

Regional Climate Changes over Antarctic

Ana Carrell; Environmental Science, Forestry and Natural Resources
Advisor- Dr. Jing Zhang; Physics, Energy and Environmental Systems

Overview

Background

Research

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Changes/Comparison

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Background



**National Science Foundation-
GEOPATHS: Pathways to
Atmospheric Sciences**

Through Immersion in Geosciences Research



Research Focus

Climate Models of the Antarctic Ice cap

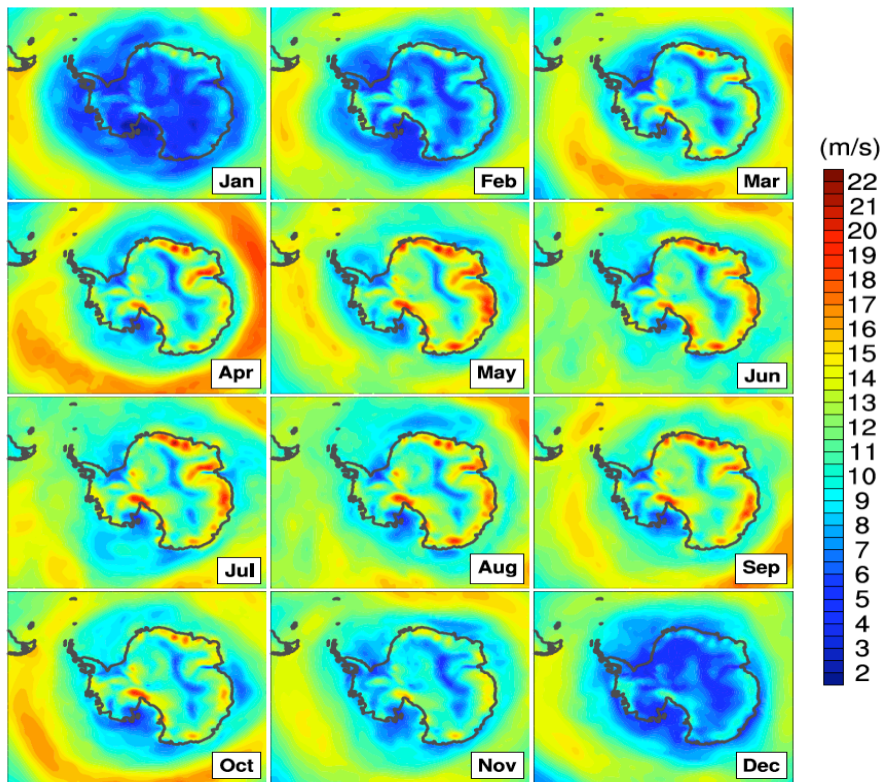
Simulated by 4th generation Community Climate System Model (CCSM4)

- Present climate state 2005
- Future projection of 2050
 - Representative Concentration Pathways (RCP6) emissions scenario

