

Self-organizing avulsions in an endorheic dryland river system

Donselaar, M.E.; Cuevas Gozalo, M.C.; van Toorenenburg, K.A.; Wallinga, J.

Publication date

2018

Document Version

Accepted author manuscript

Citation (APA)

Donselaar, M. E., Cuevas Gozalo, M. C., van Toorenenburg, K. A., & Wallinga, J. (2018). *Self-organizing avulsions in an endorheic dryland river system*. Abstract from 20th International Sedimentological Congress 2018, Québec, Canada.

Important note

To cite this publication, please use the final published version (if applicable).
Please check the document version above.

Copyright

Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

Takedown policy

Please contact us and provide details if you believe this document breaches copyrights.
We will remove access to the work immediately and investigate your claim.

SELF-ORGANIZING AVULSIONS IN AN ENDORHEIC DRYLAND RIVER SYSTEM

M.E. Donselaar^{1,2,*}, M.C. Cuevas Gozalo³, K.A. van Tooreneburg¹, J. Wallinga⁴

¹*Department of Geoscience and Engineering, Delft University of Technology, Stevinweg 1, 2628 CN Delft, The Netherlands*

²*KU Leuven, Department of Earth and Environmental Sciences, B-3001 Leuven-Heverlee, Belgium*

³*Brill, Plantijnstraat 2, 2321 JC Leiden, The Netherlands*

⁴*Netherlands Centre for Luminescence dating & Soil Geography and Landscape group, Wageningen University, PO Box 47, 6700 AA Wageningen, The Netherlands*

**e-mail: m.e.donselaar@tudelft.nl*

Absolute age dating with Optically Stimulated Luminescence (OSL) measurements, in combination with Google Earth Pro imagery and differential GPS (dGPS) measurements was employed to unravel the processes and timing of river avulsions and the resultant sedimentary architecture of a network of Holocene Río Colorado (Altiplano Basin, Bolivia) channel belts.

A radial pattern of channel belts originated from compensational stacking of interconnected alluvial ridges. Channel-belt switching occurred by avulsions with frequencies ranging from 160 yr to 1130 yr. Rivers started with a low-sinuuous (SI 1.29 to 1.64) single-channel trajectory bordered by small point bars. Over time, the rivers evolved to high-sinuuous (SI 1.80 to 2.29) streams with wide point bars with a large surface area. The average lateral point-bar accretion rate is 0.5 my⁻¹.

The alluvial ridges formed by river sediment accumulation through aggradation and lateral accretion of sand in point bars, channel-floors, and levees, and by lateral amalgamation and stacking of crevasse splays. The width of the individual ridges in the study area is approximately 1.5 km. Confined inter-channel areas received crevasse splay sediment from both sides of successive channel-belt positions, and the overlapping crevasse-splay sand resulted in a higher inter-ridge elevation as compared to the unconfined side where the alluvial ridge bordered the open floodplain. Alluvial-ridge aggradation resulted in decrease of the along-river gradient and increase of cross-floodplain gradient, to the point where the channel-floor elevation became higher than the surrounding floodplain surface, whereupon avulsion occurred, and the process of alluvial-ridge growth started anew. Successive channel belts avoided the positive morphology of earlier-deposited alluvial ridges and thus formed a self-organizing, laterally-connected alluvial-ridge network over an area of 500 km².

Acknowledgements

Financial support for the research from Wintershall Noordzee B.V., Energie Beheer Nederland (EBN) and ENGIE E&P Nederland B.V. is gratefully acknowledged. Alice Versendaal of the Netherlands Centre for Luminescence dating (NCL) at Wageningen University is thanked for the OSL measurements and analyses. The Netherlands Organization for Scientific Research (NWO-ALW) supplied the investment grant (#834.03.003) for the OSL laboratory.