Synoptic-Dynamic Discussion

-What are the physical mechanisms responsible for LSMPs?
-What roles do local dynamical processes and remote forcing play?
-What dynamical diagnostic tools -- such as wave activity flux, E-vectors, energy budgets etc. -- are useful to understand the formation and maintenance of LSMPs?

Methodologies:
Composites, pattern-based (SOM/KMC/CCA/SVD), dynamics (Qs vs Qn), statistical modeling

Dynamics Categories:
ETC, frontal (cold, warm), MCC, meso/convective/air mass, orographic (upslope, convergence zones produced by orography), tropical cyclones, monsoon, easterly waves, short waves, low-level jets … defintional issues, scales

Key Mechanisms:
Role of ridges, quasi-stationary troughs, moisture transport (including atmospheric rivers), tropical forcing (modulated by mid-lat jet, stratosphere?), rain on snow, diabatic effects (feedback of precip on circulation), teleconnections, subsidence (for heatwaves), downslope flow (for hw), sea ice, blocking, Land-atm processes / sfc conditions / built environment …importance of model resolution of jet structure

Suggestion
Review paper or tutorial on methodologies of data, statistics, and dynamics

Questions:
Dynamics of trends (e.g., trend in Ken's frontal category)
Long-lead forecasting / precursor events / pattern evolution / mjo influence
Climate model representation of dynamics
Are "intense" (upper 5 or 10%) events different from "extreme" events (5yr return)?
Are tropical convection and sea ice as big drivers of favorable environment (vs. internal variability)
How is variability changing on multiple timesales?
Is there stationary in the relationship between surface conditions and large-scale patterns
How does change in meridional gradient relate to blocking and cyclone spped, energy transport
Relative importance of local vs. remote processes
Energetics studies to examine large-scale forcing and evolution of events
How much of a limitation is prescribed SSTs

Synoptics/Dynamics Breakout Discussion

♠ *Strong focus on how to best characterize LSMPs*

♥ *Issues raised in relation to this topic:*

➡ *Composites vs. EOFs vs SOMs? Pros & cons?*

➡ *Use similar methods to characterize extremes?*

➡ *Consider joint distributions (LSMPs & extremes)*

➡ *Addressing non-stationarity (e.g., trends vs LFV)*

➡ *Related: Characterization of transition seasons*

♣ *Consensus thoughts*

➡ *Employ multiple approaches to ensure robustness*

➡ *Establish relevant LSMP index/time scale metrics*

Synoptics/Dynamics Breakout Discussion

♠ *Blocking recognized as a key player in T extremes*

♥ *Issues raised in relation to this topic:*

➡ *No unique blocking "definition"*

➡ *Assess total circulation or perturbation?*

➡ *Importance of blocking duration/persistence?*

➡ *Models have historical difficulties with blocks*

♣ *Consensus thoughts*

➡ *Better establish blocking-extremes linkages*

➡ *Use regional linkages to inform best "definitions"*

➡ *Establish suitable metrics for model validation*

Synoptics/Dynamics Breakout Discussion

♠ _**Diagnosing physical mechanisms for LSMPs**_

♥ _**Issues raised in relation to this topic:**_

➡ _**Appropriate diagnostic & modeling approaches?**_

♣ _**Consensus thoughts**_

➡ _**Employ hierarchical modeling experiments**_

➡ _**Wave activity fluxes for diagnosing remote forcing**_

➡ _**PV-based diagnoses to complement energetics**_

➡ _**Relate physics to relatively simple metrics that can be applied to model output**_

Synoptics/Dynamics Breakout Discussion

♠ **Model Validation of LSMPs & extremes**

♥ **Issues raised in relation to this topic:**

➡ *Blocking historically problematic for models*

➡ *LSMP structure and dynamics misrepresented*

➡ *LSMP time scale/persistence can be problem*

♣ **Consensus thoughts**

➡ *Need to establish simple but effective metrics*

➡ *Need to ensure correct underlying mechanisms*

➡ *Persistence/time scale metrics likely useful*

➡ *Test LSMPs, extremes & LSMP-extremes links*

Talk amongst yourselves…