



MESA: developments and numerical models studies.

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MESA DEVELOPMENTS

- **Achievements**
- **Plan 2009- Plan 2011**
- **Monitoring**
- **Research**
- **Model studies**
- **Suggestions**

Review- Recent developments on the South American monsoon system.

Marengo et al. 2010 I.J.C.

- **Main structure and life cycle of the SAMS**
- **Diurnal, mesoscale, and synoptic variability**
- **Intra-seasonal variability**
- **Inter-annual and interdecadal variability**
- **Long-term variability and climate change**
- **Land-surface processes and the role of aerosols from biomass burning**
- **Modelling, prediction and predictability**

PRA (Priority Research Areas)

- **PRA-1 diurnal and mesoscale processes**
- **PRA-2 intraseasonal variability**
- **PRA-3 interannual and longer time variability, including anthropogenic climate change**
- **PRA- 1, 2, 3 monsoon evolution and variability**

Still : better understanding and improved simulation of:

- **Diurnal cycle SAMS**
- **Mesoscale convective processes (within SACZ)**
- **ITCZ-SACZ interaction**
- **Summertime convection and circulation over the Altiplano (Central Andes)**
- **Influence of MJO on SAMS**
- **Relative roles of internal versus forced low-frequency variability**
- **Relative roles of remote and local forcing (SST, land surface (soil moisture), topography)**
- **Land surface forcing – Impacts of land use change**
- **Sources and limits of predictability on SAMS region**

Future challenges and research needs (MARENGO's et al. PAPER)

- **is there predictability at decadal time scales?**
- **what will be the functioning of SAMs in the future? Will it be more or less predictable?**
- **what will be the impacts of aerosols and changes of atmospheric composition on SAMs's circulation and rainfall patterns?**
- **what are the uncertainties in SAMs's future climate change projections?**

SAMS research

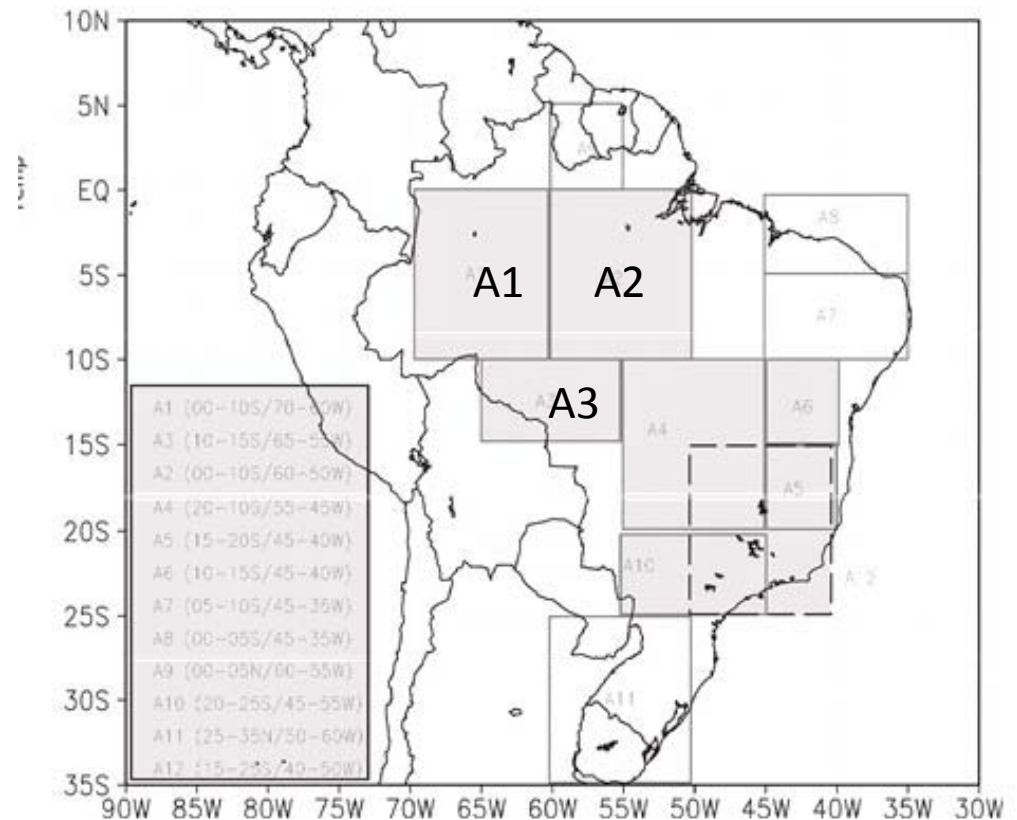
- **Leila Carvalho/ Charles Jones: regional model RAMS : impact of SST; SAMS changes (IPCC models)**
- **Anji Seth : recent papers on SAMS (IPCC models)**

