CPT Diagnostic Component

Heng Xiao and C. Roberto Mechoso, UCLA AOS
(hengx and mechoso @atmos.ucla.edu)
(310-825-9205 and 310-825-3057)

Strategy

- Close **collaboration and coordination** with developers in the CPT (“use it or loose it”).
- Analysis of output, reanalysis, observation, and performance of **model runs** in which customized output is stored (“active mode”).
- Comparison of uncoupled and coupled runs in selected cases.

Work Requirements

- Agreement on “control versions” of the models
- Access to model codes, including their SCM versions
- Agreement with model developers on when and what to analyze, in addition to standard diagnosis.
- Performance of special runs with different lengths and with output stored at different time intervals, in order to analyze model performance from diurnal to interannual time scales.

Standard Diagnosis

•Large scale flow variables, e.g. winds, temperature, divergent and rotational circulations, surface momentum fluxes.

•Water cycle and clouds, e.g. moisture distribution, precipitation, low cloud fraction, liquid water path, cloud top height, surface latent and sensible heat fluxes.

•Energy and radiation, e.g., cloud radiative forcing, radiative budget at the top of the atmosphere, surface shortwave and longwave radiative fluxes.

•ENSO: SST, surface wind stress and ocean heat content along the equator, Nino3 SST power spectrum, etc.

•Step-by-step contribution of parameterized physical processes to the time change of model's prognostic variables.

•Vertical profiles of AGCM variables in cloud regimes explored by SCMs (BOMEX, ATEX, DYCOMS).

Special Diagnosis

- **20S Cross-Section.** The PreVOCA experiment: modeling the lower troposphere in the Southeast Pacific, Wyant et al. 2010, *ACP*.

- **GCSS/WGNE Pacific Cross Section** Intercomparison (GPCI). Teixeira et al. 2010, *J. Climate*.

- **Monsoon Simulation Metrics**. Asian: Kang et al. (2002), *Clim. Dyn.*; American: Vera et al. (2004), J. Climate; African: Xue et al. 2010, *Clim. Dyn.*

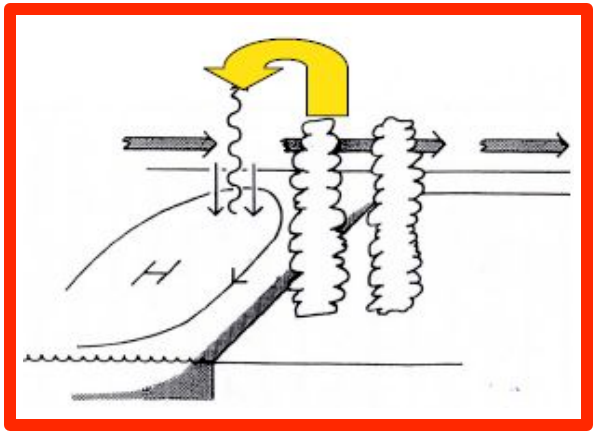
- **MJO Simulation Metrics**. www.usclivar.org

Possible sub-projects

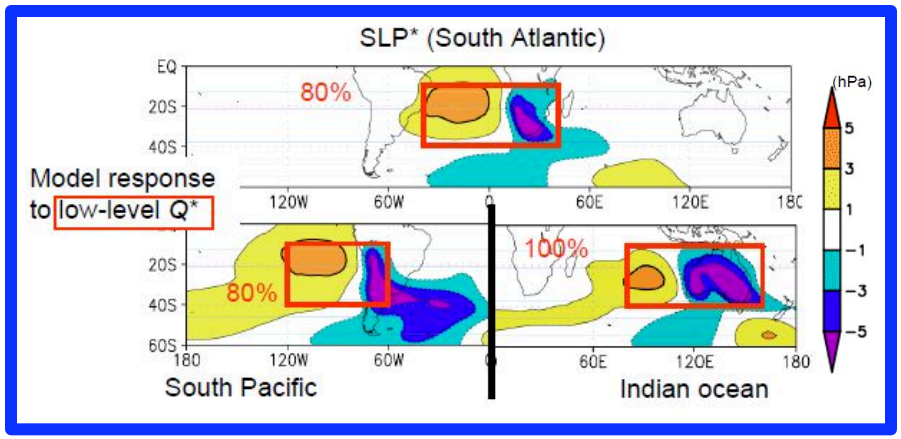
These sub-projects will be primarily AGCM and CGCM sensitivity experiments to, e.g.,

- Low-level stratus clouds in the southeastern Pacific and Atlantic (Ma et al. 1995, *J. Climate*)
- SST in the southeastern Pacific and Atlantic (Large et al. 1994, *J. Climate*)
- Land surface conditions and impact on subsidence over the oceans (Ma et al., *Clim. Dyn.* 2009)

