Geophysical Research Abstracts
Vol. 21, EGU2019-249-1, 2019
EGU General Assembly 2019

Soil Erosion and Sediment Yield Modelling of Geomorphological Diverse Western (UGB) and Eastern (KB) River Basins of the Ganga River System, India

Somil Swarnkar (1), Shivam Tripathi (2), and Rajiv Sinha (1)

(1) Department of Earth Sciences, Indian Institute of Technology, Kanpur, India (somilsw@iitk.ac.in, rsinha@iitk.ac.in), (2) Department of Civil Engineering, Indian Institute of Technology, Kanpur, India (shiva@iitk.ac.in)

High soil erosion is one of the severe problems in the Himalayan River basins. Significant regional variability in sediment production, transport and deposition in the Gangetic Rivers is a function of hydro-geomorphic diversity across the Ganga basin. For instance, the rivers draining the western Gangetic plains (WGP) are characterised by high stream power and low sediment yield whereas those in the eastern Gangetic plains (EGP) have low stream power and high sediment yield. Therefore, a systematic modelling framework is essential to comprehend the controls (i.e. climate, lithology, topography and human influence) on sediment production and to quantify soil erosion (SE) and sediment yield (SY) for individual river basins. In this work, we have used the Revised Universal Soil Loss Equation (RUSLE) and Sediment Delivery Ratio (SDR) equation to compute the SE and SY in a small basin (Garra River basin, WGP). We then assess the applicability of quantified results in this basin using a statistical framework for uncertainty estimation. We have then upscaled and quantified SE and SY variability for two river basins in different hydro-geomorphic settings viz. Upper Ganga basin (UGB) and the Kosi basin (KB) in the western and eastern parts of the Ganga basin respectively. This study predicts SE of 72 t/ha/year for KB and SY of 85 Mt/year and 75 Mt/year at upstream (Barakshetra) and downstream (Baltara) stations respectively with 26.8% associated uncertainty. Similarly, the UGB shows SE of 43 t/ha/year and SY of 36 Mt/year at Kanpur with 24.6% associated uncertainty. The overall estimated SY are validated using the observed data at gauge stations in both the basins. Further analysis suggests that rainfall erosivity, topographic steepness and agricultural practices have significant influence on SE and SY in both the basins. Finally, these modelled results are important to understand the linkage between river form and processes and to design sustainable river basin management strategies.