Seth, A., Rauscher, S. A., Rojas, M., Giannini, A. & Camargo, S. J., 2010: Enhanced spring convective barrier for monsoons in a warmer world? Climatic Change, doi: 10.1007/s10584-010-9973-8

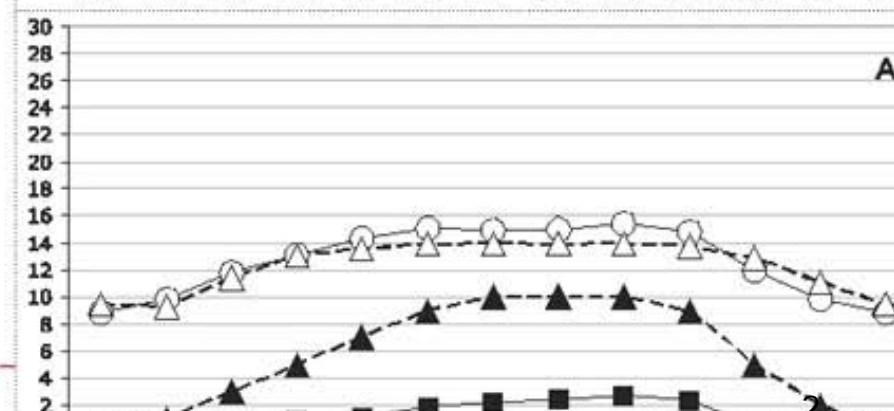
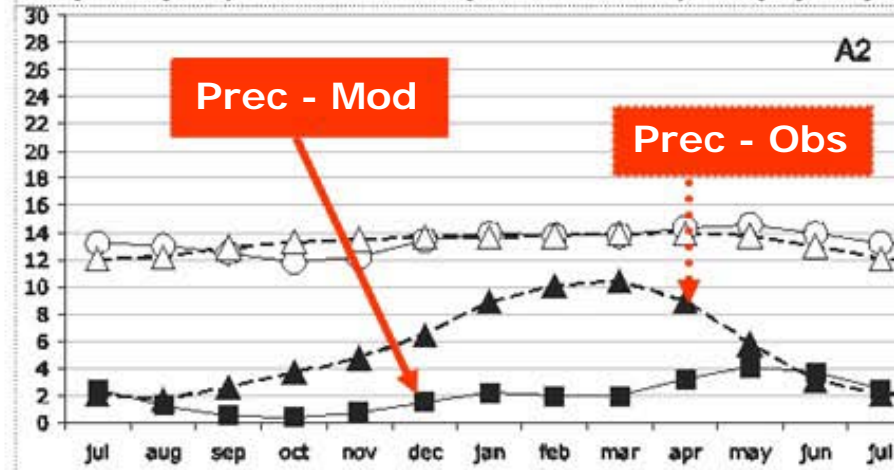
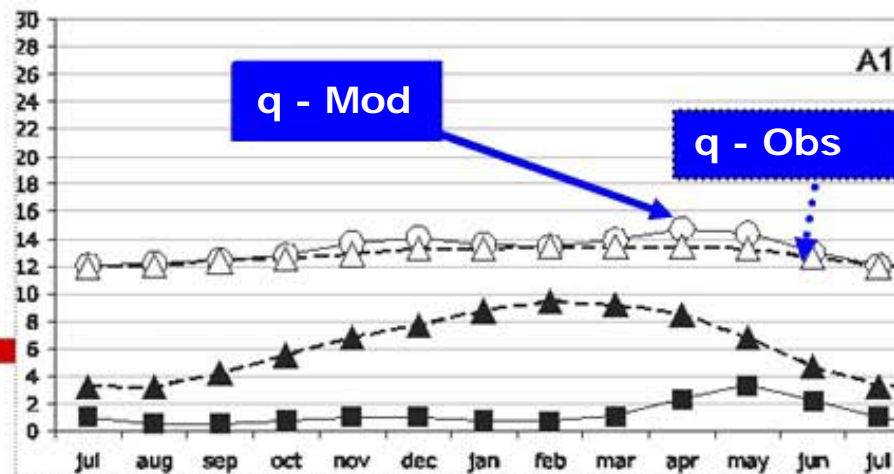
