WORKSHOP ON COUPLED OCEAN-ATMOSPHERE-LAND PROCESSES IN THE TROPICAL ATLANTIC

Miami, FL, 23-25 March 2011

Key Issues on the Large Scale
VOCALS motivating hypothesis:

*Improvement of CGCMs performance in the eastern tropical Pacific is key to successful simulation of ITCZ/SPCZ, which will also benefit simulation of other regions*

substantial ongoing effort to better understand relevant atm/ocean processes at a variety of scales for the southeast Pacific
Meeting Objectives

1. Develop a coherent synthesis of the state-of-the-art knowledge on the Atlantic biases and their causes for the southeast and eastern tropical Atlantic, as well as a set of sharpened hypotheses.

2. Articulate an effective way forward: further model analysis, and if so, AMIP, OMIP or CMIP ? further reanalysis/satellite analysis ? coordinated model experiments ? new field programs ? modification of existing observational networks, e.g., TACE ?

3. Identify an international network of interested, active researchers.

4. Define the appropriate geographical focus or foci (e.g, the Benguela coast, and/or the Amazon), and their spatial extent(s).
Hypotheses

the Atlantic basin is far smaller than the Pacific basin. The smaller Atlantic basin compared to the Pacific encourages a tighter and more complex land-atmosphere-ocean interaction with not just the east side of the ocean basin, but also its west side.

- deep convection over the Amazon impacts the Atlantic equatorial cold tongue via the equatorial trade winds (issue of vertical heating profile).
- the southeast Atlantic features a strong SST gradient known as the Angola-Benguela front at approximately 17S, and a shallow thermocline structure known as the Angola Dome at approximately 10S.
- Cloud-SST feedbacks over the cold water.
- Deep tropical jet interactions and tropical Instability waves invoke low-frequency variability
- Continental circulation patterns influence the southeast Atlantic free troposphere.
- The southeast Atlantic continental outflow includes optically-thick aerosol layers from biomass burning, stimulating unique aerosol-cloud-climate interactions that are difficult to confidently constrain with only satellite observations.
- Remote influence from outside the region (North Atl and other tropical basins).
What did we learn?

• Confirmed the hypotheses (but not ranked them).
• There are efforts underway to address the hypotheses using models.
• Observational programs collected data but are still in a synthesis phase.
• Need for more interaction between modeling and observation community.
• Need to focus on the most critical issue, including region and key process(es).
• Not clear how we achieve this?
A strawman field program

- Designed to observe key aspects of clouds and elevated biomass burning aerosols
- Also provides key measurements of stratocumulus to cumulus transition in clouds over increasing SST

seasonal cycle issue?
2 geographical tiers proposed, one in the southeast Atlantic, the other much larger; appropriate domain size needs to be defined.

[Map showing geographical tiers]
propose a task team to SSG in May

task team writes up a review, clarifies hypotheses - furthers meeting objectives
Meeting Objectives

1. Develop a coherent synthesis of the state-of-the-art knowledge on the Atlantic biases and their causes for the southeast and eastern tropical Atlantic, as well as a set of sharpened hypotheses.

2. Articulate an effective way forward: further model analysis, and if so, AMIP, OMIP or CMIP? further reanalysis/satellite analysis? coordinated model experiments? new field programs? modification of existing observational networks, e.g., TACE?

3. Identify an international network of interested, active researchers.

4. Define the appropriate geographical focus or foci (e.g, the Benguela coast, and/or the Amazon), and their spatial extent(s).