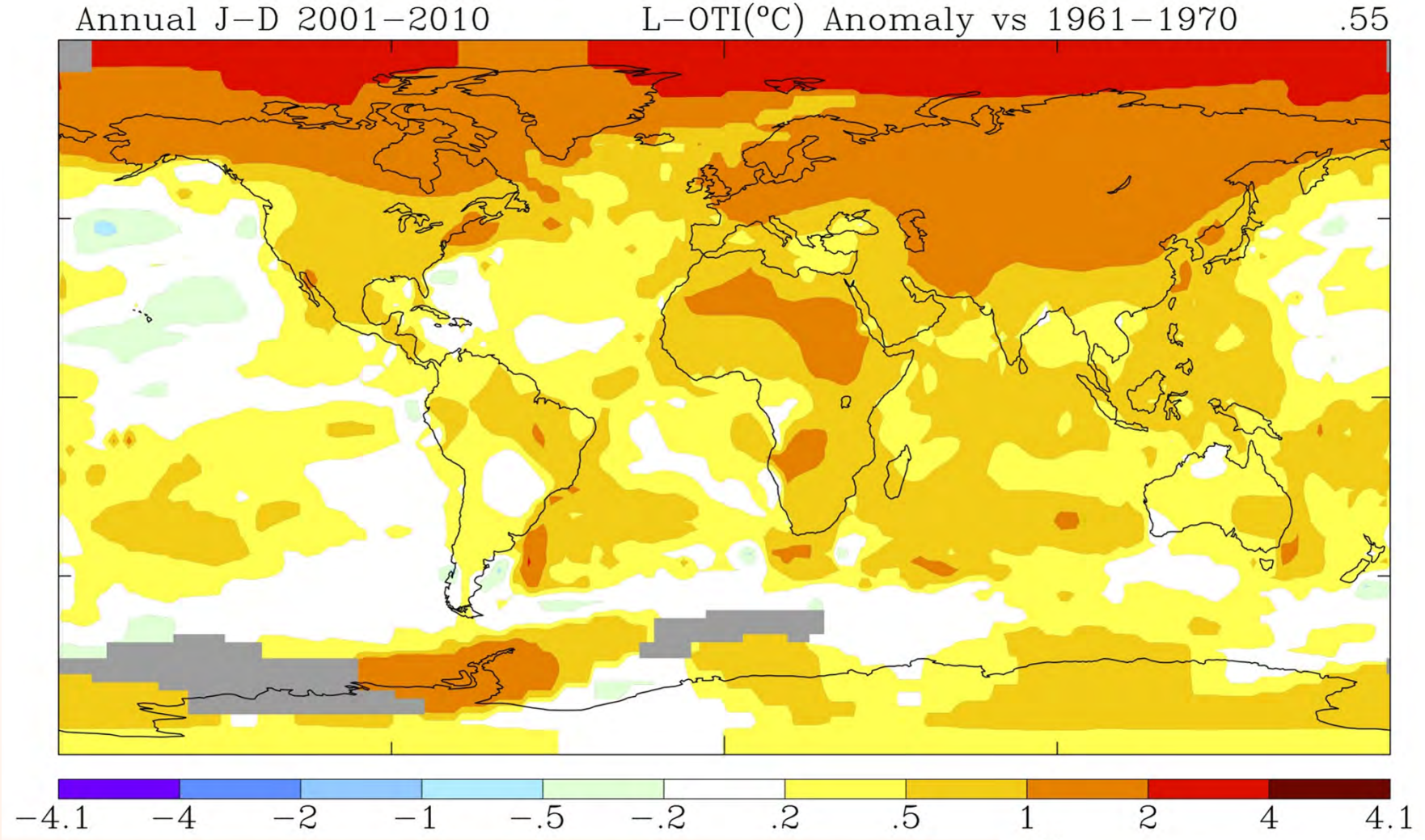
Is West Antarctica catching a tropical fever?

David P. Schneider
National Center for Atmospheric Research

Collaborators: Clara Deser (NCAR); Yuko Okumura (NCAR)

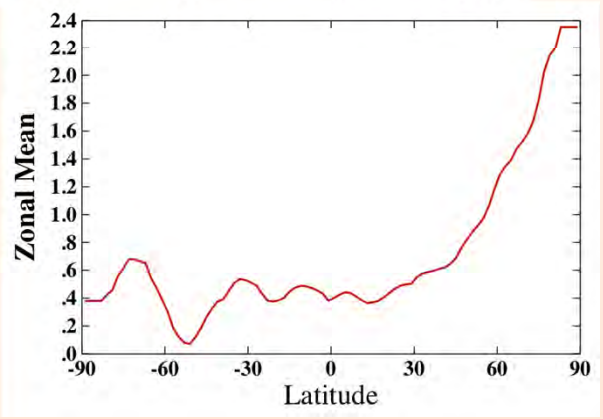
18th Annual WAIS Workshop, September 21st, 2011

Observed Surface temperature change: 2000s minus 1960s



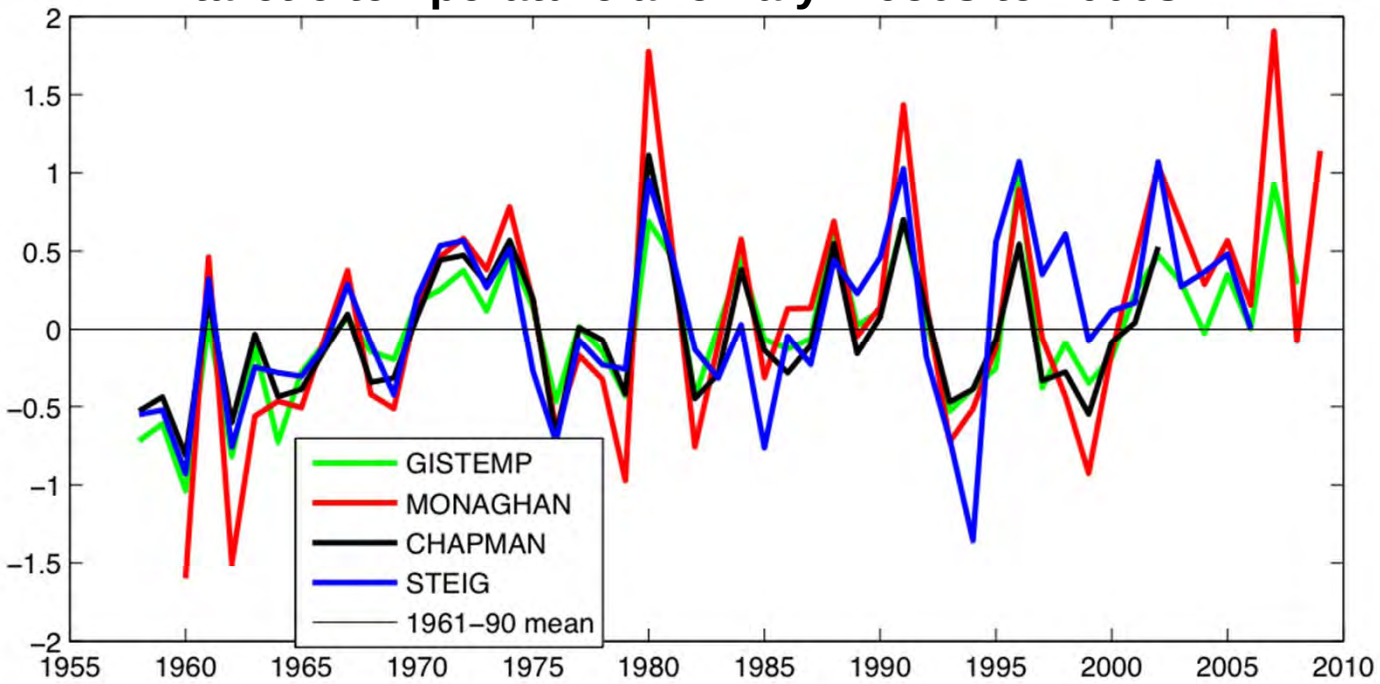
Source: GISTEMP: data.giss.nasa.gov/gistemp/maps

This is the only of the 3 major global surface temperature analyses incorporating a substantial number of Antarctic observations.