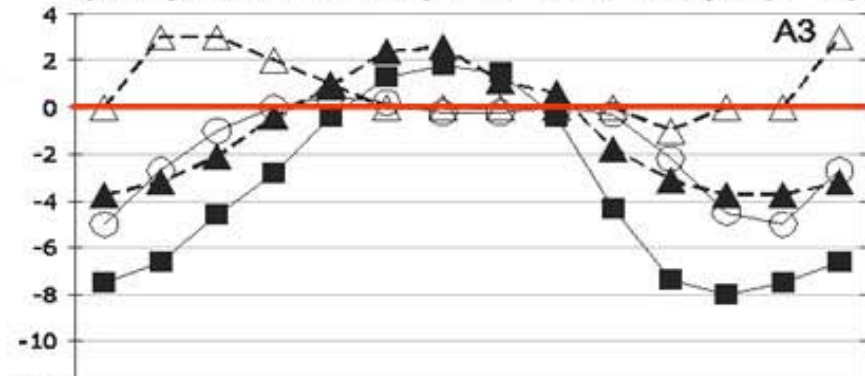
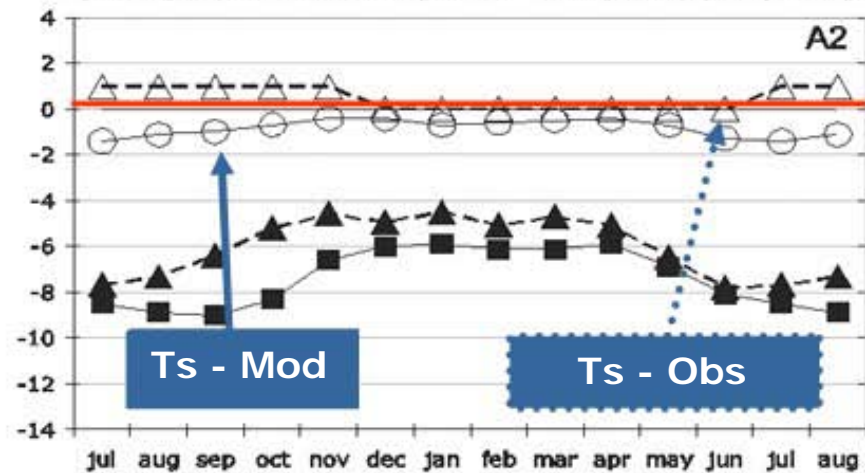
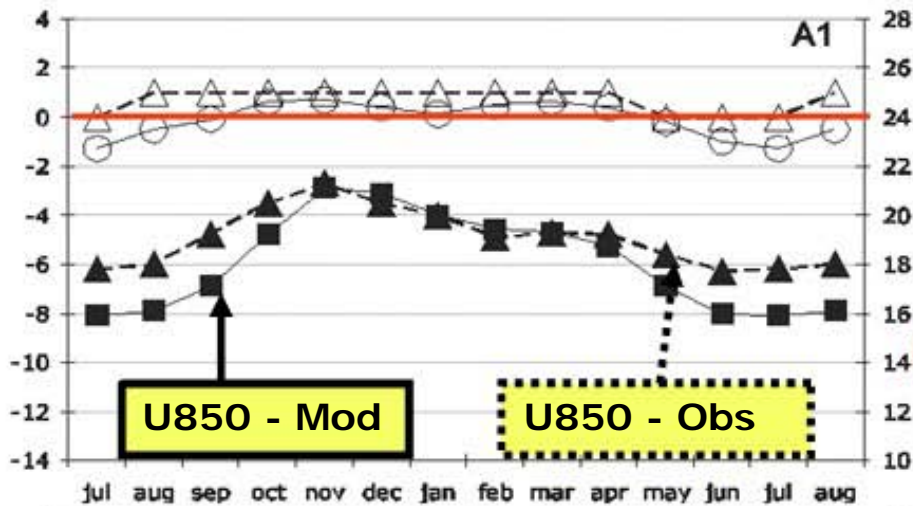
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Seth, A., M. Rojas, S. A. Rauscher, 2010: CMIP3 projected changes in the annual cycle of the South American Monsoon, Climatic Change, 98:331-357, doi: 10.1007/s10584-009-9736-6

