

Climate and Extreme Events: Subseasonal Predictability and Prediction

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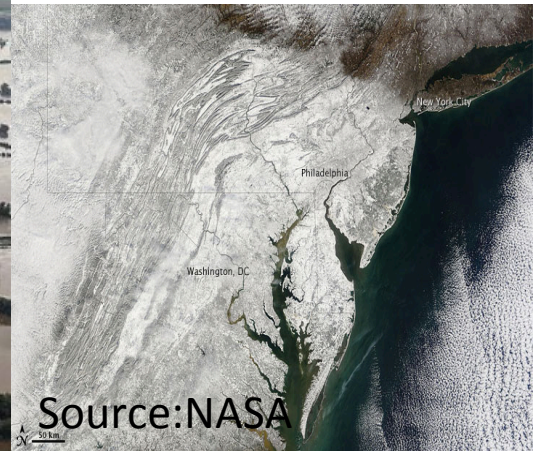
Source: Wiki



Source: Wiki



MoD/Crown



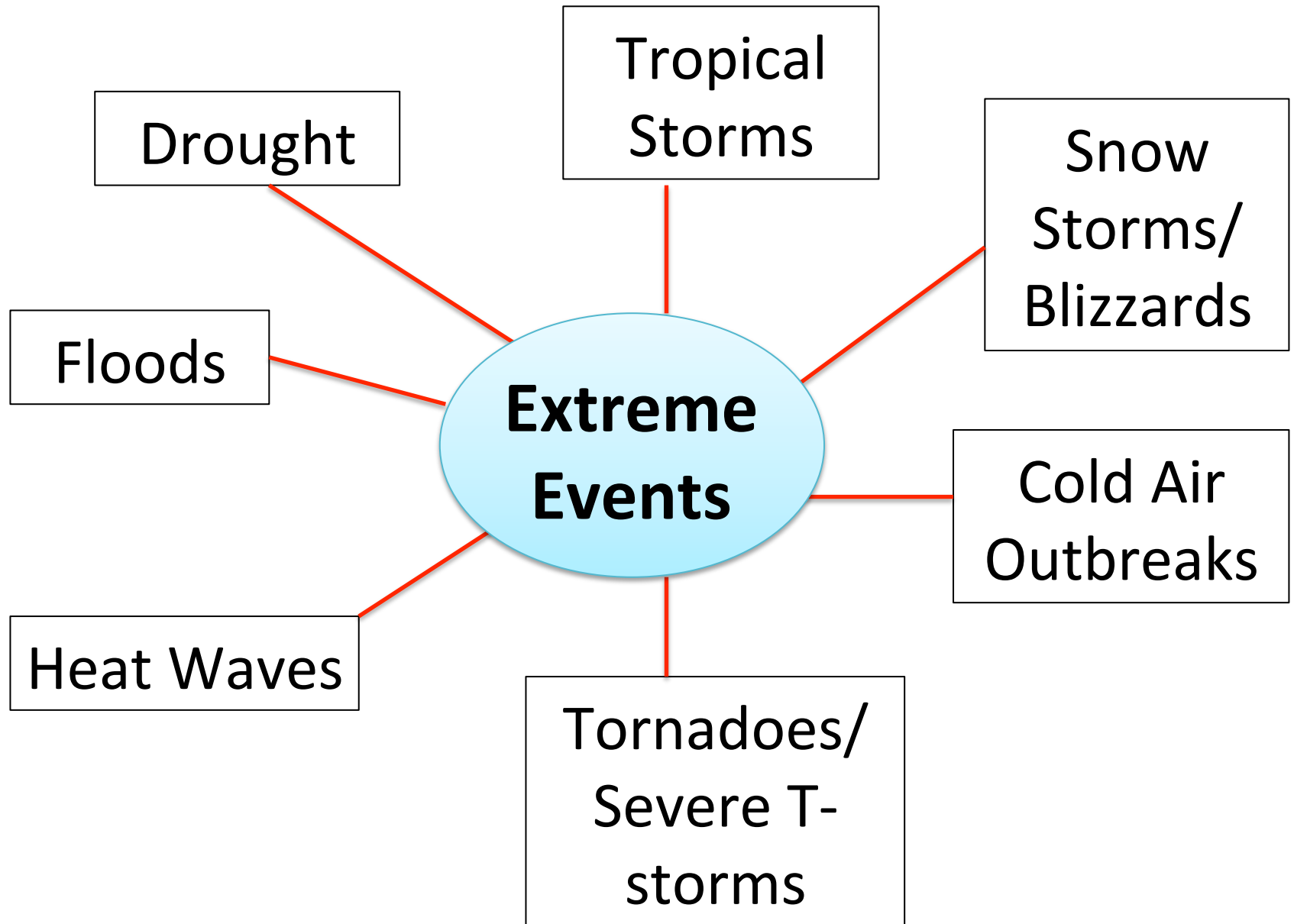
Source: NASA

US CLIVAR
Summit 2015