Observed Surface temperature change: Compare Data Sets

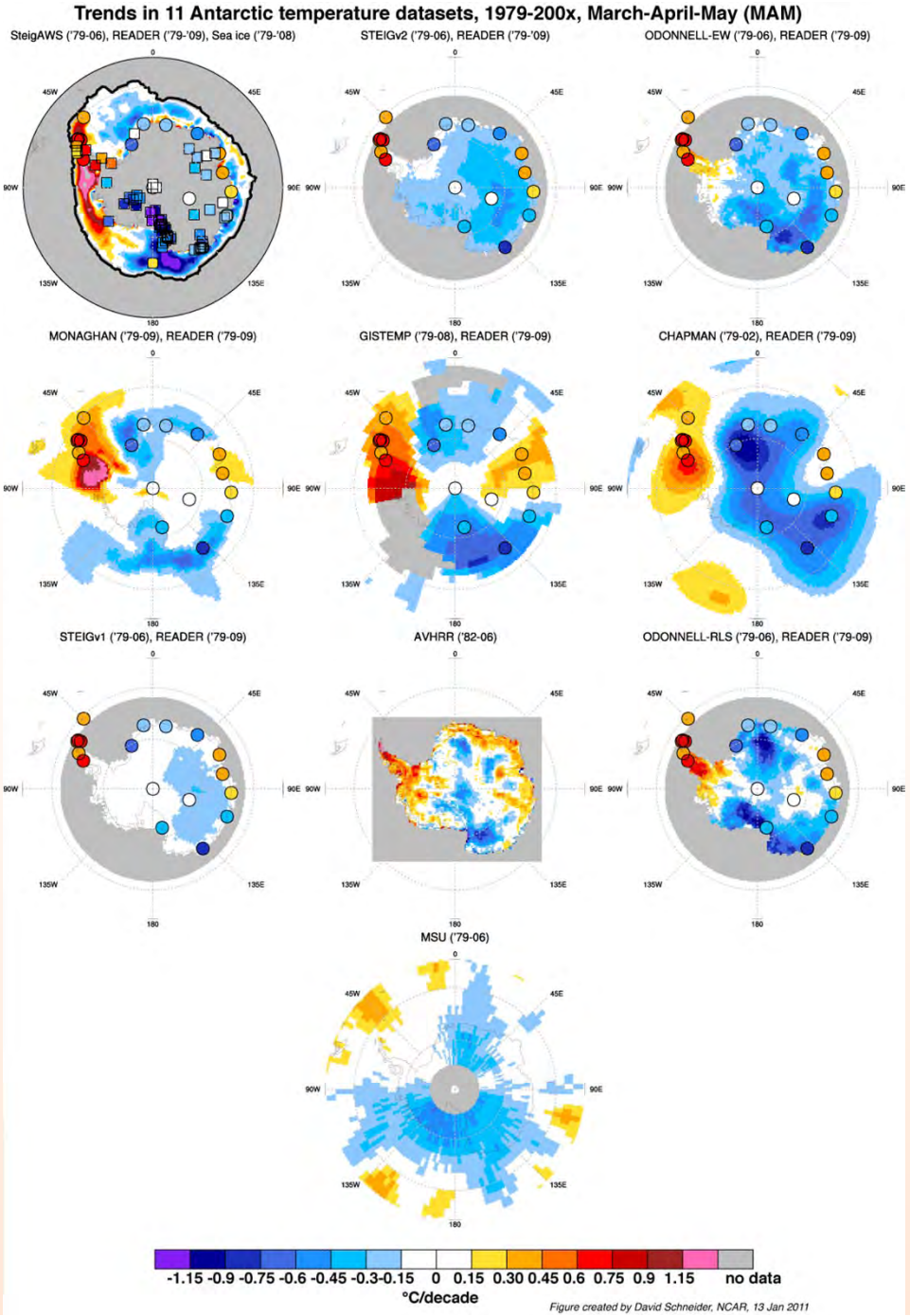
Antarctic temperature anomaly: 1950s to 2000s



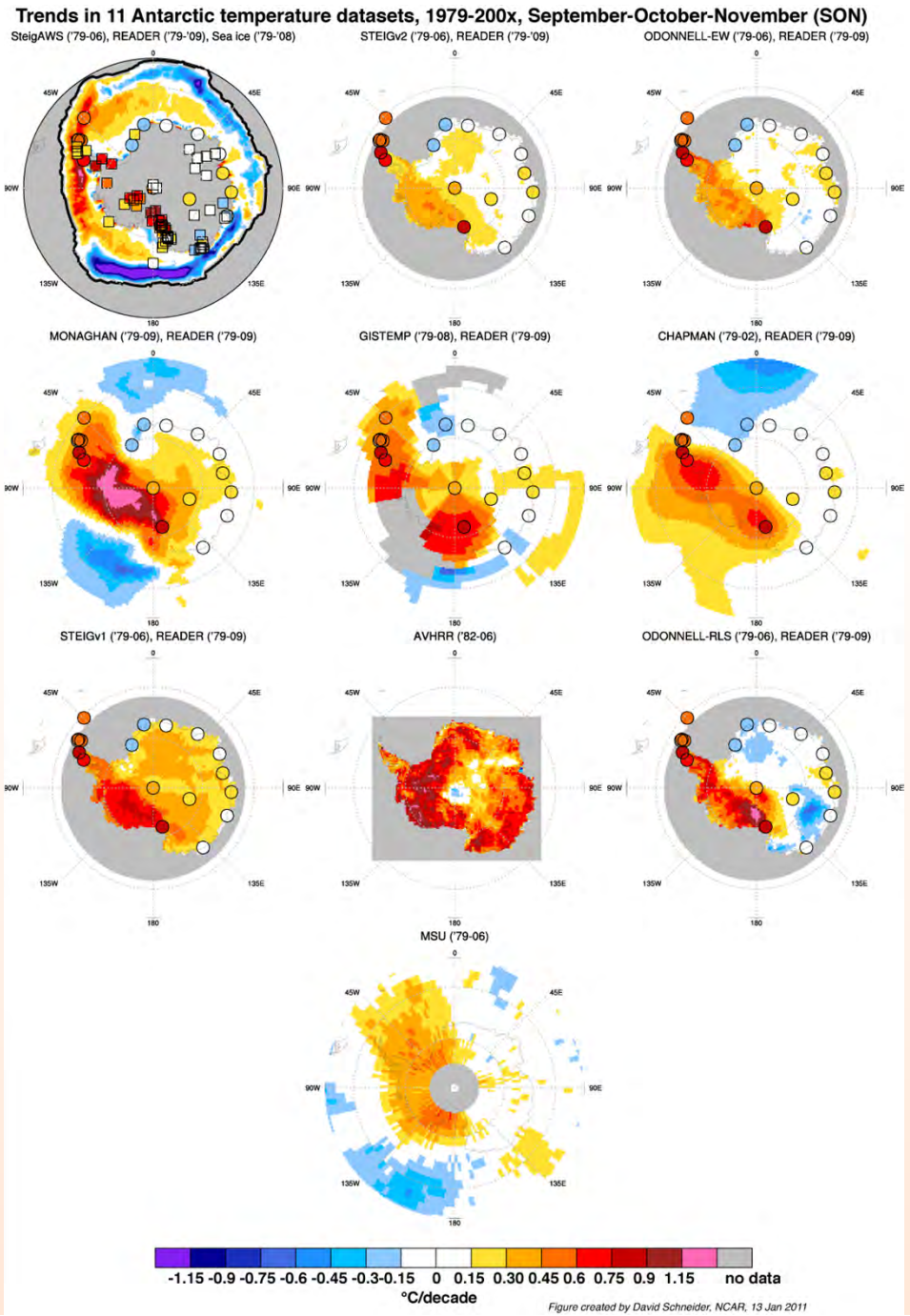
Dataset	timespan	Domain	Trend °C/decade
ANTARCTIC GISTEMP	1958-2010	64°S-90°S	**0.13±0.07**
MONAGHAN	1960-2009	Antarctic land	**0.19±0.14**
STEIG	1958-2006	Antarctic land	**0.14±0.13**
CHAPMAN	1958-2002	Antarctic land	0.07±0.11
O'DONNELL	1958-2006	Antarctic land	0.08±0.08

