



The uncertainty of hydrological regime and sampling frequency on estimating stream dissolved and suspended solids yield in subtropical mountainous watersheds

YuTing Shih (1), JrChuan Huang (1), LiChin Lee (1), and TsungYu Lee (2)

(1) National Taiwan University, Taipei, Taiwan (edster.shih@gmail.com), (2) National Taiwan Normal University, Taipei, Taiwan

The bias and precision are both basis of reliability for riverine dissolved and suspended solid yield. However, few studies focus on the basis in subtropical mountainous watersheds with extreme events. The objectives of this study are to evaluate the 50th (e50) and 5th (e05) to 95th (e95) percentile of relative error of annual material yield as included by infrequent sampling, by various flow regime and by algorithms used to compute yields. The daily total dissolved solid (TDS) and suspended solid (SS) concentration is based on hourly electrical conductivity and turbidity since 2009 - 2015 combining with manual 3-days (3 hours in events) sampling interval in 3 sites of Beishih Creek watershed in Taiwan. The unbiased mean yields were 145.5 ton km⁻² yr⁻¹ (TDS) and 1712.3 ton km⁻² yr⁻¹ (SS). With monthly resampled sub datasets, which is the frequency with the most sites of manual sample since 1970s in Taiwan, the e50 (e05 to e95) estimated by linear interpolation (LI), global mean (GM), flow weighted (FW) and rating curve (RC) methods were 10% (-6%~25%), 4% (-14%~20%), 18% (4%~30%) and -3% (-17%~19%) for TDS and -86% (-99%~16%), -93% (-107%~-29%), -87% (-108%~241%) and -79% (-107%~197%) for SS. This bias and imprecision is higher than other continental large rivers. And, no one method is outstanding advocated within monthly sample strategy, but GM is beyond acceptable range. The bias (e50) is more sensitive by sampling interval than concentration-flow regime relationship on LI and FW, but is reversed on GM and RC methods. On another side, the imprecision is less sensitive by order as GM < LI < RC < FW to the two factors. The suggested sampling frequency for -50% of reliability (e50) on SS is less than 7 days and 5% for TDS is 28 days based on the FW method in this region and comes with -103% ~ 193% and -14%~19% of imprecision, respectively. This study provided a solid basis for bias and precision estimation which is of use for further sampling design for the further environmental survey.