An Overview of the NOAA Drought Task Force

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Joint NOAA DTF and CDPW Meeting

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MAPP DTF Mission

Bring together and facilitate MAPP-funded research efforts aimed at achieving advances in capabilities to monitor and predict drought over North America.

Contribute to efforts to advance official national drought products including:

-development of a DEWS by NIDIS

-drought monitoring/prediction activities at NCEP.

Coordinate with (and take advantage of) other relevant national and international efforts (e.g. NMME, WCRP Drought Interest Group).

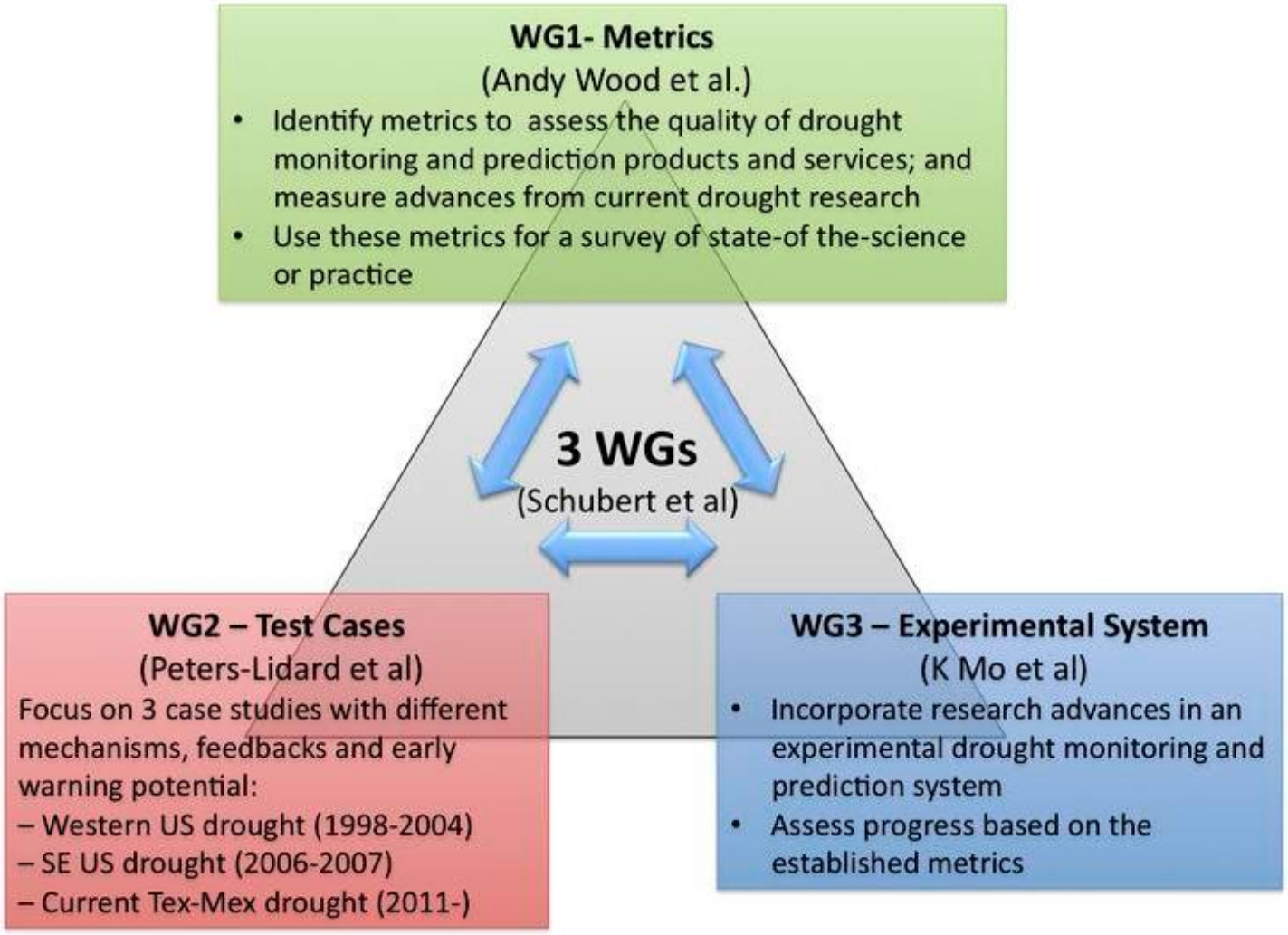
Objectives/Activities

Develop an “infrastructure” that research groups can use to test/evaluate methods and ideas – *yet minimize any additional “unfunded” work*

Initial Objectives/Tasks are:

- **Define a Test-bed** centered on case studies (three recent droughts) to encompass the wide range of project goals, obtain relevant data, etc.
- **Define metrics** for evaluating advances in monitoring/prediction.
- Scope out basic requirements/components of a DEWS and **how individual MAPP funded projects might contribute.**

Drought Task Force Working Groups



Accomplishments

- **Developed DTF "infrastructure"**: 3 working groups, testbed idea (assess capabilities/progress – focus on three recent droughts)
- **Communication/coordination:**
  - Monthly telecons, review state of understanding of selected droughts, progress of individual project, etc.
  - DTF Wiki page to help coordinate– repository for information, telecons, presentation ppts, references, work space, calendar, WG workspace – metrics, cases, plans
  - Link to NIDIS – created new DTF web page
  - Coordination with NMME (added new drought related quantities)
- **Plans for special collection in JHM** on "Advancing Drought Monitoring and Prediction "
  - About 20 contributed papers plus 3 overview/synthesis papers

Special JHM Collection on “Advancing Drought Monitoring and Prediction “

- ***Synthesis****: E. Wood and DTF leadership*

  High level summary of contributed papers. An overview of current state of science and key questions and challenges

- ***Metrics****: A. Wood/Mo/AghaKouchak/Xia/F. Chen*

  Assessment of the state of the science, and progress over the last few years. Has drought monitoring and prediction improved?

