ANALYSIS OF DIFFERENT PRECIPITATION SOURCES FOR THE DOWNSCALING OF THE MIROC5 MODEL IN THE GUADALQUIVIR BASIN, BOLIVIA

Jhonatan Ureña, Oliver Saavedra

ABSTRACT

The use of distributed precipitation data in hydrological models is important to reflect the spatial variability of hydrological processes. In this study, the HydroBID tool has been implemented in the Guadalquivir River basin using three precipitation products: i) rainfall stations; ii) GSMaP.v6_Gauge; iii) combined GS product. The latter was generated by combining the satellite-based product and the local network of rain gauges, at the sub-basin level. The hydrological model was also implemented with the precipitation products and the daily flow in the water network was obtained, showing an optimum correlation of 0.99 and efficiency of 0.96 during the period 2000 - 2016 at the sub-basin level. The results simulated with the combined GS product showed better similarity to the observed flows. Subsequently, the K-NN downscaling method was applied to the MIROC5 RCP8.5 global climate model with the precipitation and temperature variables, considering two future horizons of analysis, near (2031-2060) and far future (2061-2090). The results show that temperature shows patterns and behaviors similar to those observed, with average values of 17 and 18°C, and variations of 1.5 and 2.7°C for the near and far future scenarios, respectively. On the other hand, precipitation showed different behaviors in the three products used. The values of the rain gauges and the GS product show a drastic reduction to the observed historical average of precipitation used, with differences of up to 230 mm/year on average. The GSMaP product presented higher precipitation values, approximately 80 mm/year above the average, the modeling results using this precipitation data indicate that the simulated flows present lower values with respect to the observed ones. The observed flows show a maximum average of 40 m3/s in March and a minimum average of 3 m3/s in October. On the other hand, the simulated flows under the effect of climate change show an average maximum flow of 22 m3/s in March and a minimum flow of 3 m3/s in October, indicating a reduction in flow during the rainy season.

Keywords: Precipitation, Remote Sensing, HydroBID, Guadalquivir Basin, GCM-MIROC5 RCP8.8.

DOI: 10.23881/idupbo.024.1-2i