Session: C2 Poster: T141B

Monthly precipitation percentile trends in the Plata Basin

Moira Doyle[†]; Ramiro Saurral; Vicente Barros
[†] CIMA- CONICET/UBA, Argentina
Leading author: doyle@cima.fcen.uba.ar

The 10th, 35th, 65th, 90th and 100th percentiles of monthly precipitation for 47 stations in the La Plata Basin (LPB) are calculated. For each year, the monthly rainfall amounts falling in each range were added and their linear annual precipitation trends and statistical significance calculated. In the extremely low precipitation range, most stations had negative trends with a few exceptions. This pattern is also visible in the dry range, in which almost all the stations had negative trends and many were significant at the 5% confidence level. The near climatology range (precipitation falling between the 35th and the 65th percentiles) follows a clear pattern of positive trends in the east of the domain and negative ones over northern and western Argentina, while the above-normal and extremely high rainfall ranges are characterized by positive trends in almost all stations, many of them statistically significant. The above-90th percentile range trends reach up to 12 mm/yr over southern Brazil near the border with northern Argentina. During 1960-2005 the above normal and extremely high monthly precipitation not only had a generalized positive and in many cases significant trend over the LPB, south of 22^{o}S, but also that they accounted for most of the annual precipitation trends. In the warm semester the pattern is similar, although negative trends in the low precipitation range are more widespread and generalized in the domain. The east-west gradient found in the annual series in the 35th-to-65th percentile group is now switched to a more meridionally-oriented gradient, with positive trends in the south and negative in the north of the region. Extremely high rainfall again follows a positive trend pattern over almost the whole domain with few exceptions in the farthest southern part of the area. In the case of the cold semester the range patterns are similar, but their trends are smaller compared to both the annual and the summer cases. Trends in monthly precipitation percentile ranges can be caused either by a trend in the frequency of cases within each range or in the average amount of precipitation within the range, or by both. To explore this issue, the changes in the annual frequency of months in each precipitation percentile range are calculated. It can be seen that in general the low-precipitation months became less frequent along the period, while months with high precipitation became more frequent. The largest increase in the frequencies of months with extremely high precipitation was in a few stations in the far southern portion of the domain and some in southern Brazil; in both areas there are stations with upward trends that resulted in an increase of about 1 to 2 cases in the 46-year period. Since the expected number of cases in the upper 10th percentile for this period is 55, this implies that the increase in the frequency of months with extremely high rainfall should be in the order of 2% and no more than 4%. In the area with an upper limit of about 800 mm in the extreme rainfall range a 4% increase in the frequency of events explains only less than a 32-mm increase in precipitation in the whole period, against the observed increment of 1 to about 10 mm per year during 46 years. It can be concluded that the increase in rainfall in the upper 10th percentile range of monthly rainfall was basically owed to higher precipitation in this range with only a small contribution from the higher frequency of months with rainfall in this range.