Impact of resuspension events on the carbon budget of Hiroshima Bay, Japan

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Hiroshima Bay is a shallow semi-closed eutrophied estuary (area 1000 km^2, mean depth 25.6 m) in the western Seto Inland Sea. Riverine input and primary production are concluded to be the main contributors to the DOM budget of the water body [1]. However, field measurements in the Seto Inland Sea demonstrated that during strong wind events a marked amount of sediments is stirred up [2]. Dissolved organic matter released from a disturbed sediment layer and sedimentary particles may give a supplement to the DOM budget of the bay.

To evaluate changes in the carbon concentration and structure of DOM in the bay during episodes of resuspension, a laboratory experiment was conducted. Samples of surficial sediment collected from 5 locations within Hiroshima Bay were resuspended in pre-filtrated respective bottom water and artificial seawater, shaken during 10 s and thereafter left non-interfered for 3 min, 10 min, 1 h and 2 h. In the experiment with natural bottom waters the exposition was lengthened up to 5 h. Thereafter the samples were clarified by filtration. A fluorescence approach was used to detect the changes [3].

Results of the experiment indicate that after disturbance of sediments considerable quantitative and qualitative changes in DOM of bottom water occur. An amount of DOM comparable to daily riverine input can be rapidly eluted from sediments if even a very short-lasting perturbation of topmost sediments has taken place. The simulation experiment also demonstrated that the increase in the DOM concentration in the bottom water was primarily due to pore water released from sediments, the contribution of DOM leached from particles was fractional. The DOM from sediments appreciably differs from the bottom water one, resembling more a riverine DOM. From a collation of fluorescence spectra of sediment suspension in natural and seawater it can be deduced that certain interactions occur between sedimentary DOM and water DOM when mixed.

References

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