

Estimating the Total Sediment Load using MEP and SEMEP

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Abstract. The determination of the total sediment load in rivers is challenging because of the bedload is rarely measured. At most sites, only part of the suspended load is measured. There are several methods to estimate the total sediment load from the measured suspended load. The Modified Einstein Procedure (MEP) is one of the most popular one which is developed by Colby and Hembree in 1955 and several re-modifications have been proposed. The series expansion of the modified Einstein procedure (SEMEP) was proposed by Shah-Fairbank in 2009 to improve the results by calculating the Rouse number from median particle size in suspension instead of fitting the Rouse number based on power function. In this study, we collected the suspended load measurement from 35 river stations in South Korea and the total sediment load were computed by both MEP and SEMEP. The mean annual sediment load for the 35 sediment gauging stations are computed using the flow duration/sediment rating curve method based on discharge and sediment concentration measurements. With values of u_* / ω is in the range between 10 and 2000, the results showed that the ratio between suspended load and total load calculated by MEP varied from 10^{-7} to 20. In reality, this ratio should never greater than 1, and this raises suspicion regarding the accuracy of the original MEP method. The ratio between suspended load and total load calculated by SEMEP correctly ranges from 0.2 to 1 and 97% of them are greater than 0.9. For this reason, the SEMEP calculations are considered better and more accurate. The total load estimated by MEP is typically less than 40% higher than the SEMEP calculations. Nevertheless, calculations using MEP are still useful in practice when considering that the MEP calculations are slightly higher than those of SEMEP. The use of MEP can thus be considered to include a safety factor in the calculations.