



First Assessment of Itaipu Dam Ensemble Inflow Forecasting System

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Inflow forecasting for Hydropower Plants (HPP) Dams is one of the prominent uses for hydrological forecasts. A very important HPP in terms of energy generation for South America is the Itaipu Dam, located in the Paraná River, between Brazil and Paraguay countries, with a drainage area of 820.000km². In this work, we present the development of an ensemble forecasting system for Itaipu, operational since November 2015. The system is based in the MGB-IPH hydrological model, includes hydrodynamics simulations of the main river, and is run every day morning forced by seven different rainfall forecasts: (i) CPTEC-ETA 15km; (ii) CPTEC-BRAMS 5km; (iii) SIMEPAR WRF Ferrier; (iv) SIMEPAR WRF Lin; (v) SIMEPAR WRF Morrison; (vi) SIMEPAR WRF WDM6; (vii) SIMEPAR MEDIAN. The last one (vii) corresponds to the median value of SIMEPAR WRF model versions (iii to vi) rainfall forecasts. Besides the developed system, the “traditional” method for inflow forecasting generation for the Itaipu Dam is also run every day. This traditional method consists in the approximation of the future inflow based on the discharge tendency of upstream telemetric gauges. Nowadays, after all the forecasts are run, the hydrology team of Itaipu develop a consensus forecast, based on all obtained results, which is the one used for the Itaipu HPP Dam operation. After one year of operation a first evaluation of the Ensemble Forecasting System was conducted. Results show that the system performs satisfactory for rising flows up to five days lead time. However, some false alarms were also issued by most ensemble members in some cases. And not in all cases the system performed better than the traditional method, especially during hydrograph recessions. In terms of meteorological forecasts, some members usage are being discontinued. In terms of the hydrodynamics representation, it seems that a better information of rivers cross section could improve hydrographs recession curves forecasts. Those opportunities for improvements are currently being addressed in the system next update.