



PEARL

Evaluating the competing effects of lithology and sediment supply on the erosional dynamics of rivers crossing active faults.

Whittaker, A; Boulton, S; Kent, E; Zondervan, J; Hann, M; Watkins, S; Bell, R; Brooke, S

Publication date:
2017

Link:
[Link to publication in PEARL](#)

Citation for published version (APA):
Whittaker, A., Boulton, S., Kent, E., Zondervan, J., Hann, M., Watkins, S., Bell, R., & Brooke, S. (2017). *Evaluating the competing effects of lithology and sediment supply on the erosional dynamics of rivers crossing active faults..* Paper presented at 19th EGU General Assembly 2017.

All content in PEARL is protected by copyright law. Author manuscripts are made available in accordance with publisher policies. Wherever possible please cite the published version using the details provided on the item record or document. In the absence of an open licence (e.g. Creative Commons), permissions for further reuse of content should be sought from the publisher or author.

Evaluating the competing effects of lithology and sediment supply on the erosional dynamics of rivers crossing active faults.

Whittaker, Alex¹; Boulton, Sarah²; Kent, Emiko²; Zondervan, Jesse¹; Hann, Madeleine¹; Watkins, Stephen¹; Bell, Rebecca¹; Brooke, Sam¹

¹ Imperial College London, Department of Earth Science and Engineering, London, United Kingdom

² School of Geography, Earth and Environmental Sciences, University of Plymouth, Fitzroy, Drake Circus, Plymouth, Devon, PL4 8AA

Lithology and sediment supply influence the erosional dynamics of rivers crossing active faults and together these effects govern the style, timescale and means by which landscapes respond to their tectono-climatic boundary conditions. Here, for transient bedrock catchments in the Gediz Graben, Turkey, and the Gulf of Corinth, Greece, for which the timing and rate of active faulting is known, we quantify the relative importance of rock strength and sediment supply on models of fluvial incision. We determine rock type, strength and erodibility using a Schmidt hammer and structural measurements of joint density and size. We evaluate the downstream distribution of channel width and stream power and calculate the extent to which the latter scales with tectonic rates and rock strength. Sediment supply is constrained using estimates of bedrock exposure, transport capacities and erosional fluxes. For the Turkish examples, stream powers in the metamorphic rocks are four times greater than in the Neogene sediment units, indicating a four-fold difference in bedrock erodibility, K , for a two-fold variation in Schmidt hammer hardness. In the Gulf of Corinth examples, we interpret differences in stream powers near the active faults to represent order of magnitude differences in bedrock erodibility between carbonate and sandstone/conglomerate units. We also observe that in both cases, significant along-strike variation in fault slip rate is not associated with an increase in stream power for the sedimentary rocks and we assess the extent to which this stream power deficit may also represent the effects of sediment-flux-dependent incision.

19th EGU General Assembly, EGU2017, proceedings from the conference held 23-28 April, 2017 in Vienna, Austria., p.11779