New tools on *Terra Antiqua 2.0* applied to reconstructing the paleogeography of the India-Asia collision

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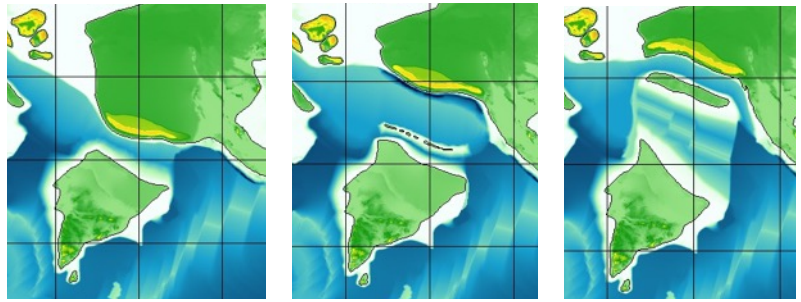
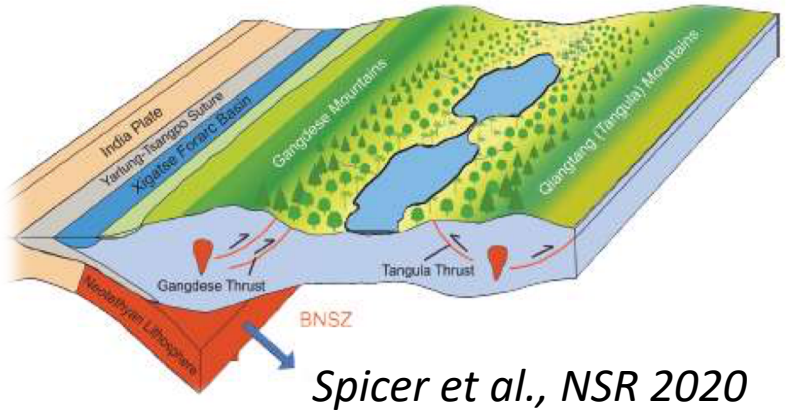
Sharing is encouraged

Paleogeographies are essential

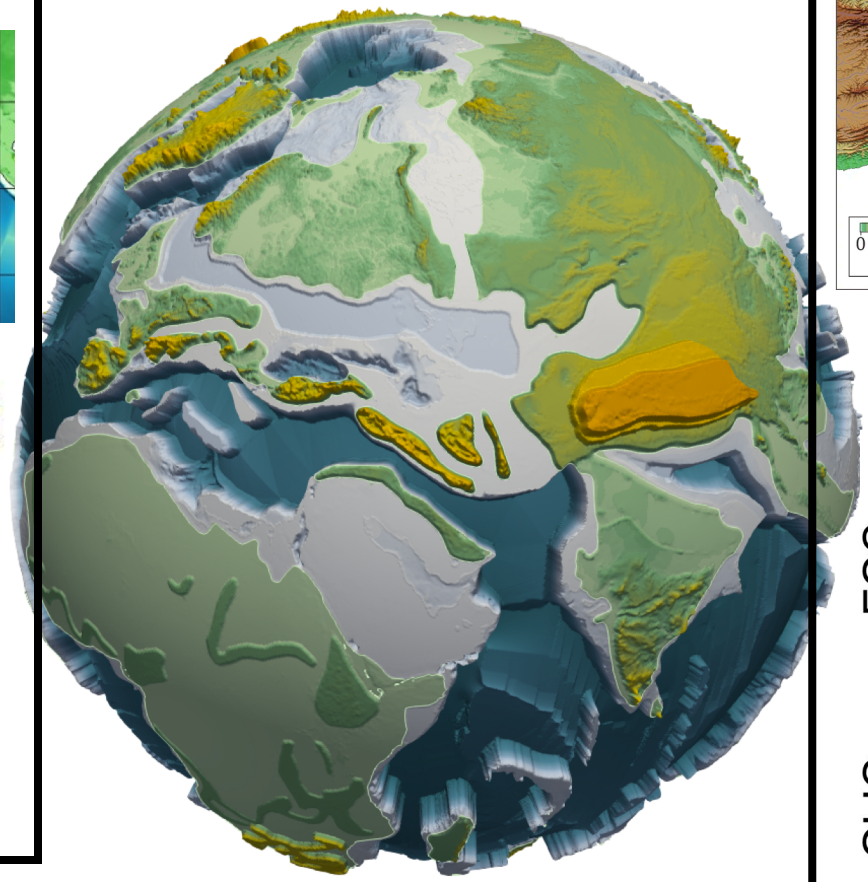
Current need for regional high-resolution reconstructions.
India-Asia collision : an ideal site.