ONSET/DEMISE SAMS (CPTEC/COLA AGCM and OBSERVATIONS)

Raia, 2008)



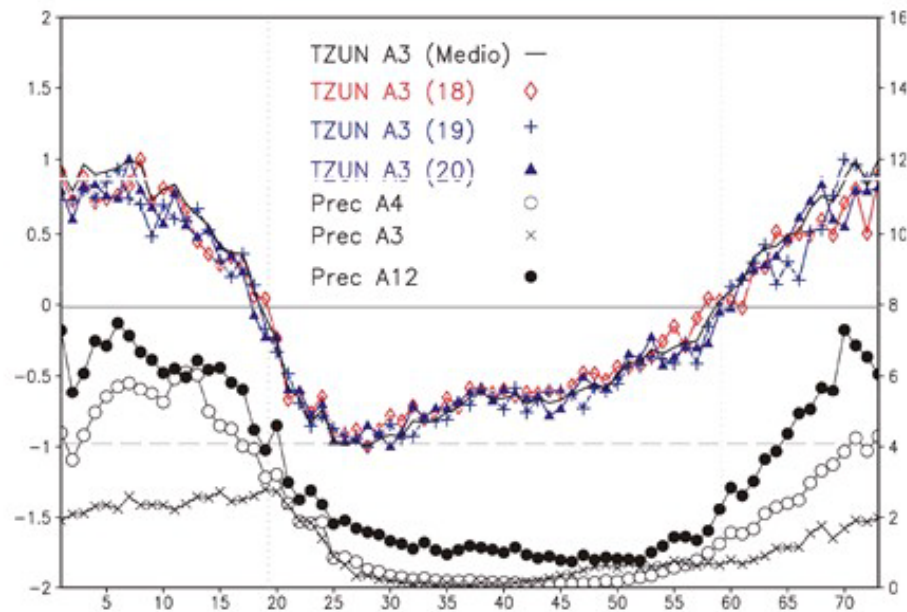
Raia and Cavalcanti 2008, J Climate



ONSET AND DEMISE

Simulation - MCGA/CPTEC

TUQ (A3) x Prec (A3, A4 e A12) (medio)



Simulation

Observation

Membro	Inicio	Decaimento	Duração
18	61	18	31
19	60	19	33
20	58	20	36
Médio	59	19	34

