

# IMPACTS OF CLIMATE CHANGE ON THE HYDROLOGY OF LA PLATA BASIN

Anthony Schrapffer (1, 2), Anna A. Sörensson(1, 2), Jan Polcher (3, 4)



1. Centro de Investigaciones del Mar y la Atmósfera (CIMA/CONICET-UBA)
2. Instituto Franco-Argentino sobre Estudios de Clima y sus Impactos (UMI-IFAEI/CNRS-CONICET-UBA)
3. Centre National de la Recherche Scientifique (CNRS), France
4. Laboratoire de Météorologie Dynamique du CNRS, UMR8539, CNRS, IPSL, France



## 1. Motivation

La Plata basin is the fifth largest basin in the world and its aquatic resources are fundamental for the socio-economic development of Argentina, Bolivia, Brazil Paraguay and Uruguay.

The sub basins differ widely from one to another in terms of climate, land use, population, hydrology and projected future changes : the range of possible Climate Change impacts is very large and will imply a great diversity of adaptation measures.

## 3. Methodology

1

### ACTUAL PHASE

Checking the ORCHIDEE model with 1959-2001 data : Evaluation of its sensibility, improvement of its processes in order to have the most appropriate model

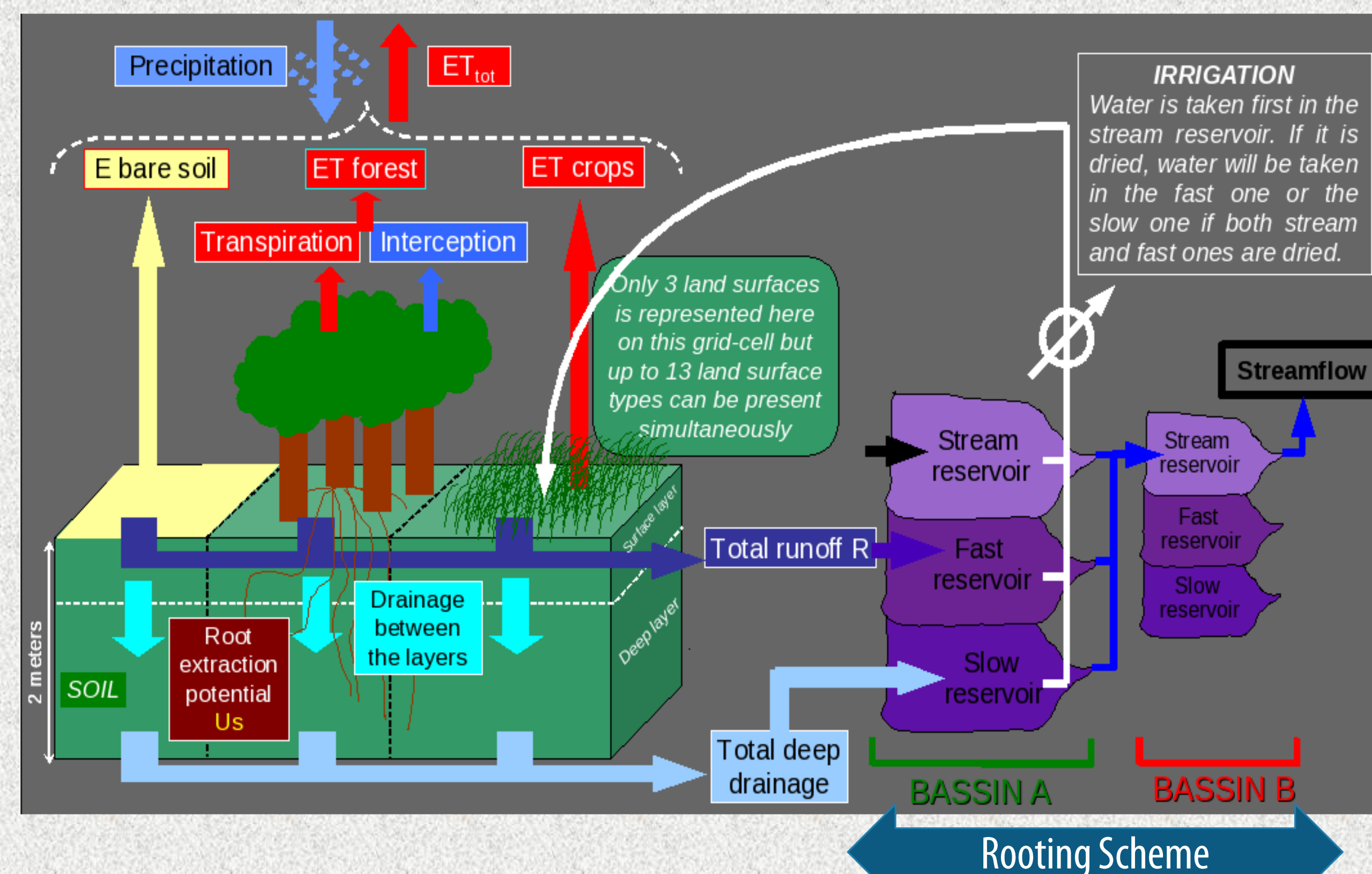
2

Augmenting the precision of ORCHIDEE model (from a 50 km grid to a 10 km grid) : Adaptation of the model to this new scale

3

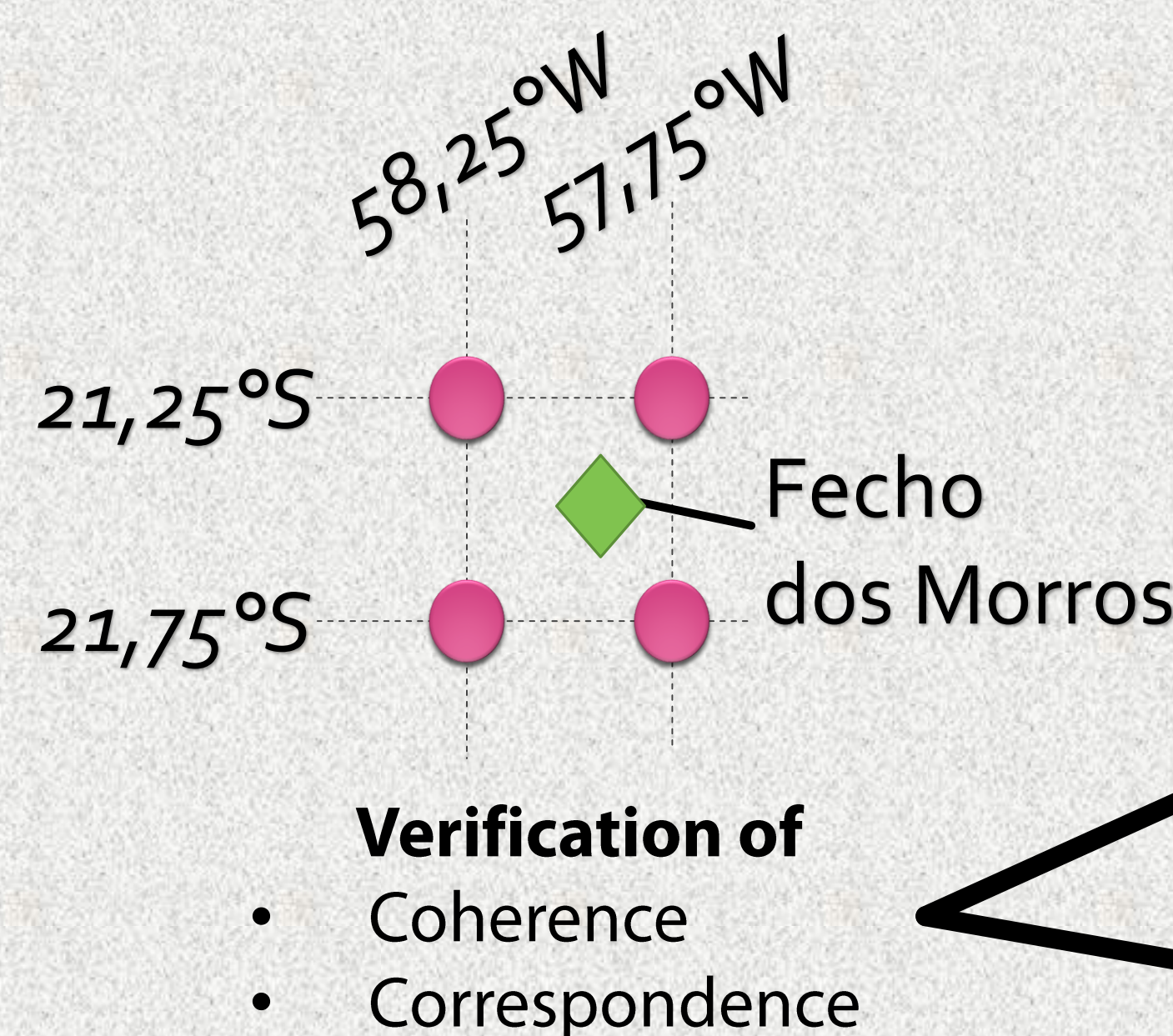
Combining ORCHIDEE model and WRF model : Simulation of past and future climate of La Plata Basin, evaluation of the main changes and consequences due to climate change

## 4. Hydrology and routing of ORCHIDEE



Guimberteau et al., 2009: General scheme of the Land Surface Model ORCHIDEE and its routing scheme. Postdam, Germany, Conference: WATCH General Assembly Meeting.