Compare Data Sets: Trends 1979 to 2000s

austral autumn (MAM)

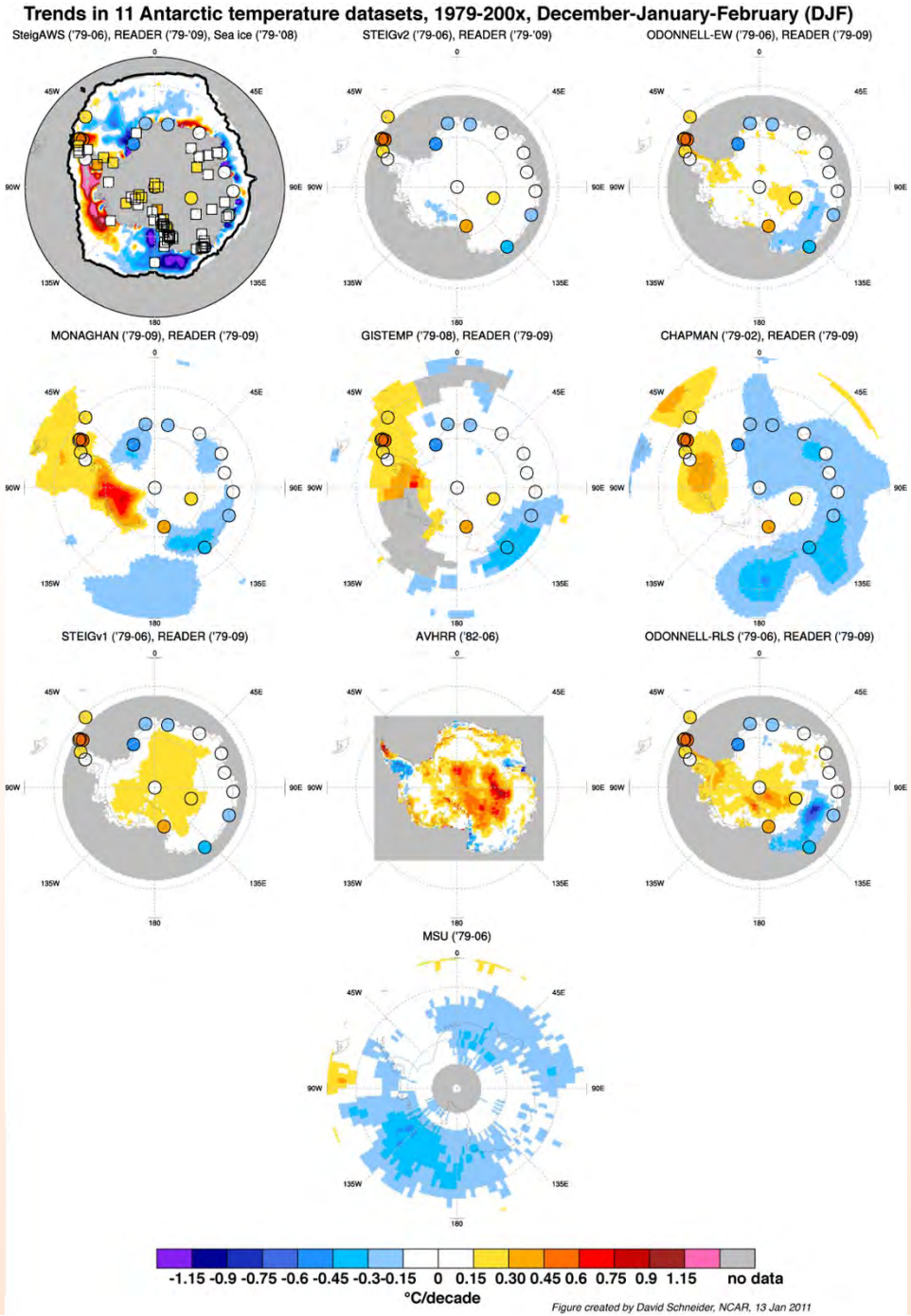


austral spring (SON)

