

Decadal / interdecadal variability of the main rivers discharges of La Plata BasinCarla Gulizia[†]; Ines Camilloni[†] CIMA/CONICET-UBA, ArgentinaLeading author: gulizia@cima.fcen.uba.ar

The principal goal of this research is to advance in the knowledge of South America's decadal/interdecadal variability with emphasis in the hydrological response of the main rivers of La Plata basin. A better comprehension of the climate low frequency variability is fundamental for the elaboration of regional hydroclimate scenarios for the near future (2020-2040). Recent studies showed that the ability of global climate models to represent the present climate has a temporal and spatial variability consistent with the climate decadal/interdecadal variability, indicating the existence of climatic processes which are not being represented by them. Consequently, uncertainties with respect to short-term future climate scenarios are still high. A statistical characterization of the 20th century decadal variability and trends of the discharges of the main rivers of La Plata Basin was assessed considering a set of hydrological stations and a common period from 1936 to 2005. The annual cycle of the discharges was analyzed for the complete period and for seven particular decades within it. Particularly, to analyze the Paraguay River we considered a shorter period due to problems of availability of data. The annual normalized discharge anomalies at each station were smoothed with an 11-year running mean filter to obtain the decadal component of the series. Power spectral analyses of the normalized and detrended annual discharges time series were computed to detect their decadal/interdecadal principal oscillation modes. The wavelet transform was also applied to annual normalized discharges. Results show significant positive linear trends in the annual discharges of all rivers. Decadal changes in the annual cycle of the discharges were also identified for most of the hydrological stations. Furthermore, this study verifies the existence of an evident decadal and interdecadal oscillation in the river discharges. The power spectral analyses disclose three different patterns among the hydrological stations: a group of stations south of 22°S in the Parana, Uruguay and Iguazú rivers present a decadal significant signal (8-10 years) as the most important among all the peaks in the spectral density diagram, another group of them located north of where the Parana River begins has the main signal between 20-25 years. Finally, a set of stations in the Paraguay River have the most significant oscillation mode around 30-35 years. Besides, all of the stations show a significant oscillation mode near 5 years which it is probably related with the ENSO phenomenon. These representative modes correspond mostly to the non-stationary discharges variability as seen in the wavelet analysis. A multi-decadal significant oscillation is present around 32 years in five stations in Parana sub-basin, four in Paraguay sub-basin and one in the Iguazú River.