



## **Role of climate changes for wind gap formation in a young, actively growing mountain range**

Andrea Hampel (1) and Ralf Hetzel (2)

(1) Leibniz Universität Hannover, Institut für Geologie, Hannover, Germany (hampel@geowi.uni-hannover.de), (2) Institut für Geologie und Paläontologie, Westfälische Wilhelms-Universität Münster, Münster, Germany

Wind gaps in actively growing mountain ranges are unique geomorphological features testifying the competition between tectonics and fluvial incision. Although it is clear that these landforms reflect the defeat of rivers during sustained rock uplift (e.g. Burbank et al., *Basin Res.*, 1996; Keller et al., *GSA Bull.*, 1998), the role of climate changes for their formation has never been explored. Here we use a coupled tectonics-landscape evolution model to show that temporal changes in precipitation rate exert an important control on wind gap formation (Hampel and Hetzel, *Terra Nova*, 2016). In models with a constant precipitation rate, rivers flowing across a growing range are defeated either at an early stage or they abandon their valleys very late, if at all. If precipitation varies, wind gaps form mostly  $\sim 100\text{--}200$  ka after a transition to drier conditions because of sediment aggradation upstream of the range. Our results suggest that the Pliocene-Quaternary aridification of Central Asia (Cai et al., *Global Planet. Change*, 2012; Wu et al., *Earth Planet. Sci. Lett.*, 2007) contributed to wind gap formation in active mountain ranges in the foreland of northeastern Tibet.