Large Scale Circulation Patterns Associated With North American, Short-term, Temperature and Precipitation Extreme Events aka: The ‘Extremes’ WG

US CLIVAR 2012 Summit Report
R Grotjahn & M Barlow
‘Extremes’ WG: focus & purpose

• Selected types of extreme events:
  – North American region
  – Short term (5 days or less)
  – Temperature (hot spells & CAOs) and Precipitation (not from TCs)
  – Strongly associated with Large Scale Meteorological Patterns (LSMPs)
  – LSMPs are NOT LF phenomena (not ENSO, not MJO, not NAO, etc.) though such LF may influence environs

• Main thrusts
  – Identifying LSMPs, their dynamics, their simulation
  – Identifying various gaps in understanding
‘Extremes’ WG: CA hot spells LSMP

• Large scale patterns with a ‘synoptic’ time scale that are highly associated

• Distinct from climate modes (e.g. ENSO) but may be influenced by them.

• Example: $Z_{500}$ at 36hr, 24hr, & 12hr before and at onset of California hot spells.
500hPa HGT & VORT for Peak Merrimack River Flooding Events (which are top 100 daily precipitation extremes)
‘Extremes’ WG: membership/expertise

- Regular committee members
  - Richard Grotjahn – Co-Chair (UC Davis): dynamics, synoptics & modeling of T extremes and extreme frontal system precip.
  - Mathew Barlow – Co-Chair (UMASS Lowell): large-scale climate variability and change on local conditions; extreme precip.
  - Robert Black (Georgia Tech): LSCPs and extreme weather in Southeastern US
  - Joshua Xiouhua Fu (U. Hawaii): Tropical dynamics, modeling and prediction of monsoon, MJO, and extreme events
  - Alexander Gershunov (Scripps; UC San Diego): climate extreme events; teleconnections; extreme weather statistics
  - William Gutowski (Iowa St. Univ.) atmospheric dynamics in climate, dynamics of the hydrologic cycle and regional climate.
  - Rick Katz (NCAR): extreme statistical methods applied to meteorological data
  - Arun Kumar (CPC NCEP/NOAA): Seasonal climate variability; weather-climate connection; climate models diagnostics
  - Young-Kwon Lim (NASA GSFC) Climate variability and weather/climate extremes in observations, reanalysis, & model data.
  - Russ S. Schumaker (Colo. St. Univ.): organized precipitation systems producing extreme amounts of precipitation
  - Michael Wehner (LBL, California): extreme value statistics applied to observed and modeled precipitation and temperature

- International Members
  - Tereza Cavazos (CICESE, Mexico) Extreme rainfall under climate change conditions. CLIVAR-VAMOS extremes WG member.
  - John Gyakum (McGill U., Canada) Synoptic analyses of atmospheric blocking; Heavy precipitation events

- Contributing Members
  - Anthony Barnston (IRI Columbia U): seasonal forecasting
  - Michael Bosilovich (GMAO, NASA/GSFC): Reanalysis and data issues
‘Extremes’ WG: objectives

1. Synthesize knowledge on LSMP–extremes links (journal articles; 2013 workshop)
2. Identify key questions & knowledge gaps (journal articles; 2013 workshop)
3. Develop methodology/protocols using LSMPs in observation and model output analyses (2013 workshop; follow-up publication)
4. Apply such tools in preliminary assessment of models LSMP simulation (unfunded; ad hoc)
‘Extremes’ WG: activities

• To date:
  – Two teleconferences
  – Decision to have separate T and P review articles
  – Wiki & other web presence for information sharing
  – Informal meetings (e.g. LSMPs, knowledge gaps)

• Planned
  – Monthly teleconferences
  – 2 survey papers (P extremes; T extremes)
  – In person meeting 7-8 December (fall AGU)
  – Workshop in summer 2013
  – Post-workshop document
Appendix:
CCSM4: CA heat wave LSMP circ. index