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Sediment discharge variability in Arctic rivers: implications for a warmer future

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ABSTRACT

A new model for predicting the sediment flux in ungauged river basins is applied to 46 Arctic to sub-Arctic rivers. The model predicts the preanthropogenic flux of sediment to within a factor of 2, across four orders of magnitude in basin area and run-off. The model explains for the first time why Arctic rivers carry so little sediment when compared at the global scale. Sensitive to drainage basin temperature, the model is used to examine the impact of a climate warming scenario on the loads of high latitude rivers. As the Arctic warms, rivers will carry increased sediment loads, similar to more temperate rivers. For every 2°C warming, the model predicts a 22% increase in the flux of sediment carried by rivers. For every 20% increase in water discharge there will be a 10% increase in sediment load. The model also aids the interpretation of palaeoclimate records obtained from Arctic continental margins.

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