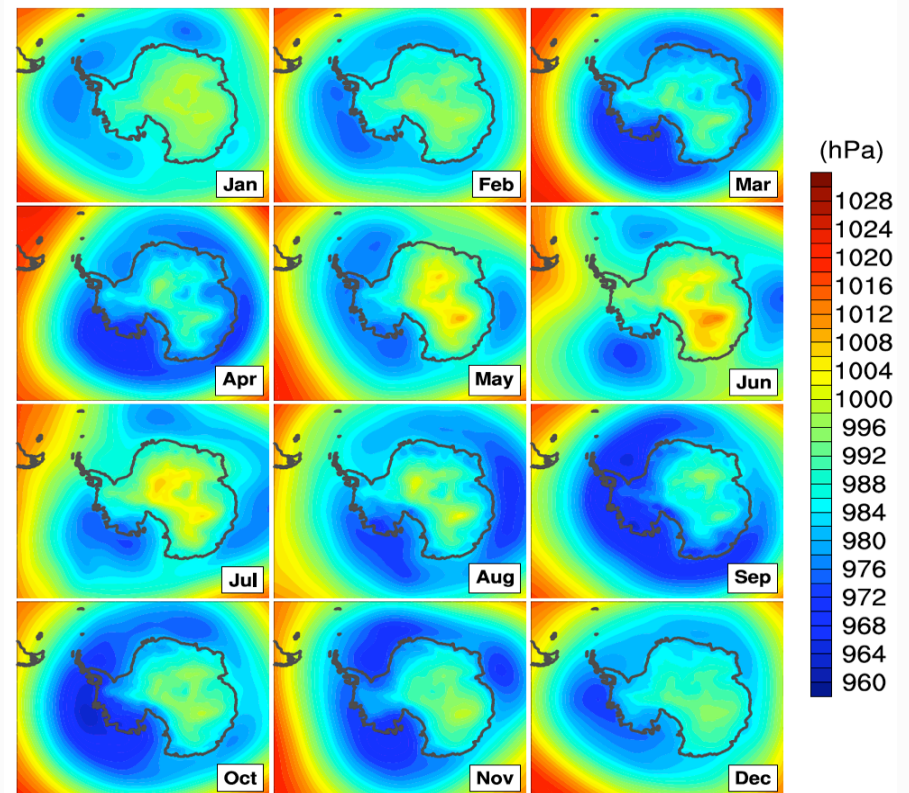
Wind speed, sea level pressure, sea ice coverage, and surface temperature

CCSM4 Results are compared with bias-corrected outputs (C-CCSM4)