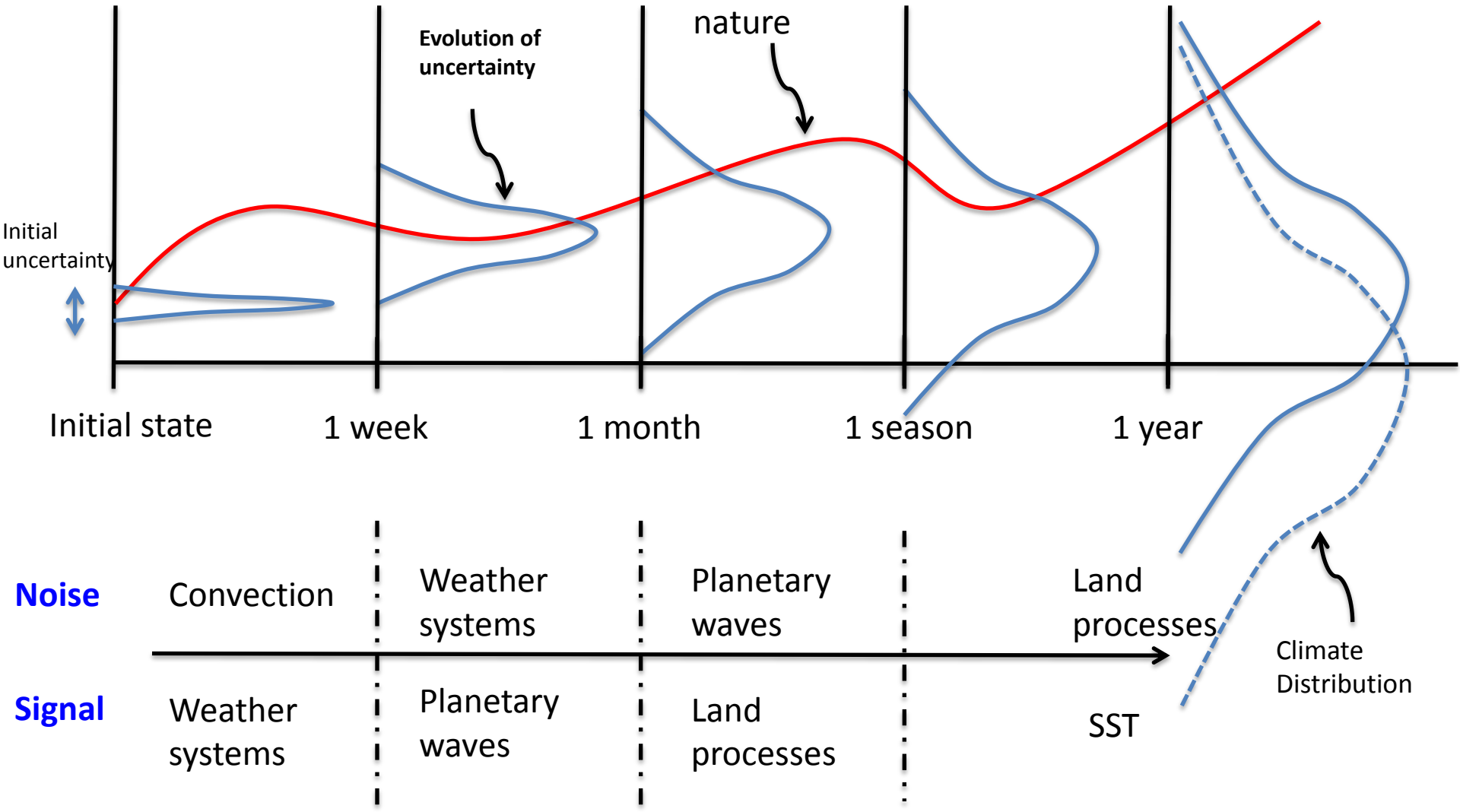
- ***Predictability****: Schubert/Kirtman/Lyon/Koster/Sheffield*

  What are the current estimates of the predictability of drought? How do these estimates compare with actual prediction skill

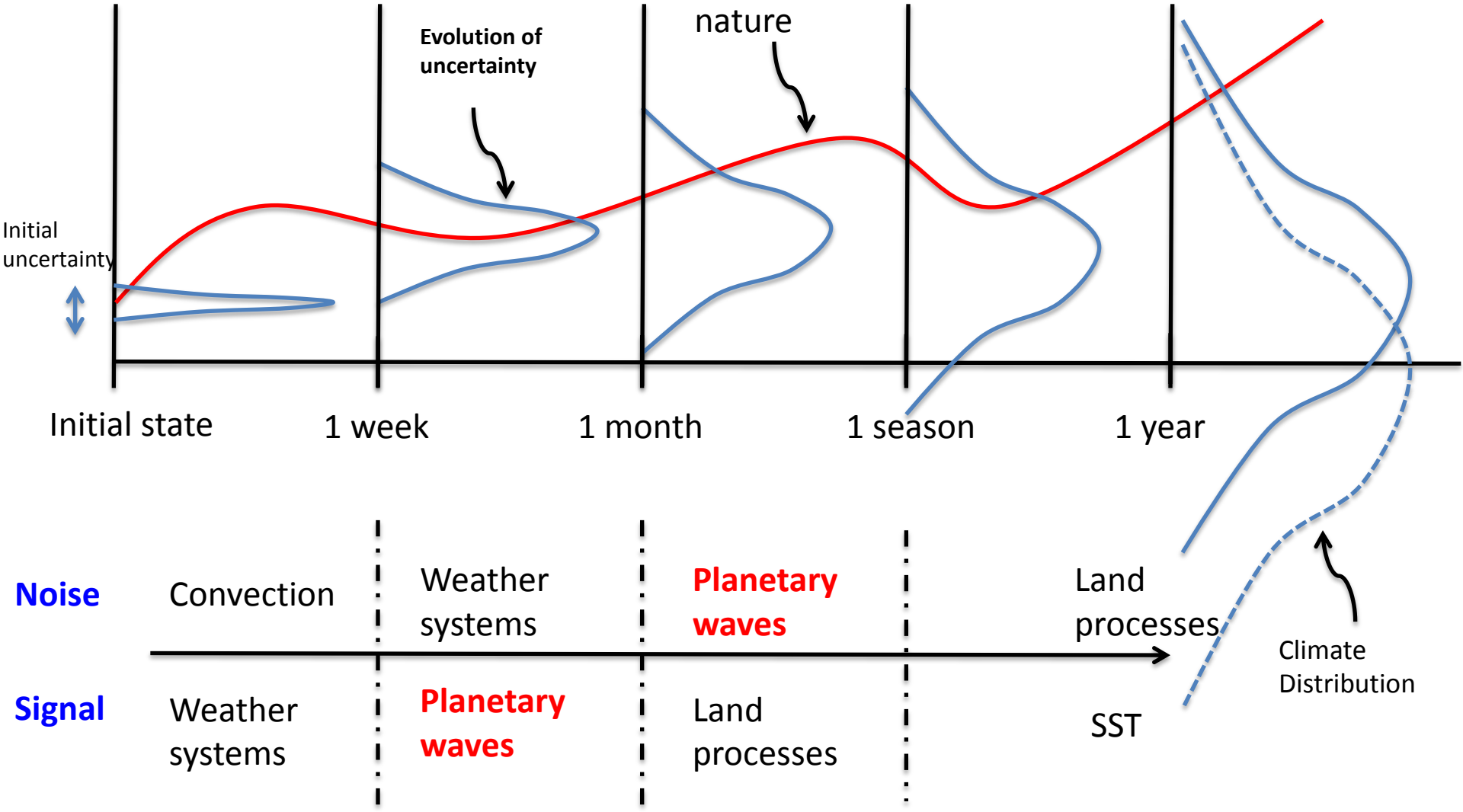
How Do We Improve Forecast Skill?

- *Are there untapped sources of predictability?*
- *What are the key roadblocks to improving skill*?
- *Where do we get the most bang for the buck?*
- ***Need to look at the problem from a phenomenological perspective***

