

# Remote effects in the South-eastern South America climate of land use change

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## 1. Land use changes

- Large areas of South America are undergoing changes in the land use.
- The replacement of natural vegetation by crops modifies the soil –atmosphere interaction.



This affects local hydroclimate...  
¿And in remote areas?



## 2. Experiments

Simulations were carried out using the WRF regional climate model, assuming two scenarios of land cover / use:

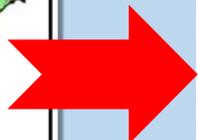
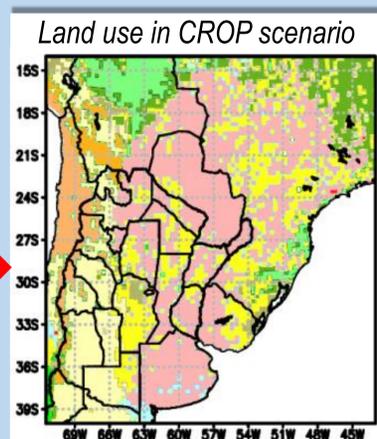
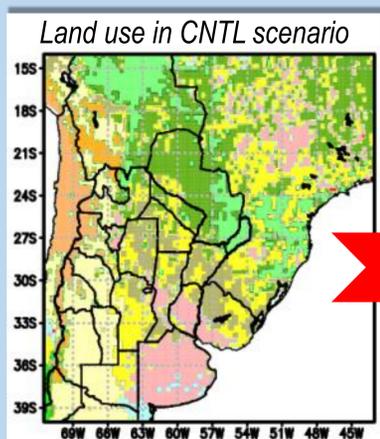
- Period: September 2002 – November 2002.

- Domain: South America.

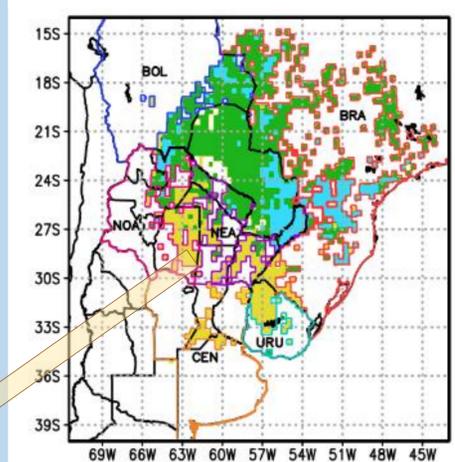
- Two simulations were compared

CNTL: control simulation.

CROP: replaces forests, grasslands and savanna by crops.



Remote areas to be evaluated



- Savanna → Dryland cropland
- Grassland → Dryland cropland
- Evergreen broadleaf forest → Dryland cropland

Remote areas to be evaluated

BRA  
BOL  
URU  
NOA  
NEA  
CEN

## 4. Conclusions

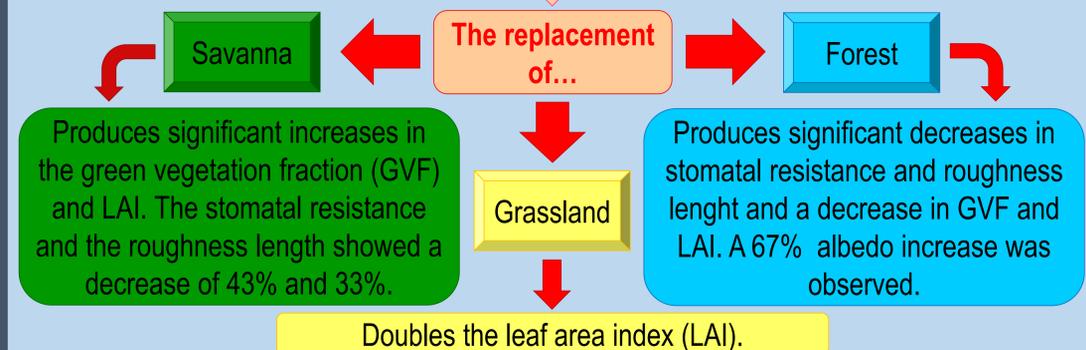
- The expansion of crops on native vegetation modifies the biophysical properties: leaf area index, albedo, roughness length, among others.
- Land cover changes produce effects in remote areas by altering (in time and space) the behavior of hydroclimatic variables.

