Poster Presentation
Theme 3.1: Biogeochemical Processes - Processes Understanding and Human Impacts
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Implications of riverine nutrient and carbon fluxes derived from a weathering model on the ocean biogeochemistry

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The coastal ocean is widely viewed as a hotspot for oceanic primary production, partly due to the supply of nutrients by rivers. Furthermore, river loads of C, P, N, Si and alkalinity can be considered as compensation fluxes for any sedimentation processes which occurs within the global ocean. By implementing riverine nutrient and carbon fluxes into the Earth System Model MPI-ESM, we aim to better represent these fluxes from land to the ocean, as well as investigate their effects on the carbon cycle of the coastal ocean, as well as of the global ocean.
We use a first order weathering model (Hartmann et al., 2013) to estimate weathering fluxes of dissolved phosphate, silicate, inorganic carbon as well as alkalinity. We thereby generate a spatial distribution of weathering yields that are dependent on temperature, runoff, lithology and soil properties. Such an approach permits an implementation of dynamical riverine fluxes in the ESM, in a way that they are sensitive to changes in hydrology and climate. The state of art NEWS database (Mayorga et al., 2010) is used to derive the fluxes of organic carbon as well as nitrate, which are from non-weathering sources. The fluxes are routed to the ocean through hydrological catchments from the MPI-ESM.
Our preliminary results show weathering hotspots, more specifically in Southeast Asia, the Amazon, Northern Europe and Siberia. These areas also deliver large fluxes of carbon and nutrients to the coastal ocean. In comparison to a model run without riverine nutrient and carbon fluxes, the total ocean global primary production is only slightly affected by these fluxes, whereas changes in the spatial distribution of the primary production can be observed, as it is enhanced in the proximity of the rivers but is decreased in some areas of the open ocean. The carbon sink of many major coastal regions is thereby enhanced. Other regions in the high latitudes show a source of carbon in comparison to the control run. Furthermore, we make carbon budgets for several well-known coastal shelves, to determine how much of the carbon input from rivers is buried within the shelf, or if it is transported offshore.

Poster Session (see poster session schedule)