CCSM Monthly Wind Speed in 2005

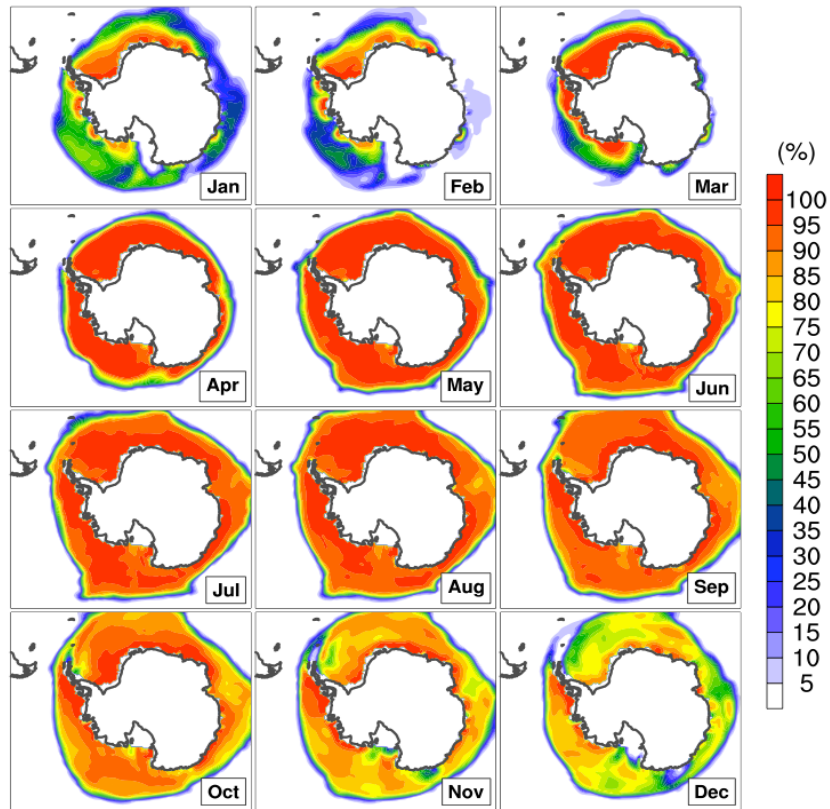


CCSM Monthly Sea Level Pressure in 2005

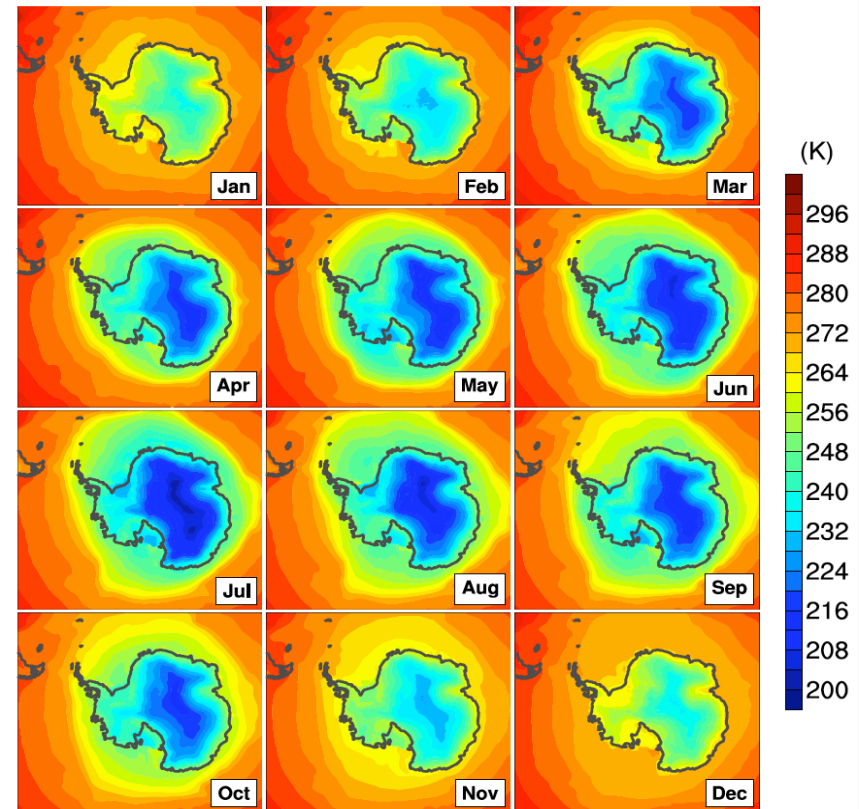


Figures showing the climate models for