Fases	FW modificado (TZUN)
Inicio	60 23-27 outubro
Decaimento	18 27-31 março

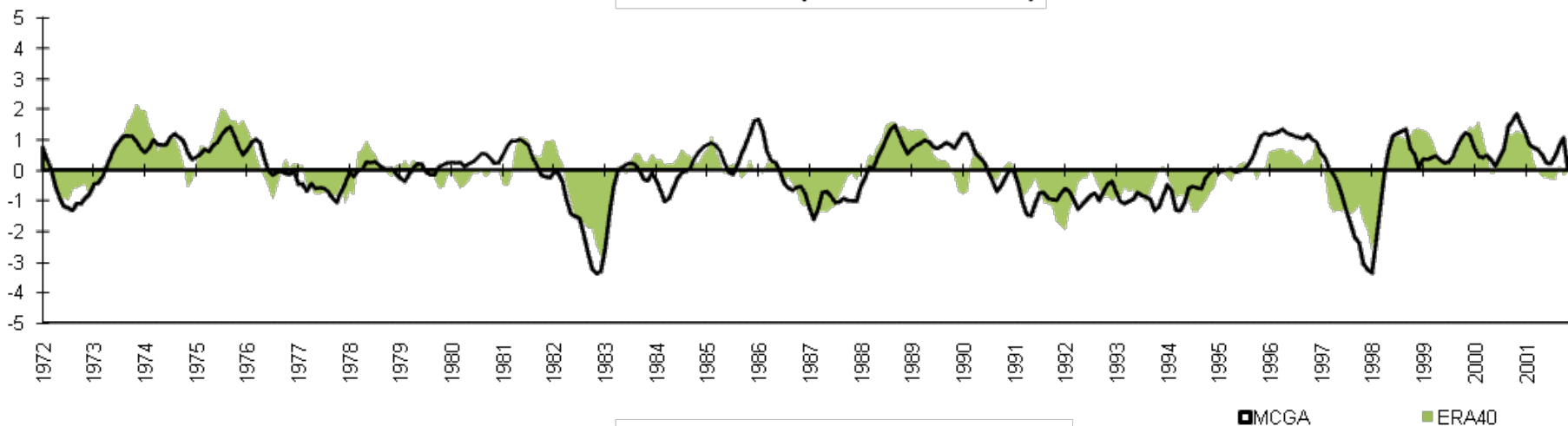
INDICES

AGCM AND OBSERVATION

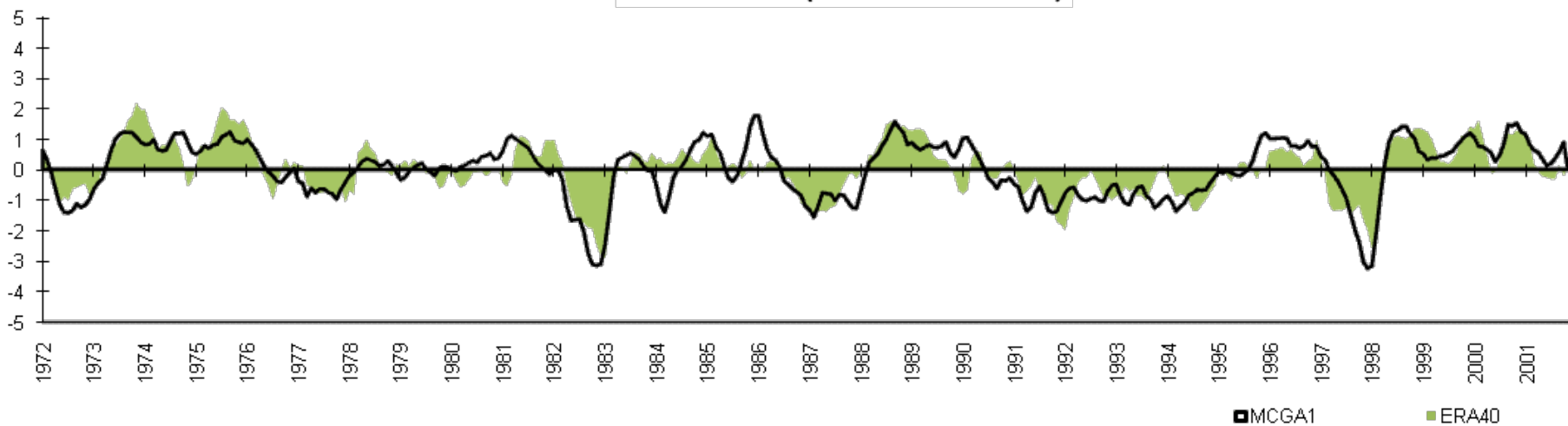
IOS

Média de 3 meses

IOS 3 meses(ERA40 x MCGA)

