Diversity of Ecosystems and Coastal Ocean CO2 Fluxes

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Annually integrated air-water CO\(_2\) flux data in 44 coastal environments were compiled and gathered in 8 major ecosystems (inner estuaries, outer estuaries, whole estuarine systems, mangroves, salt-marshes, coral reefs, upwelling systems and open continental shelves), and up-scaled in the first attempt to integrate air-water CO\(_2\) fluxes over the Coastal Ocean, taking into account its geographical and ecological diversity. If estuaries and salt-marshes are not taken into account in the up-scaling, the Coastal Ocean behaves as a sink for atmospheric CO\(_2\) and the uptake of atmospheric CO\(_2\) by the Global Ocean increases by 24%. If estuaries and salt-marshes are taken into account in the up-scaling, the Coastal Ocean behaves as a source for atmospheric CO\(_2\) and the uptake of atmospheric CO\(_2\) from the Global Ocean decreases by 12%. A rigorous up-scaling of air-water CO\(_2\) fluxes in the Coastal Ocean is hampered by the very poorly constrained estimate of the surface area of inner estuaries. However, the present estimates clearly indicate the significance of this biogeochemically highly active region of the biosphere in the global CO\(_2\) cycle.