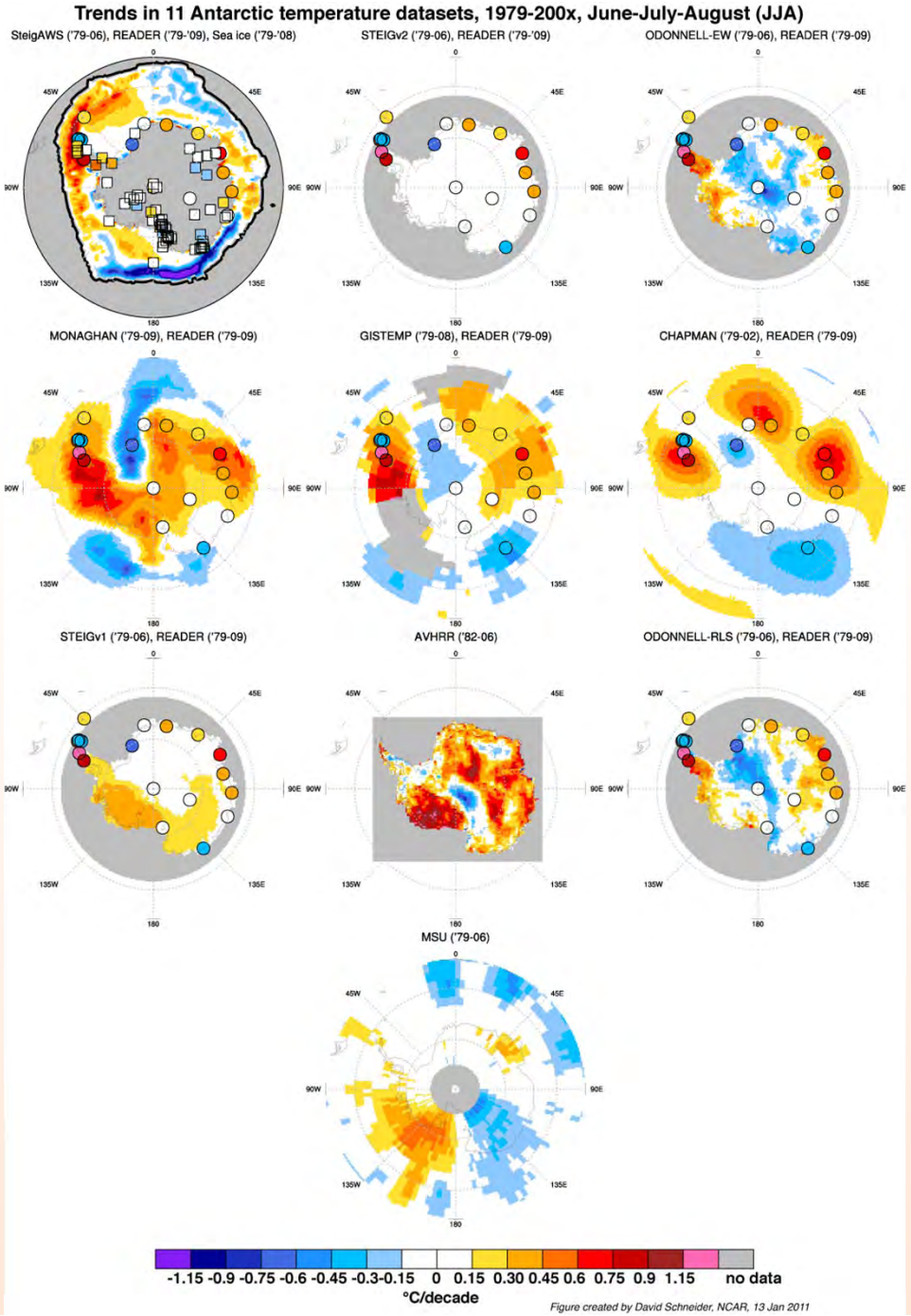


Compare Data Sets: Trends 1979 to 2000s

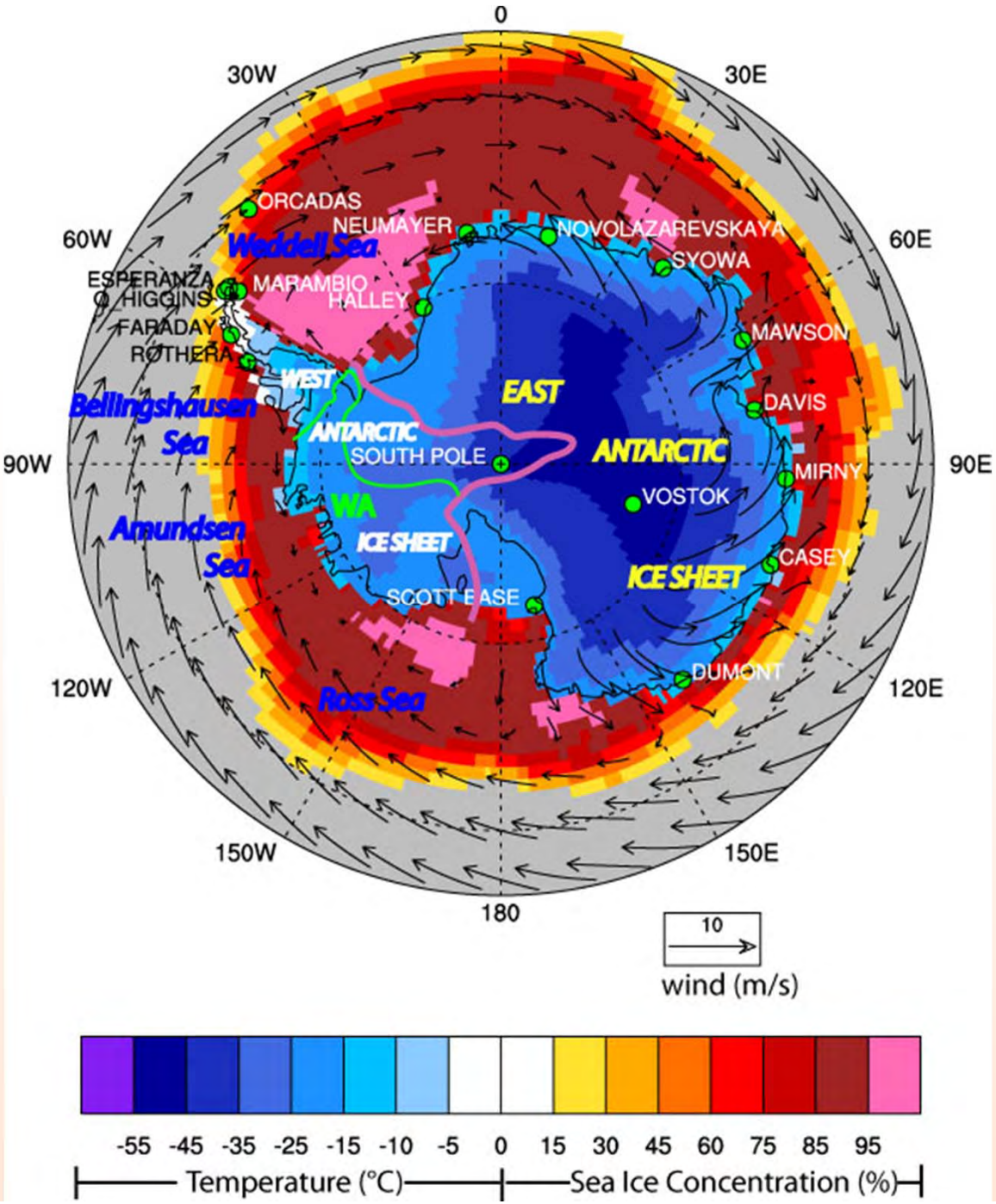
austral summer (DJF)



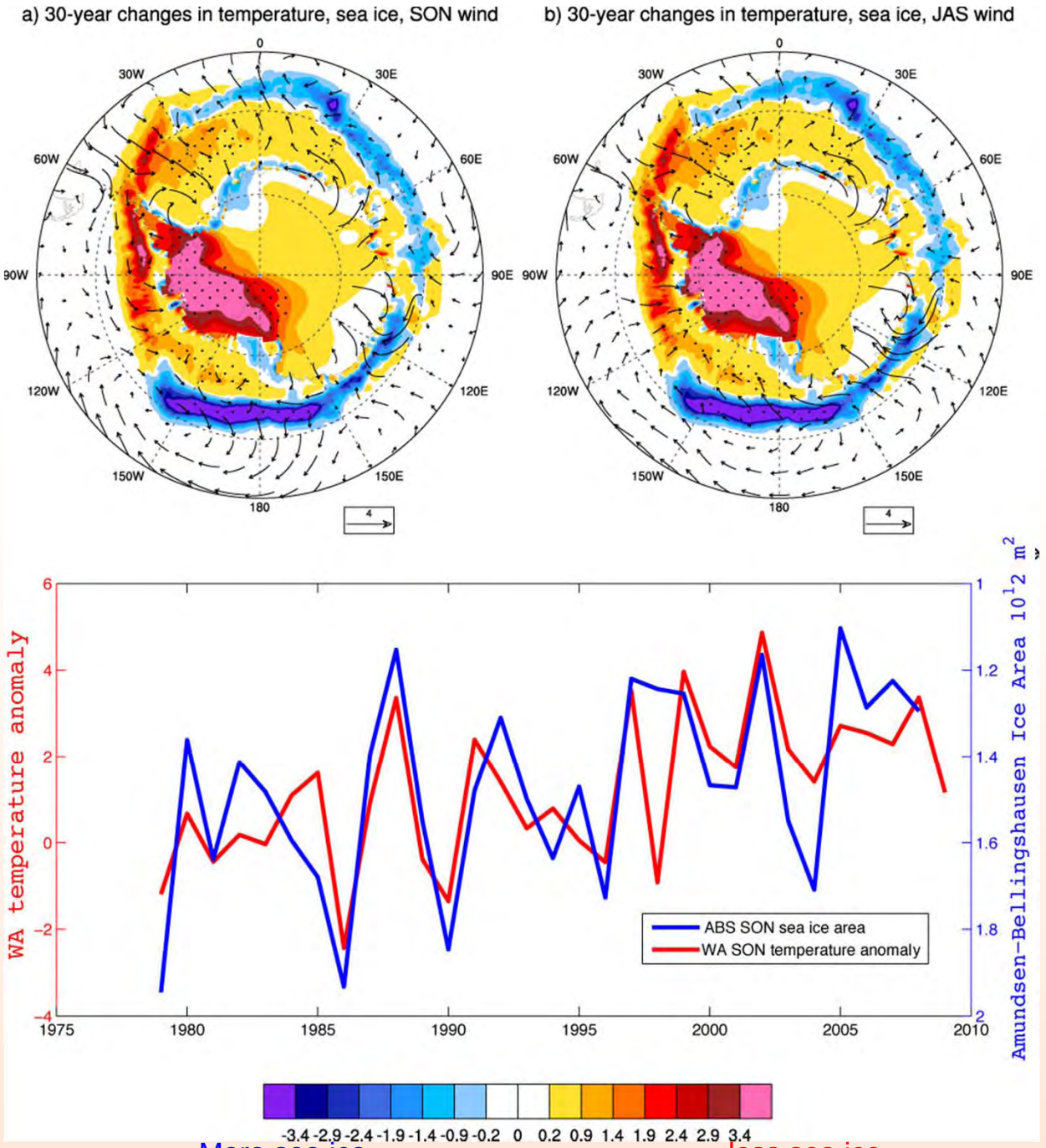
austral winter (JJA)



