Variability of the Inflow at the Intraseasonal Scale and Relationship with Precipitation from the BAM Model

Stéfani Kunzler[1], Nathalie Boiaski[1], Simone Ferraz[1], Dirceu Herdies[2], and Caroline Bresciani[2]

[1]Federal University of Santa Maria, Santa Maria, Brazil (stefanikunzler@gmail.com, ntboiaski@gmail.com, simonetfe@gmail.com)

[2]National Institute for Space Research, Cachoeira Paulista, Brazil (dherdies@gmail.com, carolinefrbresciani@gmail.com)

One of the great concerns of the scientific community in the last decade concerns climate change and its consequences for humanity. The Brazilian hydric planning has faced constant challenges to guarantee supply and energy. In the various regions of the country, serious water shortages have been observed in recent years, due to the scarcity of rainfall, which has become more frequent and intense over the years. Due to its vast territorial extension and topographic complexity, Brazil has different precipitation regimes. Therefore, the study of changes in hydro-meteorological data time series is of extreme importance for the management of water resources. In this context, an analysis of the variability of the historical series of inflowing water flows of the main reservoirs in the country is fundamental for the understanding of the processes involved in drought episodes, in view of the significant impact that these oscillations can produce on Brazilian hydric planning. It is known that the variability of the flow in these reservoirs is closely related to the rainfall regime of each region, which in turn is influenced by climatic variability. Among the climatic variability stands out the Madden-Julian Oscillation (MJO) or 30-60-day Oscillation, which is a mode of intraseasonal climate variability that plays a key role in precipitation over much of South America. Based on this theme, the present work aims to analyze, quantify and predict the influence of MJO on precipitation and consequent hydro-energy variability in Brazil, considering the significant impact that these oscillations can produce on the economy of the country. In this way, we sought to determine what is the contribution of this oscillation to the variability of tributary flows, in the period from 1990 to 2016, data obtained through the National Water Agency (ANA), in order to contribute substantially to the improvement of hydroclimatic forecasts. After the identification of the extemos events of the historical series (positive and negative anomalies of affluent flow) the following analyses were carried out through the method of Wavelets, with the objective of identifying the intensity and the temporal scale of the most expressive phenomena acting in each reservoir of this study. Then a filter was applied on the Wavelets in order to highlight the intraseasonal scale (MJO) and smooth the interannual scale to identify what is the contribution of this phenomenon for each of the regions studied. Finally, in possession of these results, a comparison was made between them and the precipitation simulated by the Brazilian Global Atmospheric Model (BAM) for the same period, with the objective of analyzing the precipitation simulations and their influence on the levels of the country's water reservoirs. In view of this information, the analysis of BAM simulations will be of extreme importance in the

comparison between simulations of precipitation and the levels of the reservoirs studied, which can contribute to the forecast and decision-making regarding the management of water resources and thus efficiently improve administration and investments throughout the sector, reducing the degree of vulnerability currently faced by the country.