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 patters 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).*

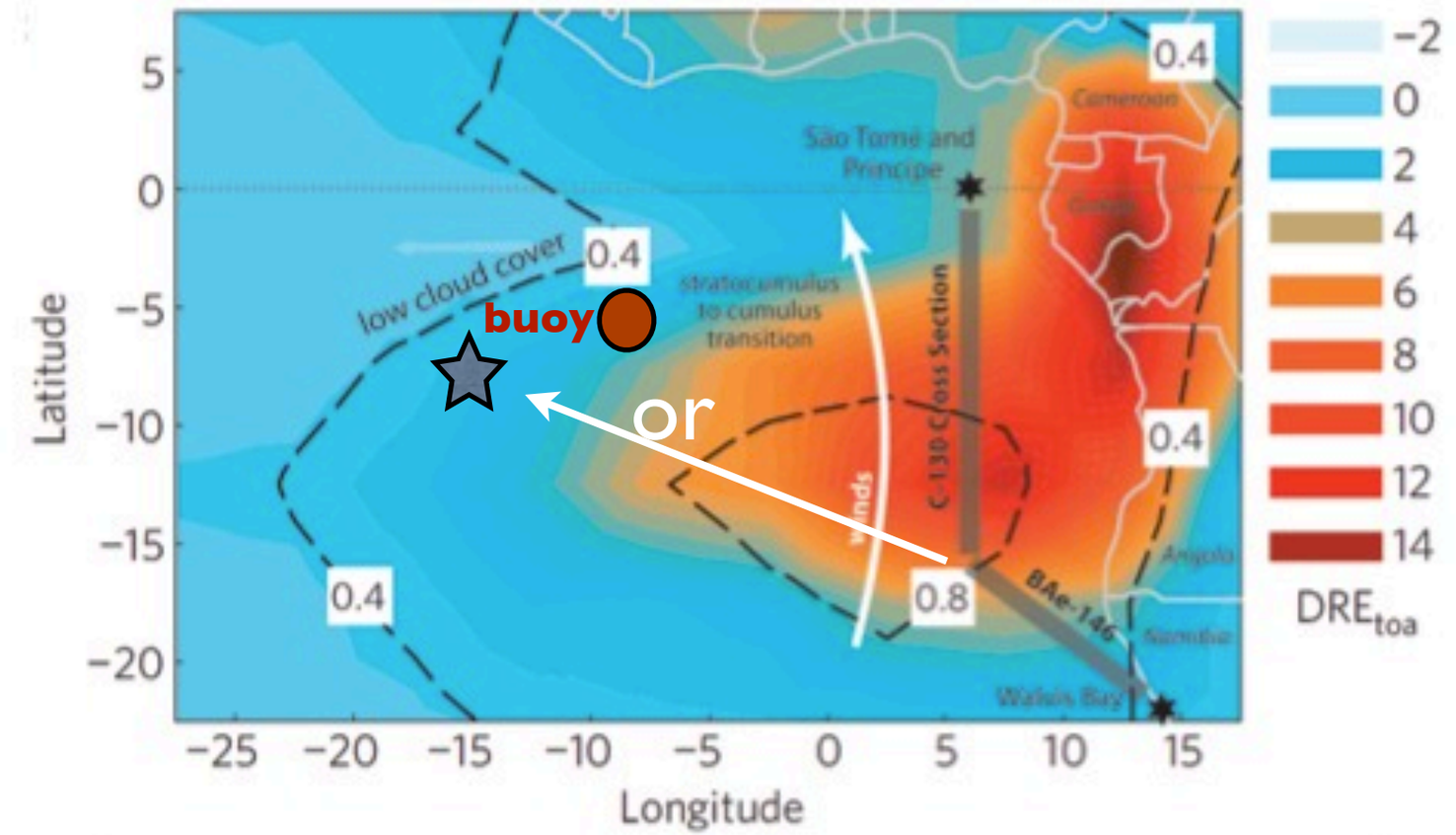
What did we learn?

