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Temporal variation of the rainfall frequency and intensity in the Northeastern Argentina. Variability or climatic change?

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It was analysed the temporal variation of the total number of days a year with rainfall and the number of days a year with rainfall above the 100 mm threshold at the rain gage stations in the region. The results show an increase both in the frequency of days with rainfall and the frequency of days with heavy rainfall starting at the beginning of the 70s. The increase in frequency of occurrence is more significant in the case of heavy rainfall. The annual maximum rainfall was calculated for periods of 1, 3, 5, 7 and 10 consecutive days at regional rain gage stations for the respective historical periods and the rain intensity - duration - return period curves (IDT) were determined on a frequency analysis. The IDT curves were contrasted to rainfall intensity-duration data of critical storms occurring in the last decades. It was noticed that the rain intensities of critical storms (mostly convective), widely exceeded the intensities given by the 100-year IDT curves, particularly in short durations. The increase in both the frequency of heavy rainfall occurrence and rain intensity from the 70s onwards show an increase in frequency and intensity of the average scale convective systems in the region, resulting from the climatic change. These systems tend to produce rainfall of very high intensity and spacially concentrated, which generally produces significant floods in the local rivers. The results show that the IDT curves do not represent the real frequency of occurrence of heavy rainfall taking place in the last years. Methods of frequency analysis were used in the curve determination. These methods assume that the statistical series of the analysed random variable (in this case, maximum rainfall

intensity) are stationary, i.e. they belong to a unique statistic population. However, if tests of homogeneity are applied to the sample series, this hypothesis is rejected. These results show that the climatic change is modifying the statistic parameters of the series (mean, standard deviation, skewness). The IDT curves are usually used to determine hydrologic parameters for design water control. Their lack of adjustment obliges the professionals in engineering to restate design criteria and mainly, to adopt non structural measures to palliate the flood effects at the occurrence of hydro-meteorological events superior to the design's.