

Supplementary materials for

**South American freshwater fish diversity shaped by Andean uplift since
the Late Cretaceous**

Lydian M. Boschman, Fernanda A.S. Cassemiro, Luca Carraro, Jorad de Vries, Florian Altermatt, Oskar Hagen, Carina Hoorn, Loïc Pellissier

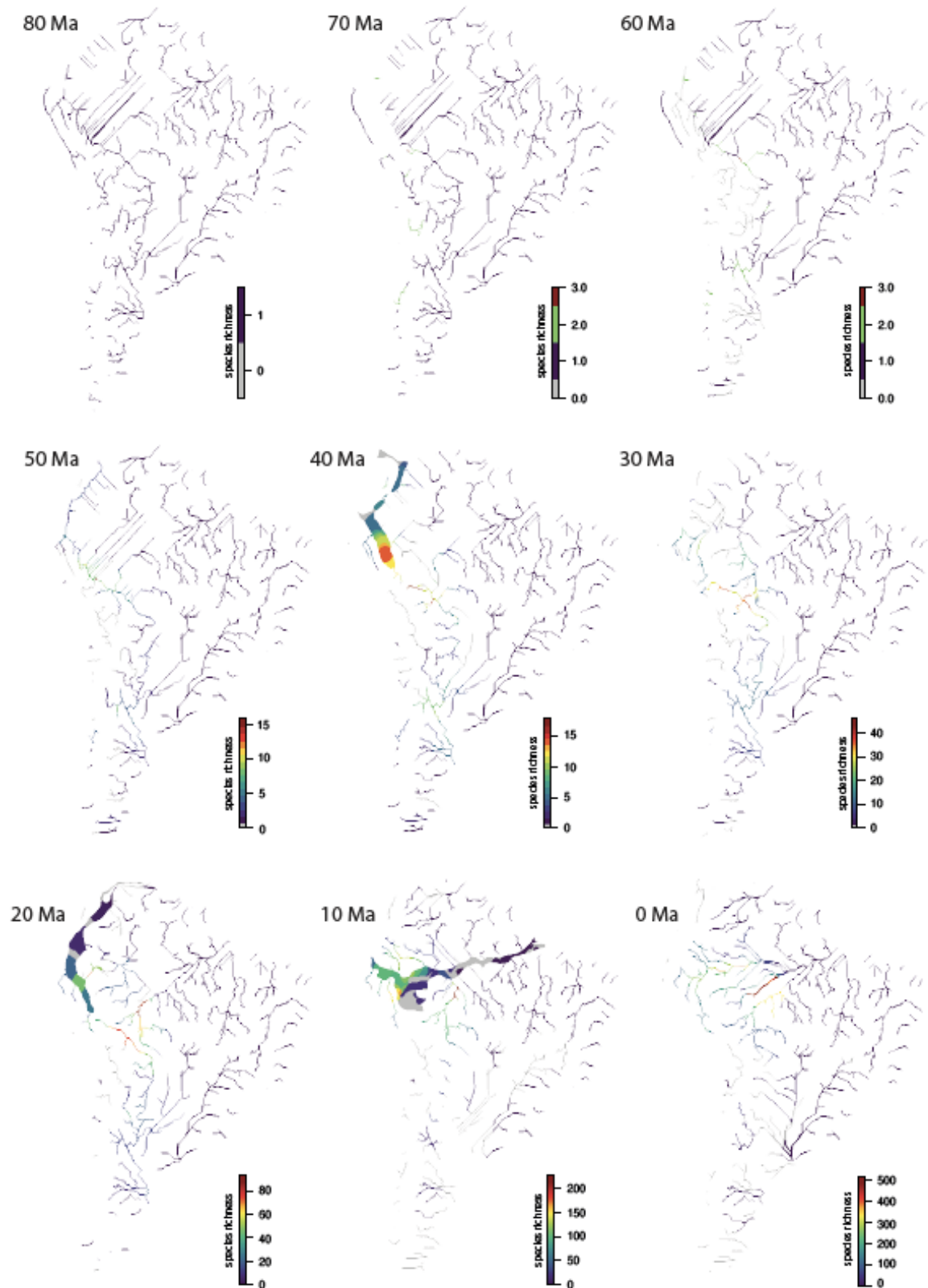


Fig. S1 | Example of a gen3sis simulation. Snapshots at 80, 70, 60, 50, 40, 30, 20, 10 and 0 Ma; results of richness per sub-basin shown in Fig. 3c.

