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Air-Land-Sea Exchanges of Carbon and Nitrogen in the Marginal Seas

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Continental marginal zones are characterized as those areas where rivers, lands, oceans, the atmosphere and sediments meet and interact. Despite their moderatelysized surface areas, marginal zones play a significant role in the biogeochemical cycles of both carbon and nitrogen in that they receive huge upwelled and riverine inputs of both. Because the riverine flux of nutrients has continually been on the rise marginal zones may have become larger CO_2 sinks over the past few decades, now absorbing $30\times10_{12}$ mol C/y (0.36 Gt C/y) from the atmosphere, which represents important, albeit often neglected, links in the global carbon cycle. On the other hand, most shelves and estuaries do show that the production of other such greenhouse or reactive gases as CH_4, dimethyl sulfide (DMS) and N_2O are an ongoing feature and make up a net total flux of $0.1*10_{12}$ mol/y CH_4, $0.07*10_{12}$ mol/y DMS and $2.5*10_{12}$ mol N/y N_2O to the atmosphere. The shelves also transport $50*10_{12}$ mol/y DOC, $45*10_{12}$ mol/y POC, $21*10_{12}$ mol/y PIC, $5*10_{12}$ mol/y DON and $5*10_{12}$ mol/y PON to the open oceans.