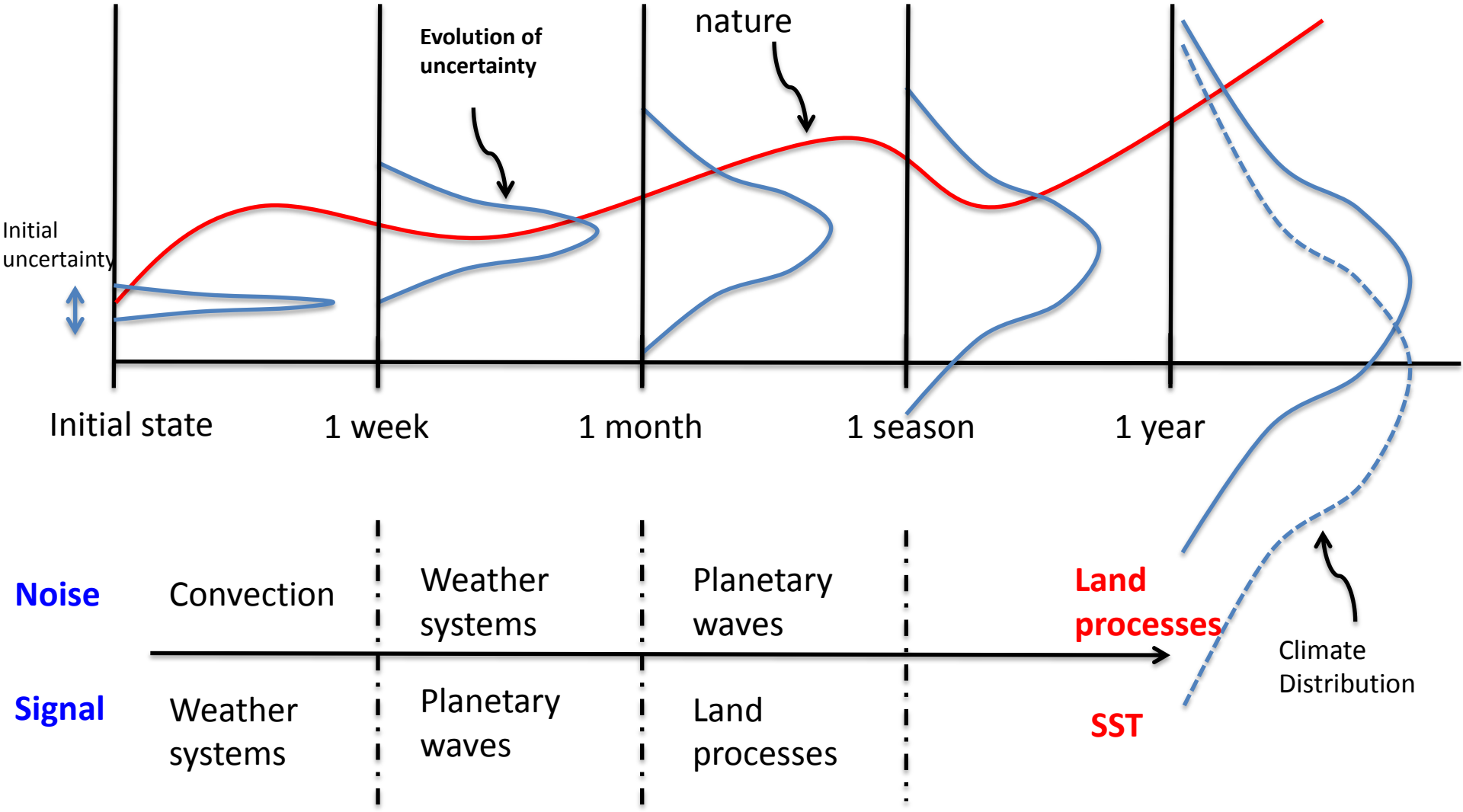
Predictability and Processes/Phenomena



Predictability and Processes/Phenomena



Predictability and Processes/Phenomena



See Wang et al. poster

T2m during 2012 (°C)

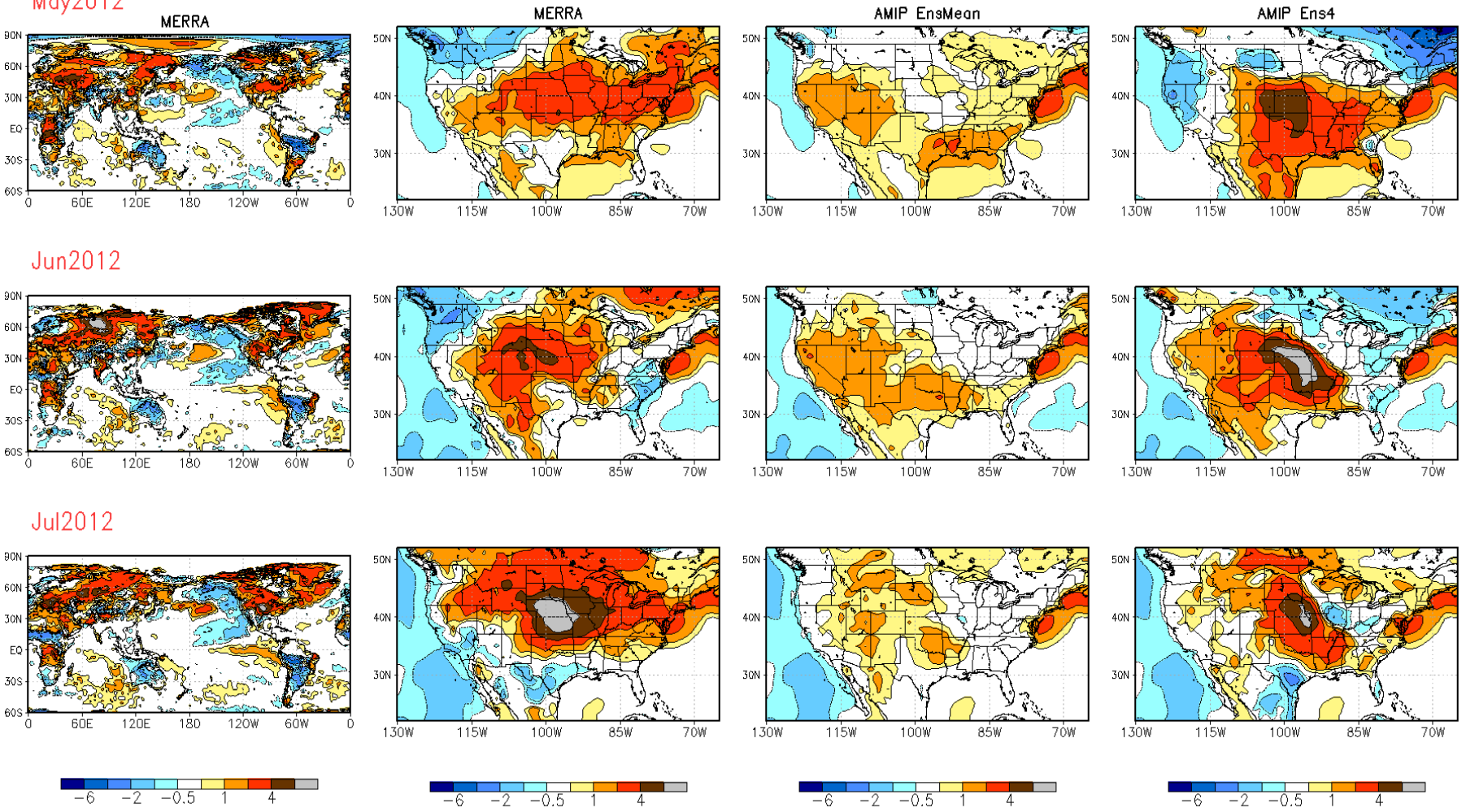
MERRA (Obs)

MERRA (Obs)

GEOS-5 AMIP (Ensemble mean)

GEOS-5 AMIP (Single member)

