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Supporting Information for

Constraining plateau uplift in southern Africa by combining thermochronology, sediment flux, topography, and landscape evolution modeling

Jessica R. Stanley[1], Jean Braun[2,3], Guillaume Baby[4], François Guillocheau[5], Cécile Robin[5], Rebecca M. Flowers[6], Roderick Brown[7], Mark Wildman[7], Romain Beucher[8]

[1] Department of Geological Sciences, University of Idaho, 875 Perimeter Dr MS3022, Moscow ID 83843, USA.

[2] Helmholtz Centre Potsdam, GFZ German Research Center for Geosciences, Telegrafenberg Building A27, 14473 Potsdam, Germany.

[3] Institut für Erd- und Umweltwissenschaften, Universitä̈t Potsdam, 14476 Potsdam, Germany.

[4] Université de Paris, Institut de Physique du Globe de Paris, CNRS, F-75005, Paris, France.

[5] Université de Rennes 1, CNRS, Géosciences Rennes - UMR 6118, 35000 Rennes, France.

[6] Department of Geological Sciences, University of Colorado Boulder, UCB399, Boulder CO 80309, USA.

[7] School of Geographical and Earth Sciences, University of Glasgow, Glasgow, Scotland.

[8] Research School of Earth Sciences, The Australian National University, Canberra ACT 2600, Australia.

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Additional Supporting Information (Files uploaded separately)

Introduction

The supporting information includes summaries of the previously published thermochronology and sediment flux data used in the inversion models (Tables S1 and S2), uploaded separately. This document includes Figure S1 and Table S3, which are results and parameters used for the second inversion model testing only precipitation variability (see main text for more details. Also uploaded separately is a movie showing the landscape model topography for the best fit scenarios.

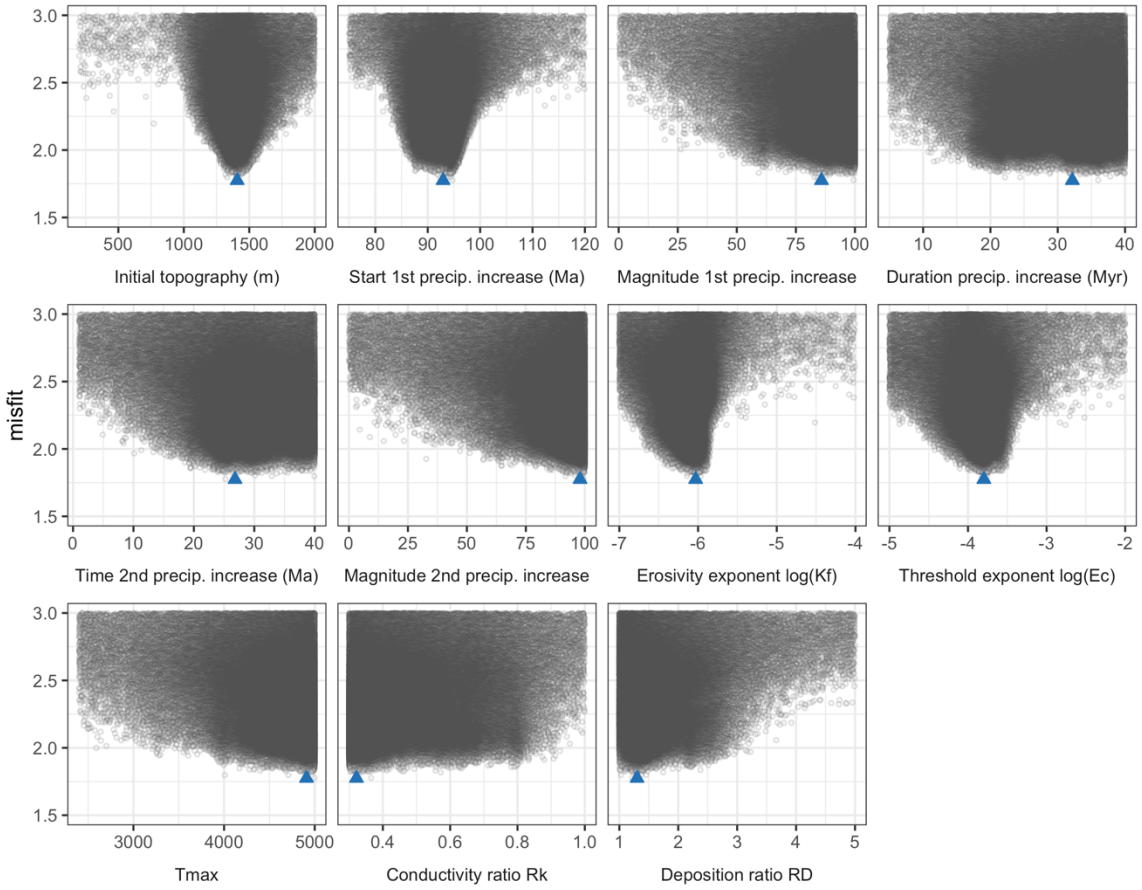

Figure S1. Results from model inversion testing only changes in precipitation (see Table S3 for parameter explanation). Plots show the values of parameters for models with misfits < 3. Each grey circle represents one forward model and the value for a given parameter. The lowest points show the parameters converging toward value(s) with better fits to the data. Blue triangles show best fit parameter values.

Table S1. Table S1. Thermochronology dates used in inversion model. AFT date and uncertainty represents the central age and 1σ standard deviation, while AHe date represents the average from multiple grains and uncertainty the 1σ standard deviation.

Table S2. Summary of the sediment flux data used in the model, originally published in Baby et al., (2020).

Variable Parameter	**Units**	**Value Range**	**Precip best fit**
K_f: Erosivity	$m^{0.2}$/yr	10^{-7} to 10^{-4}	$9.325x10^{-7}$
ε_c: Threshold for erosion	m/yr	10^{-5} to 10^{-2}	$1.591x10^{-4}$
T_{max}: Temperature at base of 120 km thick model lithosphere	°C	2400-5000	4909
R_k: Ratio of thermal conductivity between 2km thick Karoo sedimentary cover and underlying basement		0.3-1	0.322
R_D: Ratio between volume of material eroded and volume of material deposited in the marine basins		1-5	1.301
h_0: Height of initial base plateau in first time step	m	200-2000	1408
t_{p1}: Geologic time when first precipitation increase initiates	Ma	120-75	92.92
M_{p1}: Magnitude of first precipitation increase		0-100	83.83
t_{dur}: Duration of first precipitation increase before	Myr	5-40	32.17
t_{p2}: Geologic time of start of second precipitation increase	Ma	40-0	26.81
M_{p2}: Magnitude of second precipitation increase		0-100	97.98

Table S3. Variable parameters for precipitation driven inversion. Fixed parameters the same as in Table 2.

Movie S1. Movie showing topographic evolution from forward model runs for best fit model scenarios. Left panel shows results from the best fitting Hybrid Scenario, right panel shows best fitting result from the Cretaceous Scenario.