Databases

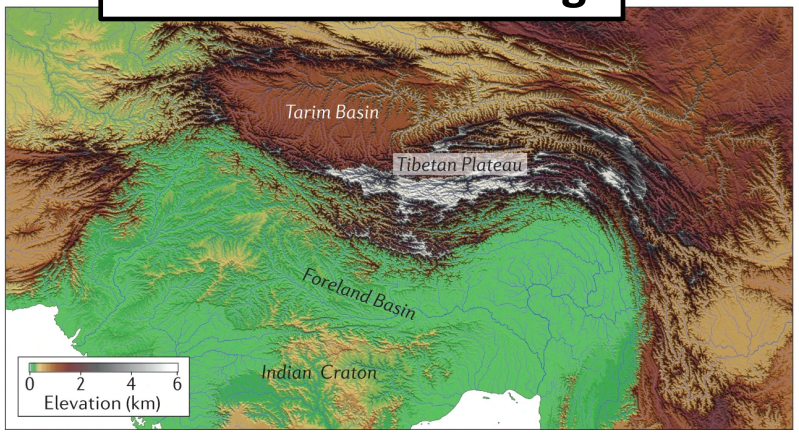




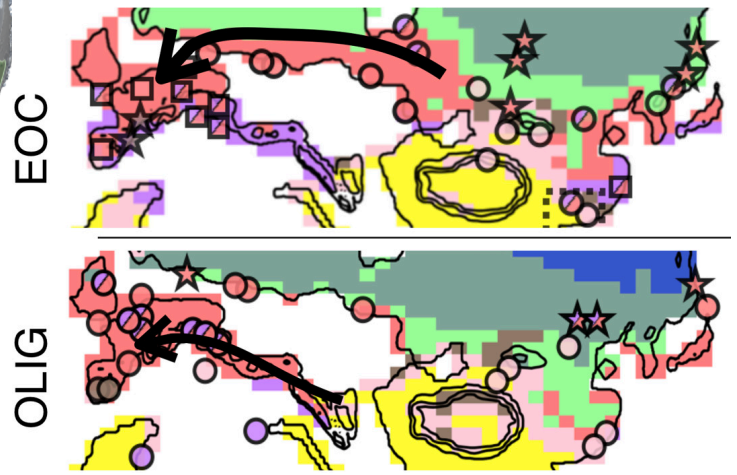
Spicer et al., NSR 2020



Numerical Modeling



Rey et al., 2022 Nature REE



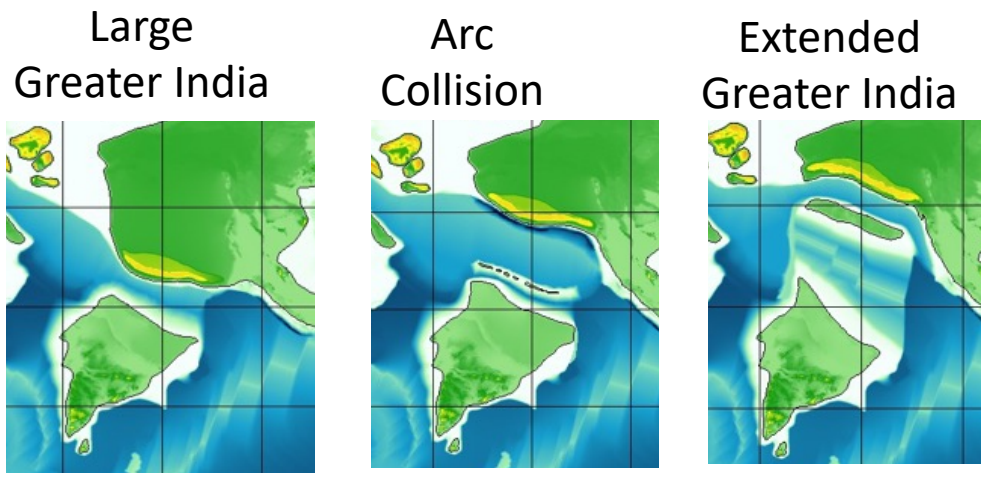
Tardif et et al., 2021 Sci. Adv.

