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Poster AT-33

Evaluation of Seven Different Atmospheric Reanalysis Products in the Arctic

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Purpose of the study

To intercompare Reanalysis products in order to see which are most reliable, to determine the amount of variability between the products, and point to where they can be improved.

Time interval

1980-2009, 30 years

Conclusions:

Compared to observations, the best models are

- For temperature: ERA-I, CFSR, and MERRA
- For radiative flux: CFSR, ERA-I, MERRA
- For precipitation: JRA-25, MERRA, ERA-I

Some models show considerable differences from the ensemble median in both radiative fluxes and precipitation.

The trends also vary considerably between the models, often even differing in sign.

- The temperature trends are more consistent, since temperature is assimilated.
- The vertical structure of the temperature trends is different between the models.
- The spatial patterns in the trends also show significant differences
- Annual precipitation trends show considerable variability spatially and between the models

Sponsor

NOAA Climate Program Office, Modeling Analysis Prediction and Projection program

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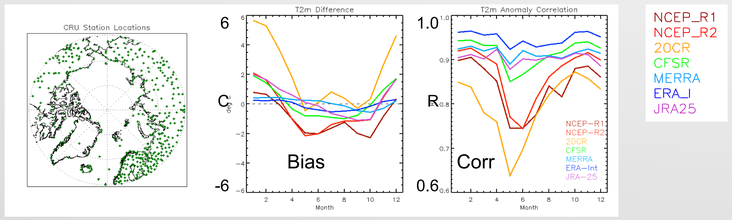
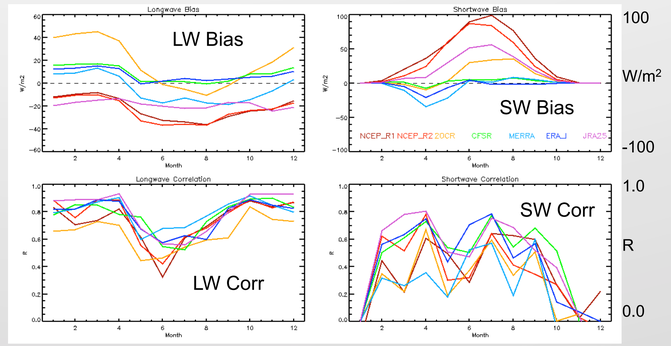
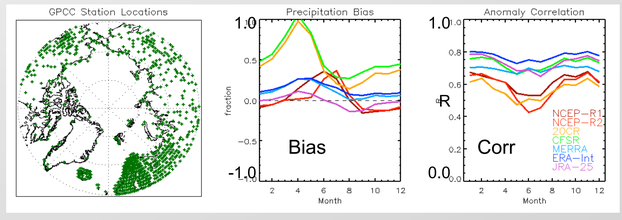
• Comparisons to Observations



Comparison of the **2-m air temperature** measured at land stations with the estimates from the models. **a) station locations; b**) **mean difference** by month; and **c) anomaly correlations,** where variability between stations has been removed. Data are from the Climate Research Unit, University of East Anglia.



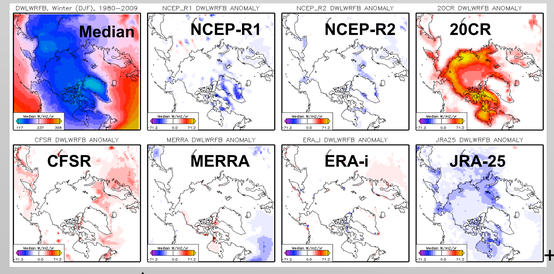
Comparison of the **downwelling longwave and shortwave radiative fluxes** measured at the ARM sites at Barrow and NyAlesund. **top) mean difference** for all stations by month; **bottom) the anomaly correlations**.



Comparisons of the **monthly precipitation** to the model estimates. **a) map** of the station locations; **b) bias of each model expressed as a fraction of the observed precipitation**; and **c) the anomaly correlation**. Data are from the GPCC Full Data Reanalysis Version 5.

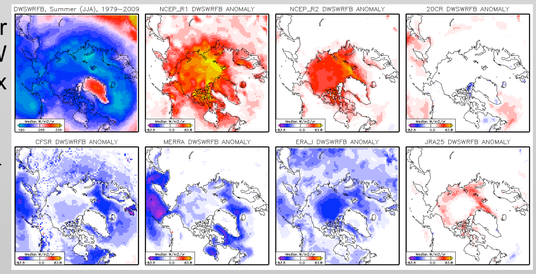
• Seasonal Intercomparisons

Each set of maps shows the **median of all seven reanalysis products in the upper left** and then anomalies from the median of each product.