CCSM monthly wind speed (left) and sea level pressure (right) in 2005

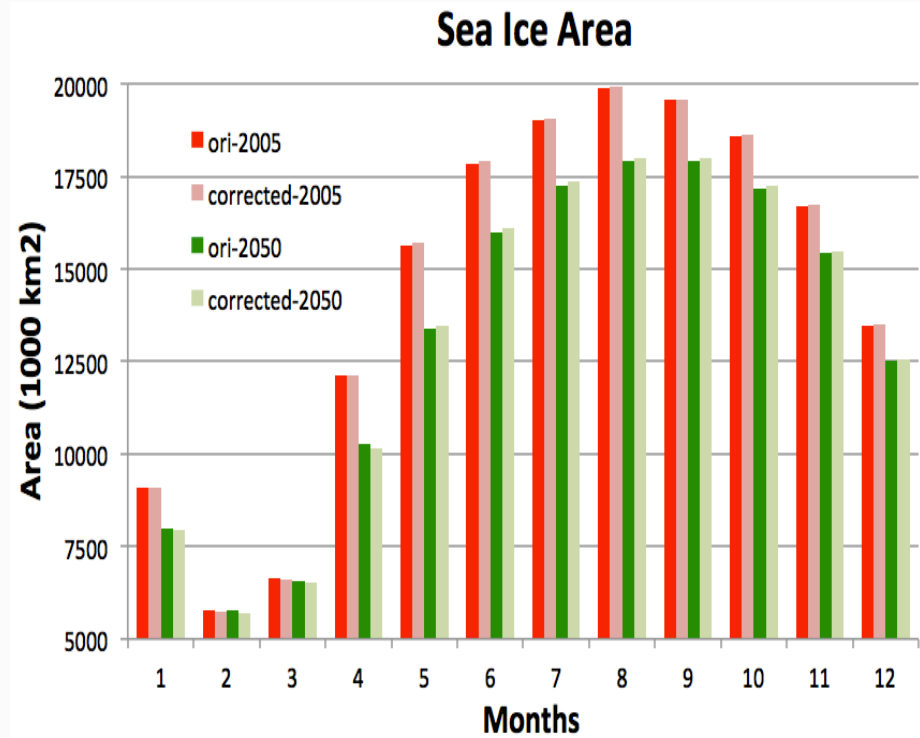
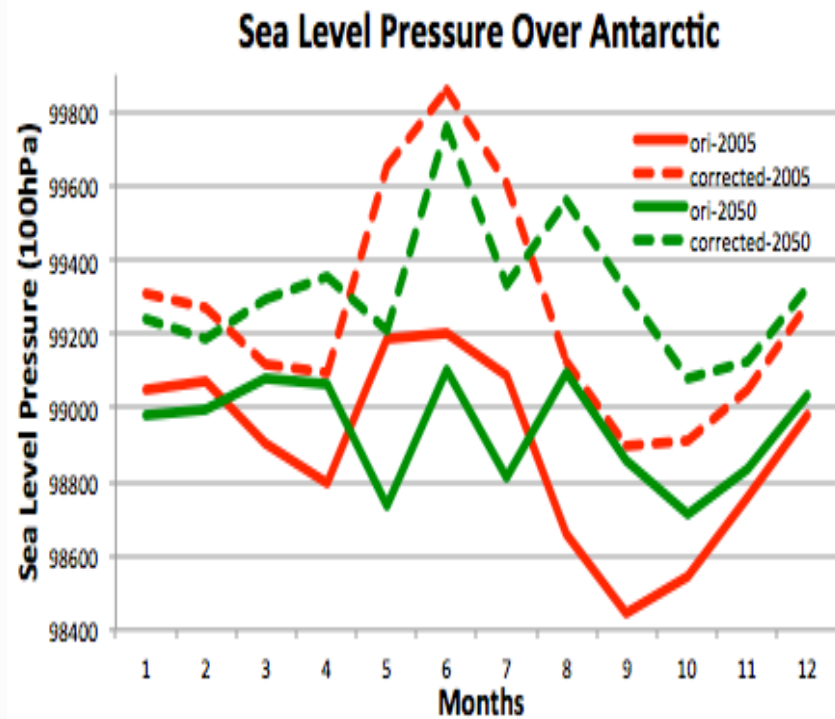
CCSM Monthly Sea Ice Concentration in 2005



