



Variability and predictability of the streamflows in Coastal and Andean Ecuador

César Quishpe-Vásquez (1), Samir Córdoba-Machado (1,2), Reiner Palomino-Lemus (1,2), Matilde García-Valdecasas-Ojeda (1), Sonia Raquel Gámiz-Fortis (1), Yolanda Castro-Díez (1), and María Jesús Esteban-Parra (1)

(1) Universidad de Granada, Dpto Física Aplicada, Granada, Spain (esteban@ugr.es), (2) Technological University of Chocó, Colombia

The main objective of this study is to examine the variability and the predictability in available water resources in Coastal and Andean Ecuador. For this aim, we use the streamflow data from a network of hydrological stations, provided by the National Institute of Meteorology and Hydrology of Ecuador (IHNAMI), distributed over the Ecuadorian territory and strategically located in the watersheds of its main rivers. A number of 20 stations with a continuous period of daily data covering a period of 42 years (1973-2015) were selected. To analyze the spatio-temporal variability of streamflow in Ecuador, principal component analysis (PCA) along with a study of trends have been applied to the streamflow data at monthly time scales. The significance and magnitude of trends have been analyzed using Man-Kendall test and Sen slope. Moreover, to analyze the predictability of the streamflow, the spatio-temporal effects of the ENSO phenomenon on the country have been evaluated through a correlation analysis using different lags between different El Niño indices (Niño 1+2, Niño Modoki, Trans-Niño and Niño 3.4) and the seasonal streamflow.

The results show two main regions that differ in terms of variability. We found that the variations in water resources have a close relationship between the magnitude and the seasonal distribution of the streamflow and the ENSO. However, each index shows a different impact on the streamflow depending on the season and the region. In general, the higher correlations between the ENSO indices and the streamflow are observed in the stations closer to the coast.

KEY WORDS: Ecuador streamflow; trends; PCA; variability; predictability; ENSO.

Acknowledgements: This work has been financed by the projects P11-RNM-7941 (Junta de Andalucía-Spain) and CGL2013-48539-R (MINECO-Spain, FEDER).