Austral spring (SON) average temperatures & sea ice



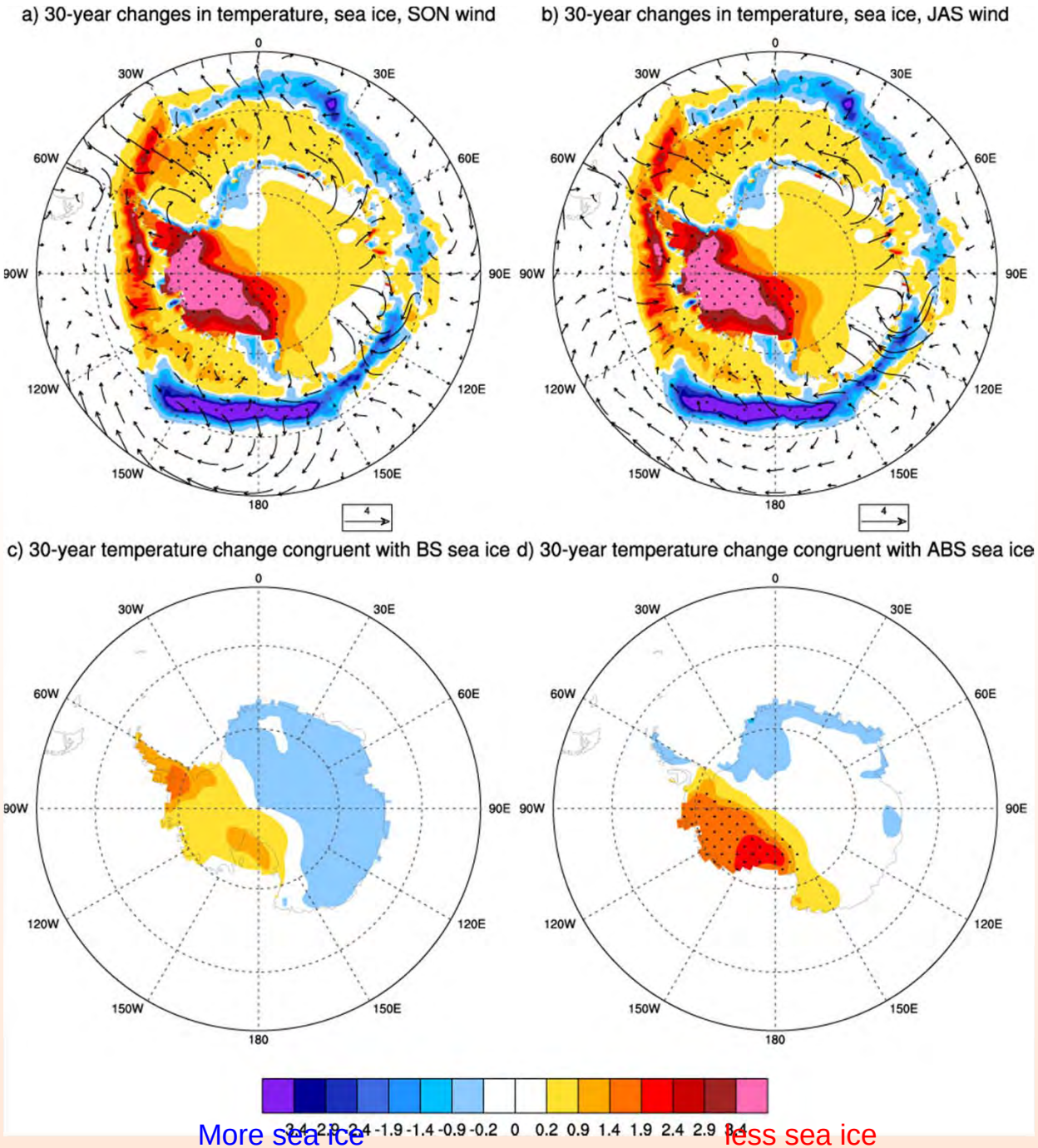
Austral spring (SON) 1979-2008 trends in temps & sea ice



More sea ice
colder

less sea ice
warmer

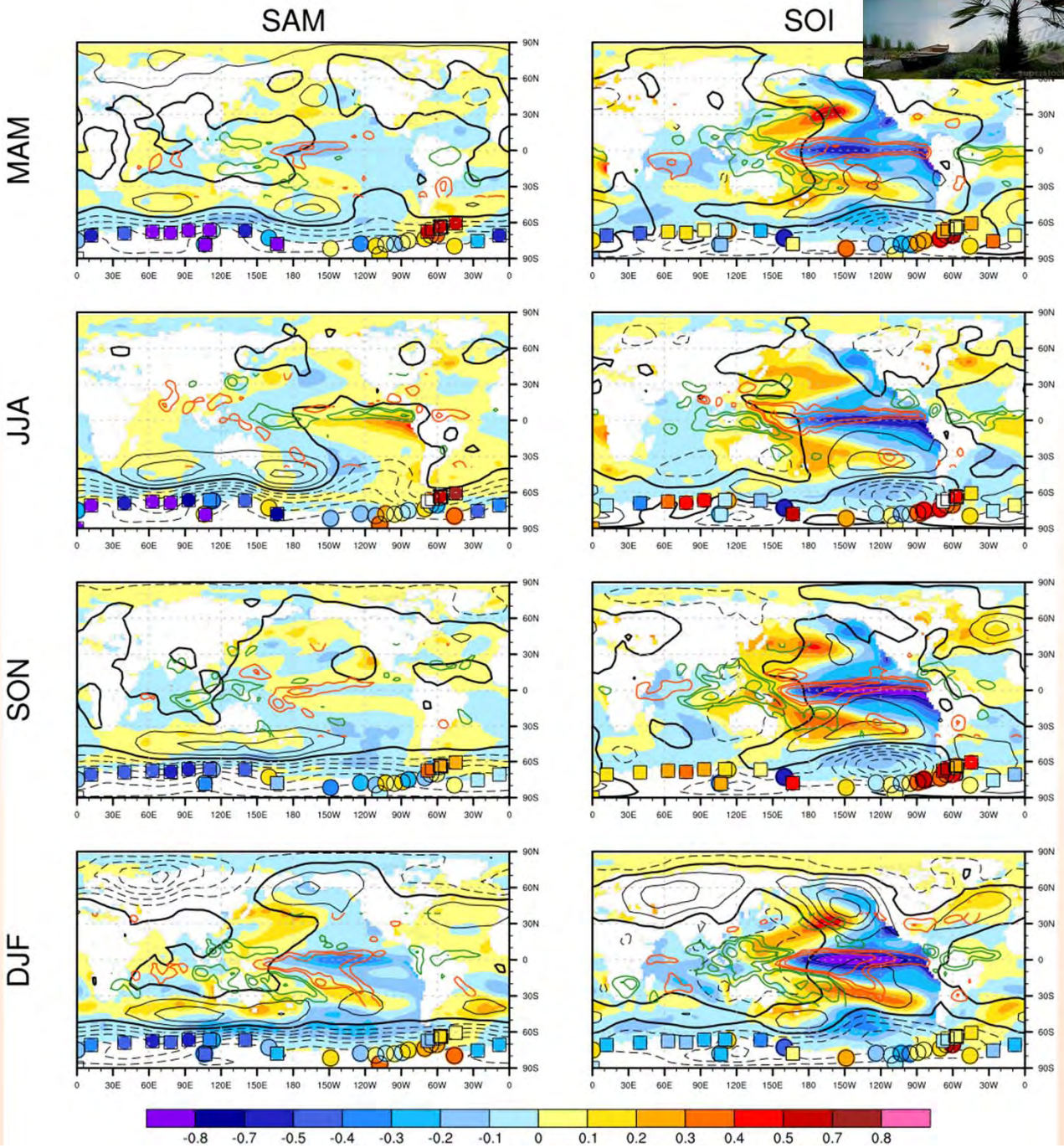
Austral spring (SON) 1979-2008 trends in temps & sea ice



