# MESA STRATEGY REPORT

- **Currently MESA has been organized in regional programs. LBA and SALLJEX will end by 2005 while PLATIN is under design.**

- **A new MESA structure is being discussed in order to better address the main MESA goal related to SAMS variability and the improvement of the SAMS monthly-to-seasonal prediction.**

MESA STRATEGY

- **Tier 1: Diurnal and mesoscale variability.**

- **Tier 2: Intraseasonal variability.**

- **Tier 3: Interannual variability: The response of circulation and precipitation over South America to slowly boundary conditions (SSTs and soil moisture)? Which is its impact on the water cycle?**

NAME & MESA: Complementary activities between both programs for tiers 2 &3 including a description of the annual cycle.

Labels on figure: MESA DOMAIN, SALLJEX DOMAIN, LA PLATA BASIN, PANAMERICAN DOMAIN
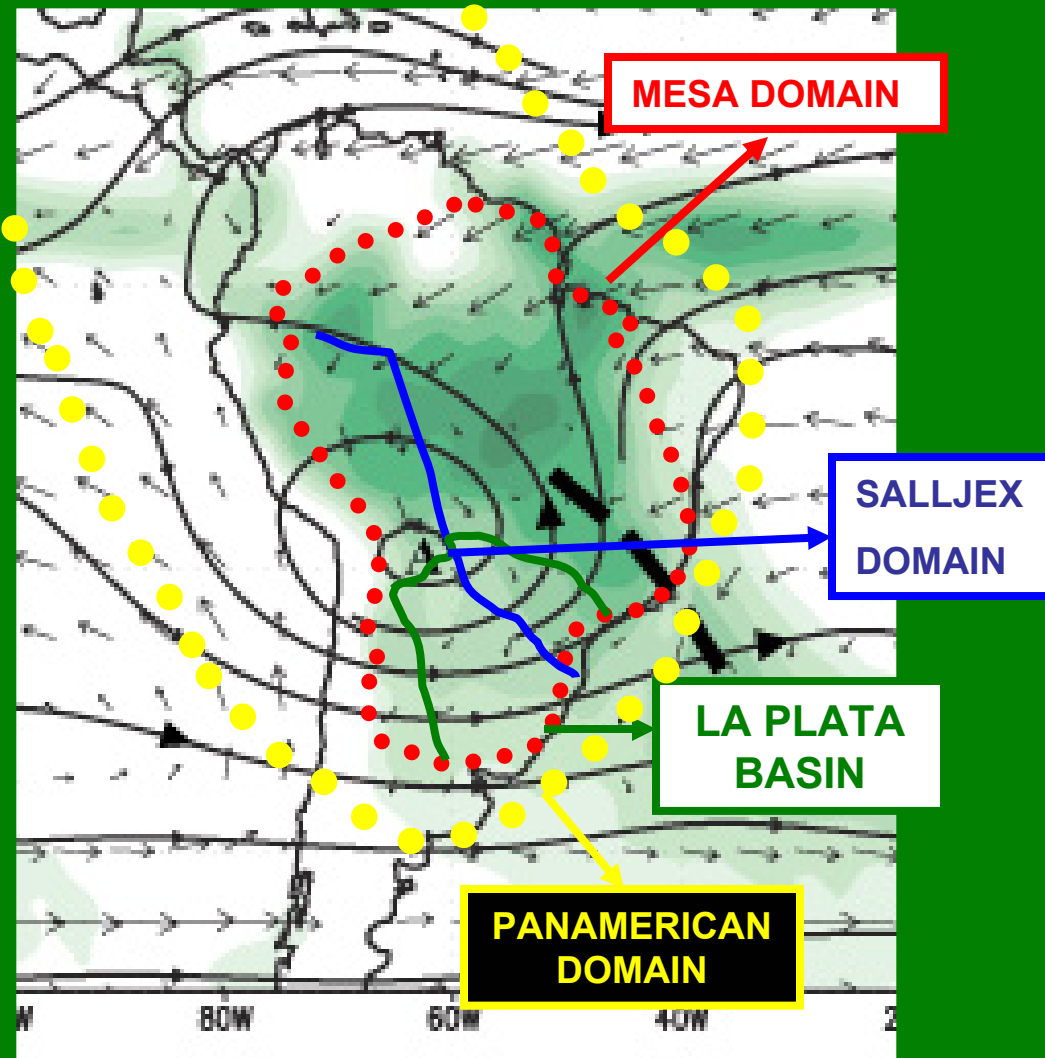
MESA scientific objectives

A better undestanding and improved simulation is expected on:

- 3-dimensional description of the low-circulation east of the Andes. (Tier 1)
- Diurnal variability of circulation and precipitation. (Tier 1)
- Mesoscale convective processes (Tier 1)

- SA see-saw pattern. (Tiers 2 &3)
- ITCZ-SACZ interaction (Tiers 2 &3)
- MJO and other IOs (tier 2)
- Relative roles of internal vs forced variability. (tiers 2 and 3)
- Land surface forcing. (tiers 2 and 3)
- Role of remote and local SST (tiers 3)
- Global response to SAMS forcing (tier 3)

- Sources and limits of predictability on SAMS region (tiers 2 &3)

Some issues to be addressed to understand the sources and limits of seasonal predictability over South America

- To what extent do model systematic errors affect seasonal predictability in the region? The SACZ story and predictability of the see-saw pattern.

- Seasonal climate predictions: more accurate during strong ENSO years, what about normal, weak-ENSO or la Niña events (meaning, most of the time)? A prediction system geared to extremes? Predictability of seasonal prediction skill. The role of purely statistical predictions for sub-regions and special applications.

-- Will seasonal predictability change as a function of land cover changes?

- Remote versus local forcing. Can soil moisture memory help for seasonal predictions for South America? Need to improve soil moisture measurements and assimilation in some regions that do not show influence of SST forcing.

-Dealing with the complexities of orography. Higher resolution models and/or dowscaling with regional models?-

Continued …

-Atlantic SST forcing: (i) understanding tropical versus extratropical contributions; (ii) good predictions of SST patterns up to 6 months as a necessary condition for using couple O-A models in seasonal predictions for South America.

-- Can instraseasonal oscillations be a source of short term climatic predictability? What about the frequency distribution of transient (weather related) systems and onset and demise of rainy season in the South America monsoon region?

- Need improvements in the representation of hydrological cycle and river runoff in the Tropics and subtropics (e.g., most AGCMs underestimate rainfall in portions of Amazonia).

- At the end, can we expect that model improvements and observational techniques will improve predictability in regions such the highly populated and economically important one in SE South America?

- Better seasonal climate predictions, more accurate projections of climate change scenarios for the future?

MESA field campaigns & related programs

- SALLJEX. Tier 1
- Platin CSE and field experiment over la Plata Basin (Tier 1, 2 and 3?).

- Some recommendations for PLATEX and LPB CSE:
  - PLATEX still under planning (PLATIN SWG).

  - Numerical experiments over the basin may be used for a better experiment design of PLATEX. Can PLATEX contribute to understand the predictability levels of the region? Does it need specific observation systems?

  - A enhanced monitoring could be implemented by 2007 in order to describe the diurnal cycle of precipitation over the middle portion of the basin, using LBA raingauges and a radar over the region where MCS get their mature stage. Flux towers (4, potential 1D reference sites for CEOP) currently operating in Southern Brazil are available too.

- Some regional programs currently contributing to MESA: IAI/PROSUR, EC/CLARIS (not started yet)

MESA modeling activities

- Some modeling issues after SALLJEX are still open:

    – Does SALLJEX data improve the understanding of the water budget of the Plata Basin? Does the uncertainty of the LLJ moisture transport have been reduced?

    – Does SALLJEX research improve the numerical model skill for predicting MCSs ?

MESA modeling activities

Additional activities related with Tier 1 modeling issues:

- – Explore potentiality of PSAS (global) and RPSAS (regional) at CPTEC – use of remote sensing products including precipitation and physical initialization.

- – Evaluate through the breeding vector method, the impact of the "Errors of the day" in the initial conditions, over all SALLJEX period. (E. Kalnay, Univ. of Maryland)

- – Use the global bred vectors as BC and IC for regional breeding with the ETA model or other regional models.

- – Analyze the synergism between the LLJ and MCS.

MESA modeling activities

New coordinated numerical experiments of the SALLJEX modeling group:

2004:

- – Impact of improved soil moisture initializations on precipitation simulation
- – Impact of improved initial conditions enhanced by SALLJEX data
- – Data Assimilation including SALLJEX data

2005:

- – Intraseasonal variability during SALLJEX period
- – Seasonal mean representation of the SALLJEX period.

MESA organizational issues

- A MESA SWG will be presented at the executive session of VPM8 for Panel endorsement. The MESA/SWG will include members from LBA, SALLJEX, PLATIN, CLARIS, Diagnostic studies, Modeling, (WGSIP?), …

- PLATIN SWG

- 2004: MESA Workshop with the intention of promote the discussion on the understanding and the simulation of the intraseasonal and interannual variability of SAMS.