



Carbon Dioxide Emissions from the Littoral Zone of a Chinese Reservoir, and a Comparison with Other Greenhouse Gases

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The continuous increase in the number of reservoirs in countries like China, India and Brazil has raised important questions about the environmental impact of their greenhouse gases emissions. In particular, the littoral zone may be a hotspot for production of greenhouse gases. We investigated the spatiotemporal variation of CO₂ flux at the littoral zone of a Chinese reservoir along a wet-to-dry transect from permanent flooded land, seasonal flooded land to non-flooded dry land, using the static dark chamber technique. The mean total respiration was 346 mg m⁻² h⁻¹ (52% of which was contributed by shoots) and the rate varied significantly among water levels, months and time of day. We developed a statistical model which shows that temperature and biomass explain 76% of the variation. Flooding could play a positive role in carbon balance if water recession occurs at the time when carbon gains associated with plant growth overcomes the carbon loss of ecosystem. The overall carbon balance was analysed using cumulative greenhouse gases fluxes and biomass, bringing the data of the present study alongside our published data of CH₄ and N₂O flux which had been investigated simultaneously. CO₂ and CH₄ emissions correlated significantly under flooding, while N₂O did not show significant correlations with CO₂ or CH₄ irrespective of whether the land was flooded or not. For the growing season, 11.6 g C m⁻² was absorbed by the littoral zone. Taking CH₄ and N₂O into the calculation showed that permanently flooded sites were a source of greenhouse gases, rather than a sink. We emphasise the importance of taking into account all three gases when evaluating the greenhouse gas budgets of wetland ecosystems.