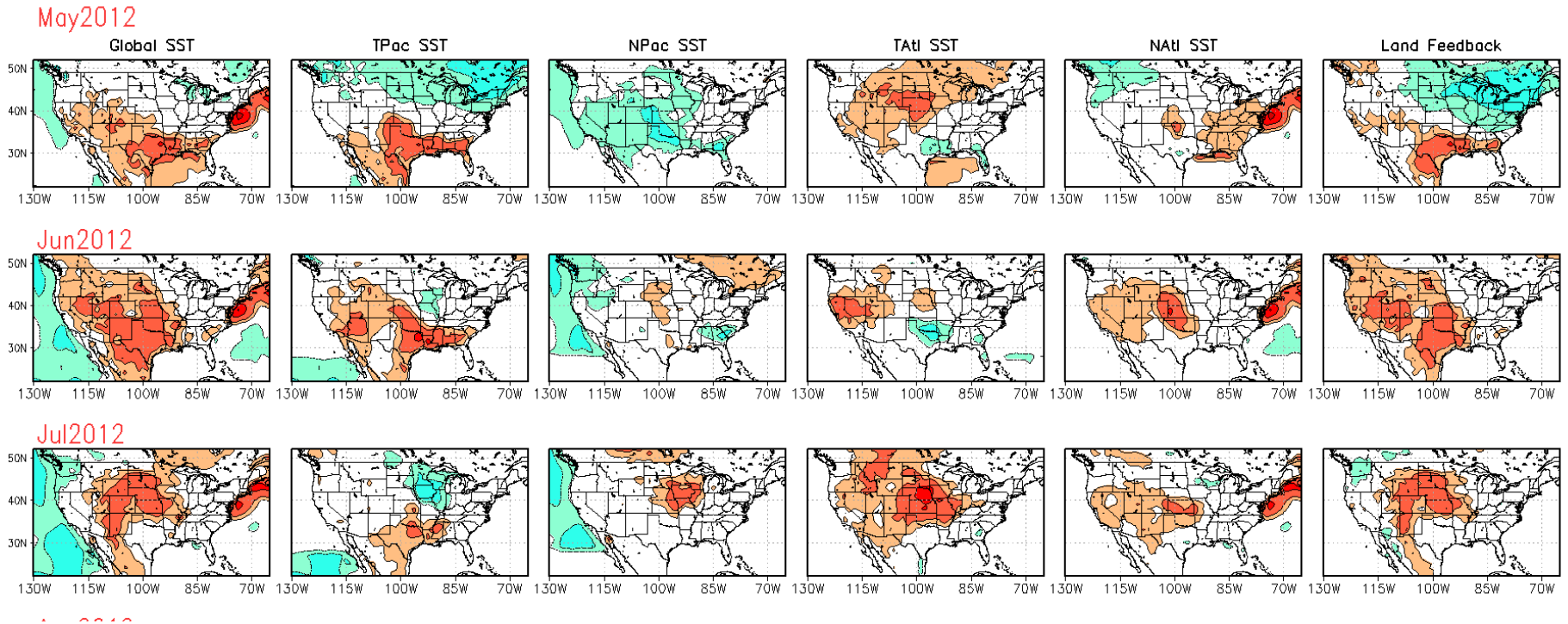
May2012



Jun2012

Jul2012

Impact of SST in Different Ocean Basins (T2m °C)



Global SST

Tropical Pacific SST

NPac SST

Tropical Atlantic SST

NAtl SST

Impact of land feedback

Importance of a Global Perspective (e.g., link to GDIS)

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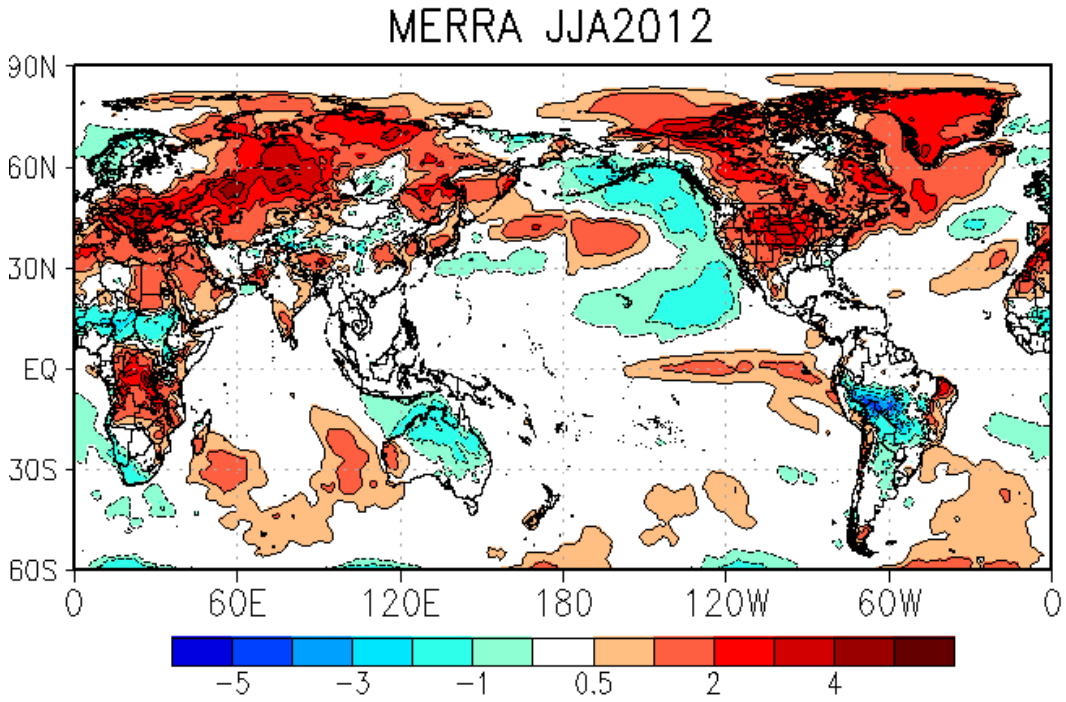
- Facilitates understanding
- Facilitates validation

