COMPARATIVE STUDY OF ENSO EFFECTS ON THE MONTHLY RIVERFLOWS OF SOME OF THE MAJOR SOUTHERN AMERICAN RIVERS DURING MOST OF THE TWENTIETH CENTURY

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This is a preliminary study of the influence of ENSO on the monthly flows of some of the major rivers of the South American continent: the Amazon river (northern Brazil, southern Venezuela, eastern Colombia, eastern Peru, eastern Ecuador and northern Bolivia), the Negro river (northern Brazil, southern Venezuela and eastern Colombia), the upper Paraná river (southwestern Brazil), the Orinoco river (Venezuela), the San Francisco river (central-eastern Brazil) and the Tocantins river (central-northern Brazil). The original river flow data is converted into standardized monthly anomalies and the annual cycle is removed. Two subsets are generated, a first set includes the years of warm ENSO events or El Niño and the second group includes the years of cold ENSO events or La Niña. The elements of the subsets are composites of 24 consecutive months starting in January of the year when the ENSO event begins, identified as year(0), and ending in December of the following year, identified as year(1). The length of the river flow records and the number of ENSO events considered are the following: Amazon river (45 years, 20 events), Negro river (92 years, 39 events), Paraná river (97 years, 42 events), Orinoco river (70 years, 29 events), San Francisco river (62 years, 25 events), and Tocantins river (68 years, 30 events). The following is a summary of the preliminary results obtained. The Amazon river shows above (below) normal flows during April(1)-September(1) of La Niña (El Niño). During May(0)-July(0) of both El Niño and La Niña the flows are above normal, although not so significantly. The Negro river (tributary to the Amazon river) shows a above (below) normal flows from March(1) until December(1) of La Niña (El Niño). This signal is particularly strong between June(1)-September(1). The Paraná River shows below (above) normal flows during October(0)-April(1) of La Niña (El Niño), with a significant peak of this relationship during November(0)-December(0). Curiously, in January(1) this signal completely disappears and normal year flows are equal to ENSO years flows. During May(1)-June(1) of both La Niña and El Niño events, the flows are above normal. The Orinoco river shows below normal flows during February(1)-March(1) of La Niña (El Niño). River flows during El Niño years do not differ from those of normal years, except during August(1) when they are above normal. The San Francisco river shows below normal flows during January(1)-April(1) of La Niña, particularly during
February(1) and March(1). During El Niño years the flows are similar to those of normal years. The Tocantins river shows below normal flows during January(1)-April(1) of La Niña, while during El Niño the flows are similar to those of normal years.