

# A PUNCTUATED RIVER INCISION MODEL FOR QUATERNARY STRATH TERRACE FORMATION

**Jesse R. Zondervan<sup>1,2\*</sup>, Martin Stokes<sup>1</sup>, Anne E. Mather<sup>1</sup>, Matt W. Telfer<sup>1</sup>, Sarah J. Boulton<sup>1</sup>, Jan-Pieter Buylaert<sup>3</sup>, Mayank Jain<sup>3</sup>, Andrew S. Murray<sup>4</sup>, Mohamed A. Belfoul<sup>5</sup>**

<sup>1</sup>*School of Geography, Earth and Environmental Sciences, University of Plymouth, United Kingdom*

<sup>2</sup>*Now at: Department of Earth Sciences, University of Oxford, United Kingdom*

<sup>3</sup>*Department of Physics, Technical University of Denmark, Denmark*

<sup>4</sup>*Nordic Laboratory for Luminescence Dating, Department of Geoscience, Aarhus University, Denmark*

<sup>5</sup>*Structural Geology and Thematic Mapping Laboratory, Earth Sciences Department, Ibn Zohr University, Morocco*

*\*Correspondence to: Jesse R. Zondervan (jesse.zondervan@protonmail.com)*

We define a conceptual model of punctuated incision for strath terrace formation, with implications for deriving river incision and rock uplift rates. To illustrate this model, we present a detailed ~200 kyr history of strath terrace formation spanning two stratigraphic levels in the High Atlas Mountains (NW Africa). Extensive preservation and exposure of strath-top gravels, and the post-orogenic setting unaffected by eustatic sea level, allow us to derive a rate of base-level fall, integrated over periods of strath-top deposition, metastable equilibrium, and incision, which is consistent with an independently constrained regional rock uplift rate [1]. In addition, we find limited correlation of strath-top deposition with climatic shifts, and variable lengths of time between terrace incision across stratigraphic levels and downstream locations. Combining our conceptual model with our well-constrained terrace formation history allows us to demonstrate how often-used assumptions about Quaternary river incision and deposition can lead to the problematic Sadler Effect [2, 3]: an apparent dependence of incision rates on measured time interval. Subsequently, reinterpreting previously published data [4, 5] we demonstrate that the punctuated incision model, even when combined with limited terrace age data, leads to more consistent and parsimonious conclusions about rates of river incision, rock uplift and base-level lowering.

## REFERENCES

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