Global Picture during JJA 2012

- Eurasian grain belt impacted by heat wave and drought

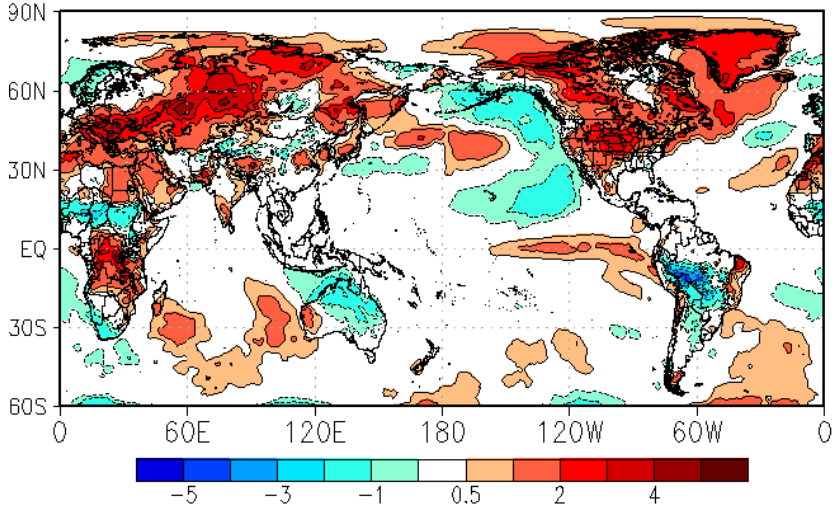


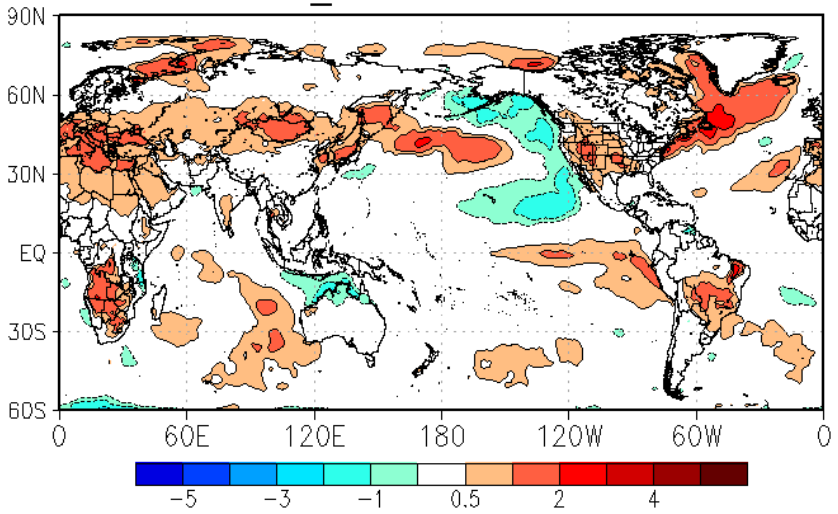
JJA 2012 Anomalies wrt 1980-2010 Mean

MERRA

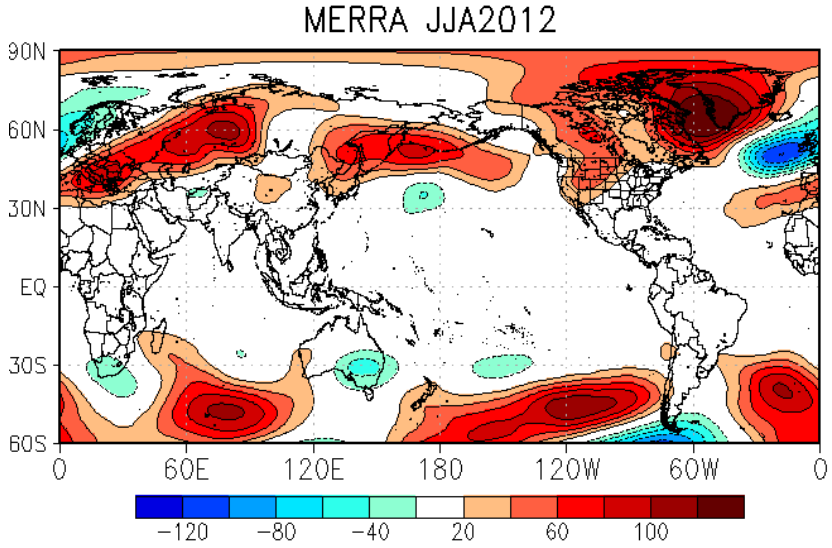
GEOS-5 AMIP Ens Mean

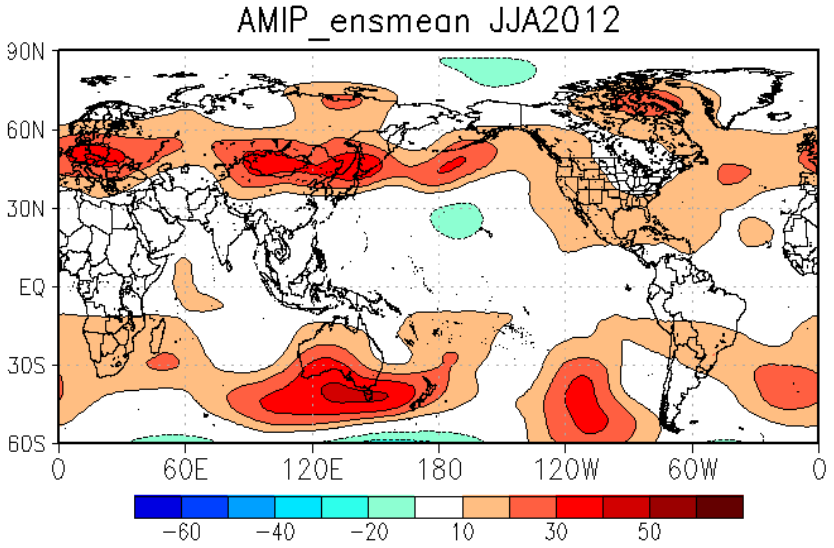
T2m



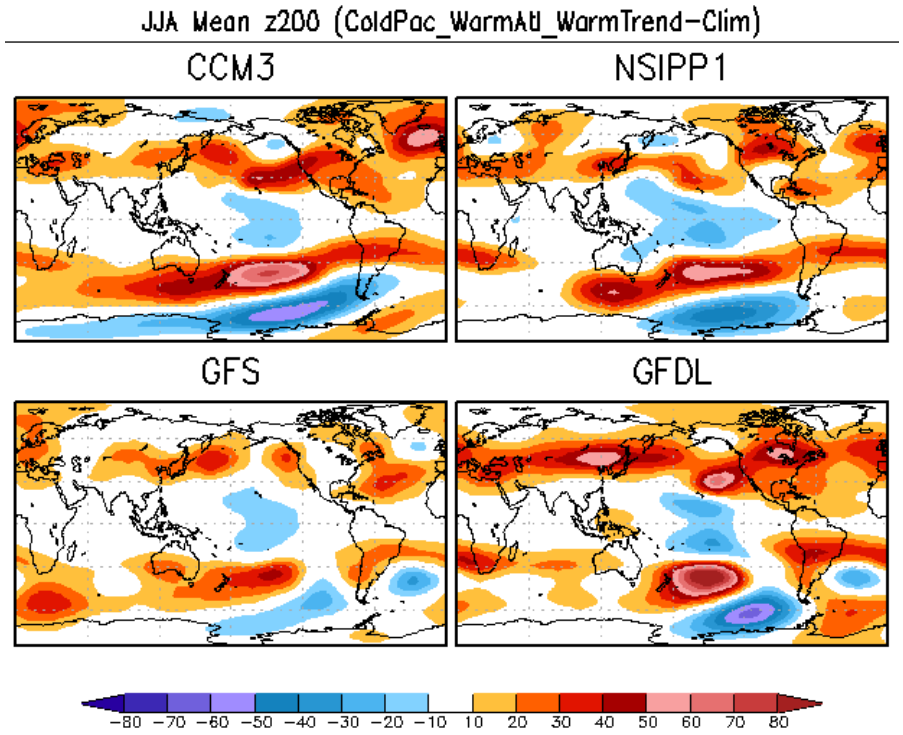


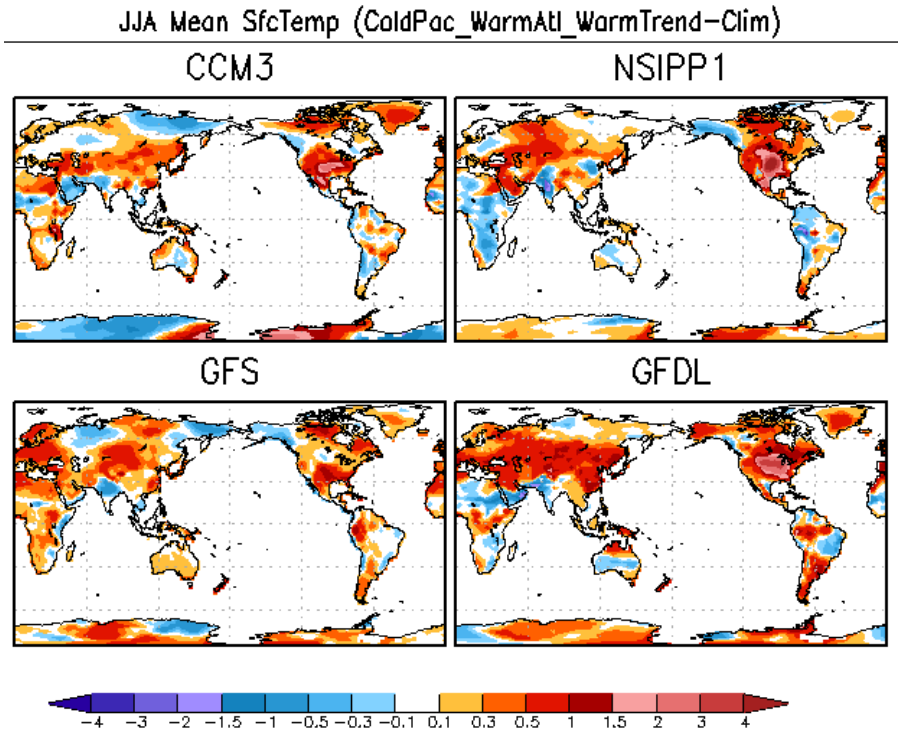
z250 mb





Response to Idealized SST Forcing (JJA)
(cold Pacific, warm Atlantic, trend)

