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Supplement of

Carbon dioxide (CO$_2$) concentrations and emission in the newly constructed Belo Monte hydropower complex in the Xingu River, Amazonia

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1. Sampling details

Based on visualization in Google Earth we estimated that the maximum distance drifted may be approximately 1 km for measurements in the river channel up and downstream of the reservoirs. In sheltered areas located in bays and over islands with standing trees, where the water flow was very low, drifting was very short and caused by wind. An estimate of the drifting distance in the natural river channel and in the main channel of the Xingu Reservoir was obtained by using the average water velocity measured by the National Water Agency of Brazil at the Altamira station. We separated the historical values into before and after 2016 when the dams was completed. Therefore, representing estimates of water velocity in the natural river (between 2005 and 2016), and in the Xingu Reservoir main channel (after 2016). The average water velocities at Altamira are 0.74 and 0.24 m s^{-1} for before and after the dam, respectively. Assuming that there is no resistance of the boat with the water or air, drifting speed is similar to the water velocity. The total time of deployment was up to 30 minutes for the three consecutive measurements. Based on these we found that in the main channel of the Xingu Reservoir the drifting distance would be 432 m, and 1,332 m for the natural river channel up and downstream the reservoirs.
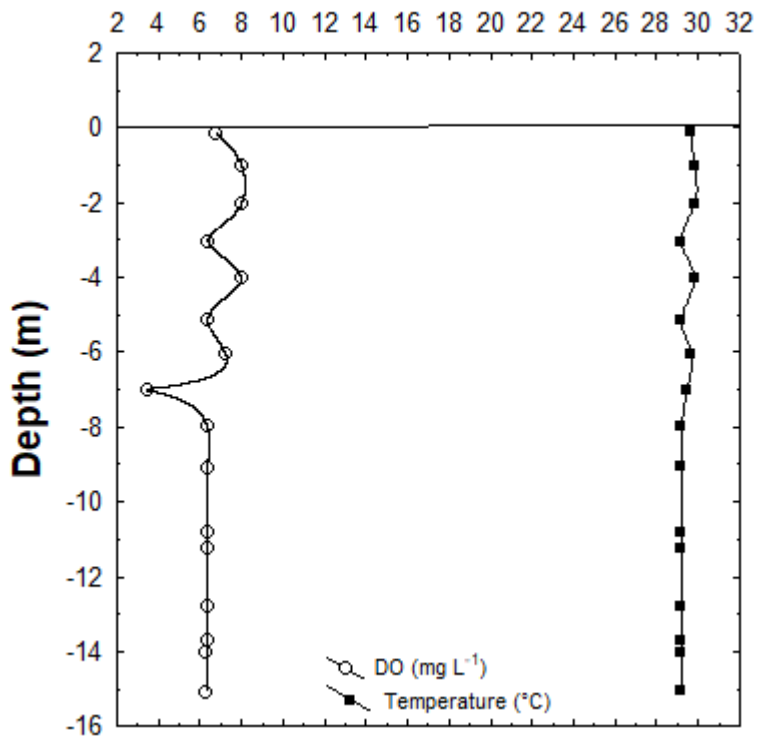
2. Depth profiles

During high water of 2016 and 2017, we registered depth profiles for physical-chemical variables through the whole sampling area. We measured water column pH, depth, dissolved oxygen (DO), conductivity, and temperature using a multiparameter probe (EXO2®, YSI). The depth profiles were registered until near bottom depth (approximately 80 % of total depth) to avoid sediment interaction.Sites were grouped according to the location in unaffected sections of the river channel, Xingu reservoir, and Intermediate reservoir. Measurements along the water column were done at 1 m interval. Total depths are listed in table 1 and summarized depth profiles of whole physiochemical variables on table 4 of the manuscript. Depth profiles of dissolved oxygen and water temperature are presented by year below in Fig. S1.

