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Seasonal variability of CO2 fluxes in the tropical lagoons of Ivory Coast

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The seasonal variability of partial pressure of CO2 (pCO2) was investigated during four seasons in five lagoons in Ivory Coast (West Africa). The Potou, Ebrié and Grand-Lahou lagoons were oversaturated in CO2 with respect to the atmosphere during all seasons in agreement with the low chlorophyll a concentrations suggesting the dominance of heterotrophic processes. These lagoons seem to behave as oligohaline estuarine regions that typically are CO2 sources to the atmosphere due to strong heterotrophic activity and inputs of riverine CO2 enriched waters. Their average air-water pCO2 gradient ranged from 432 to 4756 ppm and the annual CO2 emissions to the atmosphere varied from 20.5 to 23.8 mol C m-2 yr-1. In contrast, the Aby lagoon was undersaturated in CO2 with respect to the atmosphere because of its strong permanent stratification with higher phytoplankton production and low freshwater inputs. Its annual CO2 invasion was -5.1 mol C m-2 yr-1. The Tendo lagoon was characterized by a seasonal shift between sink and source of CO2 depending on the fresh water discharge from Tanoé river. Annually it was a modest CO2 source to the atmosphere of about 2.4 mol C m-2 yr-1. Overall, the five studied lagoons in Ivory Coast emit 14.0 mol C m-2 yr-1. They are moderate CO2 sources to the atmosphere in comparison to estuaries, mangrove and salt marsh ecosystems.