Raging debates remain on:

1. The India Asia collision

- Collisions with an arc or with Greater India?
- Age of the collision(s) ?

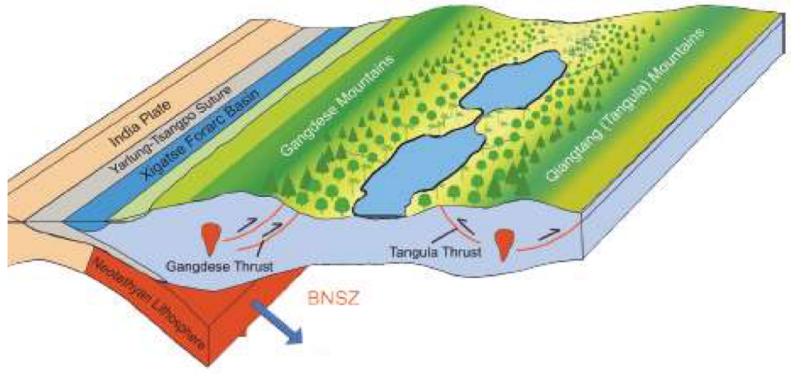
Meng et al., 2020 EPSL
Westerveel et al., 2019 Nature Geo
van Hinsbergen et al., 2019 Tectono.



2. The growth of the Tibetan Plateau

- Age of the uplift?
- Wholesale or propagating uplift?

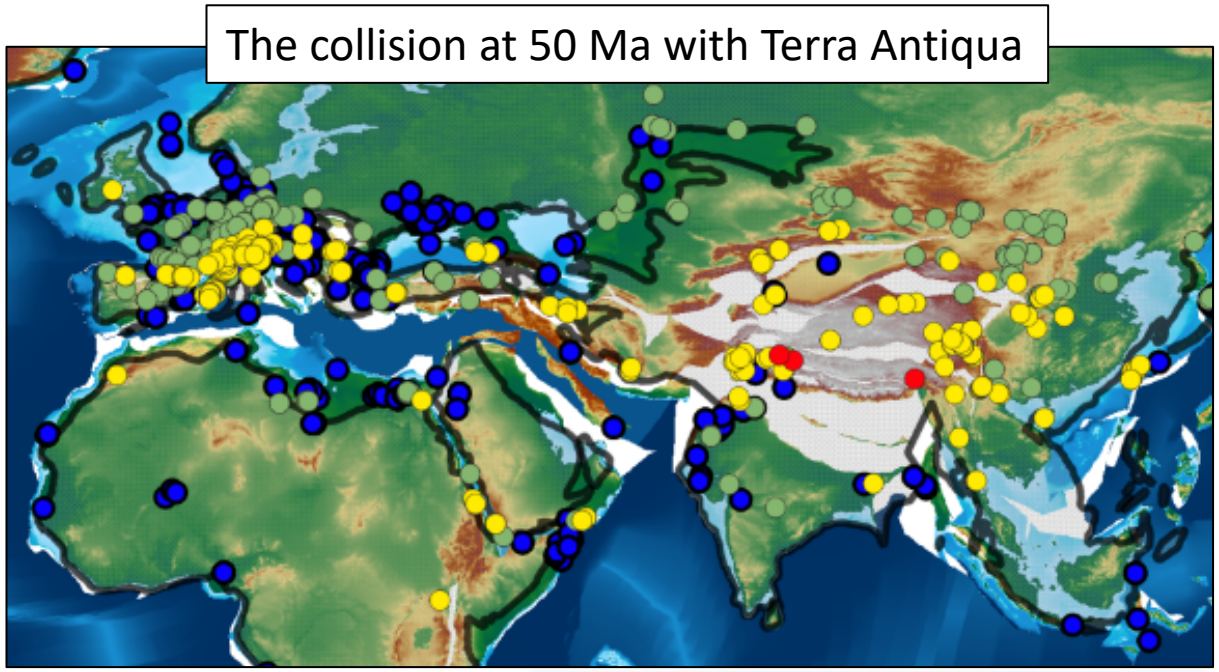
Spicer et al., 2020 NSR
Fang et al., 2021 Sci. Advances
Yuang et al., 2023 EPSL

