Temporal variability in rainfall, dry days, water balance and extreme events in northeastern Argentina

O. C. Penalba , V. Pántano, J. Rivera*, F. A. Robledo *

Departamento de Ciencias de la Atmósfera y los Océanos, FCEN, UBA, Buenos Aires, Argentina.

**Consejo Nacional de investigaciones Científicas y Tecnológicas (CONICET) , Buenos Aires, Argentina.*

penalba@at.fcen.uba.ar

MOTIVATION

Higher atmospheric temperatures affect the hydrological cycle, leading, at global scale, to higher moisture content and an increased evapotranspiration. Regionally the relation between the different involved factors, thermodynamics and dynamics, is not so direct. This interaction leads to a geographically complex response of mean precipitation to global warming. Assess the temporal fluctuation of hydrological processes and most especially rainfall, which constitutes the main source of water input and estimation of the regional water balance, is of great importance.

OBJECTIVE

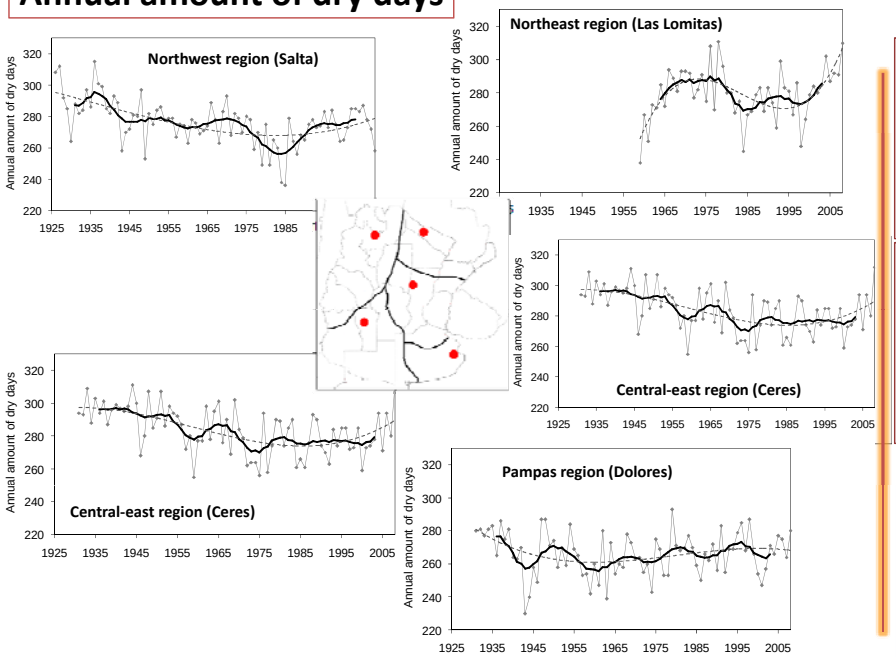
The aim of this study is to examine the inter-annual, inter-decadal and low frequency variability of rainfall in different time scale jointly with the water balance in the soil, with special emphasis in extreme events.

DATA SET

High quality daily rainfall and temperature were used in the longest period 1920 to 2008 with less than 10% of missing data, provided by national institutions and National Weather Service.

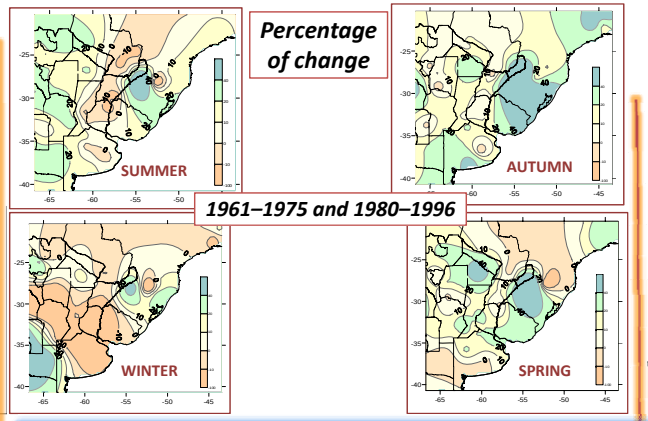
To assess the different rainfall characteristic in the region, the following indices or variables are analyzed a) total monthly rainfall; b) percentage of extreme events of rain; c) percentage of daily intensity of extreme rainfall; d) lack of daily rainfall and e) percentage of months with deficit and surplus, estimated by water balance. The indices were calculated per each austral season: summer (December to February), autumn (March to May); winter (June to August), spring (September to November), and the year as a whole.

Annual amount of dry days

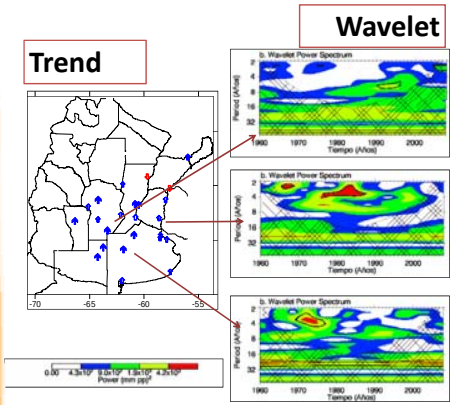


- Most of the regions exhibit an apparent downward trend in the annual amount of dry days.
- However, during the last 20 years, in some regions these trends have begun to reverse, indicating a possible return to drier conditions within LPB.

Daily extreme rainfall. 75th percentile.



Water balance. Summer



GENERAL DISCUSSION

- Most outstanding feature is the difference before and after the 1950s or 1960s.
- Interdecadal variability is particularly well defined in the west, with a “jump” or discontinuity around the mention decades. In the eastern zones, a gradual increase can be observed starting in the 1950s.
- Interdecadal and interannual variations affect the behavior of extreme rainfall in the annual scale and during the months with maximum rainfall in the region.
- The decadal analysis of deficit and surplus reveals the complexity of the different factors involved. Moreover, the results show the different hydrological behavior in the region. The most outstanding results were that 1960s and 2000s were the decades with greater amount of deficit for all seasons.