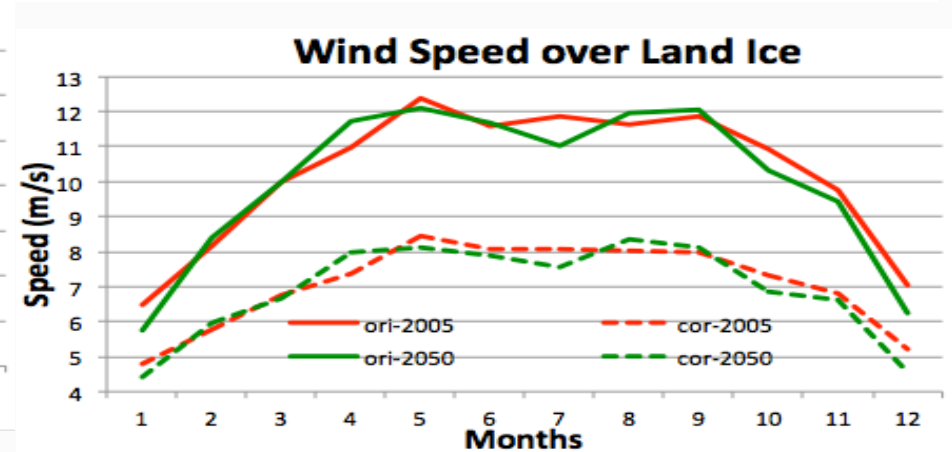
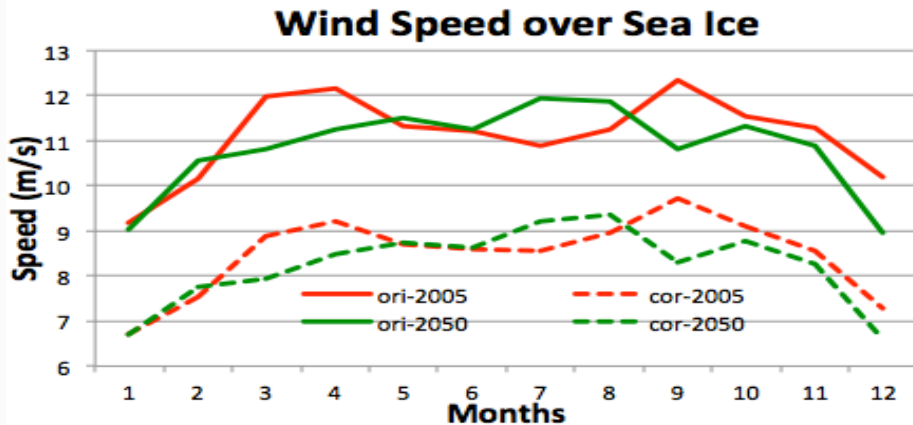
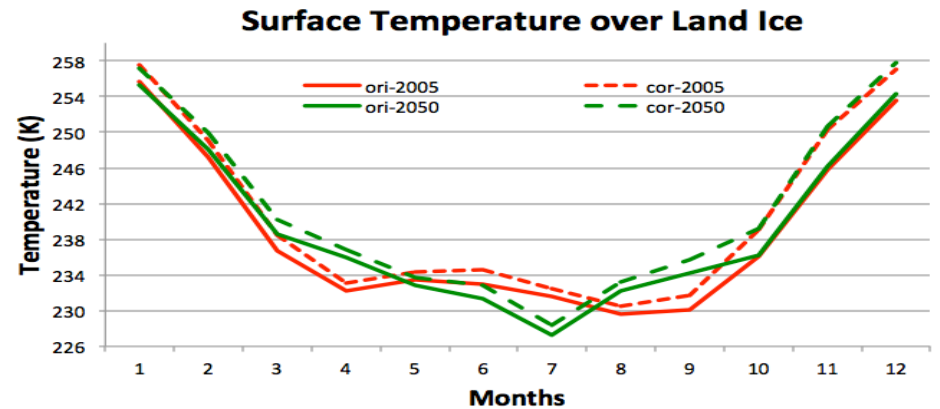
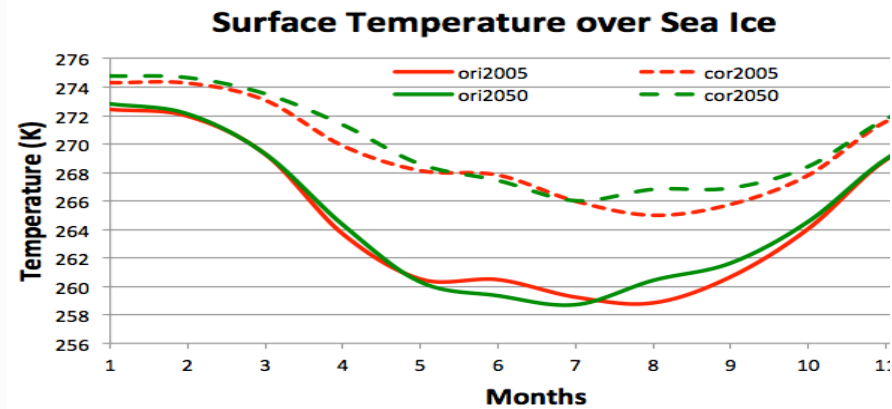
CCSM Monthly Surface Temperature in 2050



