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Himalayan-Tibetan Erosion is not the Cause of Neogene Global Cooling

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Does uplift and erosion of the Himalaya-Tibetan Plateau drive Cenozoic global cooling? We test this classic hypothesis put forward by Raymo and Ruddiman (1992) that suggests enhanced erosion in the Himalaya-Tibetan Plateau drove long-term Cenozoic global cooling through the chemical weathering of siliciclastic sediment. Here we examine three Asian marginal drainage systems (the Indus, Mekong and Pearl) where marine scientific drilling has yielded detailed seismic surveys and geochemical datasets that critically permit sediment mass flux and therefore chemical weathering flux budgets to be made. By compiling suitable bedrock endmember compositions for the fresh bedrock sources, it is possible to calculate the chemical weathering flux and relative CO_2 consumption rates for each drainage system into the early Miocene. We correct for evolving provenance of sediment delivered to the offshore and test the sensitivity of our calculations to selected bedrock endmembers, in light of the abundant mafic bedrock exposed Indus and Mekong systems. Appropriate Upper Continental Crust endmembers were further validated using data compiled from the GEOROC database. Regardless of which endmembers were used, calculations demonstrate that the total rate of CO_2 consumption decreased by 50% between ~16 and 5.3 Ma, especially within NW Himalaya as onshore erosion slowed and provenance shifted away from mafic arc units in the suture zone. This direct test of the uplift-erosion-weathering hypothesis establishes that chemical weathering fluxes did not increase during the Neogene and cannot be responsible for the drawdown of atmospheric CO_2 during that time period. Either additional mechanisms have been driving global cooling since 16 Ma or CO_2 consumption via chemical weathering is taking place in other areas outside the Himalaya-Tibetan Plateau.