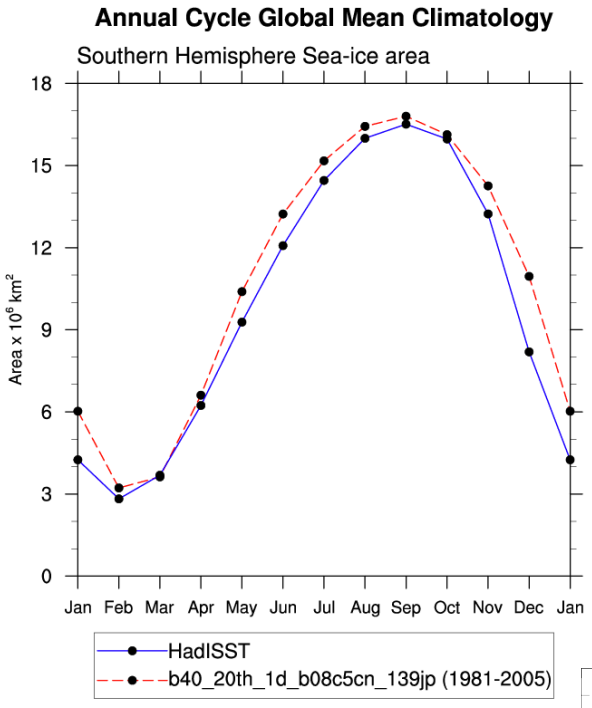
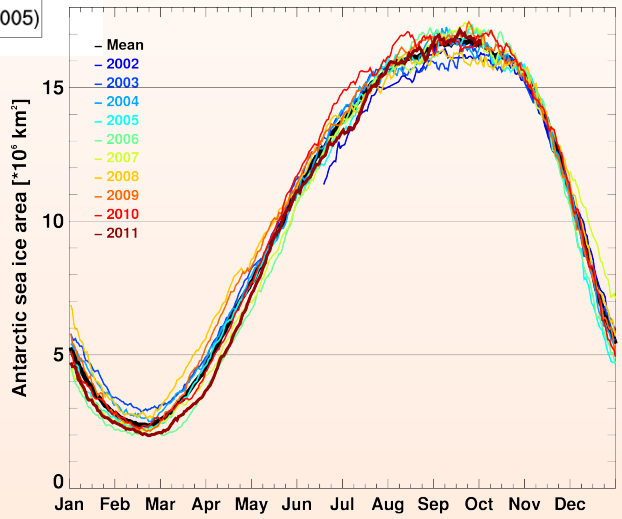
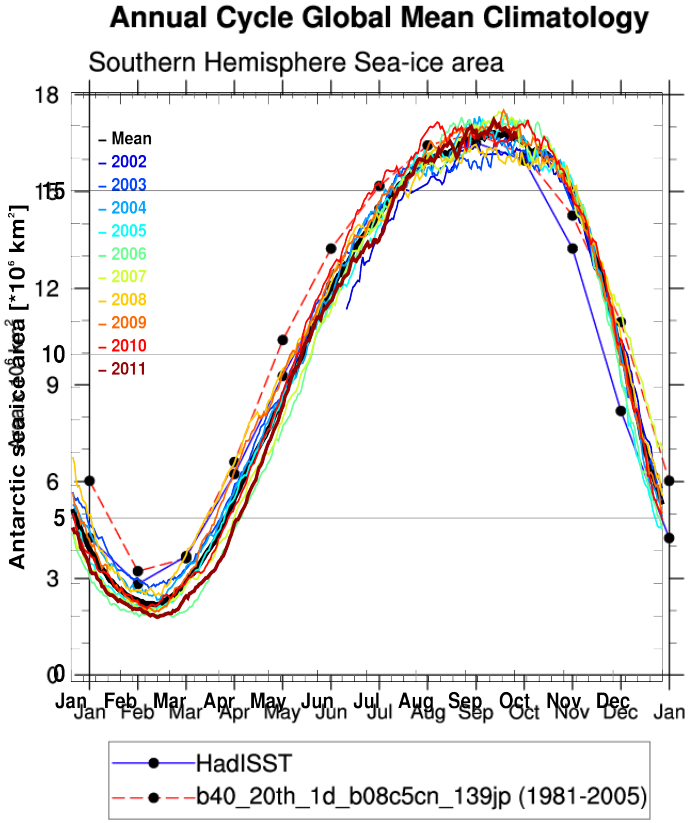
CAM5/HadISST



AMSR-E (Bremen)



CAM5/AMSR-E



Summary

- Although models are improving, increased complexity, higher resolution and regional/decadal emphasis place new demands on observational data
- The Climate Data Guide will help you find the right data set for your purpose and understand its strengths and limitations
- CESM Working groups' diagnostics data sets will be included
- Your contributions are needed to help make it a valuable community resource
- Antarctic sea ice is highlighted as one area where observations matter

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