CLARIS | LPB

CLARIS | LPB

A Europe-South America Network for Climate Change Assessment

And Impact studies in La Plata Basin

SEVENTH FRAMEWORK PROGRAMME

www.claris-eu.org

Deliverables

Instrument: **SP1 Cooperation**

Thematic Priority: **Priority Area 1.1.6.3 "Global Change and Ecosystems"**

FP7 Collaborative Project – Grant Agreement 212492

CLARIS LPB
A Europe-South America Network for Climate Change Assessment and Impact Studies in La Plata Basin

DELIVERABLES

D5.1: A set of metrics to be employed in regional model performance

Due date of deliverable: Month 12

Start date of project: **01/10/2008** Duration: 4 **years**

Organisation name of lead contractor for this deliverable: P13-CONICET

Deliverable No	Deliverable title	WP	Lead beneficiary	Estimated indicative person-months (permanent staff)	Nature	Dissemi nation level	Deliv ery date
D5.1.	A set of metrics to be employed in regional model performance	WP5	P13-CONICET	5,80	R	PU	12

- **Questions to be answered**

  -Ensemble Performance – how well does a models ensemble simulate the observed climate record?
  -Ensemble Convergence – how consistent are the simulations from a range of models in space and time?

- **Problems with model evaluation or metrics**

  -There is no widely accepted metric for assessing climate models as a whole, due to the number of variables and a lack of observational data (Räisänen, 2007).
  -Observed data sets that are used to evaluate model performance also have uncertainties (Gleckler et al., 2008).
  -It is unclear how performance in simulating the observed climate translates into future simulations, particularly since calibration of models could potentially hide deficiencies in the modelling of physical processes.

- **Uncertainties related to the observational data**

  To compare different observational data sets for precipitation and other variables (e.g. root-mean-square (RMS) differences between competing data sets and latitude-longitude maps of differences).

- **Basic statistics, skill score indices, diagrams, tables**

  Perkins PDF-based skill score: Comparison of observed and modeled probability density functions for daily precipitation and temperature (Perkins et al. 2007).

  Taylor diagrams: Statistical summary of how well patterns match each other in terms of their correlation, their root-mean-square difference and the ratio of their variances (Taylor 2001).

  Portrait diagrams to assess biases (errors in the spatio-temporal means): schematic overview of seasonal biases for different areas and models (e.g. similar to fig. 3 in Jacob et al. 2007 or alternatively in the form of a table).

  Basic measures of model performance, e.g.:
  - Regional bias for a variable “a” over a region “r”;
  - Spatial correlation coefficient between models and observations (to measure the agreement between spatial patterns);
  - Spatial standard deviation (to measure the spatial variability of a variable).

- **Long-term annual and seasonal mean fields for the observations, the ensemble mean and individual models.**

  Annual mean rainfall, sea level pressure and low-level winds (for discussion on bands of high mean rainfall (ITCZ, SACZ, Southern Andes), dry regions, and low level circulation).

  Upper-level circulation (200 hPa winds or streamlines) + rainfall for each season. For discussion of basic features of the South American Monsoon System (e.g. the Bolivian High -influence on the SACZ in summer- and the downstream trough over the NE coast of Brazil) and position/intensity of jet streams.

  Other critical physical variables (latent and sensible heat fluxes, clouds, radiation, etc).

  Any measure of inter-model spread.

- **Diurnal cycle**

  Mean diurnal cycle of precipitation (e.g. maps of late afternoon-evening and late night-early morning precipitation).

  Diurnal temperature range (Tmax minus Tmin).

- **Low level winds**

  Low level jet. (it feeds the convective rainfall over the subtropical plains). Any figure on the poleward moisture transport by the LLJ.

  "V index" (Wang and Fu, 2002): A meridional wind index representing the variability of the crossequatorial flow, based on area-averaged (5S–5N, 65–75W) daily low-level meridional winds. The V index displays large submonthly, seasonal, and interannual variabilities, and correlates well with precipitation over South America.

- **Synoptic-scale variability**

  Storm tracks (e.g. std.dev. of meridional wind at 200 hPa).

- **Intraseaonal variability**

  Tropics: Over tropical South America (10S to 10N) there is a reversal in upper level zonal winds over an approx. 30-day period (related with Madden-Julian Oscillation).

  Tropical to subtropical South America: Subtropical rainfall seesaw (affecting LPB and SACZ regions).

  Midlatitudes: Blocking activity in SE Pacific and SW Atlantic.

- **Interannual variability**

  ENSO-related changes in rainfall

References

Gleckler, P. J., Taylor, K. E., and Doutriaux, C., 2008: Performance metrics for climate models. *J. Geophys. Res. - Atmospheres*, 113.

Jacob et al., 2007: PRUDENCE, *Climatic Change*, 81, 31-52.

Perkins, S. E., Pitman, A. J., Holbrook, N. J., and McAneney, J. (2007), Evaluation of the AR4 Climate Models' Simulated Daily Maximum Temperature, Minimum Temperature, and Precipitation over Australia Using Probability Density Functions. *J. Climate*, 20, 4356-4376.

Räisänen, J., 2007: How reliable are climate models? *Tellus Series A*, 59, 2-29.

Taylor K.E., 2001: Summarizing multiple aspects of model performance in a single diagram. *J. Geophys. Res.*, 106, 7183–7192

Wang H. and R. Fu, 2002: Cross-Equatorial Flow and Seasonal Cycle of Precipitation over South America. *J. Climate*, 15, 1591-1608.