SOIL -ATMOSPHERE INTERACTION:

Future projections of extreme temperature and precipitation and their impact on soil hydric conditions in the southern La Plata Basin

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Motivation

CLIMATE EXTREMES influence *soil hydric conditions* causing an economic impact in the southern La Plata Basin, where **rainfed agriculture production** is one of the main economic activities. The assessment of their projected changes contributes to adaptation and mitigation actions regarding agricultural systems.

Objective

Statistically analyze the **response of soil hydric conditions** to **projections in mean and extreme values** of the main meteorological variables that participate in soil-atmosphere interaction (temperature and precipitation).

Data

Monthly precipitation and maximum and minimum temperatures:

Observations

46 stations provided by the National Weather Service and the National Institute for Agricultural Technology, period 1970-2010

Quality controlled!

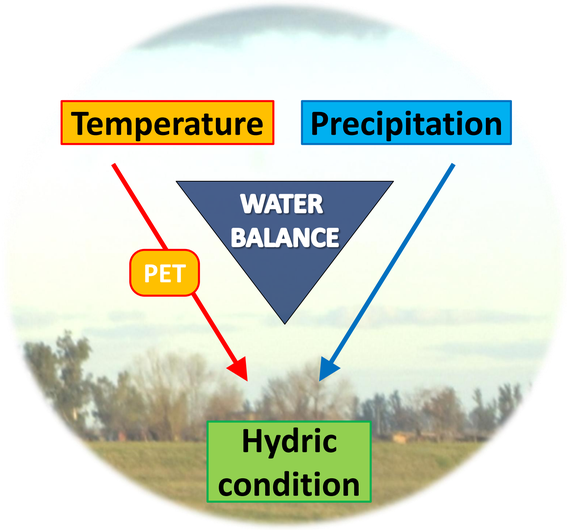
Global Climate Models

7 GCMs selected from CMIP5

-experiment *historical period* 1970-2010

-two emission scenarios (RCP4.5 and RCP8.5), period 2065-2100

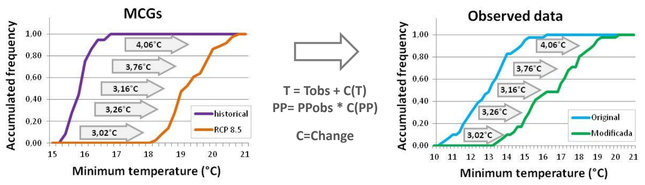
Validated!



Methodology

a) PROJECTED CHANGE: TEMPERATURE AND PRECIPITATION

PROJECTED CHANGE quantification ⇨ Inter-model **AGREEMENT** on the sign of change ⇨ Analysis of **UNCERTAINTY**



b) WATER BALANCE

- **PP** Monthly accumulated precipitation
- **PET** Monthly potential evapotranspiration (Thornthwaite,1948; Camargo et al., 1999)
  Tef= 0.36* (3* Tmax – Tmin)
- **FC** Effective field capacity (Forte Lay and Spescha, 2001)

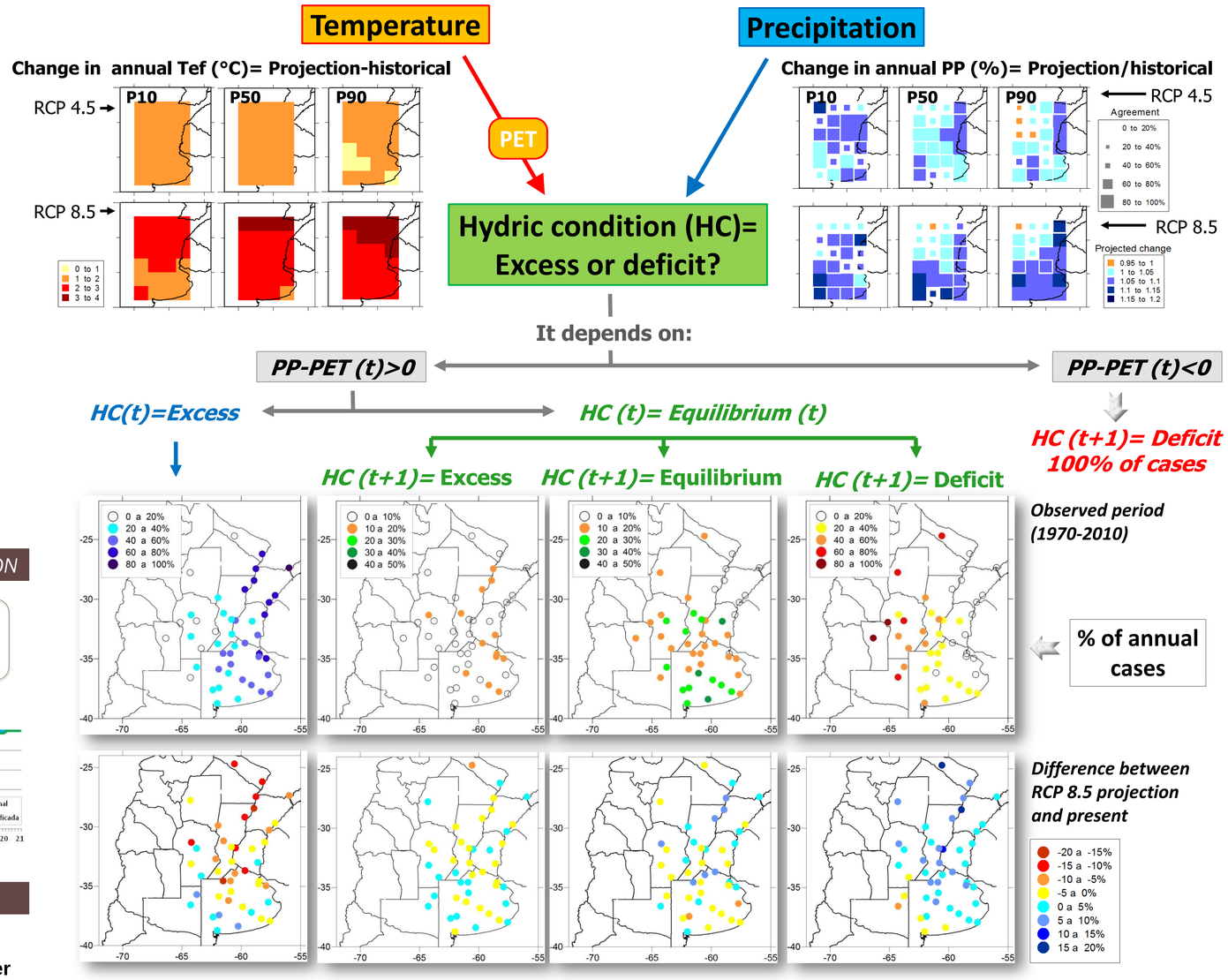
Monthly Water Balance

Thornthwaite and Mather (1957) with modifications (Pántano et al., 2014)

c) IMPACT ON SOIL HYDRIC CONDITIONS

Projected temperature and precipitation ⇨ **WATER BALANCE** ⇨ Soil Hydric Condition= EXCESS- DEFICIT

RESULTS



Discussion

➢ Effective temperature and precipitation are expected to increase according to the projections of GCMs, with few exceptions. Temperature shows better agreement between models than precipitation.

➢ Soil response to these changes show that projected increased temperatures might reduce the number of cases under excess conditions and might increase deficit cases. This means a reduction in the impact of extreme high precipitation in eastern stations but favors deficit conditions, especially in the western zone where potential evapotranspiration becomes more important.

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