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Modelling the Global River Transport of Dissolved Silica

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This paper presents a multiple linear regression model developed for describing global river export of dissolved silicate to coastal seas. The model, with river-basin spatial scale and a one year temporal scale, is based on four variables with a significant influence on DSi yields (bulk density, precipitation, slope and vulcanic lithology), for the predammed situation. The model generates predictions within a factor of 4 for 80% of the 208 rivers in the data set. It is a robust model which was cross-validated by using training and validation sets of data. In addition, Monte Carlo simulations were used to deal with uncertainties in the model coefficients for the four model variables. The global river export of DSi calculated thus is 385 Tg yr^{-1} with a 95% confidence interval of 345 to 433 Tg yr^{-1}. Most of the DSi exported by global rivers ends in the Atlantic Ocean (42%) (with a dominant contribution from the Amazon), Pacific (36%) and Indian Ocean (14%). South America and Asia are the largest contributors (25% and 22%, respectively).