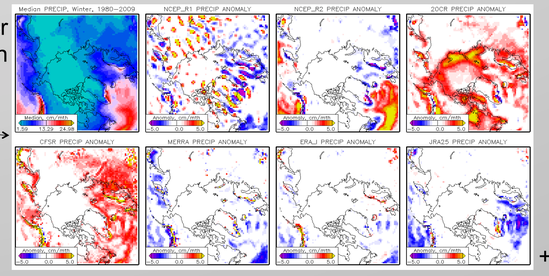
+/- 70 W/m²

Summer Sfc DW SW Radiative flux



+/- 85 W/m²

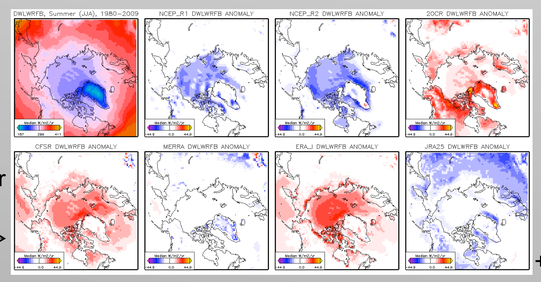
Winter Precipitation



+/- 5 cm/mth

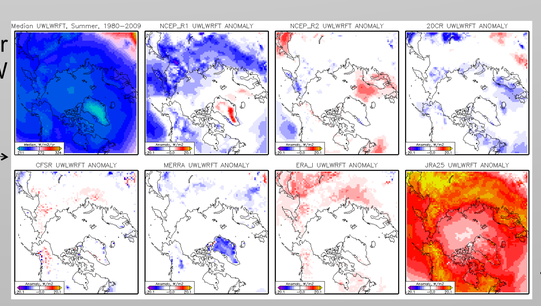
Winter Sfc LW DW Radiative flux

Summer



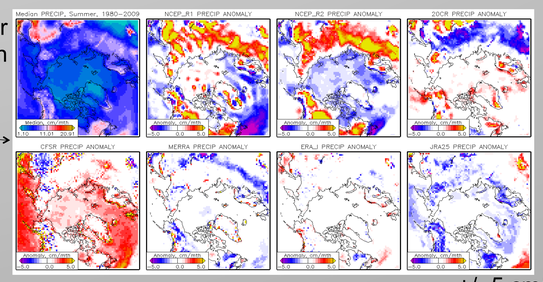
+/- 45 W/m²

Summer TOA UW LW



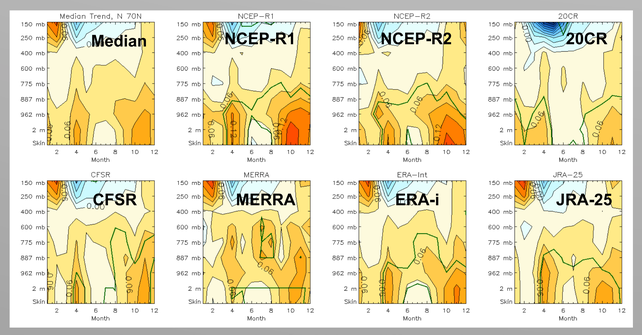
+/- 20 W/m²

Summer Precipitation



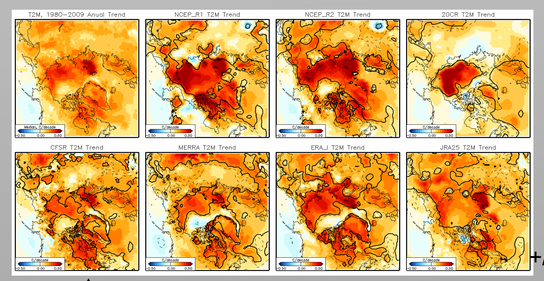
+/- 5 cm/mth

• Trends, 1980-2009



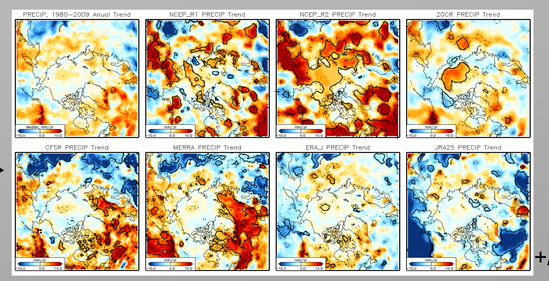
Temperature trends north of 70N at different levels for each month up to 150 mb,.
Contour interval is 0.3 C/decade.
The solid green line is the 99% confidence limit.

Annual temperature trends



+/- 0.5 C/dec

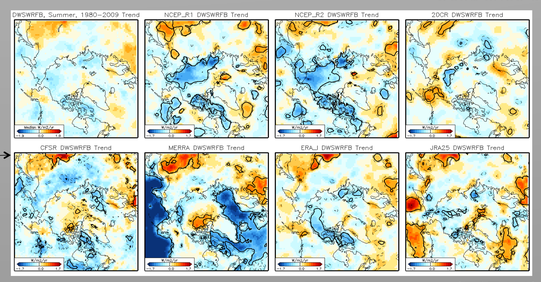
Annual Precipitation Trends



+/- 10 cm/decade

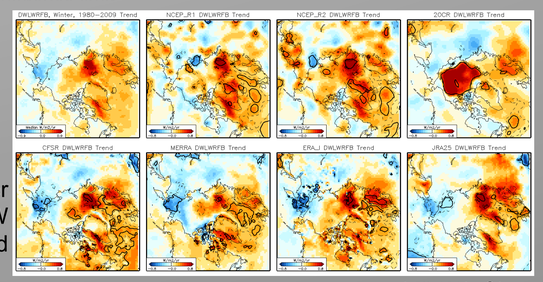
Solid lines show the 99% confidence limit

summer Sfc DW SW Trend



+/- 17 W/m²/decade

Winter Sfc DW LW Trend



+/- 8 W/m²/decade