Figures showing the climate models for CCSM monthly sea ice concentration for 2005 (left), surface temperature for 2050 (right)

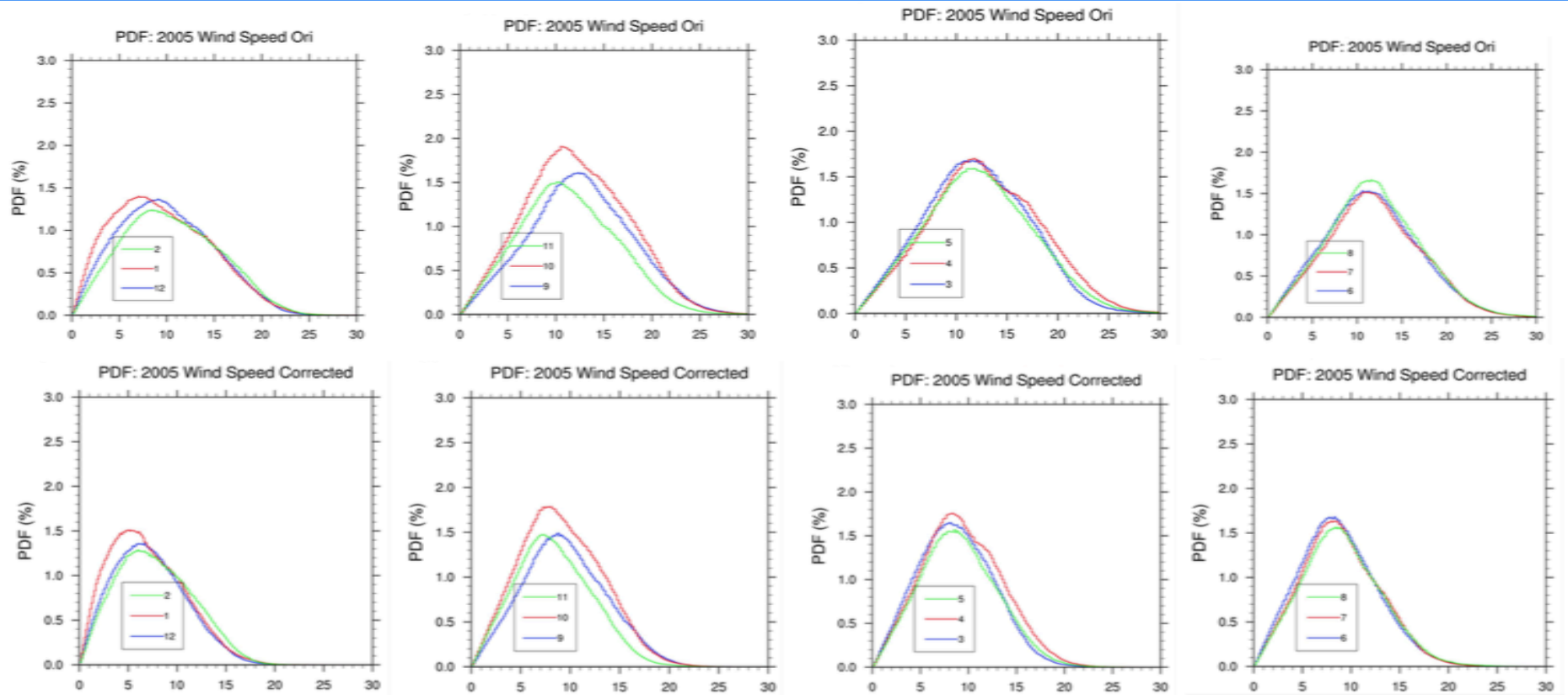


Figures showing the difference between the original and corrected data

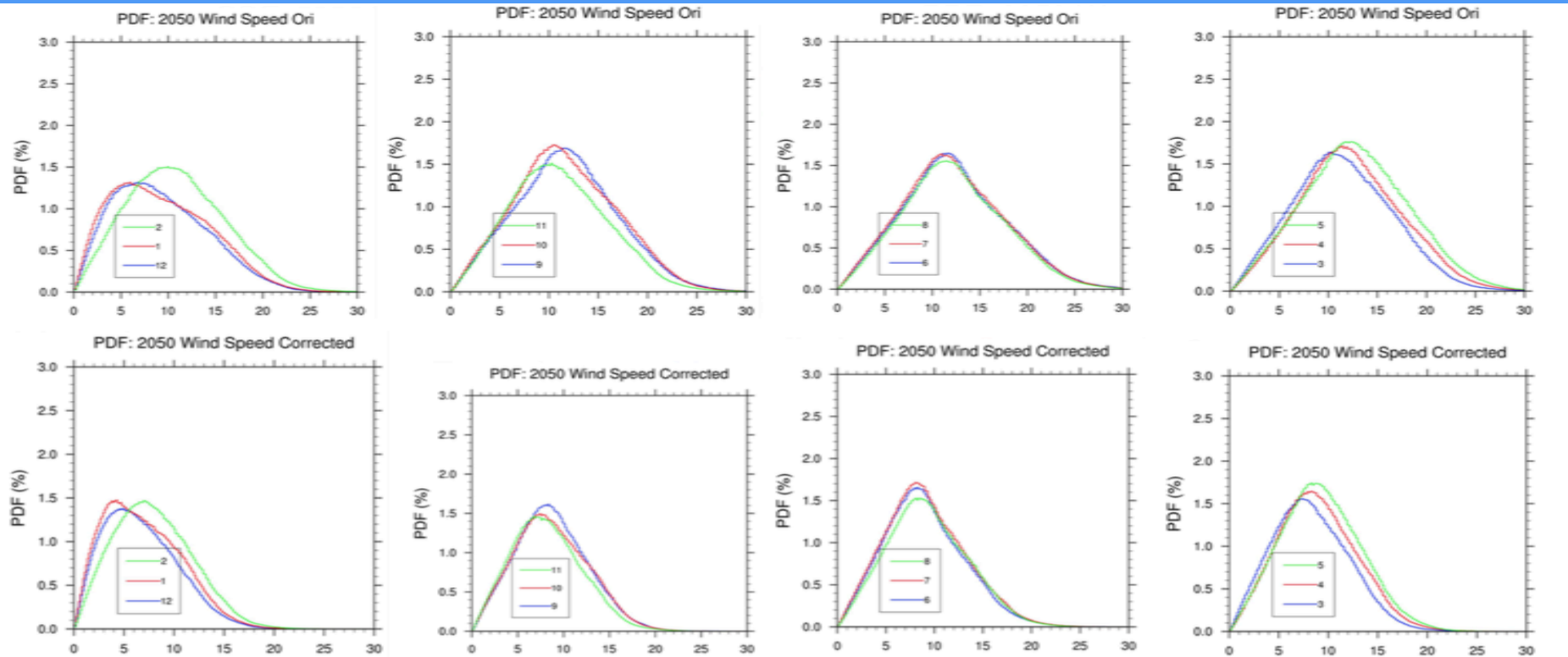


Figures showing the numerical data for surface temperature and wind speed over sea ice (left top, bottom), over land ice (right top, bottom)

Probability Density Functions



Probability Density Functions



Data Analysis...what does this really mean?

Probability density functions (PDF) tells us that the corrected data (C-CCSM4) shows a more statistically accurate model. Also that the winds may be less strong than the original data presents.

These graphs will help us determine the wind speed distribution for the past year 2005 and projected year 2050.

At this time climate models cannot accurately predict complex phenomena and therefore there is uncertainty when creating predictions

Changes and Comparison

