Closing the modern ocean alkalinity budget by riverine particulate inorganic carbon

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The ocean exerts major controls on atmospheric dioxide and and storage of athropogenically derived carbon (about 25 %). Although equilibration within the dissolved carbonate system attenuates changes in ocean carbon chemistry, further uptake will ultimately lead to ocean acidification and, thus, impact the further CO_2 uptake capacity, as well as carbonate dissolution and precipitation within the marine realm, i.e. heterogeneous buffering. The conservative variable of alkalinity, defined as the excess of bases over acids, is often used to quantify the oceans resistance to changes and impacts of biogochemical processes. Depite this importance in global biogeochemical cycles, the modern ocean alkalinity budget leaves an imbalance of about 27 $Tmol(eq)Cyr^{-1}$, that could potentially be closed by adding the particulate inorganic carbon (PIC) delivery through rivers, a so far unaccounted contribution. This detrital carbonate delivered to the ocean might either dissolve and contribute alkalinity, or can be subtracted from the the burial term as it is not formed in the ocean, and is thus capable of closing the budget. However, the magnitude of this flux is poorly constrained by now and relies on either very small or regionally restricted datasets with current estimates ranging from 30 % to 100 % of the global DIC flux to the ocean. A new database, including the major-, minor- and trace element geochemistry of global riverine suspended matter delivered to the ocean, will be used to better quantify that flux and understand its dependencies in time and space. Preliminary results from South America, the USA and the Arctic region imply that the PIC concentration of suspended matter delivered to the ocean is somewhat lower than the previous estimates, but ranges in a similar order of magnitude. Potential additional PIC inputs to the ocean, such as carbonate particles in atmospheric dust or ice-rafted debris will be integrated and their effect on ocean chemistry will be estimated.