



Benthic oxygen exchange over a heterogeneous *Zostera noltei* meadow in a temperate coastal ecosystem

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Résumé en anglais	<p>Seagrass meadows support intense but highly variable benthic metabolic rates that still need to be better evaluated to determine an accurate trophic status. The present study assessed how seagrasses and associated benthic macrofauna control spatiotemporal changes in benthic oxygen exchanges within a temperate bay. Based on seasonal sampling over a complete year cycle, the diffusive oxygen uptake (DOU), community respiration (CR) and gross primary production (GPP) were measured in a <i>Zostera noltei</i> meadow within Arcachon Bay, taking into account its spatial heterogeneity. Oxygen fluxes were assessed in sediment cores, within which benthic macrofauna and seagrass abundances and biomasses were quantified. The presence of <i>Z. noltei</i> did not significantly affect the DOU. Seasonal changes in CR and GPP correlated strongly with temperature in the presence of <i>Z. noltei</i>. The characteristics of benthic macrofauna associated with <i>Z. noltei</i> only weakly affected seasonal changes in CR. High spatial changes in both GPP and CR were mainly driven by the aboveground biomass of <i>Z. noltei</i>. When extrapolated to the whole intertidal area of the bay, in spite of limitations, our results suggest (1) overall higher contributions to CR and GPP from the seagrass meadow than from bare sediments, even though alternative primary producers in bare sediments (likely microphytobenthos) contributed significantly during winter; (2) an annual decrease in CR and GPP of 35 and 41%, respectively, resulting from the decline in <i>Z. noltei</i> of 25% between 2005 and 2007; and (3) a strong seasonality in the magnitude of this decrease, which was high during autumn and low during winter.</p>

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