river size exploration

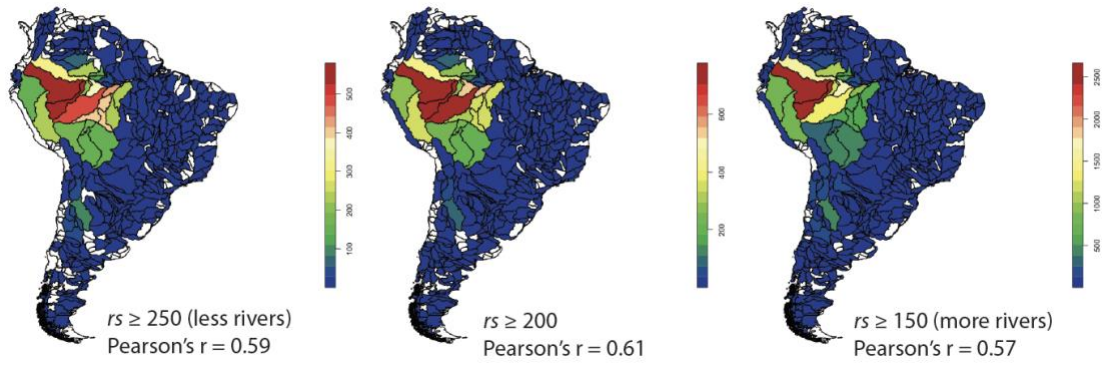


Fig. S2 | Parameter exploration: river size (rs). $d = 5$, $div = 2$.

divergence threshold exploration

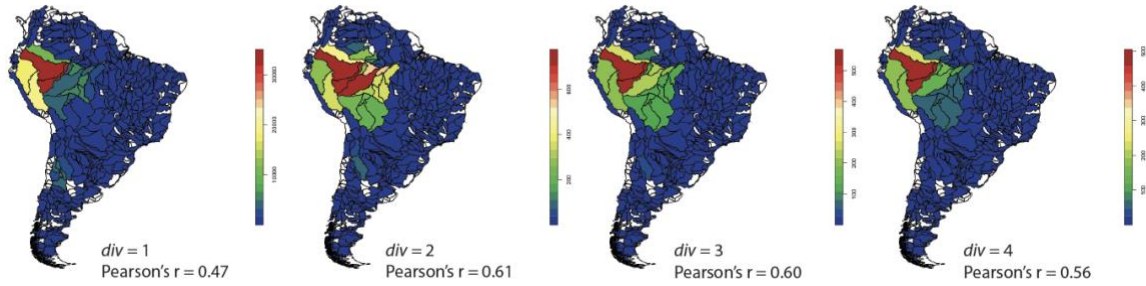


Fig. S3 | Parameter exploration: divergence threshold (div). $d = 5$, $rs = 200$.