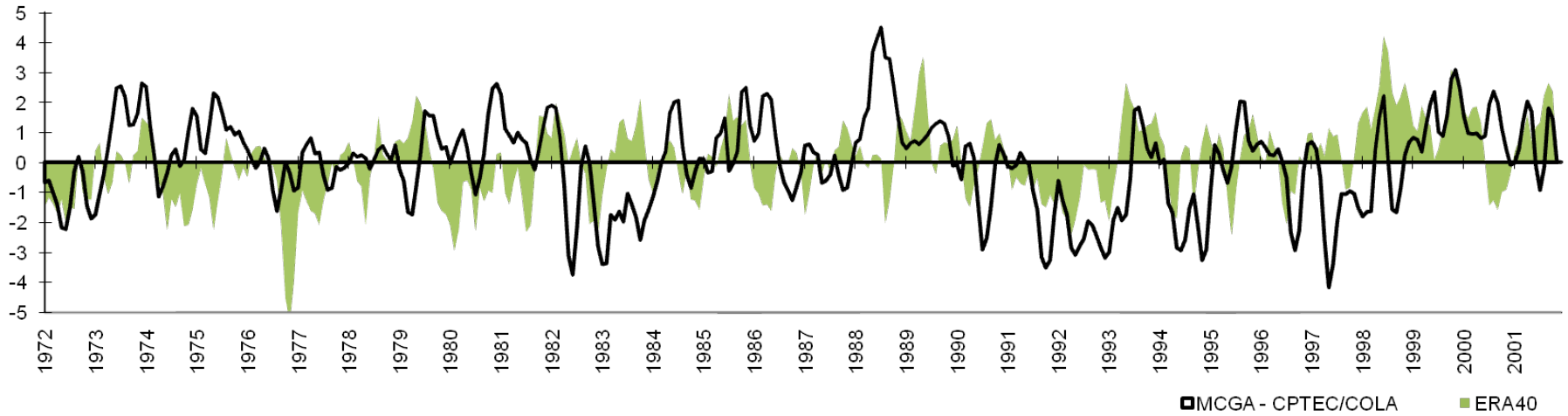
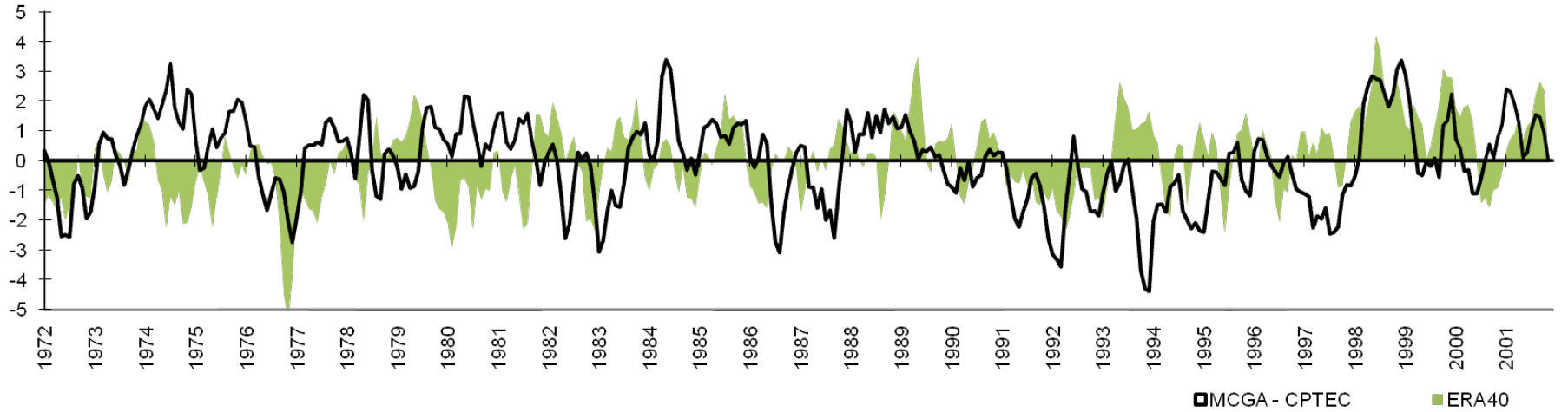


