

Analysis of storm tracks associated with flood events across the Paraguay River Basin

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The hydrological time series of the Paraguay River Basin located in the Pantanal region of Brazil exhibits a complex and interesting behavior. Previous studies identified monotonic trends, multiple step changes and strong seasonality in flows and rainfall data, imposing therefore major challenges in the water resources and flood risk management in the region. The attribution of such changes is thus of particular interest, and in this work we analyze storm tracks across the Paraguay River Basin in order to better understand moisture sources and identify large scale climate patterns associated with the largest flood events in the basin. The storm path traced by virtual particles and the moisture gains and losses along such paths are obtained using the HYSPLIT Lagrangian model and the NCEP/NCAR reanalysis data for the period 1970-2016. A K-means clustering algorithm is employed to find patterns in the storm track data and for each cluster we obtain the distribution and statistics of the associated flood events. Preliminary results show that the source regions of moisture, namely tropical North Atlantic, South Atlantic and Amazon, play a significant role on the features of flood events, particularly in the magnitude of these events. Major floods seem to be related to a large influx of moisture coming from the Amazon region. We also observe that base flow and internal dynamics of the catchment play a minor role on the streamflow variability. These findings are a new step towards a better understanding and improvement of the flood risk management in the region.