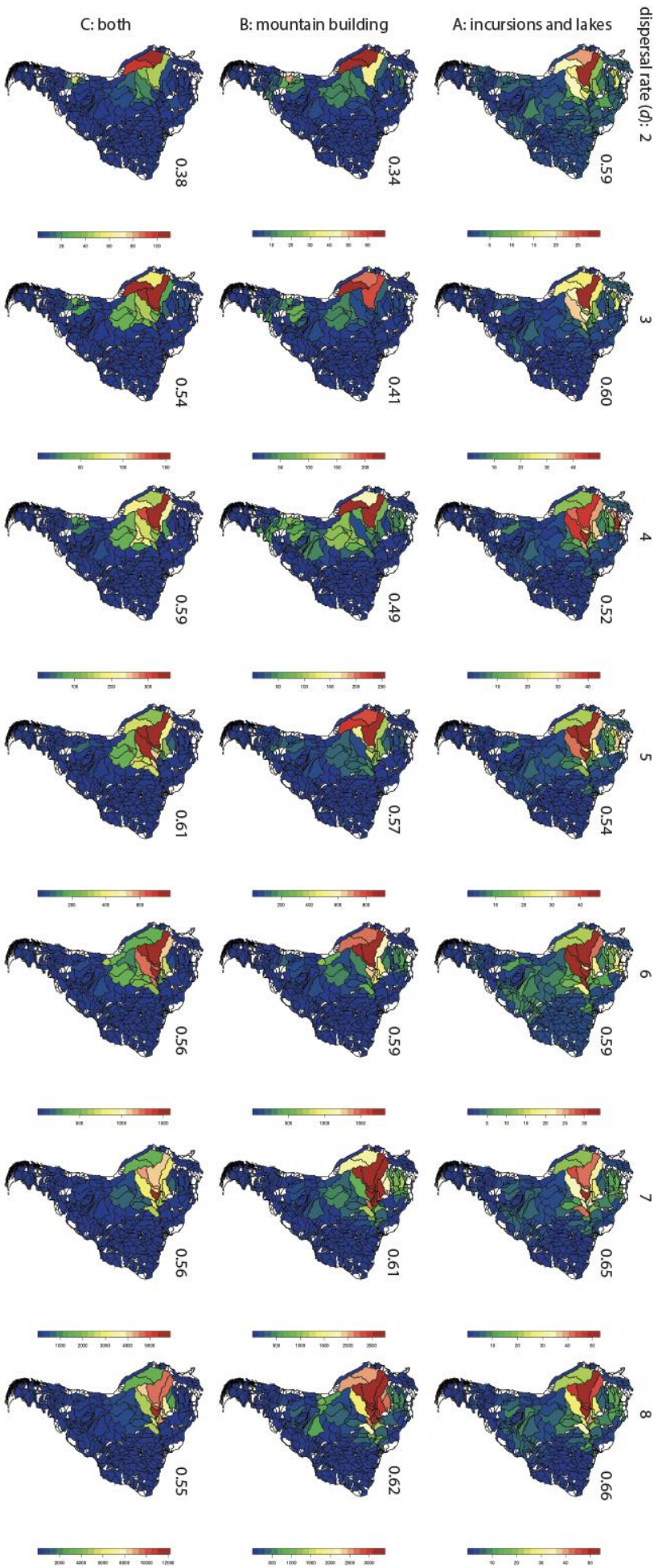


Fig. S4 | Parameter exploration: dispersal rate (d). $div = 2$, $rs = 200$. Numbers are Pearson's r .