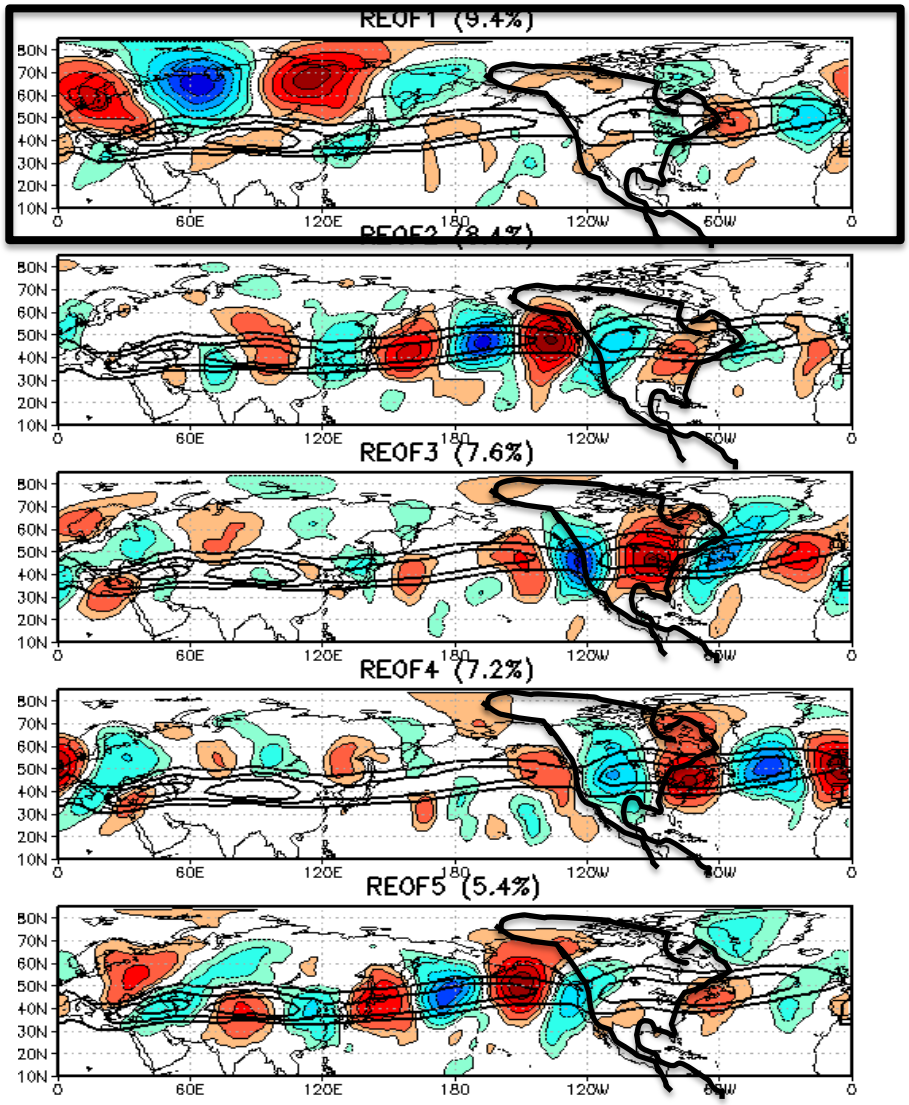




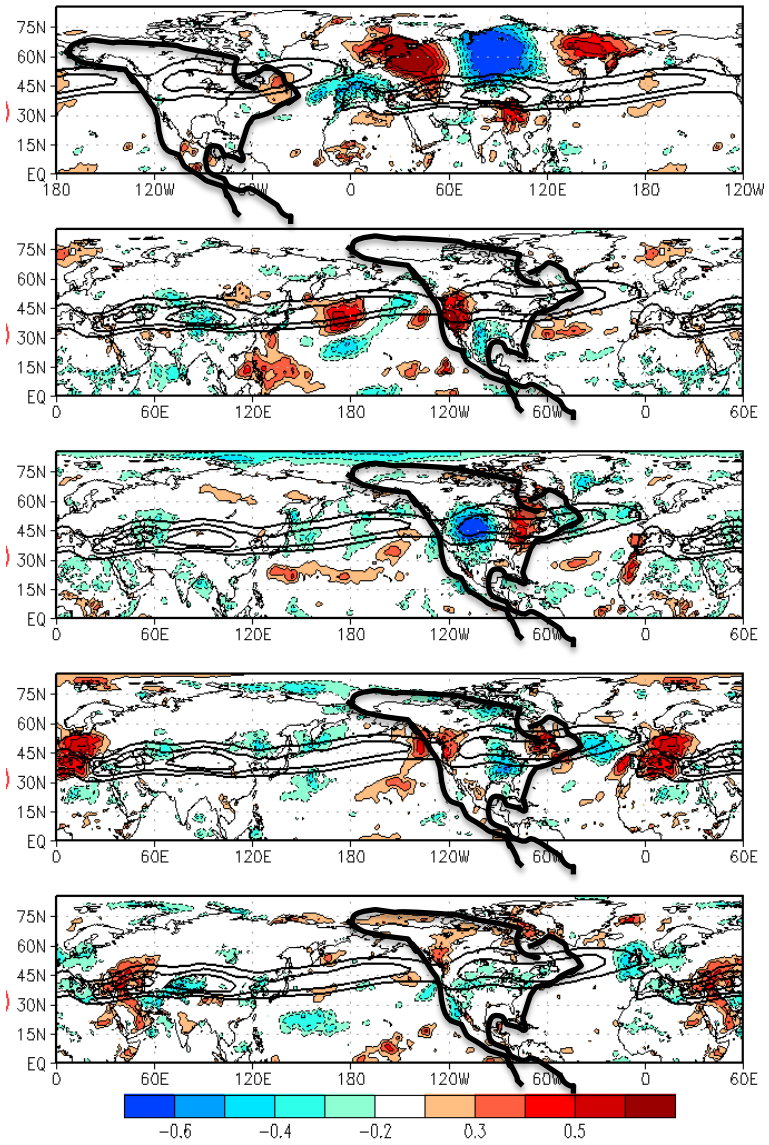
USCLIVAR working group on drought (Schubert et al. 2011)