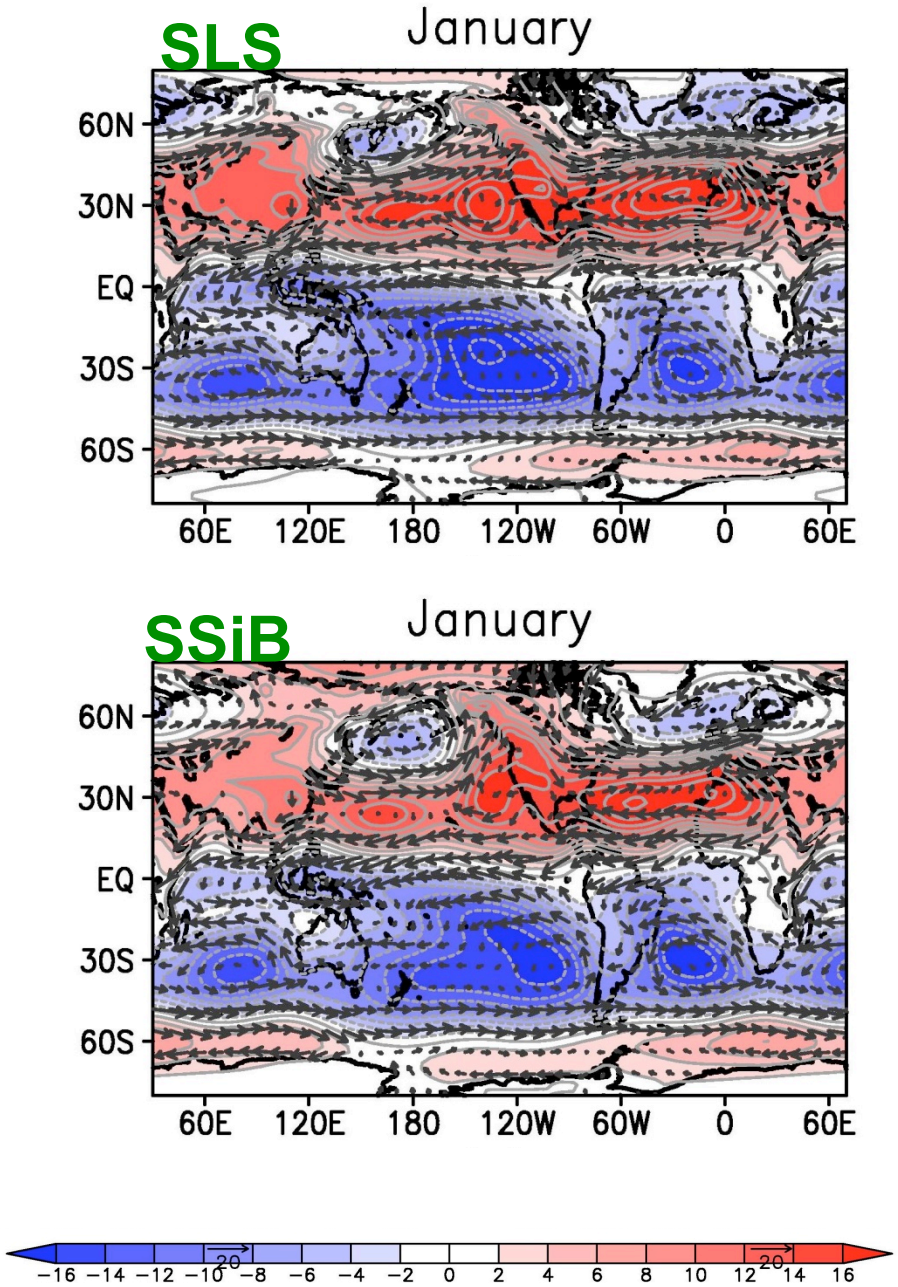
Example: Monsoons affect Adjacent Oceans



Ascent over the continent, descent to the west (Rodwell and Hoskins 2009)



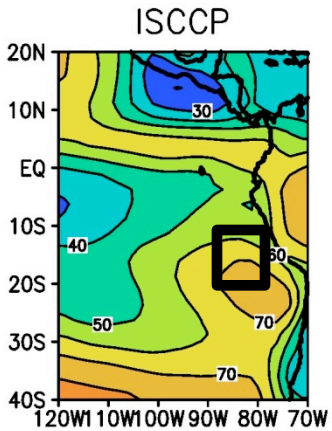
Low-level heating over the continents and cooling over stratocumulus decks to the west (Miyahara and Nakamura 2010).

