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WEATHERING OF CONTINENTAL MAGMATISM: A MECHANISTIC APPROACH INTEGRATING ISOTOPE DATASETS, PLATE RECONSTRUCTION, AND PALEO-CLIMATE MODELING

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Chemical weathering controls the long-term climate of the Earth. Rapidly eroding continental magmatic belts are the fastest weathering zones on the planet but their contribution to the global weathering budget during the Phanerozoic needs to be better quantified. Here, we reconstructed the flux magnitude and isotope composition of the global weathering of continental magmatic belts by developing a mechanistic model accounting for tectonics, paleogeography, and paleo-climate evolution. We first demonstrate that magmatic belt distribution and isotopic composition respond to the supercontinent cycle with a shift towards juvenile continental magmatism during the final assembly of Gondwana and the dispersal of Pangea. We then show that the magnitude of the weathering flux from magmatic belts is modulated by the interplay of paleogeography and paleoclimate, with the highest weathering occurring when magmatic belts are located in the tropics. Finally, we demonstrate that the weathering of magmatic belts controls the global weathering budget throughout the Phanerozoic by uncovering a strong correlation between the reconstructed isotope flux from magmatic belts and the long-term seawater $^{87}Sr/^{86}Sr$ variation.

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T183. Climate and Tectonic Interactions from Bedrock to Basins
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