PPAI Panel





Extreme Events

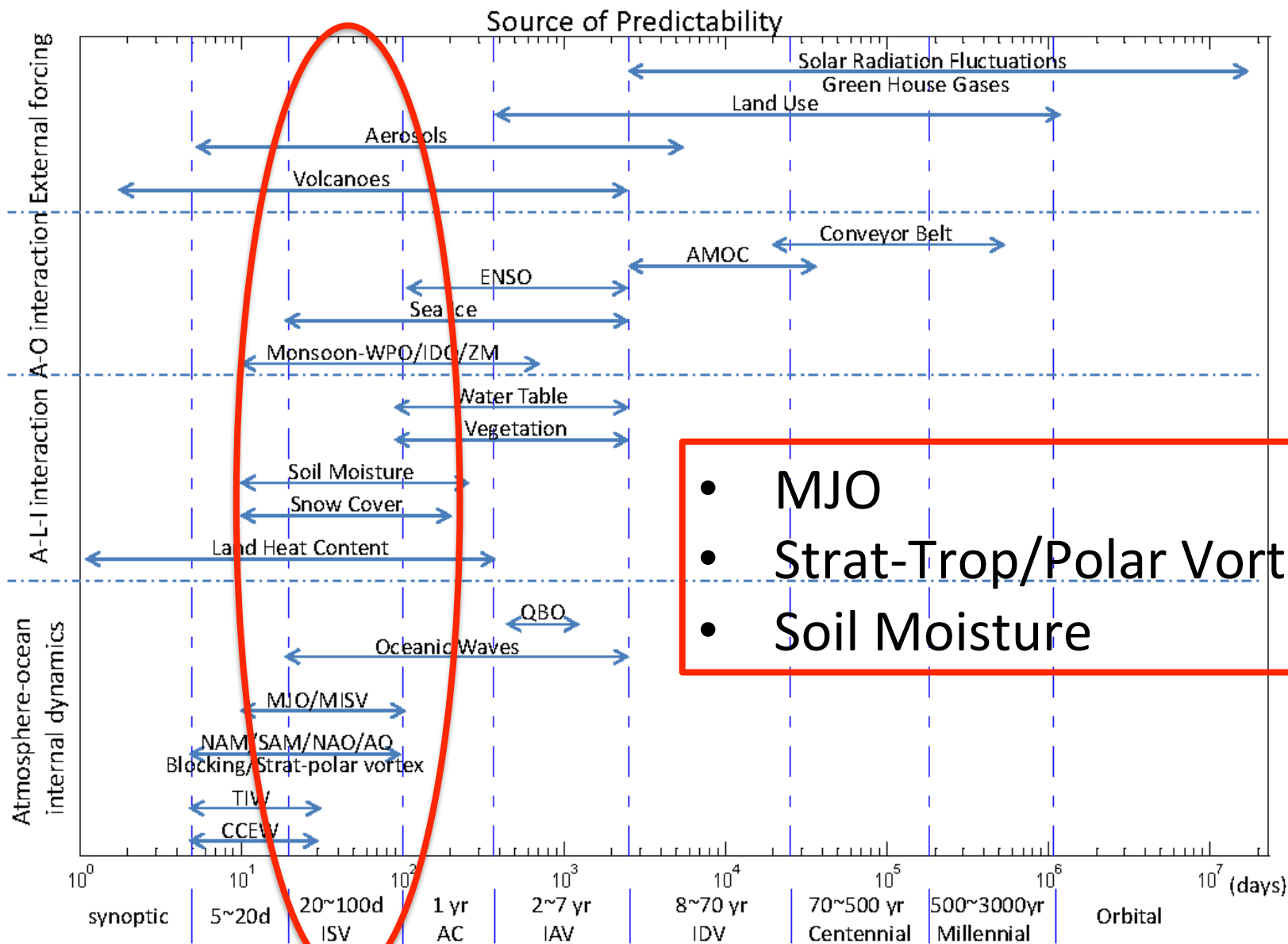


US CLIVAR Research Challenge: Climate and Extreme Events

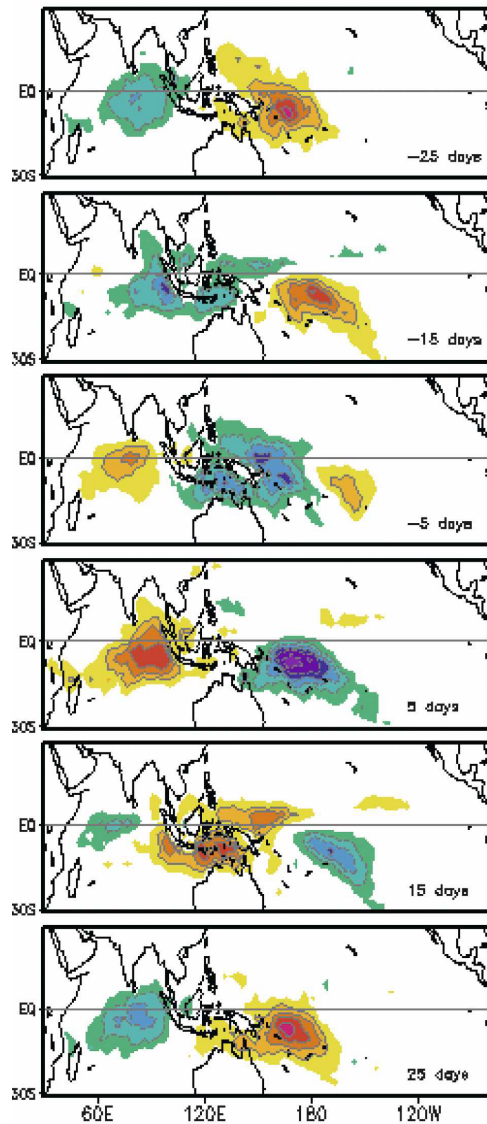
Future research

- Identify dynamical processes that underlie precipitation and temperature extremes
- Investigate how short-term processes interact with the larger-scale, slower, and potentially-predictable climate fluctuations linked to the ocean
- Determine metrics and analysis tools most relevant for extremes
- Investigate what properties of extremes, if any, are changing under global warming

