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# The role of substrate variability in longitudinal profile response to glacioisostatic rebound

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Several similarly sized, subparallel catchments drain from the highlands of western Sweden to the Gulf of Bothnia. Extensive bedrock segments along the active channel include knickzones of steep rapids and short steps. Although on a passive continental margin, Sweden has a complex history of uplift associated with post-glacial rebound; some regions continue to experience uplift ~10 mm/yr. We used map-generated data from 16 rivers in Sweden, and field-generated data from 6 of these rivers, to examine how substrate characteristics interact with stream power and uplift rate to determine the location and characteristics of knickzones. These rivers extend across a north-south transect nearly 600 km long which includes varying uplift rate and time since deglaciation. We developed basin-scale longitudinal profiles from a DEM derived from 1:50k topographic maps with 10-m contour intervals. Discharge from stream gages is used with long profiles to estimate total stream power along each river. Published post-glacial rebound rates constrain base level history. We also measured intact rebound strength, rock-mass strength, and joint spacing along north-south and east-west transects at 64 bedrock outcrops in the 6 basins. Each outcrop was associated with either a knickzone or a lower-gradient segment of a river. We tested several hypotheses regarding the relative influence on average stream gradient and knickzone characteristics of stream power, substrate resistance, and uplift rate. Preliminary analyses indicate some significant differences in joint characteristics and substrate resistance between knickzones and other river segments, suggesting that knickzone characteristics are partly a function of differing substrate resistance. The lack of correlation between profile concavity index and latitude suggests that time since deglaciation and rate of uplift are not the primary controls on profile characteristics.