“Large-sample” geomorphology with satellites and cloud computing

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# ABSTRACT

# Geomorphologists have debated the relative importance of disturbance magnitude, duration and frequency in shaping landscapes; for channel change during individual floods, it is often thought that the cumulative hydrograph, rather than magnitude or duration, matters most. However, studies of flood-induced channel change often draw upon small datasets. By using satellite data to track channel adjustment, one can query these hypotheses with large datasets, and we do so here by combining 7 years of Sentinel-2 imagery with daily flow data. We apply automated algorithms in Google Earth Engine to map river planforms and detect their lateral shifting, generating a large dataset to quantify channel change after 200 flood events in laterally active rivers. We draw upon this dataset to evaluate how flood hydrograph shape correlates with the geomorphic change observed. We examine the potential of predictive models for geomorphic change during floods, and explore some variables that moderate the effect of flood hydrograph shape on geomorphic change.