Sources of Subseasonal Predictability

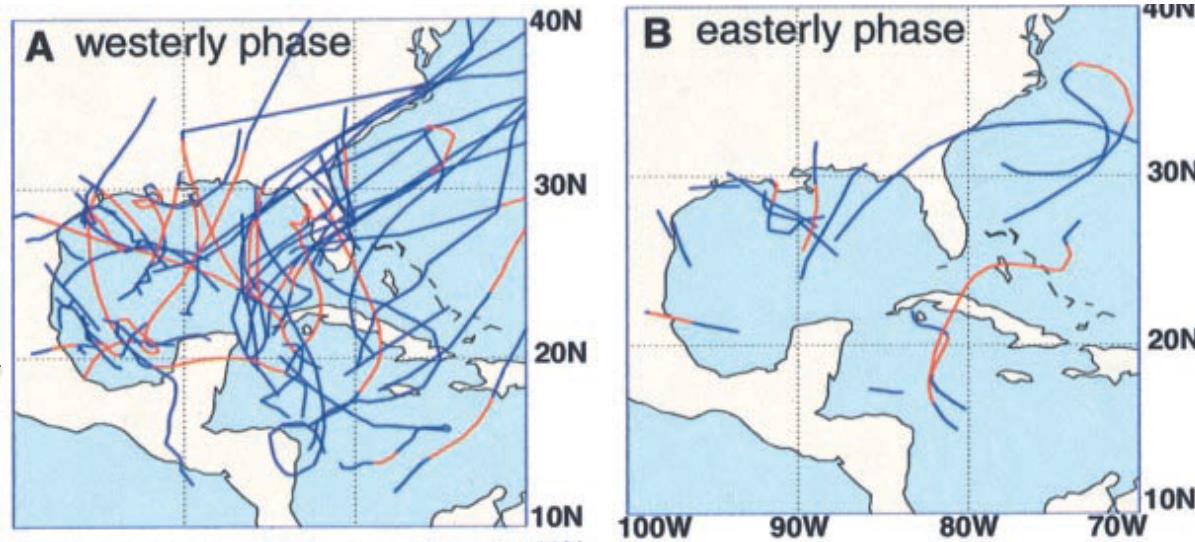


MJO

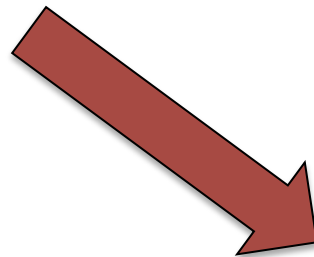


Pegion and Kirtman 2008

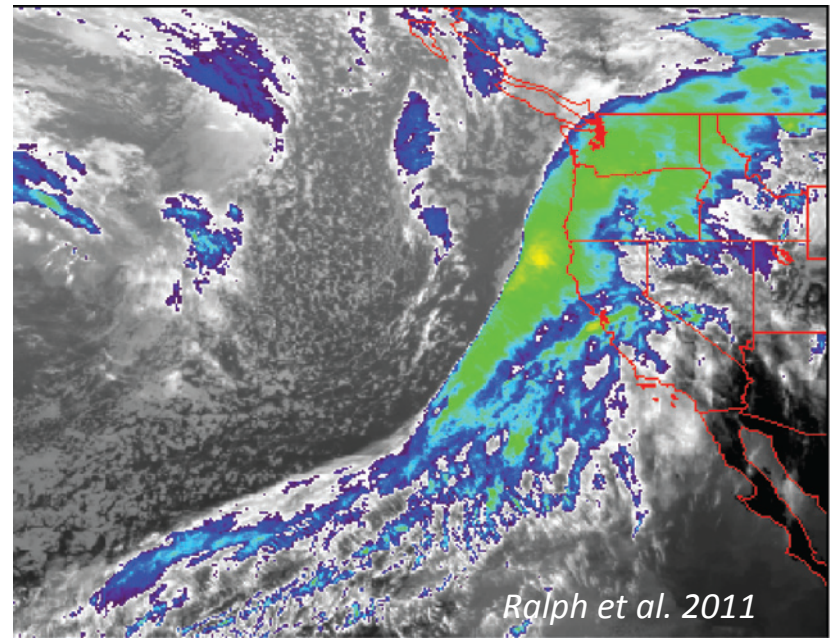
Tropical Cyclones



