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Vertical behavior of GHG in a mountainous tropical reservoir

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The typical approach of studies on greenhouse gases (GHG) of reservoirs is the transfer of gases at the water-air interface. This research is exploring the biochemical and physical behavior in the water column to understand the transport of substances involved in the emissions or storage of these GHGs in an elongated tropical reservoir of the Colombian mountains. Measurements of temperature (T), dissolved oxygen (DO), pH, turbidity and electrical conductivity of a multi-parametric probe SeaBird® CTD and / or YSI® allow us to understand the vertical structure of the water column in each monitoring station. The profiles of the turbulent kinetic energy dissipation rates (TKE) of a Rockland® micro-CTD show the vertical behavior of the turbulence. These conditions are related to the concentrations of CO_2 and CH4 analyzed from samples taken at several depths. Three monitoring stations along the reservoir show the spatial evolution of the conditions from the riverine zone to the lake area and several measurements at the deepest point throughout the day show interesting results on the diurnal dynamics. The preliminary results, obtained through four of the six projected field campaigns, show that: 1) the vertical structures of T, DO and pH are closely related and influence the vertical structure of CH4; 2) the surface processes have important changes in the diurnal scale: decrease of T, DO, pH and CH4 and increases of CO_2 during the night with respect to the daytime; 3) the surface DO, pH and CH4 decreases and the CO_2 increases from the riverine to the lake zone; 5) high surface temperatures are associated with low concentrations of CO_2 in the surface layer; 4) the layer below the epilimnium and above the plume appears to be a GHG storage, and this layer generally presents low values of TKE; 6) High values of TKE were usually found in the surface layer, as well as at the beginning and end of the plumes.