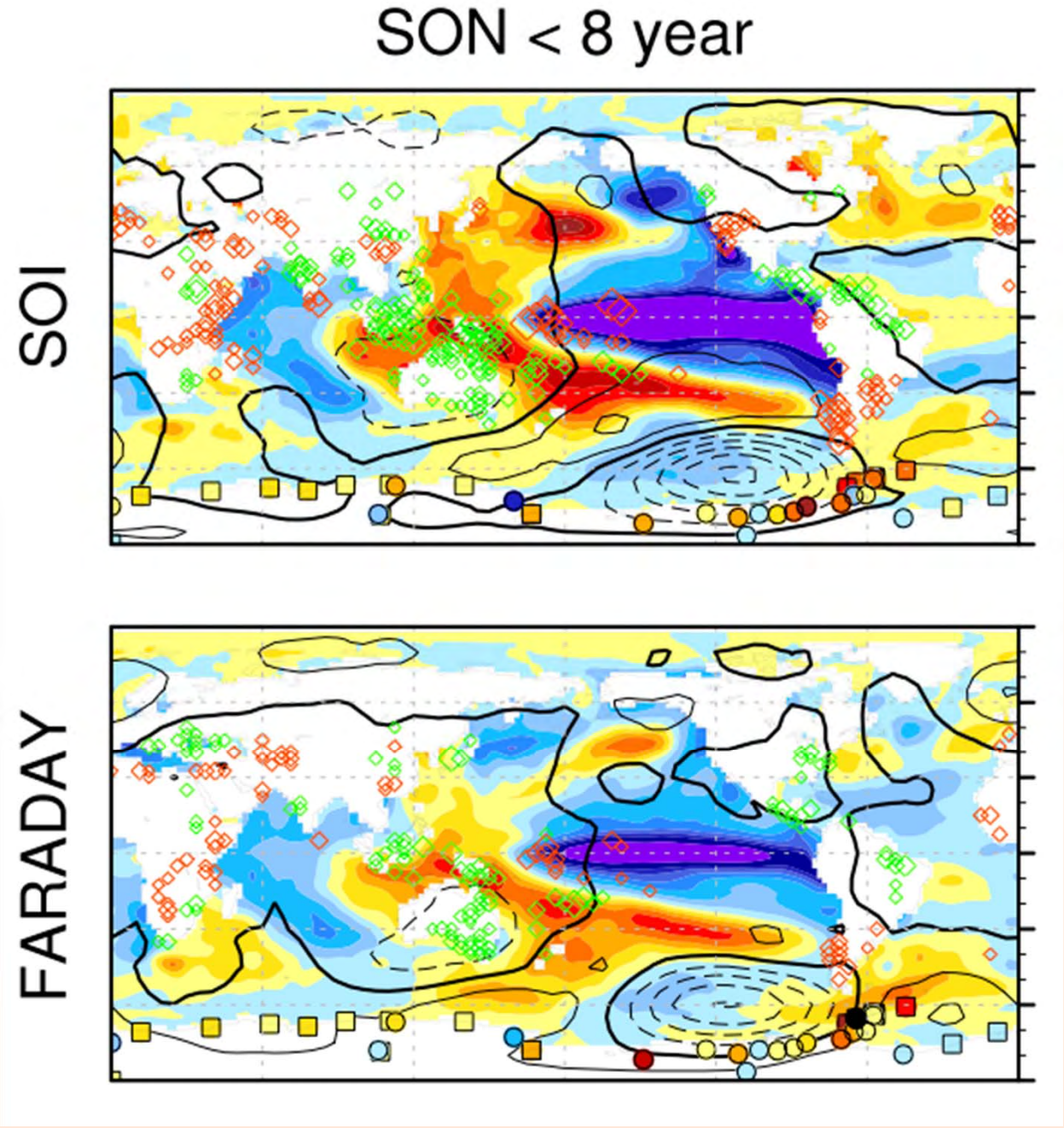
More sea ice colder

less sea ice warmer

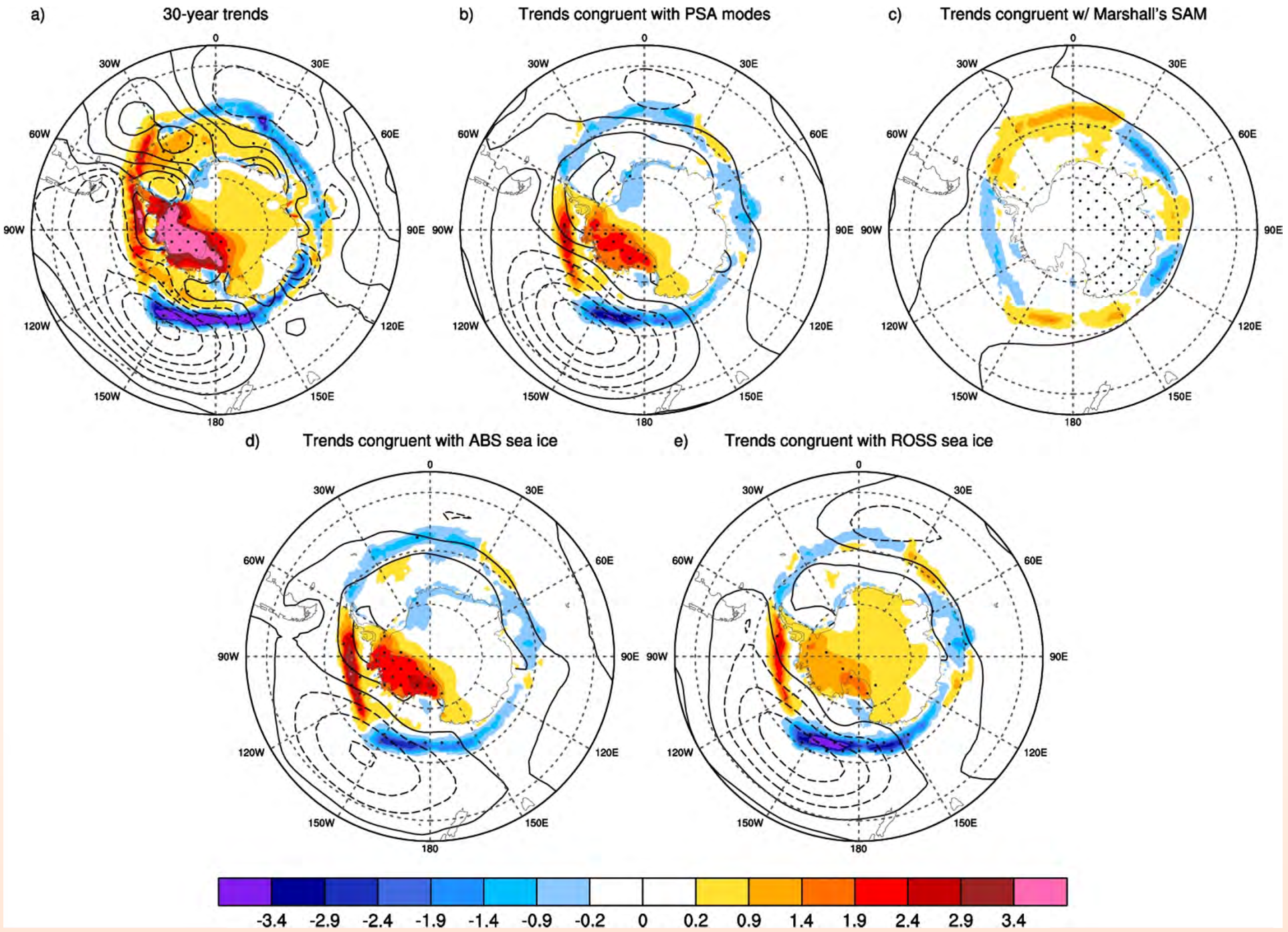
SAM vs tropical influence on Antarctic climate