Maloney & Hartmann 2000



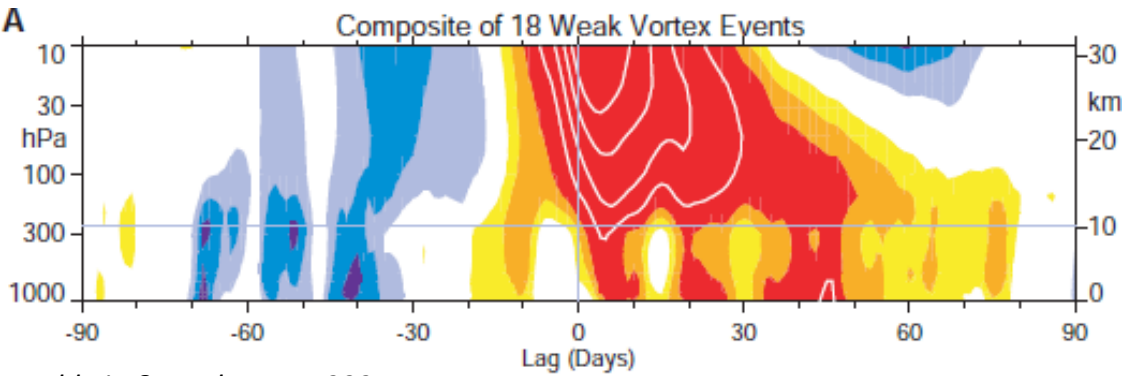
ARs & Extreme Precip



Ralph et al. 2011

Stratosphere-Troposphere Interactions

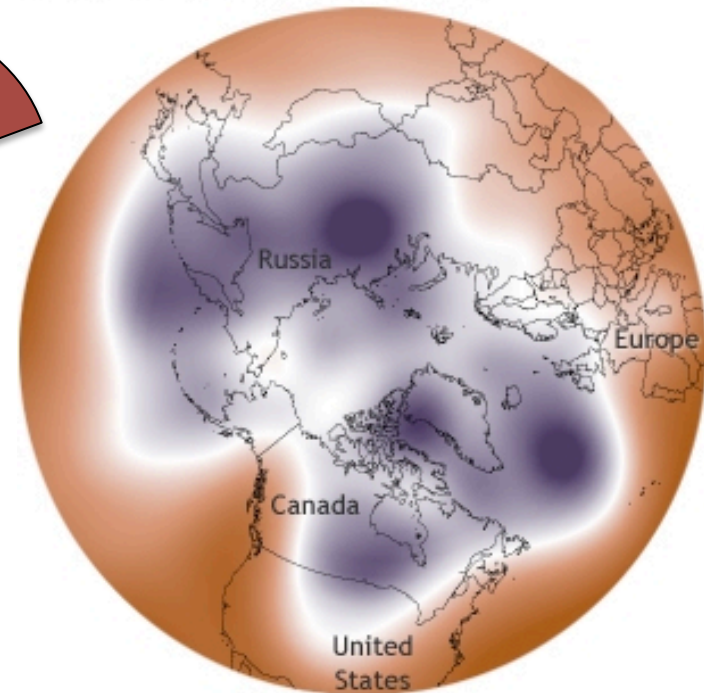
SSW



—Baldwin & Dunkerton 1999

