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Carbon Dioxide in the Gulf of Trieste

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Coastal marine regions such as the Gulf of Trieste (GOT) in the Northern Adriatic Sea serve as the link between carbon cycling on land and the ocean interior and potentially contribute large uncertainties in the estimate of anthropogenic CO_2 uptake. This system may be either a sink or a source for atmospheric CO_2. Understanding the sources and sinks as a result of biological and physical controls for air-sea carbon dioxide fluxes in coastal waters may substantially alter the current view of the global carbon budget for unique terrestrial and ocean regions such as the GOT. GOT is a semi-enclosed Mediterranean basin situated in the northern part of Adriatic Sea. It is one of the most productive regions in the Mediterranean and is affected by extreme fresh river input, phytoplankton blooms, and large changes of air-sea exchange during Bora high wind events. The unique combination of these environmental processes and relatively small size of the area makes the region an excellent study site for investigations of air-sea interaction, and changes in biology and carbon chemistry.

Here we investigate biological (phytoplankton blooms) and physical (freshwater input and winds) controls on the temporal variability of pCO2 in the GOT. The aqueous CO_2 was measured at the Coastal Oceanographic buoy VIDA, Slovenia using the SAMI CO_2 sensor. Our results indicate that: 1) The GOT was a sink for atmospheric CO_2 in late spring of 2007; 2) Aqueous pCO_2 was influenced by fresh water input from rivers entering the GOT and biological production associated with high nutrient input; 3) Surface water pCO_2 showed a strong correlation with SST when river plumes where not present at the buoy location, and reasonable correlation with SSS during the presence of the plume.