Faraday (Vernadsky) station is distinctly tropical in the spring



Attribution of austral spring (SON) trends to atmospheric circulation



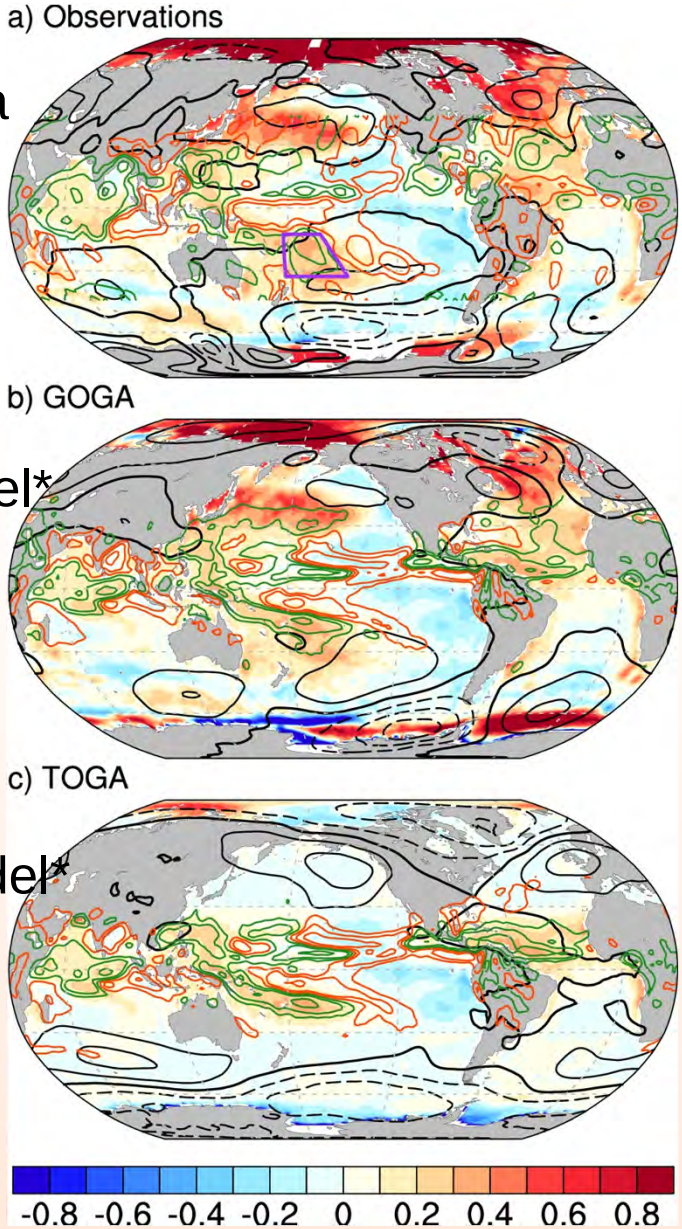
Attribution of SON atmospheric circulation trends to SST trends

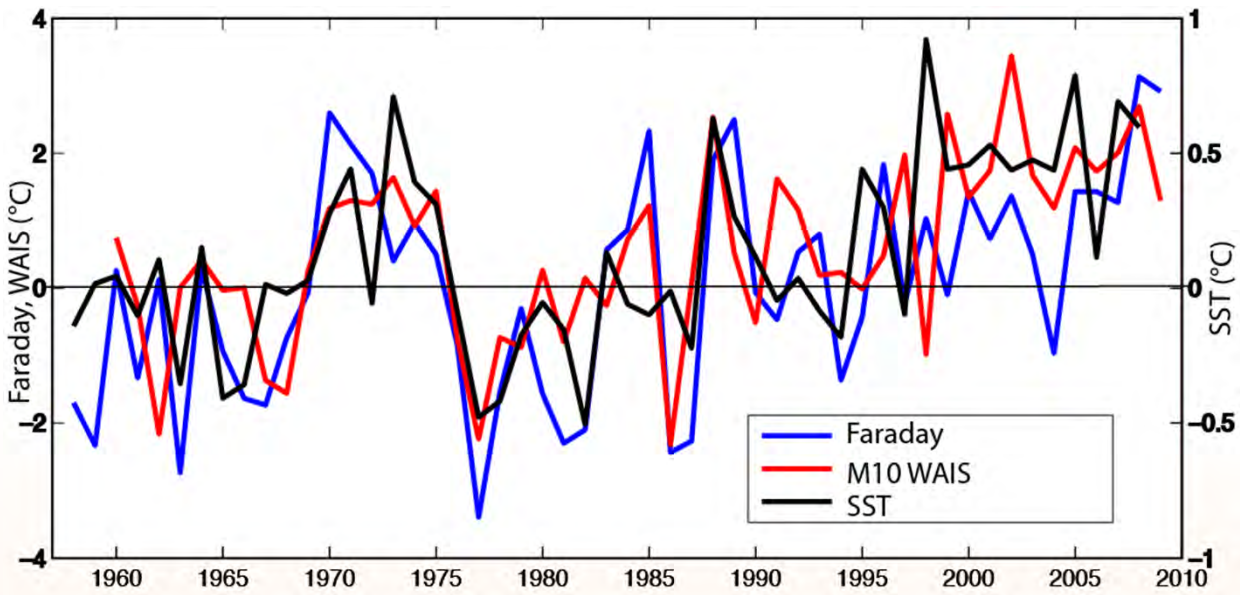
Faraday, WAIS & western Pacific SSTs are warming together

data

Model*

Model*





*model response to prescribed SST

Summary – Antarctic temperature trends and tropical influence

- Antarctica has warmed since the 1950s. Most data sets agree.
- Since 1970s, there has been marked seasonality and regionality in the trends: warming in spring in W Antarctica; cooling in autumn in E Antarctica, esp. in Ross Sea sector (though cooling has subsided in recent years)
- Increased temperatures coincide with reduced sea ice concentration and vice versa, on a regional, not Antarctic-wide scale
- Spring trends are consistent with an atmospheric circulation trend, the Pacific-South American pattern, which may be forced by tropical SST trends
- We need to push for more meteorological observations over WAIS, and intelligent discourse about Antarctic climate change

An Informed Guide to Climate Data Sets with Relevance to Earth System Model Evaluation

NCAR Climate Analysis Section

ClimateDataGuide

an informed guide to climate data sets featuring community generated expert guidance

www.climatedataguide.ucar.edu

- A web-based guide to the strengths and weaknesses of selected climate data sets
- A forum for 'expert-user guidance' and comments/discussion from the community
- Will reach a broad, international audience, especially young scientists
- Coming in October, 2011!!

Collaborative Research: Decoding & Predicting Antarctic Surface Melt Dynamics with Observations, Regional Atmospheric Modeling and GCMs

Objectives

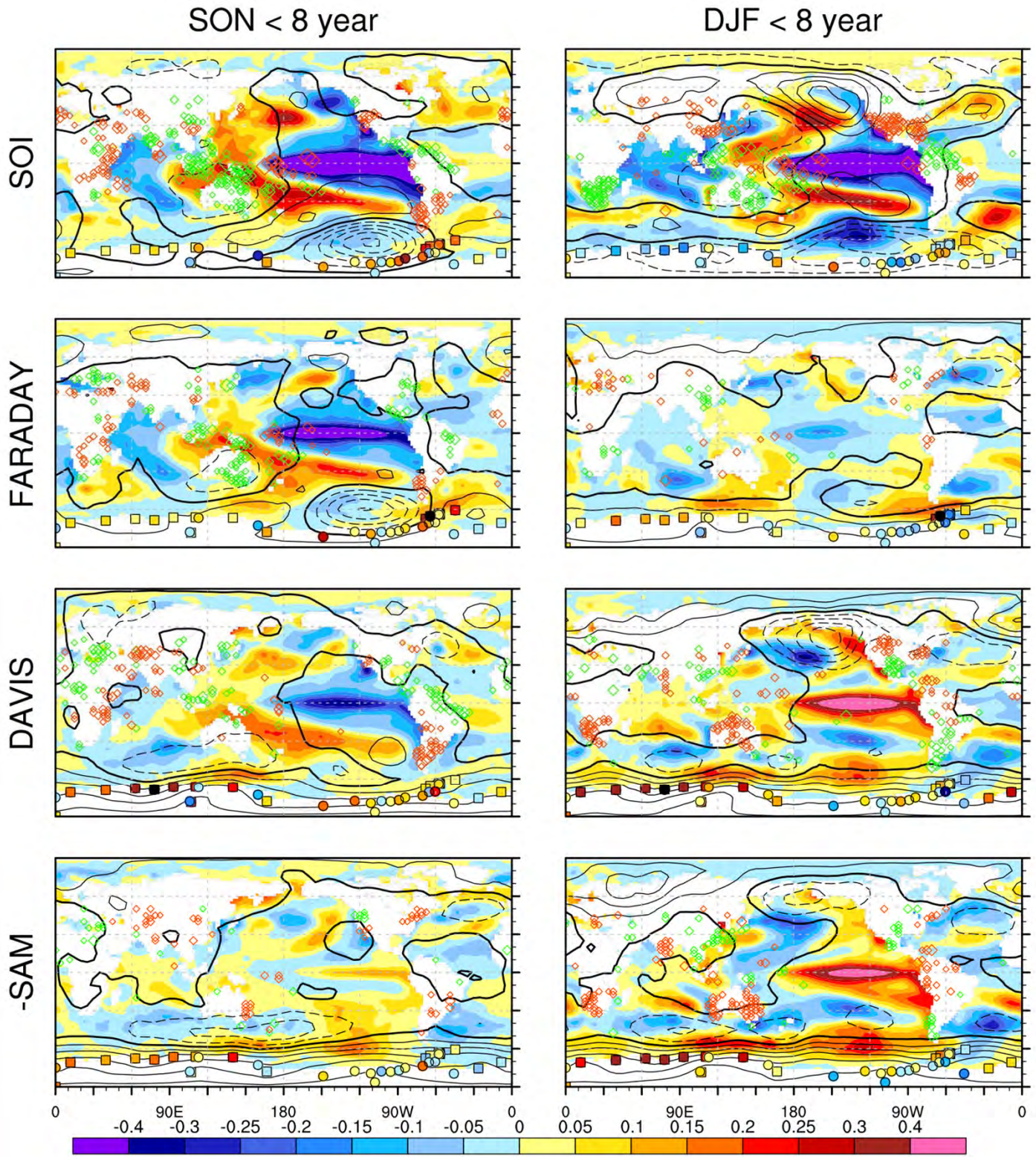
- Assess variability of observed surface melt occurrence (as seen in passive microwave data)
- Benchmark model-based melt proxies vs observed melt
- Diagnose synoptic-scale meteorological controls on melt
- Assess future change in melt proxies based on regional models driven by CMIP5 GCMs