Wavy polar vortex configuration

Cold Air Outbreaks, Snowstorms

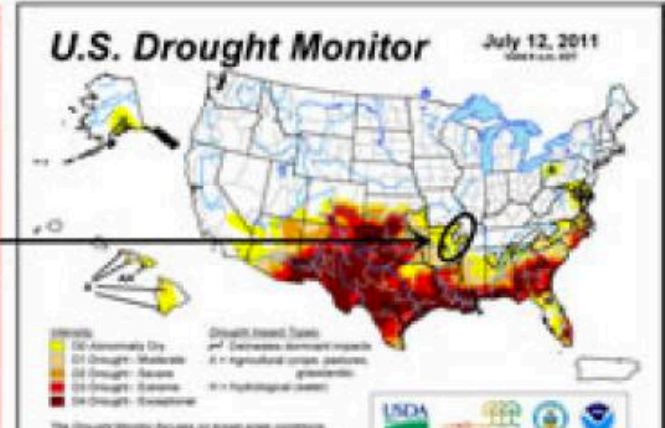
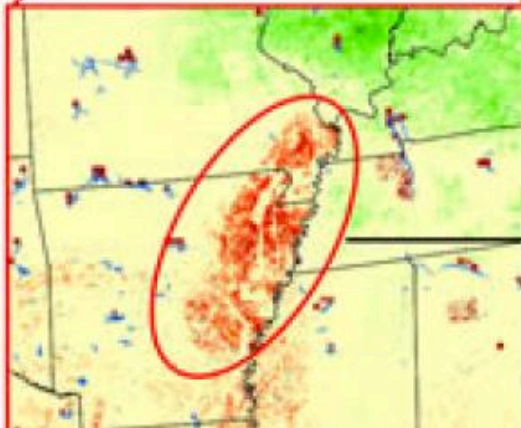
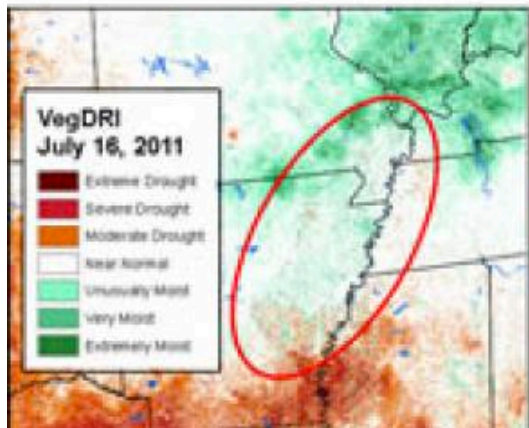
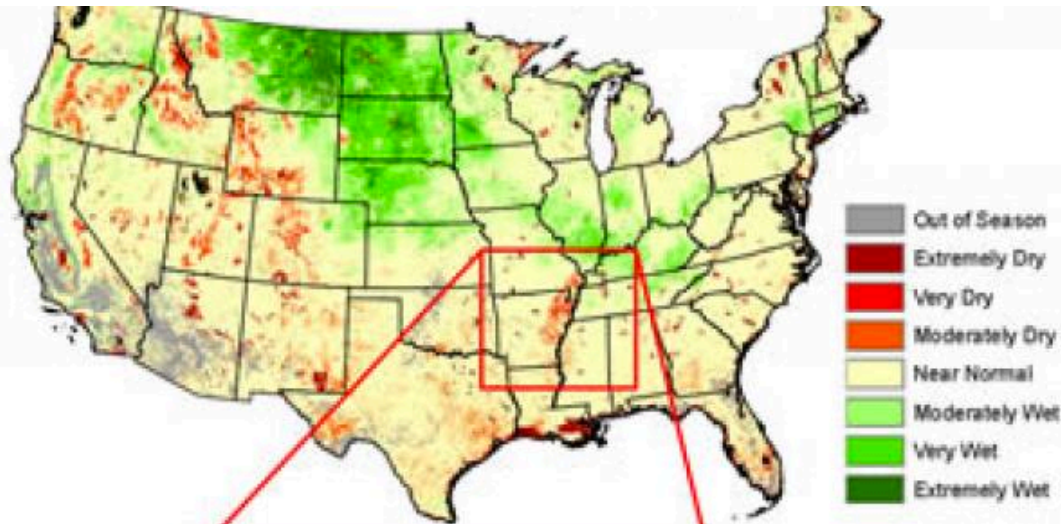