IOS 3 meses (ERA40 x MCGA1)



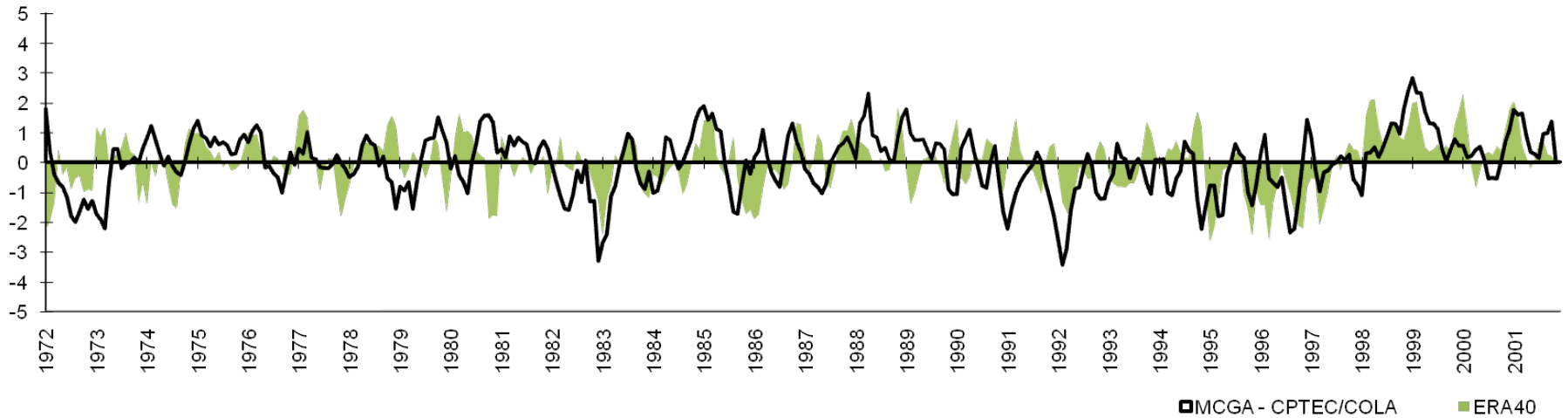
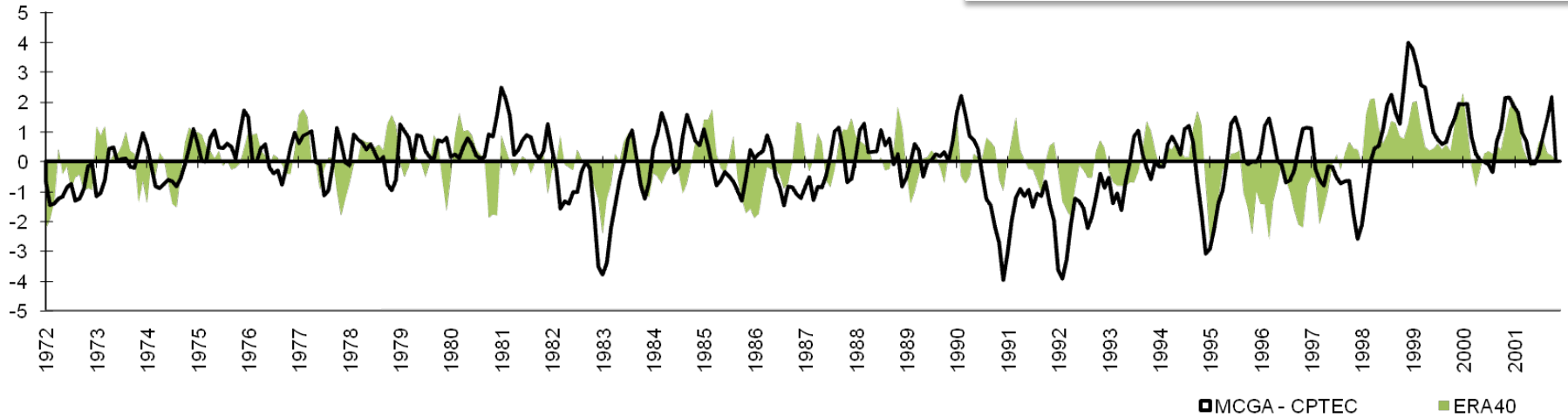
IOA