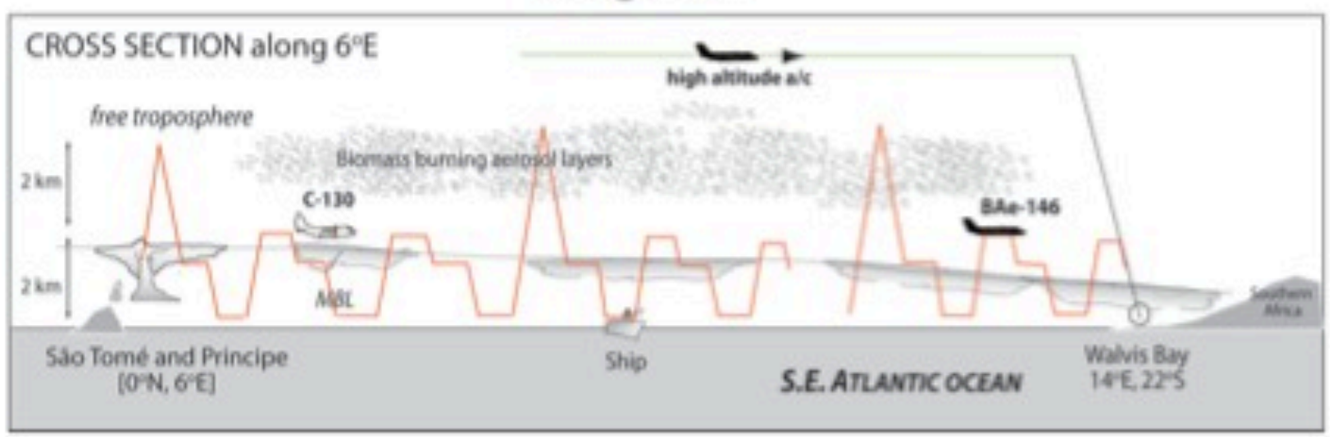
- *Confirmed the hypotheses (but not ranked them).*
- *There are efforts underway to address the hypotheses using models.*
- *Observational programs collected data but are still in a synthesis phase.*
- *Need for more interaction between modeling and observation community.*
- *Need to focus on the most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

A strawman field program

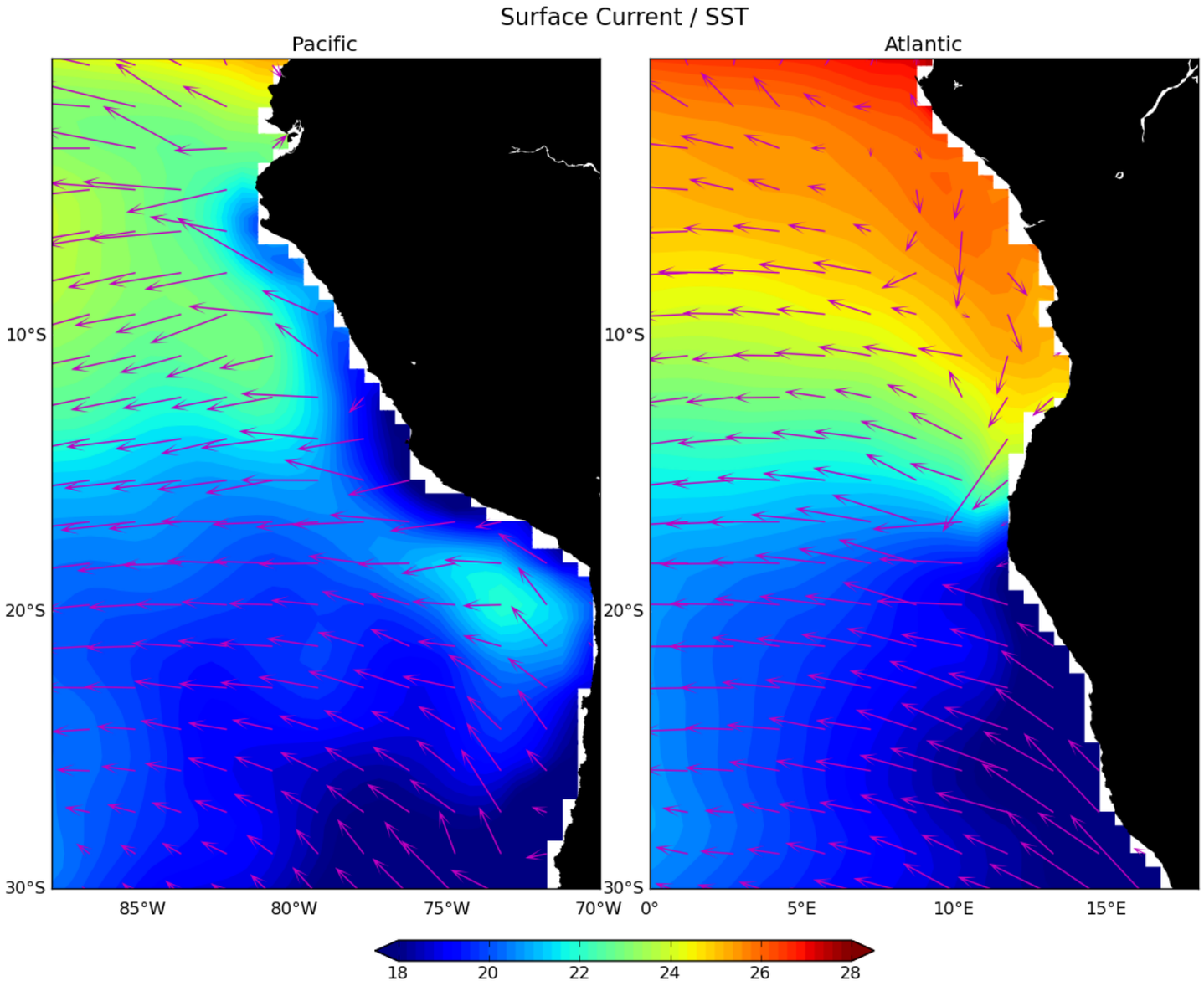
- Designed to observe key aspects of clouds and elevated biomass burning aerosols