January 5, 2014

climate.gov

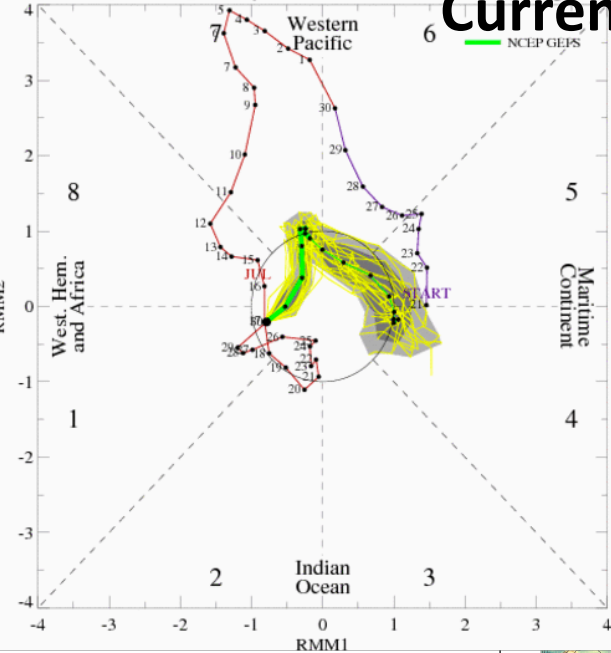
Soil Moisture

Low soil moisture => reduced ET => “Flash” drought or exacerbates heat wave & drought



Source: Kelly Helm Smith, National Drought Mitigation Center

[RMM1, RMM2] 15-day forecast for 31Jul2015 to 14Aug2015

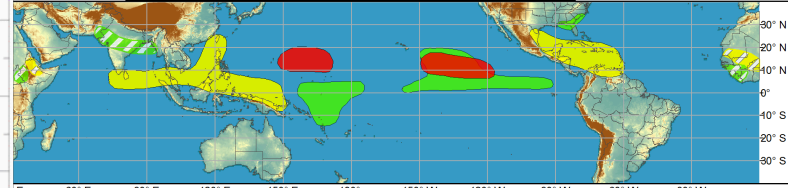


Current State of Subseasonal Predictions

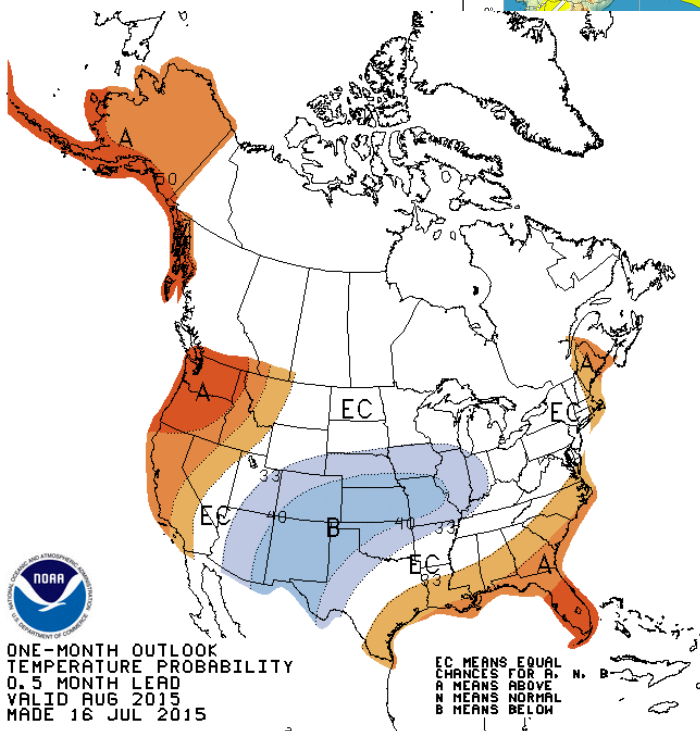
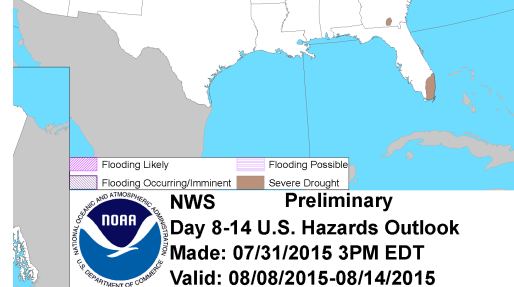
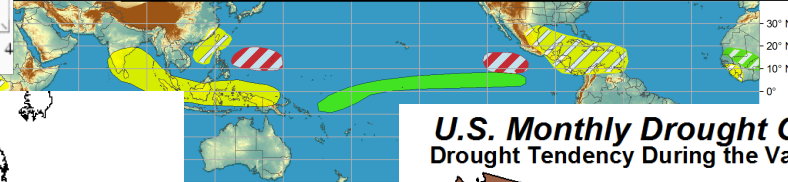
CPC Subseasonal Products