Média de 3 meses



IOAN

Média de 3 meses



PLAN 2011

- **Plan 2007**
- **Plan 2009- new additions**
- **Plan 2011- Update of plan
Achievements (paper Marengo et al)**

Discuss plans for short term and long term, based on the previous plan and include new topics.

Diurnal and mesoscale variability

Short term: to identify and quantify the diurnal cycle of precipitation associated with the main precipitation regimes documented over SAMS

- *Long term: Science questions*
- 1) Which are the main processes underlying the identified diurnal cycles in different areas of the SAMS?
- 2) To what extent and through which mechanisms does soil hydrology affect the diurnal cycle?

Modelling and Simulations/Projections

- **Improvement of model prediction in SAMS area**
- **(improving the models & applying new techniques to analyse results) [Validation]**
- **The role of soil moisture, topography,...**
- **(Global and Regional models)**

- **Impact of climate change on SAMS (CMIP3, CMIP5 model simulations/projections)**
- **Impact of land use on SAMS (experiments)**

Short term

Contributions to IPCC AR5:

SAMS (regional section)

Main modes of variability in S.H.

SAM (South Annular Mode)

PSA (Pacific South America)

Storm tracks , blockings

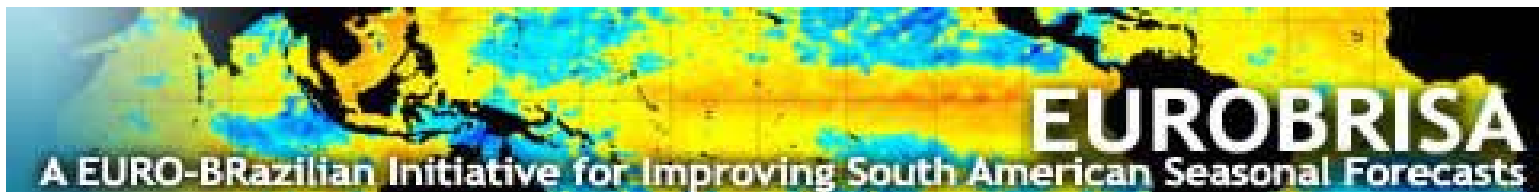
**{observations (trends) , simulations,
projections}**

Papers submitted up to 31 july 2012

Papers accepted up to 15 march 2013

MESA Collaboration projects LPB, EUROBRISA,

SITE AT CPTEC



SUGGESTION: to create another CPTEC
site with information on
SOUTH AMERICA MONSOON SYSTEM

SOUTH AMERICA MONSOON SYSTEM

Information about lifecycle

Monitoring features associated with late or early onset/demise

Forecasting onset/demise from model results

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Main publications

Link to CPC/NCEP SAMS

network of scientists rather than a science working group (?) (suggested in the previous VAMOS meeting)

- **Participants in different institutions
contribute/interact/develop/**
- **Experiments,**
- **Model developments (discussions on different
models with the aim of improving them)**
- **Observational analyses,**
- **Monitoring,**
- **...**
- **....**