- Also provides key measurements of stratocumulus to cumulus transition in clouds over increasing SST





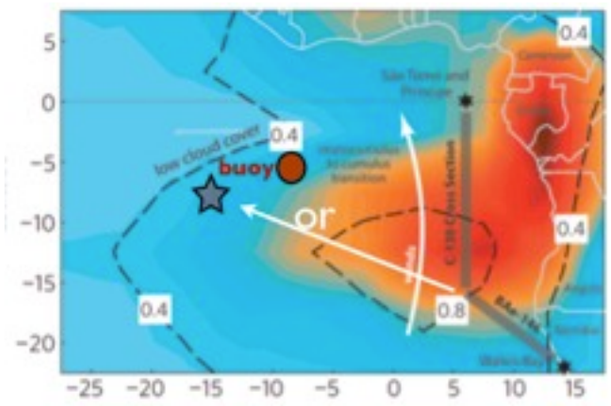
seasonal cycle issue?

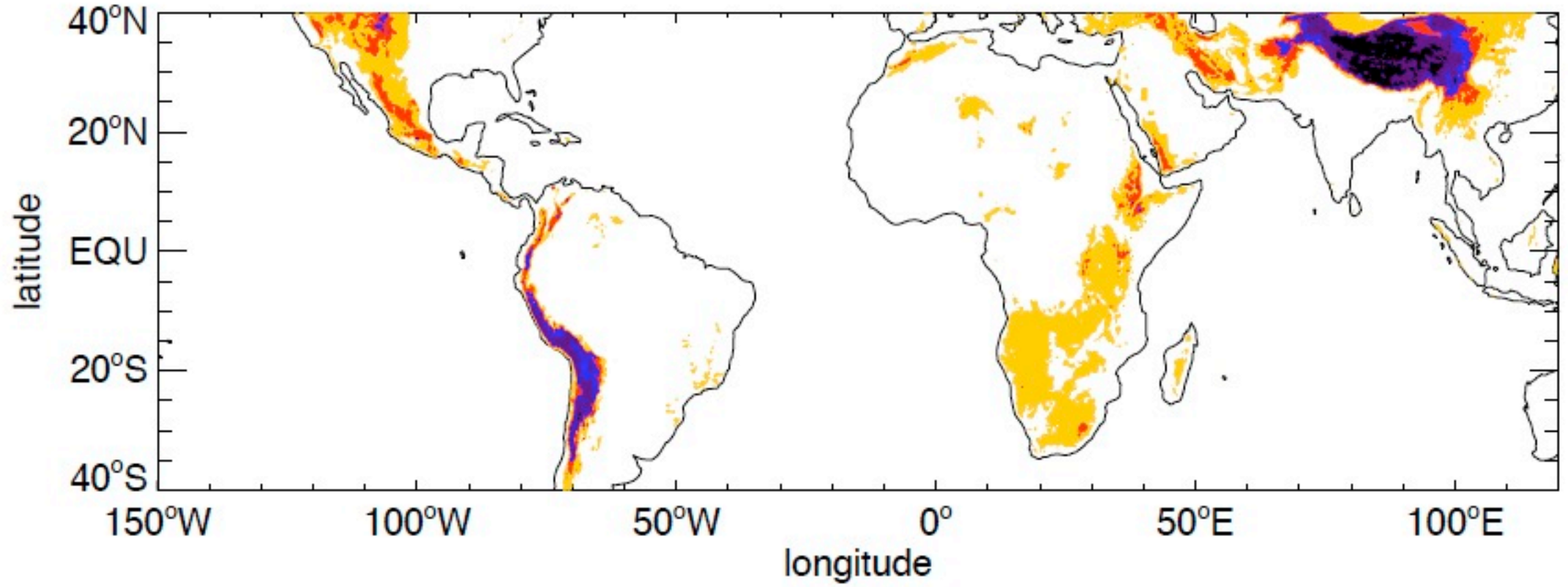

Surface Current / SST
Pacific
Atlantic
10°S
20°S
30°S
85°W
80°W
75°W
70°W
0°
5°E
10°E
15°E
18
20
22
24
26
28

Ping Chang

2 geographical tiers proposed, one in the southeast Atlantic, the other much larger; appropriate domain size needs to defined

1. ~





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).