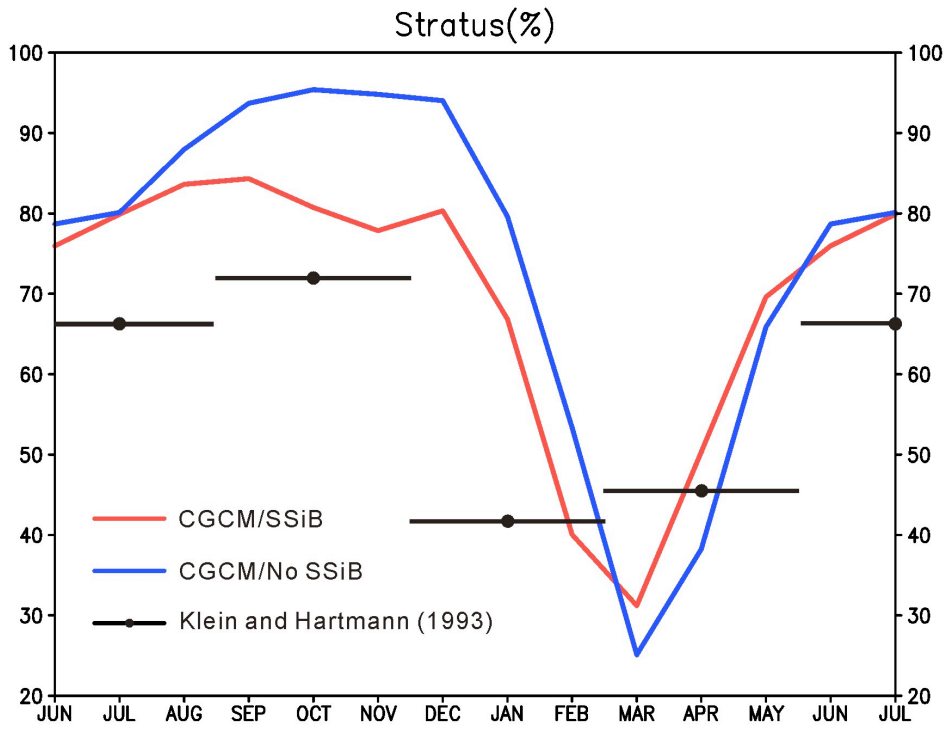


925hPa Streamfunction and Rotational Wind

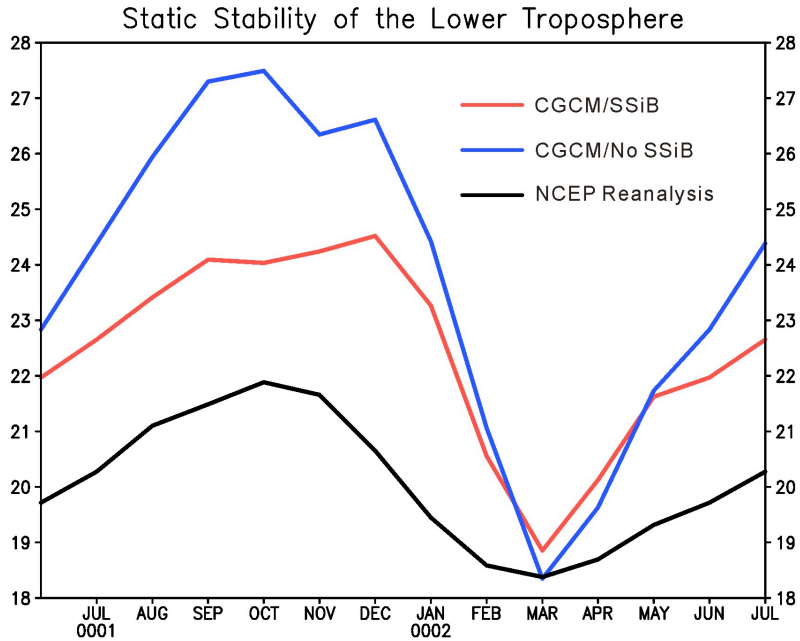
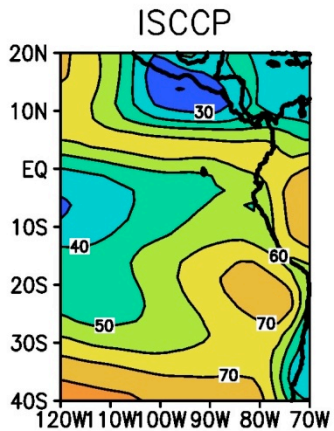
Note the weakening of the South Pacific High and the small impact on the South Atlantic High

Stratus clouds incidence in the Southeastern Pacific





Static Stability of the Lower Troposphere



$$\Delta\theta = \theta_{700hPa} - \theta_{surface}$$