(a)
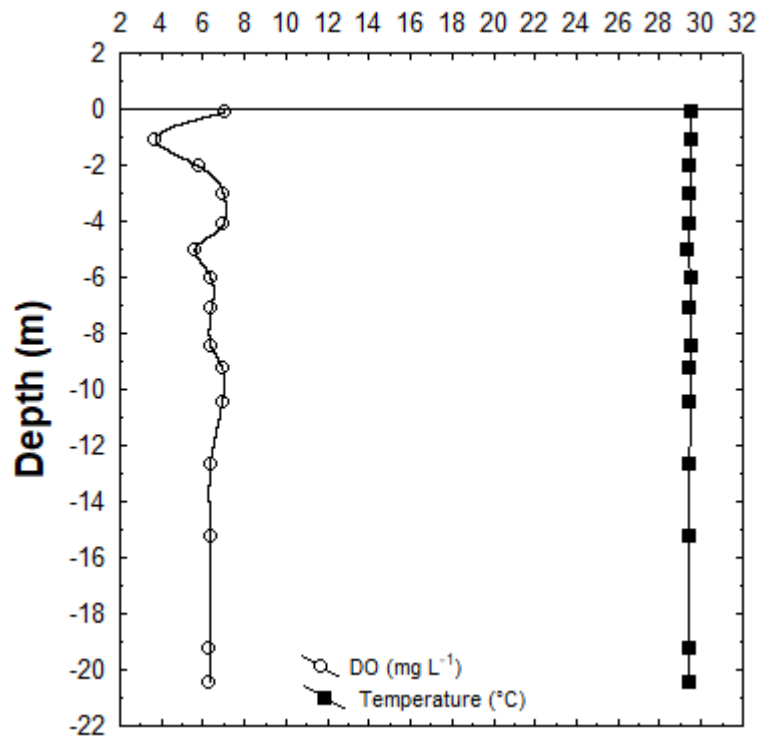
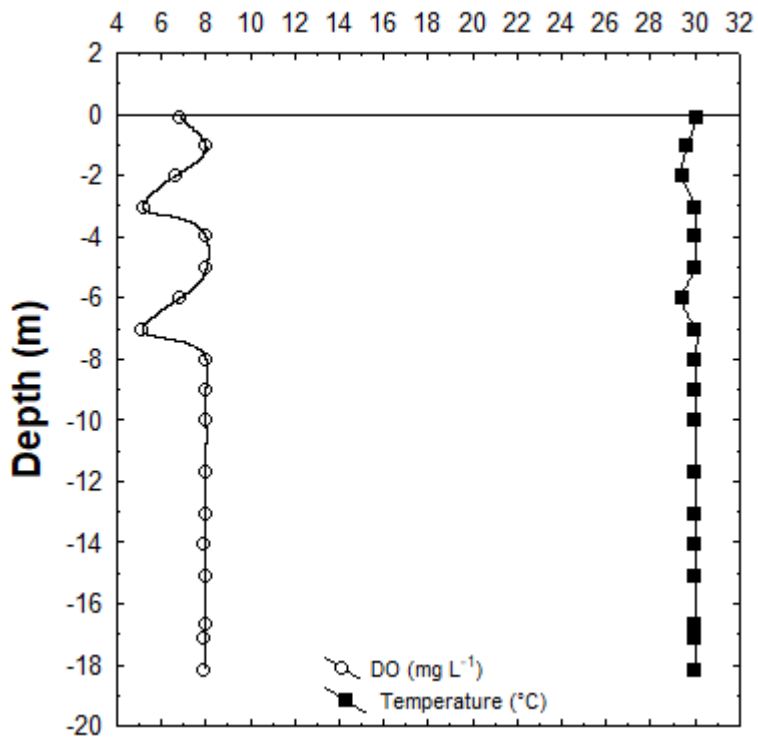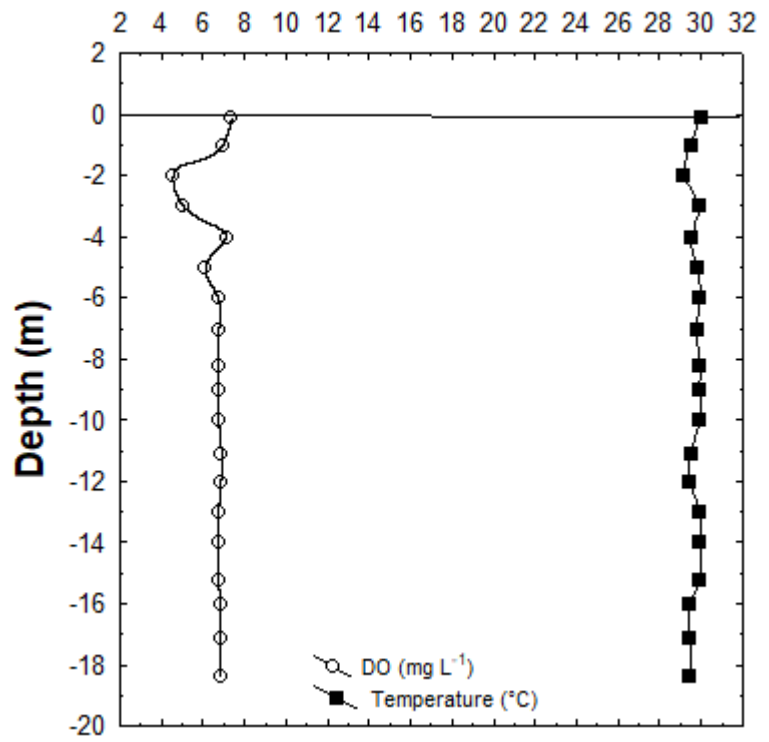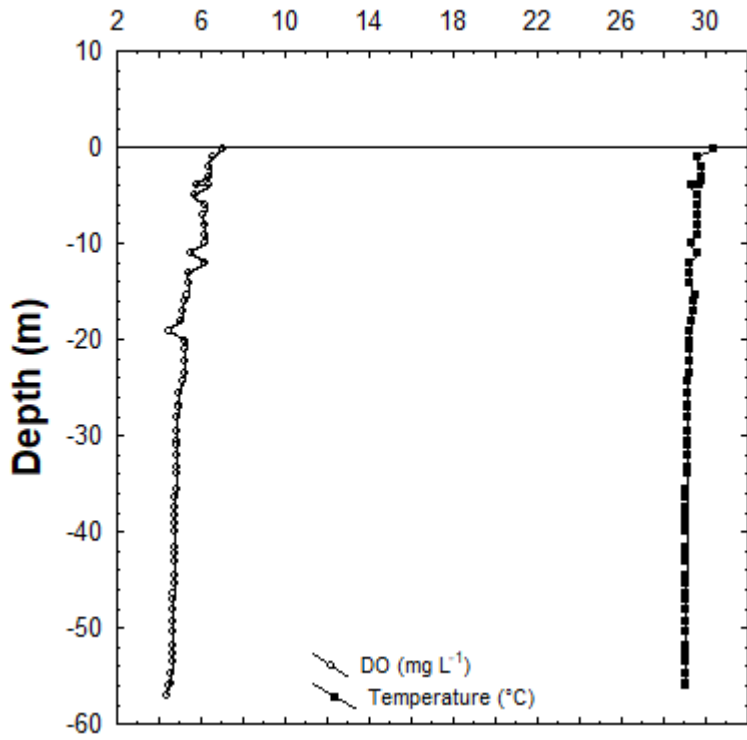**(b)**