## 5. Selection of valid hydrograph stations for comparison



### Comparison of

- Real Upstream area (from GRDC Data)
- Upstream area in the neighbor point in the model grid (from model Simulations)

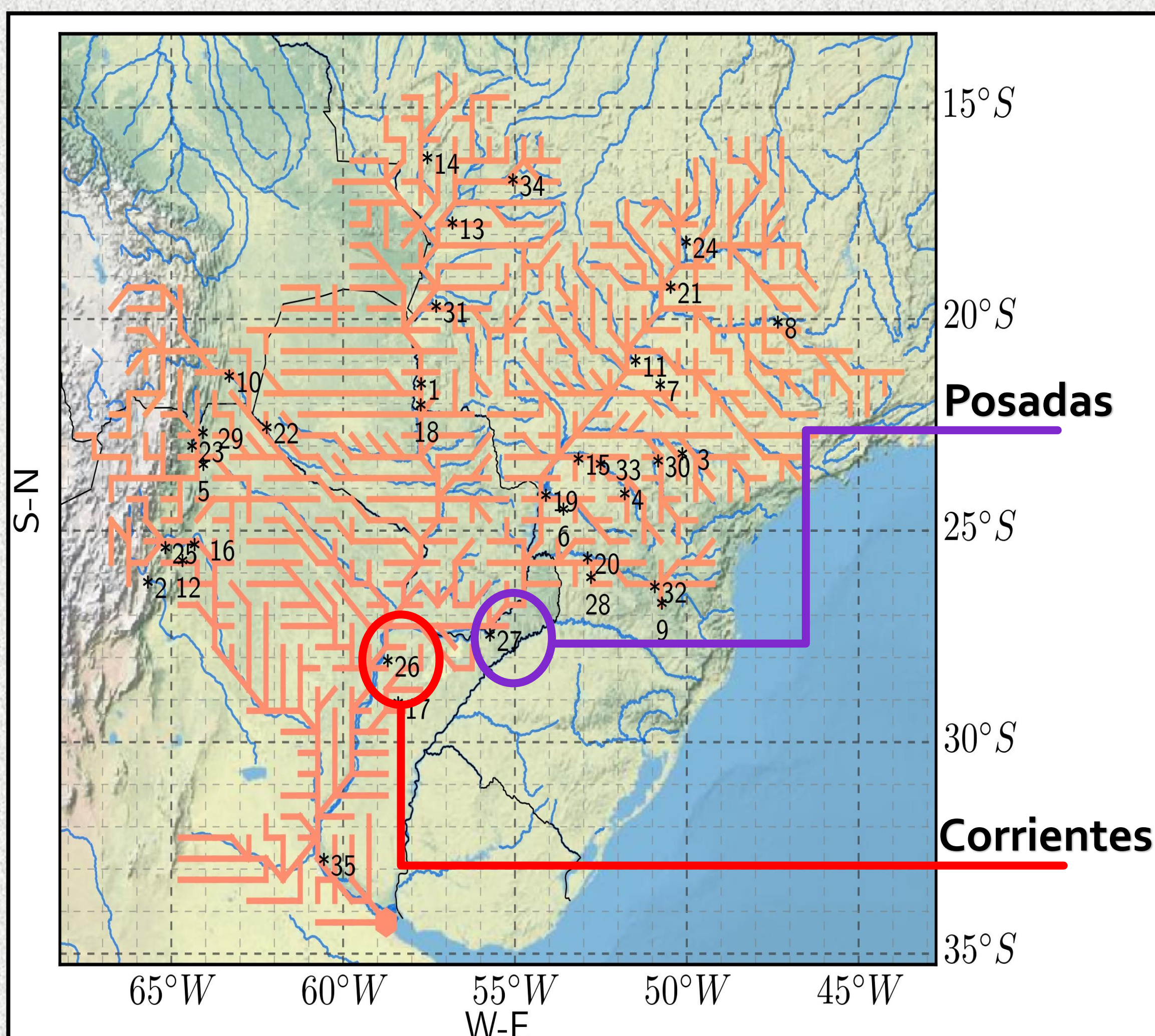
Station data are valid for evaluation

Station data are not valid for evaluation

**Example : Fecho dos Morros** – Valid for 57,75°W / 21,25°S

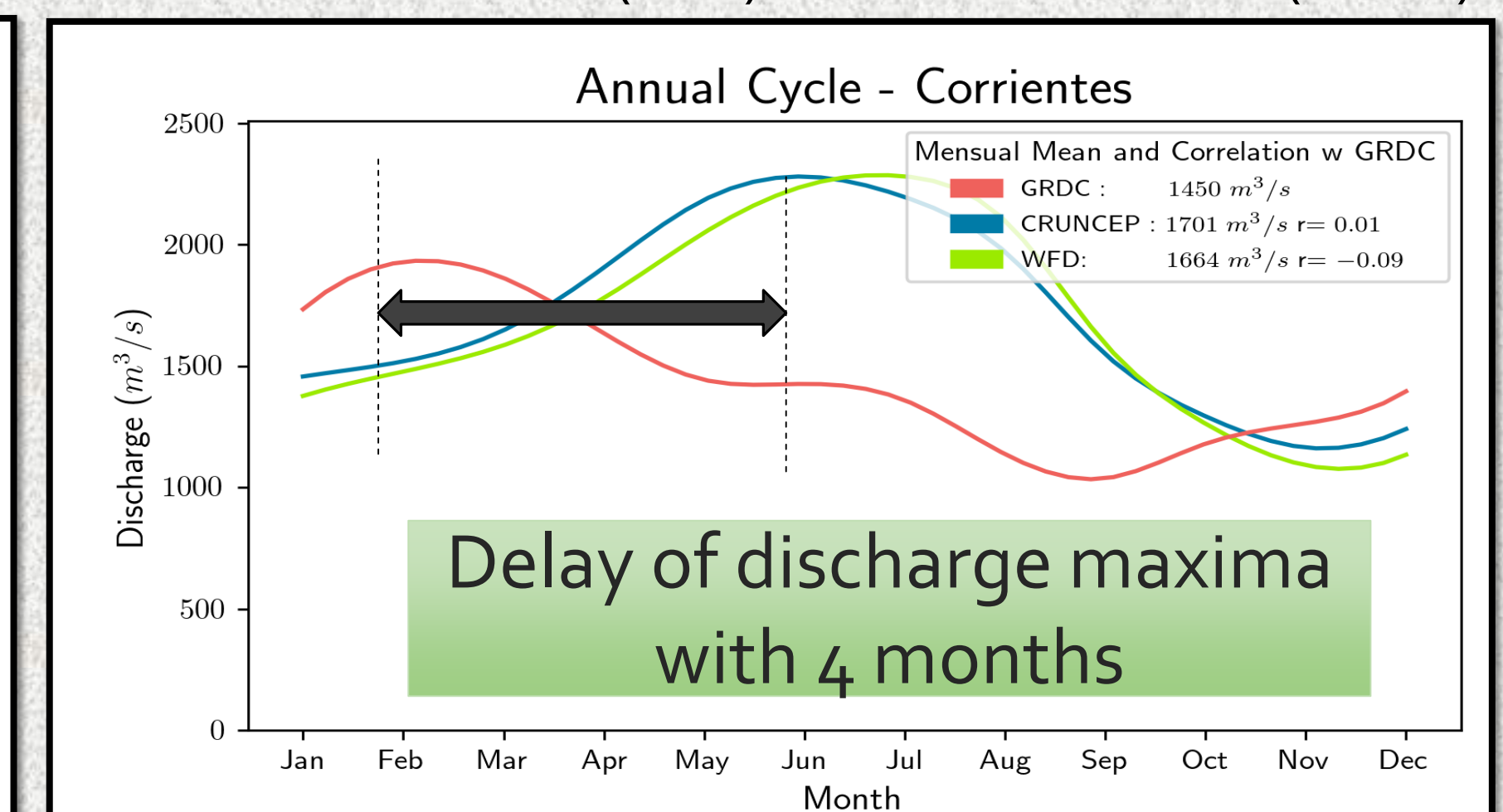
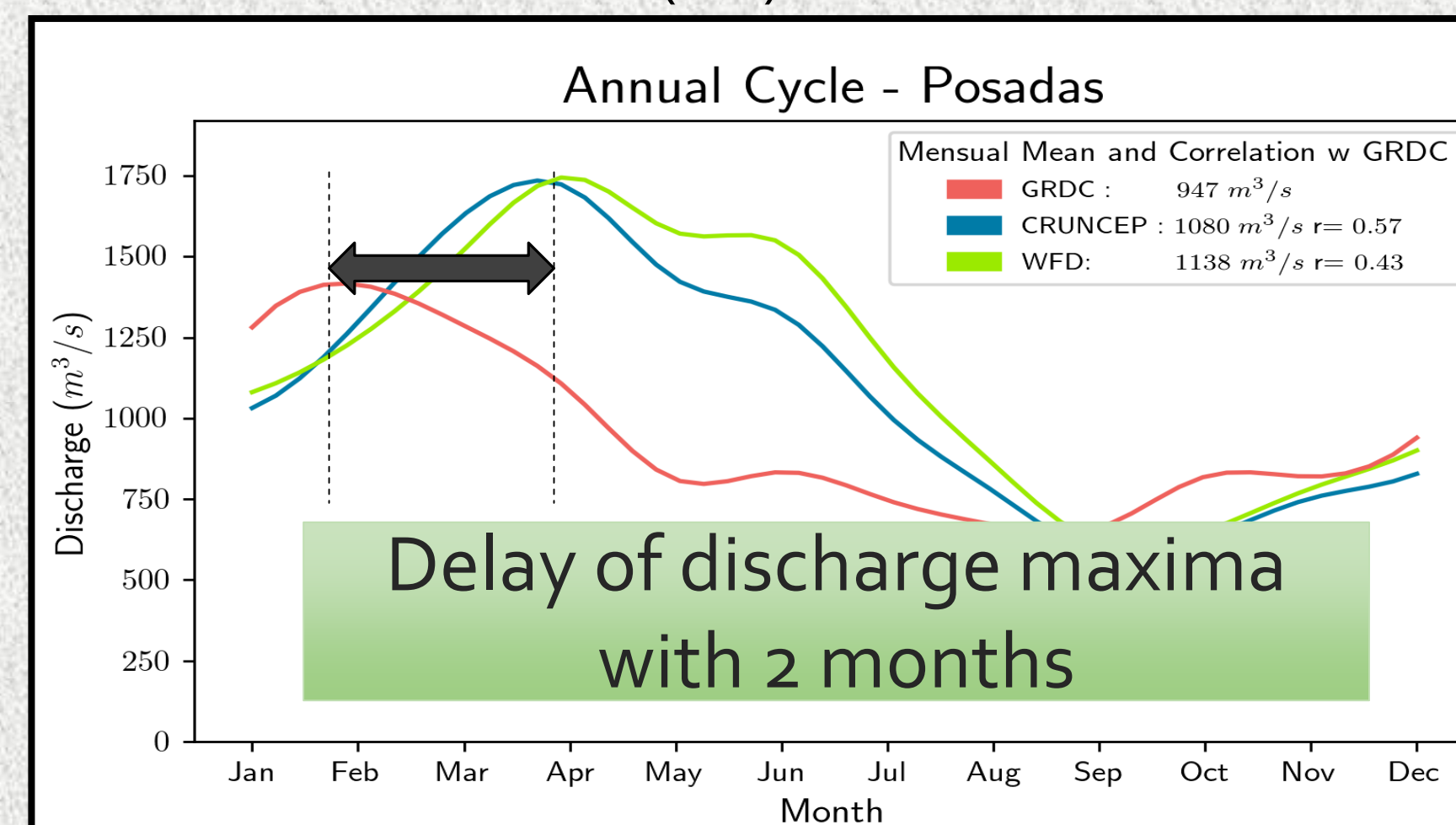
- Upstream area (GRDC Data) : 470 000 km<sup>2</sup>
- Upstream Area (ORCHIDEE at 57,75°W / 21,25°S) : 505 851 km<sup>2</sup>

## 6. Hydrograph stations used to evaluate the model



## 7. Model development based on comparison with station data

GRDC observational data (red) and ORCHIDEE results forced with CRUNCEP Data (Blue) and with WFD Data (Green)



**Example: Increase of simulated delay of máxima between Corrientes and Posadas**

The model may be considering an excessive subsurface runoff or inundation that delay the flux.

Changes to the vegetation cover and / or the parametrizations of the interactions between vegetation and infiltration will be tested to improve the model.

## 8. References

- Krinner, G. et al., 2005: A dynamic global vegetation model for studies of the coupled atmosphere-biosphere system, Global Biogeochem. Cycles, 19, GB1015.  
Skamarock, W. C., et al., 2008: A description of the advanced research wrf version 3. NCAR TECHNICAL NOTE, 475:NCAR/TN475+STR

## 9. Acknowledgement

Anthony Schrapffer was supported by a PhD grant from Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Argentina.