EGU23-4765, updated on 25 Apr 2024
https://doi.org/10.5194/egusphere-egu23-4765
EGU General Assembly 2023

Non-contact Entropy-based flow Estimation in Himalayan Rivers

Abhishek Kumar[1] and Manoj Kumar Jain[2]
[1]IIT Roorkee, Hydrology, India (abhishek_k@hy.iitr.ac.in)
[2]IIT Roorkee, Hydrology, India (manoj.jain@hy.iitr.ac.in)

Rapidly collected river discharge data can be used for flood forecasts, hydraulic structure design, and impromptu response during floods. This calls for the monitoring of both water level and velocity at the same time, which is not feasible using conventional invasive methods. Non-contact techniques like doppler radar and satellite remote sensing techniques are the sole options. Doppler radar sensors are gaining popularity in the recent decade due to their accuracy and user-friendly operation. The study was conducted using data collected at two gauging sites at Devprayag on Bhagirathi and Ganga, two significant Himalayan Rivers. This study compares the observed discharge measured using a current meter and ADCP with the entropy-based discharge estimated using radar telemetry data for water level and surface velocity. Radar-derived water level and one-point surface velocity observations were used to estimate the discharge using probability-based Shannon and Tsallis Entropy laws. The discharge varied from 77.09 to 4265.4 cumec, while the surface velocities ranged from 0.283 to 8.35 m/s. The estimated discharges using radars were compared with observed discharges using Goodness-of -fit statistics which showed a good agreement between observed and estimated discharges as well as velocities, suggesting that radars can be effectively used to estimate real-time discharge for its improved applications in Himalayan mountainous rivers.