

Statistical Downscaling for the Fusion of In-river, Drone and Satellite Water Quality Data in a River Network

Craig Wilkie¹, Surajit Ray¹, Marian Scott¹, Claire Miller¹, Rajiv Sinha², Mike Bowes³

¹University of Glasgow, Glasgow, United Kingdom

²Indian Institute of Technology Kanpur, Kanpur, India

³UK Centre for Ecology & Hydrology, Wallingford, United Kingdom

E-mail for correspondence: craig.wilkie@glasgow.ac.uk

Abstract: Rivers are a vital part of the hydrosphere, but our understanding of spatial and temporal patterns in water quality is often limited due to a lack of available data. River health can change abruptly in space and time due to impacts of pollutants from industry, farming and human populations, and knowledge of these changes is needed to inform mitigation efforts. High resolution hyperspectral satellite and drone data are needed to provide this knowledge, but they must be combined with laboratory-analysed data from in-river samples to ensure validity. This talk presents a statistical downscaling method for the fusion of river data from multiple sources with different spatiotemporal support, to provide a fully calibrated high resolution data product enabling predictions to be made at any spatial location along the river or at any timepoint. This work extends the method of Wilkie et al. (2019) to river data, with data at each location treated as observations of smooth functions over time, while spatially-varying coefficients regression (Gelfand et al., 2003) accounts for smooth spatial changes in relationships between the data sources. An illustration of the method will be presented, namely an application to simulated water quality data for the Ramganga river in northern India.

Key words: Rivers; Downscaling; Fusion; Satellite; Spatiotemporal

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