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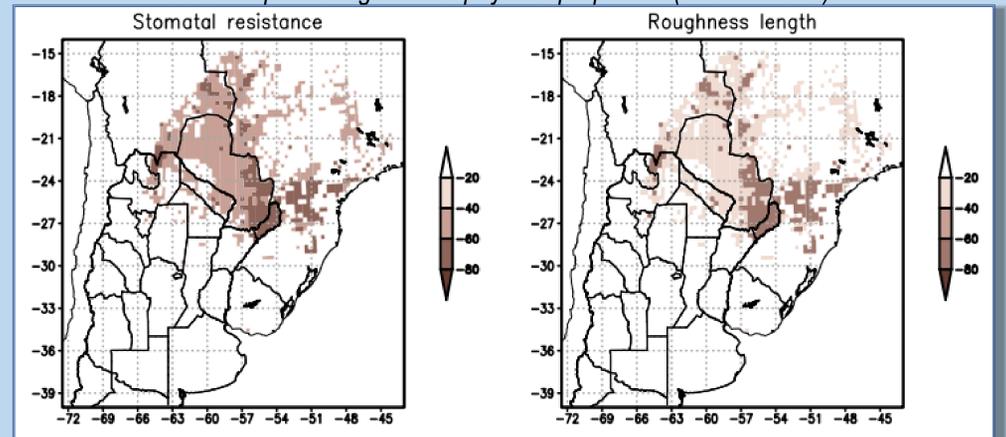
## 3. Results

### Biophysical properties variations:

Those regions where a change in coverage occurred will modify their biophysical properties, while unchanged regions will conserve them.



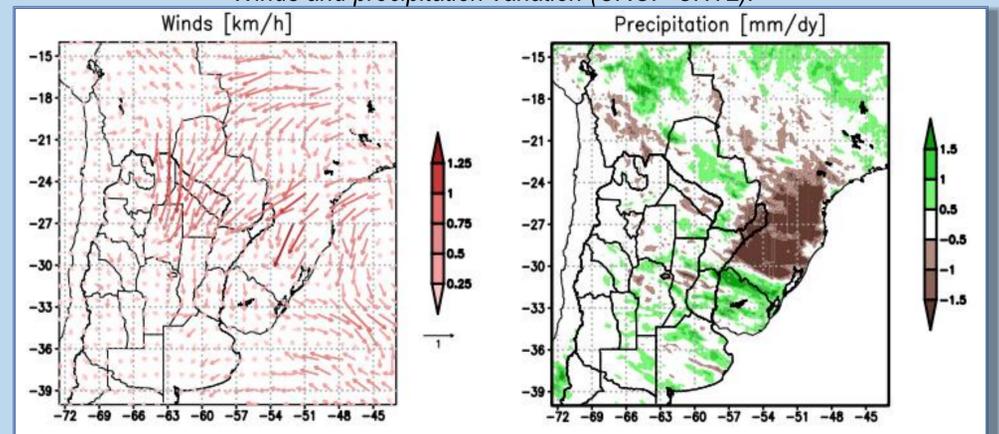
Variation percentages of biophysical properties (CROP-CNTL).



### Hydroclimatic variables variations:

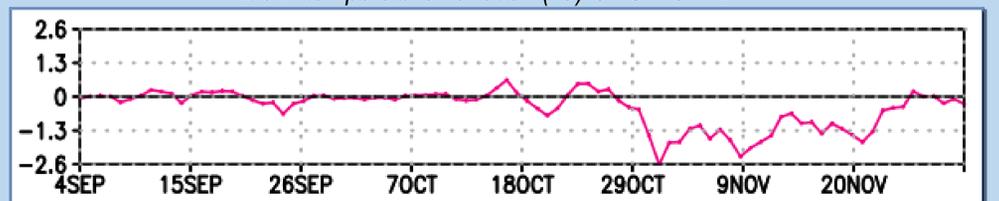
Changes in biophysical properties induce changes in hydroclimatic variables in regions where there were no alterations in the coverage ...

Winds and precipitation variation (CROP-CNTL).



... that become more evident as the simulation time advances.

Brazil temperature variation (°C) CROP-CNTL.



Percentages of variation of the averaged variables in the last month of simulation.

Region	Precip. (%)	EVT (%)	Soil moisture at 1m (%)	Runoff (%)	Temp. (%)	Winds (%)
Bolivia	2,4	5,0	5,8	11,0	-2,7	-5,6
Brasil	-15,1	5,9	6,0	-45,9	-3,5	21,1
Uruguay	55,5	-2,8	0,3	3,1	0,6	-2,1
Centro	16,0	-0,3	2,4	13,2	1,1	2,5
NOA	1,2	-2,5	0,1	-1,3	0,5	1,4
NEA	-2,5	1,1	0,8	16,4	3,1	-0,3