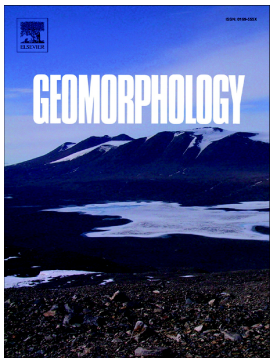

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Inferring mean rates of sediment yield and catchment erosion from reservoir siltation in the Kruger National Park, South Africa: an uncertainty assessment

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Abstract

Reservoir siltation surveys facilitate the quantification of the mean area-specific sediment yield (*SSY*) of catchments for decadal and longer time spans. This requires information on the volume (V_S) and dry bulk density (*dBD*) of reservoir deposits, the period of time (T_R) during which they were accumulated, the reservoir sediment trap efficiency (*TE*) and the catchment area (*A*). For the calculation of the catchment-wide average rate of erosion by water (*E*), the sediment delivery ratio (*SDR*) of the catchment needs to be estimated. Each step in this workflow represents a potential source of uncertainty. Here, we explore the extent to which individual error sources contribute to uncertainties in *SSY* and *E* values. Mean *SSY* and *E* values are inferred for small to medium-sized catchments ($\leq$100 km^2) of 15 small ($\leq 350 \times 10^3$ m^3) intermittently dry reservoirs located in the southern Kruger National Park and observation periods of 30 to 65 yr. Mean relative uncertainties of resulting *SSY* and *E* values amount to ±21% and ±46% at the 95% confidence level, respectively. Uncertainties in *SSY* values arise mainly from the *TE* estimation (mean fractional uncertainty contribution of 64%), while the *SDR* estimation is the major cause (79%) for uncertain *E* values. Uncertainties in the determination of V_S and *dBD* values are rather unimportant, contributing