

Session 3 Discussion

Frameworks for Diagnosing Fast
Physics in the Coupled System

Initialized Coupled Simulations

- For what phenomena would initialized coupled models (e.g. coupled CAPT) be of use for diagnosing fast physical processes of the climate system?
- What can initialized simulations (either single component or coupled) reveal about fast coupled processes, such as rapid development of flux errors that lead to long-term bias and prediction error for the climate system?
- What timescales should be targeted by such efforts?

Resolution Dependence of Small-Scale Processes

- How does the fidelity of small-scale physical processes in the climate system change as resolution is increased?

Ideas for Initialized Coupled Simulations

- List phenomena of interest & group by time-scale
 - Diurnal cycle of SST
 - Tropical cyclones on coupling with ocean – ocean wakes (1-day)
 - Intraseasonal SST anomalies associated with MJO
 - Radiatively/Evaporatively driven SST errors (monthly)
 - Something for sea-ice?
- What type of model experimental design is optimum for each phenomena?
 - Ocean-mixed-layer-model simulations?
 - Coupling frequency between ocean and atmosphere

Ideas for Initialized Coupled Simulations (continued)

- Are ocean model initial conditions good enough to provide a meaningful starting point to study growth of model errors?
- How to separate model errors from initialization errors from model shock?
- Bridge Question: Do we have observations for testing and evaluating models processes at this time-scales?
 - Limited when you get to very fine scales

Ideas for Resolution Dependency of Small-Scale Processes

- Physics improvement with resolution (summary) – what is achieved by going to 10 km? In the atmosphere, land, and ocean?
- Do observations (and/or finer-scale models) demonstrate improvement?
- Is high-resolution always necessary to inform about what is missing and needs to be improved?
- Does going higher than 50 km help you with tropical cyclones?
- How high is high enough? Expanding on the prior talks
- Travis could provide an initial summary ...
- What do we get if we increase atmosphere only, ocean only, coupled-together? What phenomena get better at what resolution?
- What role can variable resolution models play?
- Computational – what can we afford?