Global Tropics Hazards and Benefits Outlook - Climate Prediction Center

Week 1 - Valid: Jul 29, 2015 - Aug 04, 2015



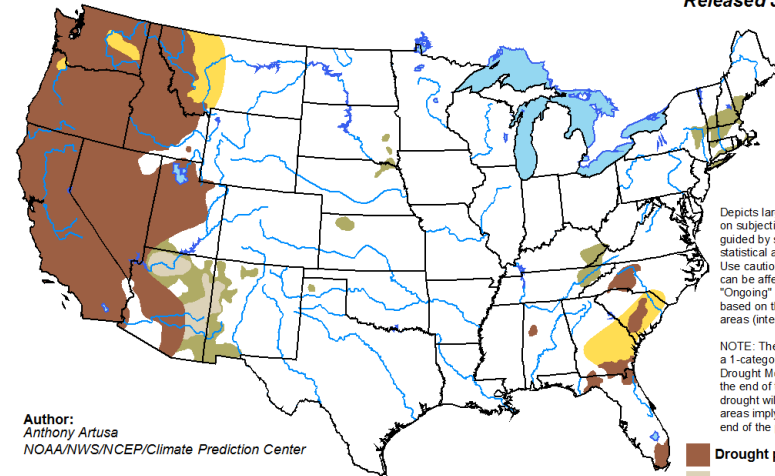
Week 2 - Valid: Aug 05, 2015 - Aug 11, 2015



U.S. Monthly Drought Outlook

Drought Tendency During the Valid Period

Valid for July 2015
Released June 30, 2015



Author:
Anthony Artusa
NOAA/NWS/NCEP/Climate Prediction Center



- Drought persists/intensifies
- Drought remains but improves
- Drought removal likely
- Drought development likely



<http://go.usa.gov/h6jh>

Challenges

- Predictability is limited
- Don't know how to quantify skill for extremes and “forecasts of opportunity”
- Often difficult to predict source of predictability; teleconnections even harder.
- Extremes research requires infrastructure to support “big data” (from US Clivar Extremes WG *report*)

Relevant Programs, Projects, & Datasets

WCRP/WWRP S2S Project

- > Implementation Plan Document
- > Series of Workshops
- > Re-forecast Database

NMME

- > Monthly re-forecast database w/daily data
- > Monthly real-time predictions
- > Subseasonal effort underway

Intraseasonal Variability Hindcast Experiment

- > series of hindcasts from collection of CGCM and AGCMs

NRC Reports

- > Assessment of Intraseasonal to Interannual Climate Prediction and Predictability (2010)
- > Developing a U.S. Research Agenda to Advance Subseasonal to Seasonal Forecasting (expected 2016)

NOAA/CPO/MAPP FY15 Funded Projects NMME Evaluation & focus on Extremes

NOAA/MAPP FY16 S2S, subseasonal NMME & S2S Task Force

Discussion

What can PPAI do to advance the prediction of extremes on subseasonal timescales?

Some Ideas:

- Webinars to review the NRC ISI Report and the new NRC report when it comes out to identify critical research areas that PPAI can endorse
- MAPP FY15 NMME extremes evaluation projects: sponsor special issue or CLIVAR Variations
- Given community focus both nationally and internationally on S2S, should train the next generation: ASP workshop?
- Utilize US CLIVAR Project Office to highlight extremes work by PPAI panel members on website, twitter, etc.: who is doing work on extremes already?

