

# **Integration Project#2: SGP2006-2007**

## **Focus on Drought/Flood Contrast**

Prospectus Overview  
30 May 2008

## Integration Project#2: SGP2006-2007 Focus on Drought/Flood Contrast

### **Objective:**

To understand the mechanisms responsible for water and energy extremes (floods and droughts) in the U.S. Southern Great Plains (SGP) during 2006-2007, including their relationships with continental and global scale processes, and to assess their predictability on multiple space and time scales.

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### **Hypothesis:**

An integrative analysis of observed extremes which reflects the current understanding of the role of SST and soil moisture variability influences on atmospheric heating and forcing of planetary waves, incorporating recently available global and regional hydro-meteorological datasets (i.e., precipitation, water vapor, clouds, etc.) in conjunction with advances in data assimilation, can lead to new insights into the factors that lead to persistent drought and flooding.

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### Scientific Questions:

- How does large scale dynamics play a dominant role in controlling the synoptic conditions that lead to onset and maintenance of climate extremes in the U.S. Southwest and to what extent can this explanation be transferable to other regions (e.g., the Sahel, Australia)?
- To what extent are these processes and extremes predictable, and with what reliability?
- Does the role of the diurnal cycle change in dry versus wet years?
- Other?

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### Data & modeling Requirements:

- Long (multi-decade) climate records for retrospective studies
- Global and regional reanalysis (emphasis on hydrological cycle)
- Improved (real-time ) observation/assimilation for model initialization
- Coordination of the development of new drought indices with drought monitoring community
- Improvements in the atmosphere-land-ocean model prediction system focusing on teleconnections between SST, precipitation and land/atmosphere interaction
- Research leading to improved understanding of the roles of local and remote processes on drought variability
  - Research on mechanisms that control the land surface branch of the hydrological cycle at multiyear timescales

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### **Data & modeling Requirements (continued):**

- Research on the causes of historical droughts (attribution studies)
- Improved simulations of hydrological variability on decadal time scales
- Research focusing on predictability of multiyear-to-decadal drought
- Improvement in mechanisms for providing drought predictions to stakeholders
- Working with stakeholders to improve traditional drought response strategies
- Interagency support for research-to-operations transition of proven capabilities
- Improved international collaborations (e.g. GEWEX)

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### **Expected Outcomes and Milestones:**

- Justification of the scientific basis for linking drought and flood cause/effect rationale
- Emphasis on regional analysis products for different time scales
- Improvements in hydrometeorological data assimilation techniques
- Composite datasets to be made available through the NEWS data system
- Other?

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### Key References:

- (1) Drought Research, An imminent transition to a more arid climate in southwestern North America, R. Seager et al, 2007, Lamont-Doherty Earth Observatory
- (2) UCAR Newsletter, Fall2002, Vol.9, No.1
- (3) S.Schubert, R.Koster, M.Hoerling, R.Seager, D.Lettenmaier, A.kumar, D.Gutzler, 2005, Summary report on observational and Modeling Requirements for predicting Drought on Seasonal to Decadal time Scales, University of Maryland Conference Center, Adelphi, MD