Comparisons of monthly surface temperature, wind speed, SLP, and sea ice coverage between CCSM4 and C-CCSM4 indicate that significant cold biases over sea ice and overestimated surface winds over both sea ice and land ice surfaces exist in the CCSM4 simulations.

Significant negative biases in Sea level Pressure occur over the entire Antarctic.

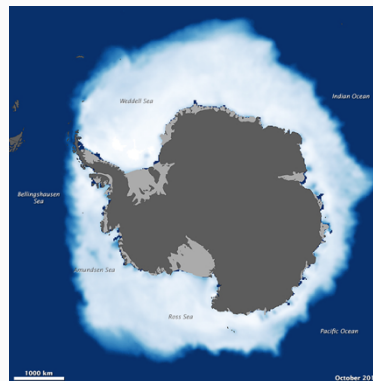
Differences in sea ice coverage between CCSM4 and C-CCSM4 are small.

Future Work



To gain a more whole understanding of climate modeling and how there can be an unknown bias when creating future models

Determine a more accurate climate model that is lacking bias not only over the Antarctic but globally



References

Steve T. Stegall, Jing Zhang. Wind Field Climatology, Changes, and Extremes in the Chukchi-Beaufort Seas and Alaska North Slope during 1979-2009.

Cindy L. Buryere, Andrew J. Monaghan, Daniel F. Steinhoff, David Yates. Bias-Corrected CMIP5 CESM Data in WRF/MPAS Intermediate File Format.

Questions? Comments? Concerns?