Predictability of Summertime (JJA) Rossby Waves

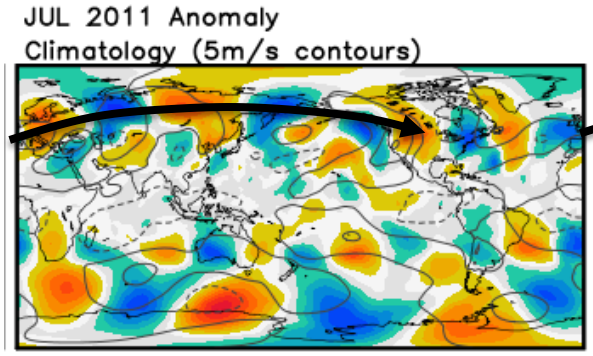
Leading REOFs of v250mb Monthly JJA

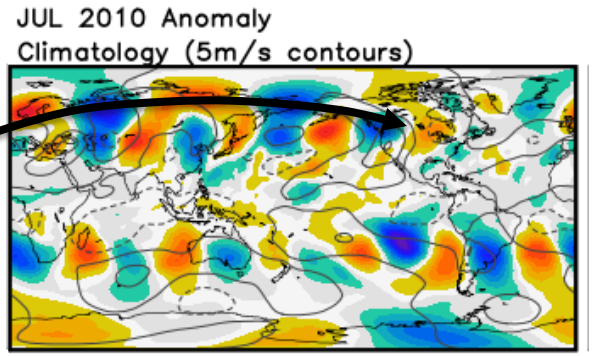


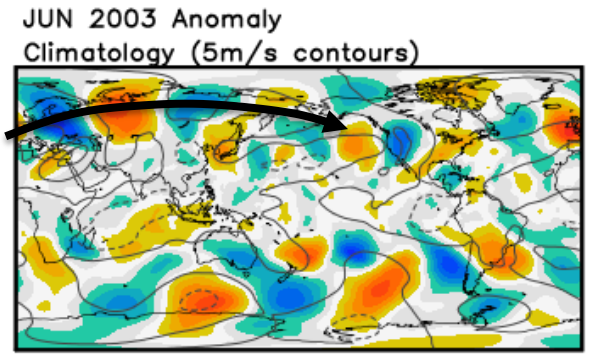
Correlation with T2m

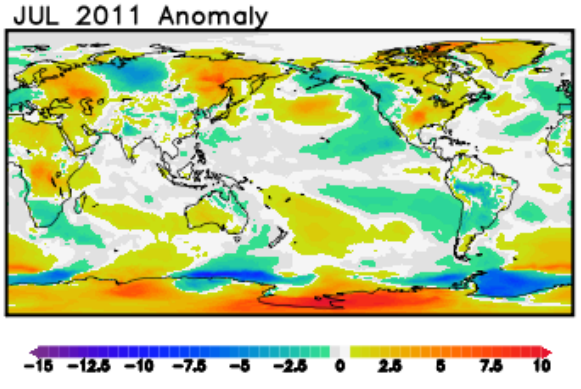


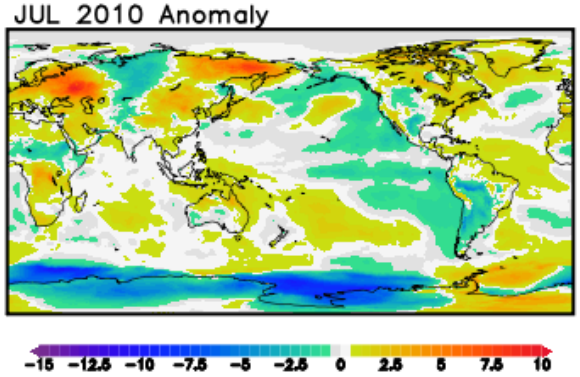
Eurasian Heat Waves

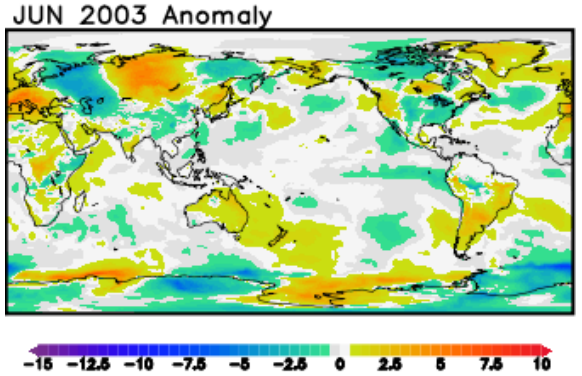










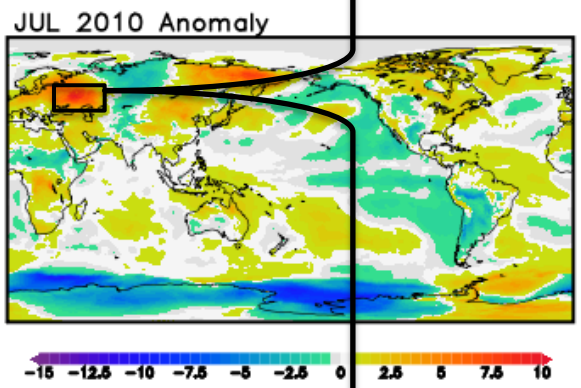


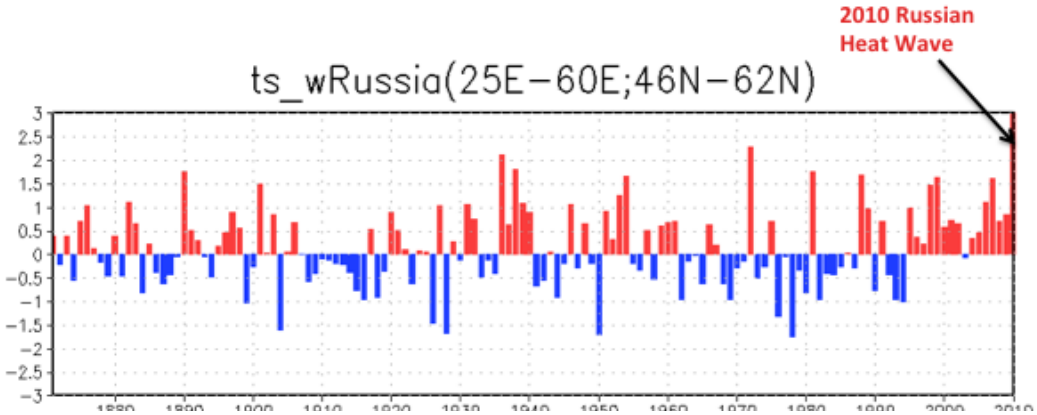
July 2011

July 2010

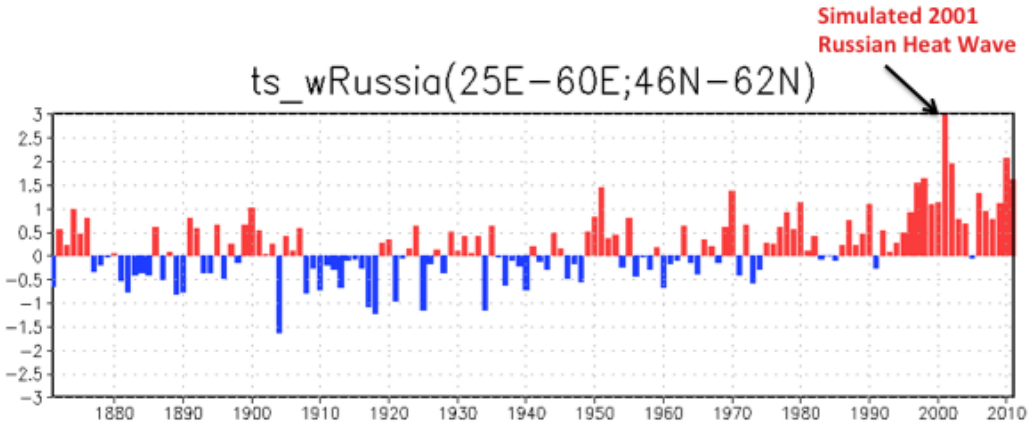
June 2003

JJA T2m time series over Russia

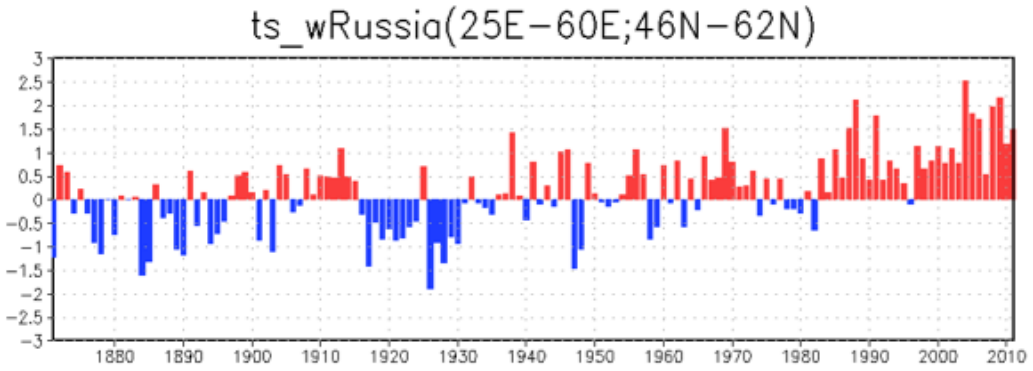




Obs



AMIP 1



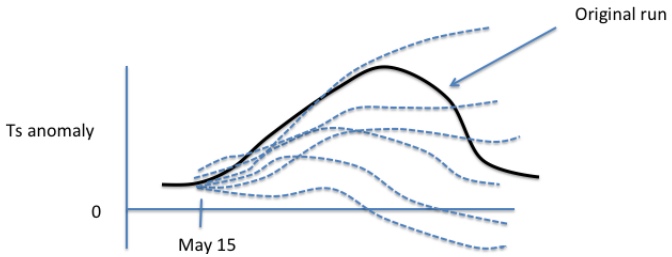
AMIP 2

1870 2010

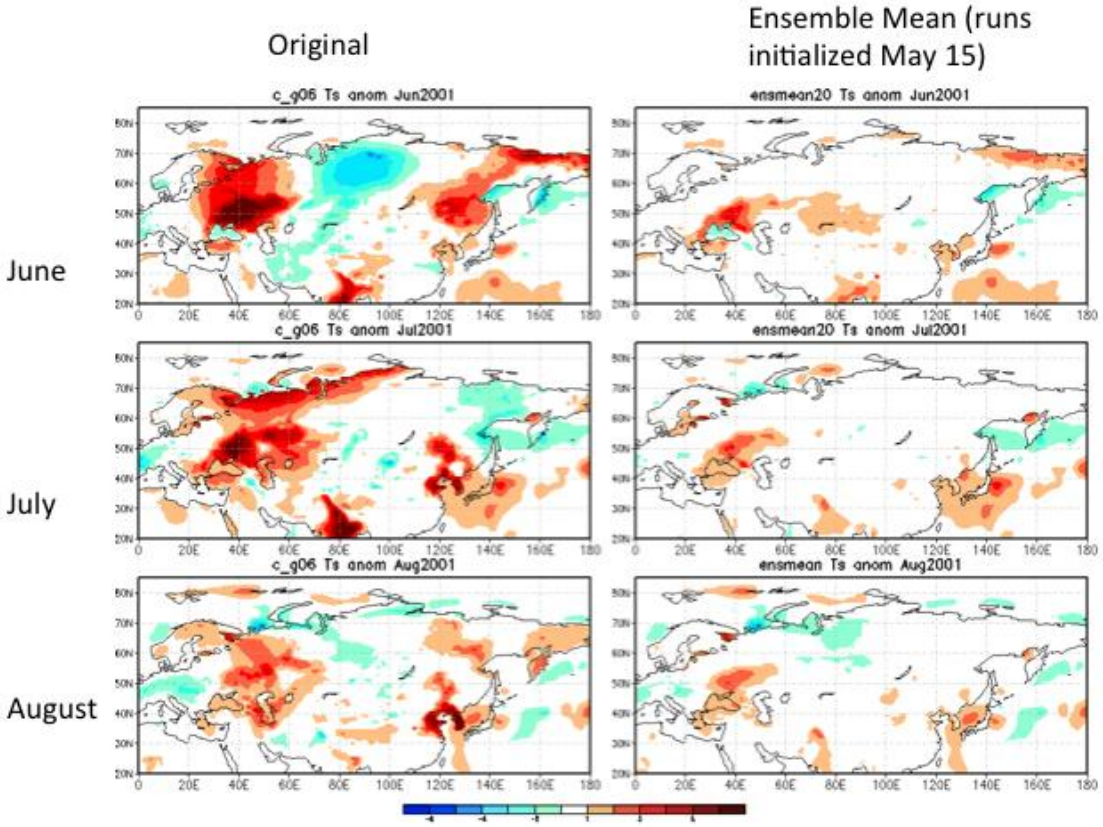
Limited Predictability of 2001 Simulated Heat Wave Linked Rossby Wave but Land Memory does Play a Role in Extending Warm Surface Temperature

How Predictable is the Event?

