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Chemical weathering and CO2 consumption rate in the Liaohe river basin, Northeast of China

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Rock weathering and the burial of organic carbon are the two main sinks of atmospheric CO_2 in the global carbon cycle on the geological timescales. Rivers play important roles in geological timescales carbon cycle by transporting rock weathering products, especially the bicarbonate, into the ocean. This study focuses on the processes of rock weathering in the Liaohe river basin, using the methods of river chemistry and element geochemistry. We analyzed the main parameters and the major element composition of the river water and the reservoir water in the Liaohe river. Based on the forward method model, the chemical composition of river water in the Liaohe river was dominated by rock weathering, which was mainly affected by carbonate weathering, though was strongly influenced by human activities (livestock breeding, agriculture, industry and etc.). The chemical weathering rate, with respective carbonate and silicate weathering rates of 12.99t/(km^2*yr) and 2.27t/(km^2*yr), was a little lower than the global average. The CO_2 consumption rate was estimated to be 14.66×10^9mol/yr by carbonate weathering, whose contribution to total continental CO_2 consumption by carbonate weathering was 1.19‰. The CO_2 consumption rate via silicate weathering of 6.40×10^9mol/yr, whose contribution to total continental and global CO_2 consumption and via silicate weathering was 0.73‰ and 0.55‰, respectively, is lower than the contribution of drainage area of the Liaohe river to the world land surface area~0.84‰.