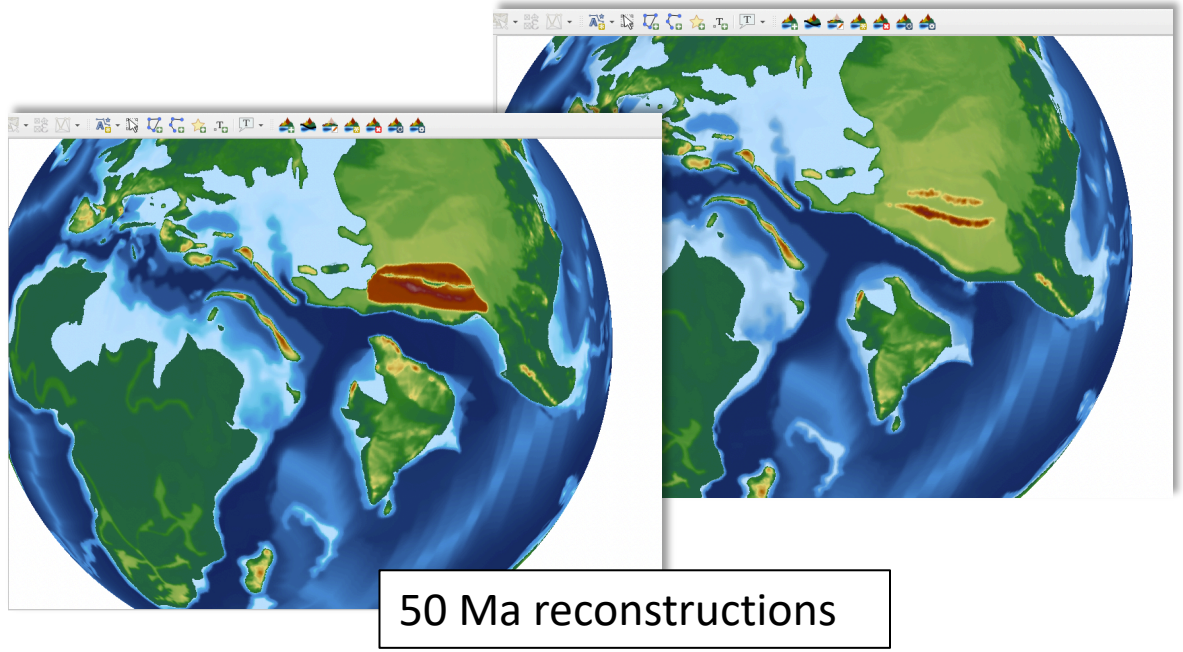


Objectives

- Build a set of reconstructions based on various collision, uplift scenarios and updated databases.
- Link collision scenarios with Tibetan uplift.