Participants

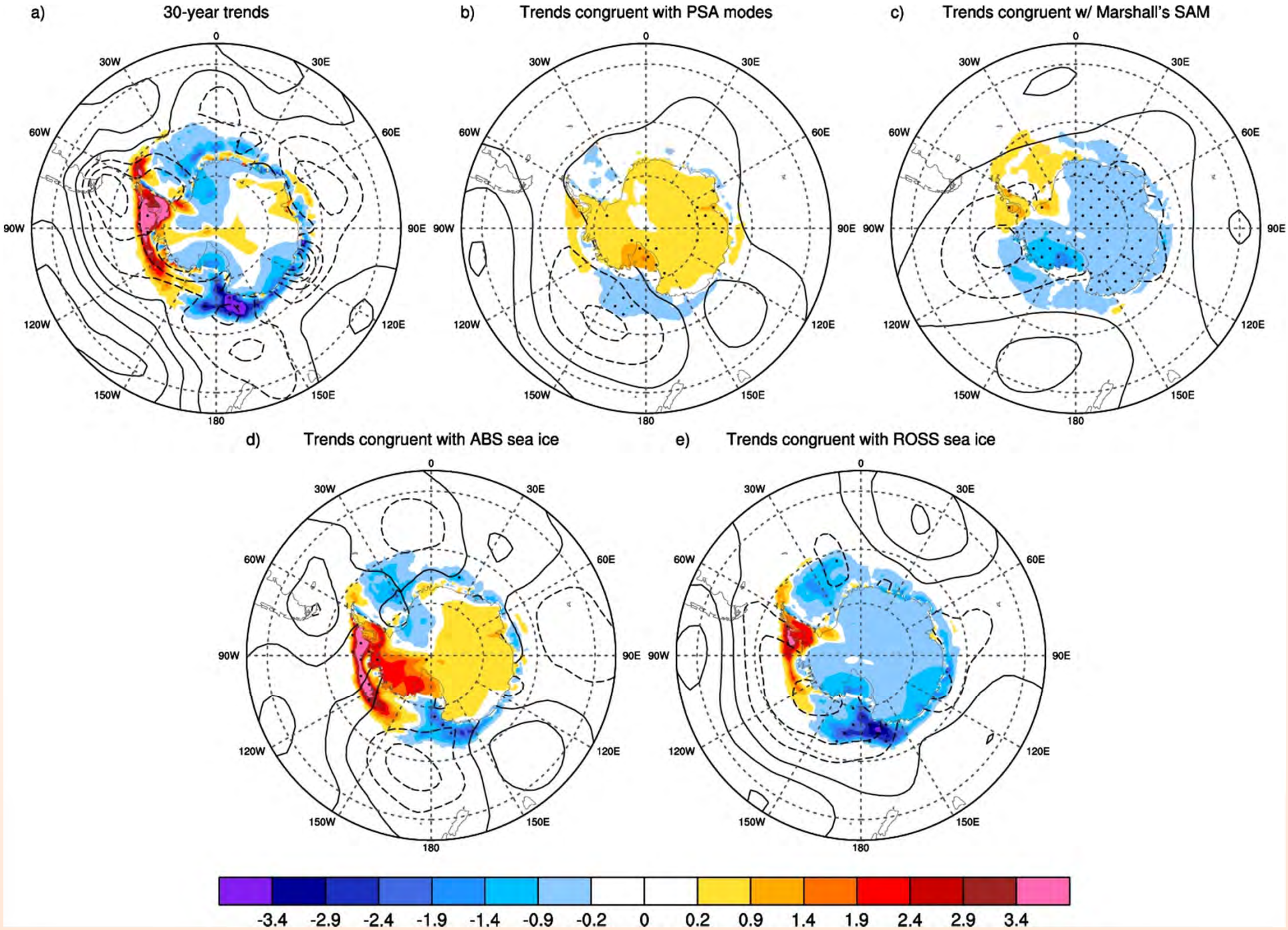
- David Reusch, New Mexico Tech (dreusch@ees.nmt.edu)
- Derrick Lampkin, Penn State (djl22@psu.edu)
- Dave Schneider, NCAR (dschneid@ucar.edu)

See us at AGU, Poster Session C41E, Thursday morning, 8 December

THANK YOU


SON < 8 year
DJF < 8 year
SOI
FARADAY
DAVIS
-SAM
0
90E
180
90W
0
-0.4 -0.3 -0.25 -0.2 -0.15 -0.1 -0.05 0
0 0.05 0.1 0.15 0.2 0.25 0.3 0.4

Attribution of austral autumn (MAM) trends to atmospheric circulation



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an Informed guide to climate data sets featuring community generated expert guidance

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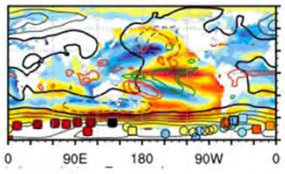
Community Generated Expert Guidance



A new community resource established in 2011, **climatedataguide.ucar.edu** is an interactive website that enables researchers and students to identify and make effective use of climate data sets by providing a focal point for expert-user guidance, commentary, and questions on the strengths and limitations of selected observational datasets and their applicability to model evaluations.

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***Informed Guide* at World Climate Research Program's Open Science Conference, Denver, Colorado, 24-28 October, 2011**

Please visit our poster session on Tuesday, October 25th, 2011 in Session C23, 10:30 AM – 12 noon. We will be on hand to answer your questions about the *Informed Guide* and provide a live website demonstration on our laptop or yours.

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Researchers! Be sure to register and log in to (1) View comments; (2) Post comments; (3) See preliminary expert guidance; (4) Contribute expert guidance. NCAR staff may use ucas credentials.

Featured Climate Data Sets

Overview: Reanalysis

***Reanalysis** is a systematic approach to produce data sets for climate monitoring and research. These reanalysis data sets are created via an unchanging ("frozen") data assimilation scheme and model(s) which ingest all available observations every 6-12 hours over the period being analyzed. This unchanging framework provides a dynamically consistent estimate of the climate state at each time step.*

NCAR Sea Level Pressure

experts: Hurrell, James | Trenberth, Kevin

NCAR Sea Level Pressure is a gridded analysis of SLP based on land station reports, covering 1899 to present for latitudes 30°N-90°N. Quality controlled raw data plus empirical corrections for changes in instrumentation and station location. Although the data are regularly updated, the guidance here is largely from the original Informed Guide, circa 2001.

ICOADS Surface Marine Weather Observations

experts: Deser, Clara

The 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

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Example Data Set 1.0

Water Isotopes from Satellites

ICOADS Surface Marine Weather Observations

Overview: Reanalysis

Kaplan Sea Surface Temperature

NCAR Sea Level Pressure

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in brief

External links about data set news and issues.

ERA Interim Reanalysis: configuration and performance of the data assimilation system [link]

Spurious trends in Antarctic P-E in reanalysis [link]

Erroneous Arctic temperature trends in ERA-40 [link]

Sudden Increase in Antarctic Sea Ice: Fact or Artifact? [link]

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