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A normalised seawater strontium isotope curve and the Neoproterozoic-Cambrian chemical weathering event

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Abstract. The strontium isotope composition of seawater has varied over geological time in response to changes in the rates of continental weathering relative to ocean crust alteration. However, the potential of the seawater $^{87}\text{Sr}/^{86}\text{Sr}$ curve to trace globally integrated chemical weathering rates has not been fully realised because ocean $^{87}\text{Sr}/^{86}\text{Sr}$ is also strongly influenced by the isotopic evolution of Sr sources to the ocean. A first attempt is made here to normalise the seawater $^{87}\text{Sr}/^{86}\text{Sr}$ curve to plausible trends in the $^{87}\text{Sr}/^{86}\text{Sr}$ ratios of the three major Sr sources: carbonate dissolution, silicate weathering and submarine hydrothermal exchange. The normalised curve highlights the Neoproterozoic-Cambrian interval as a period of exceptionally high chemical weathering rates, which can be linked to increased nutrient availability, bioproductivity and oxygenation of Earth's surface environment. Use of normalised seawater $^{87}\text{Sr}/^{86}\text{Sr}$ curves will, it is hoped, help to improve future geochemical models of Earth System dynamics.

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