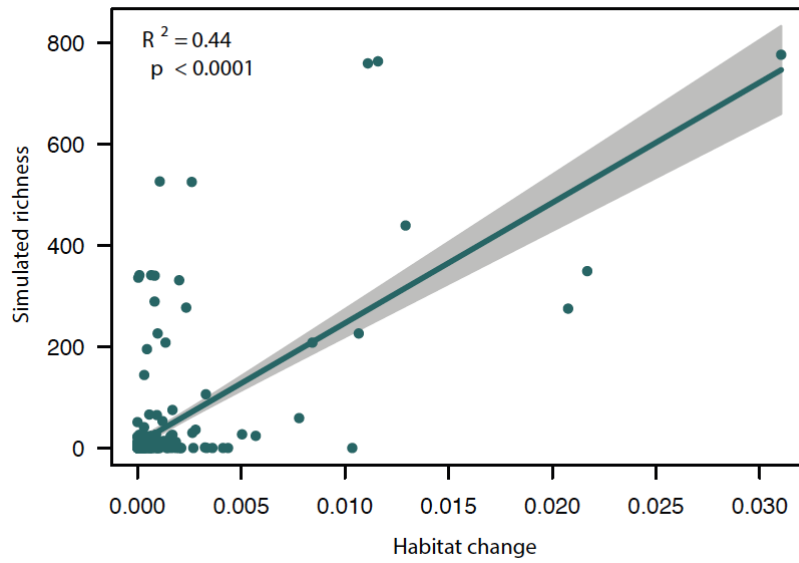


Fig. S5 | Simulated richness versus cumulative habitat change of sub-basins. Cumulative habitat change per sub-basin (shown in Fig. 2) is a measure of the amount of cells changing from suitable to unsuitable habitat, or vice versa, summed for all 80 time steps.



Fig. S6 | Map of South America, outlining the area in which elevation is reconstructed by the study of Boschman¹, and this study.

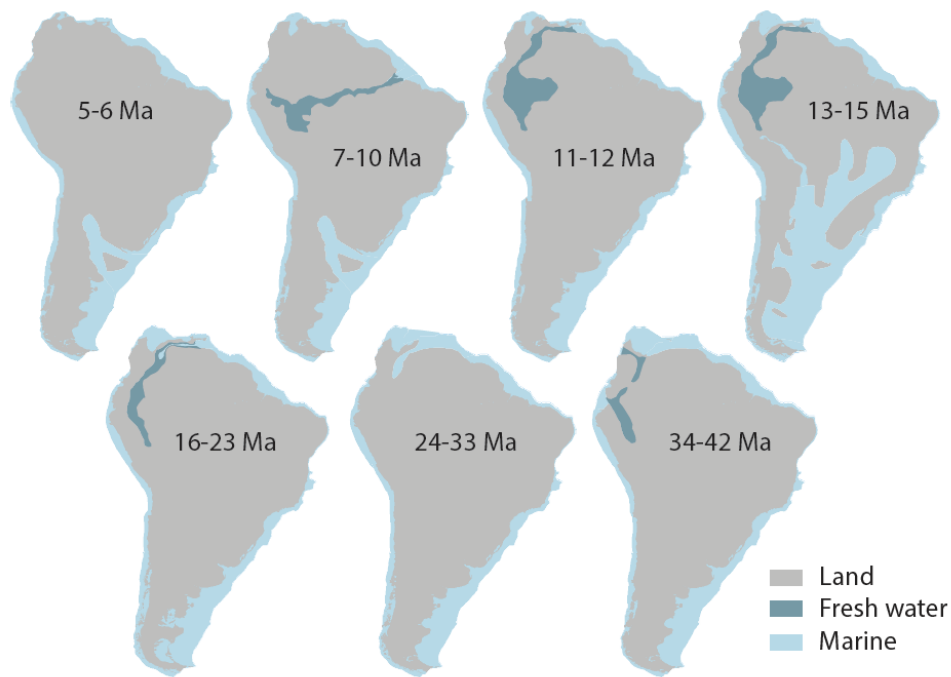


Fig. S7 | Outlines of lakes and marine incursions included in the reconstruction, based on the maps of Hoorn and Wesseling² for northern South America and Hernández, et al.³ for southern South America.

- 1 Boschman, L. M. Andean mountain building since the Late Cretaceous: A paleoelevation reconstruction. *Earth-Science Reviews*, doi:10.1016/j.earscirev.2021.103640 (2021).
- 2 Hoorn, C. & Wesselingh, F. *Amazonia: landscape and species evolution: a look into the past*. (John Wiley & Sons, 2011).
- 3 Hernández, R. *et al.* Age, distribution, tectonics, and eustatic controls of the Paranense and Caribbean marine transgressions in southern Bolivia and Argentina. *Journal of South American Earth Sciences* **19**, 495-512 (2005).