(c)

(d)

(e)

Fig.S1: Depth profiles of dissolved oxygen (DO) and water temperature to unaffected river channel (a) and Xingu reservoir (b) during high water season of 2016. In the same season on 2017 unaffected river channel (c), Xingu reservoir (d) and Intermediate reservoir (e) are presented.
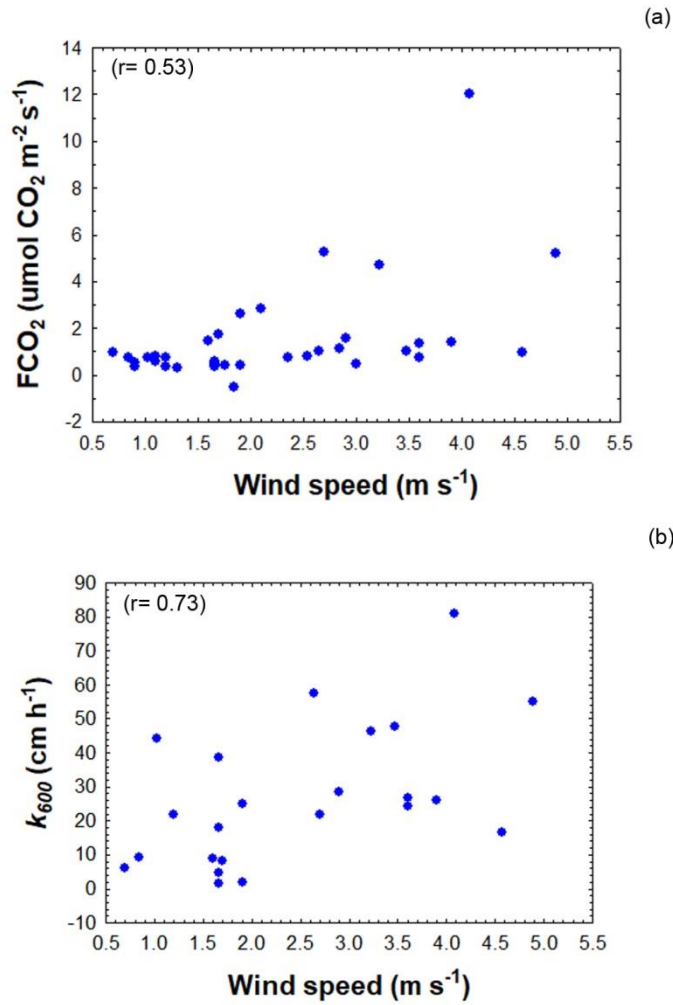
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58 **3.** ***k*₀₀₀ correlation scatterplots**

Fig. S2: Scatterplots between FCO_2 (A) and k_{600} (B) as a function of wind speed. Values from figure 5 (A) include high and low water seasons. Figure 5 (B) comprises only high water values for statistical correlation (Spearman correlation). Rho values are located on each image left superior side.