- Examine sensitivity to initial conditions
- Restart runs on May 15th 2001 with small perturbations in the atmosphere
- 20 ensemble members

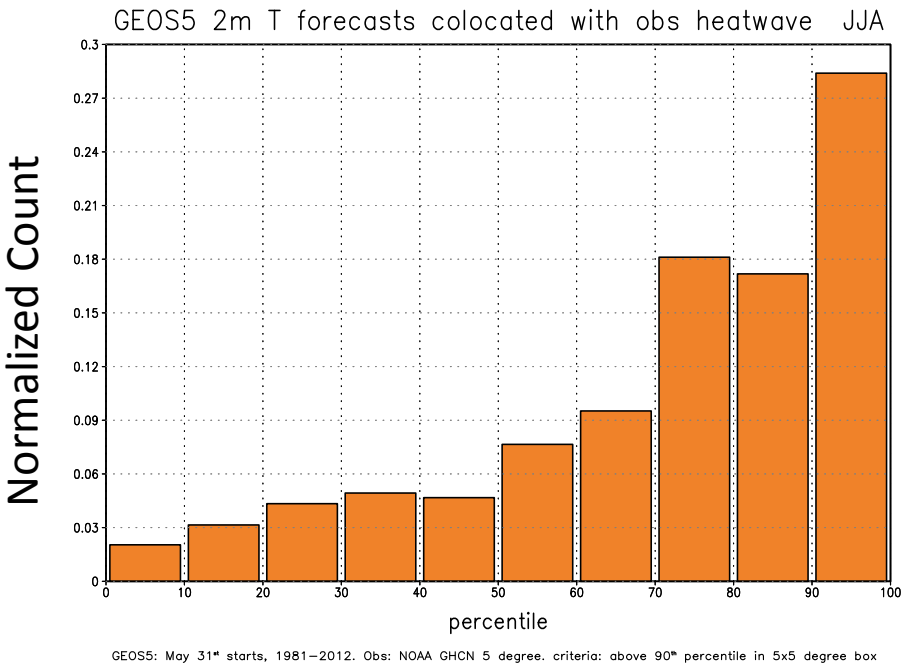


Simulated 2001 Russian Heat Wave (T2m °C)



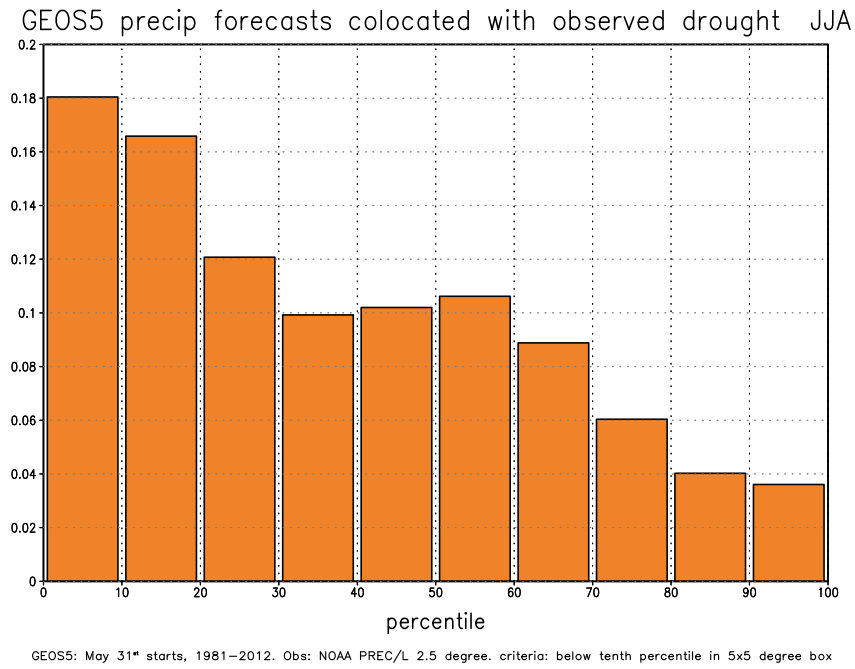
Global Evaluation of GEOS-5 Forecasts of Drought and Heat Waves (courtesy Randy Koster)

Temperature at 2M



Percentile

Precipitation



Percentile

Counts of forecast deciles for T2m and Precipitation for all 5°X 5° boxes where the observations fall in the top (bottom) decile for T2m (Precipitation) for JJA and all land areas. Forecasts are initialized at the beginning of June for the period (1981-2010).

Next Steps

- Work plan for DTF in the coming year
  - Build on infrastructure (WGs, test cases)
  - Carry out regular assessments of capabilities (facilitate RtO)
  - Strengthen links to NIDIS, GDIS etc