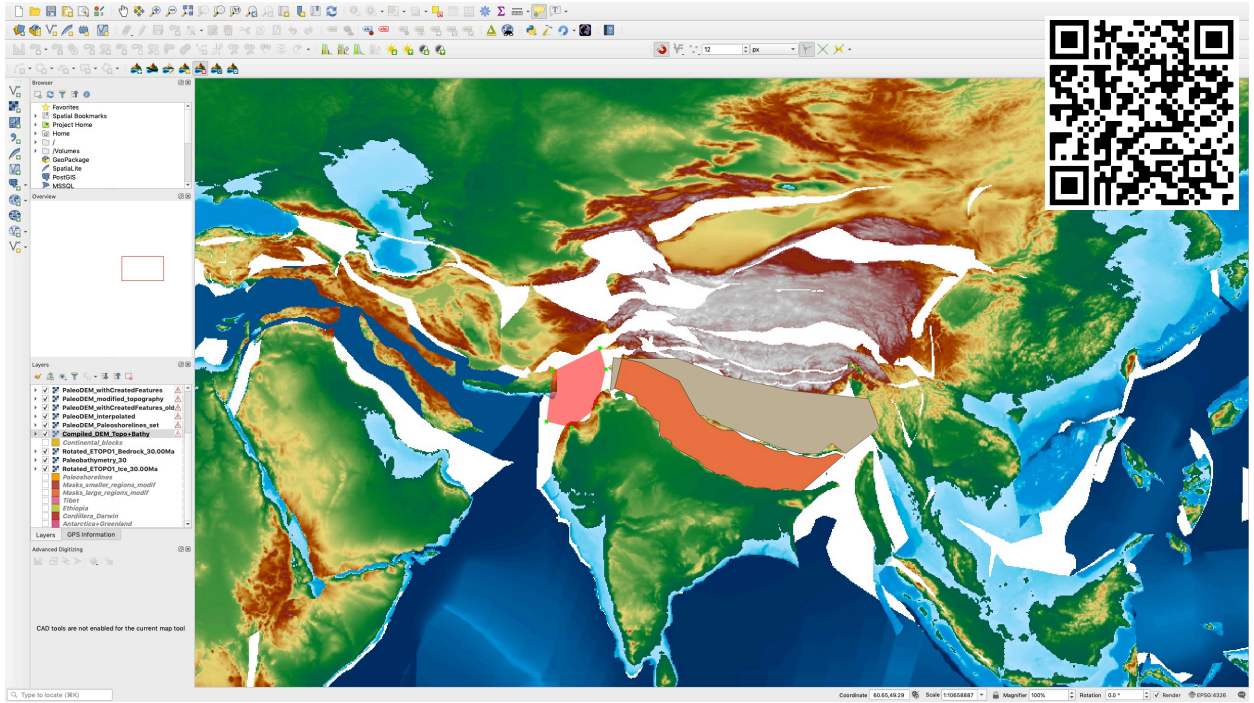
➢ Need a simple tool to generate and modify paleogeographic reconstructions: **Terra Antiqua**





Towards accessible and easy paleogeography with:

1. ***Terra Antiqua*** Reconstruction tool

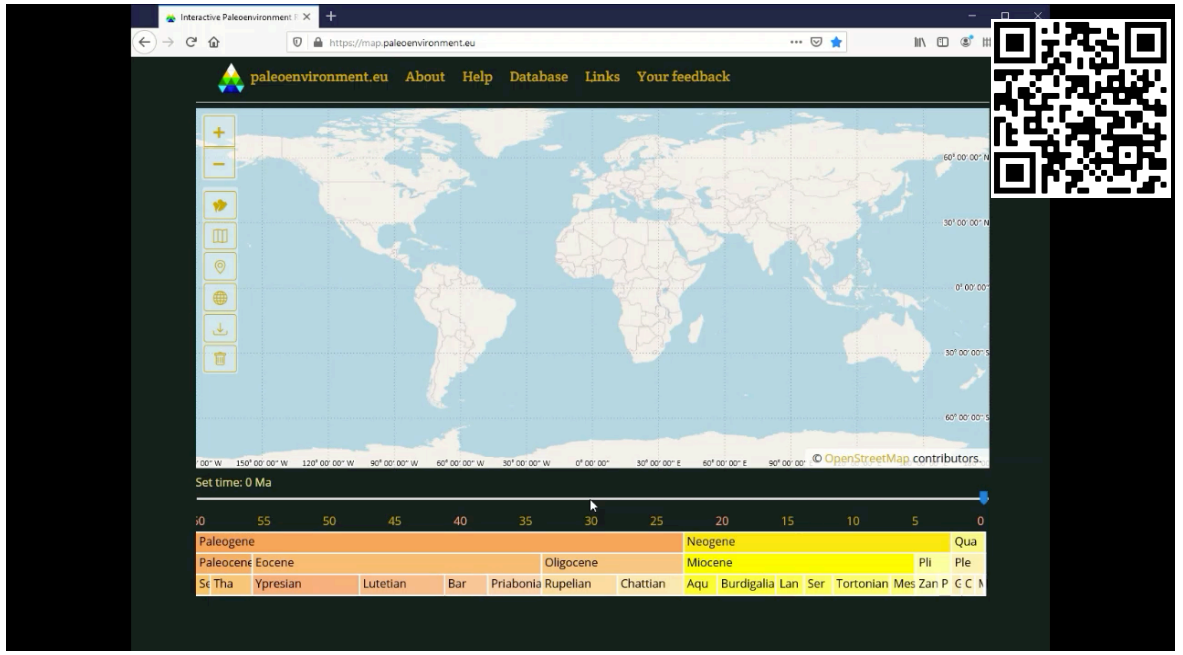


Aminov et al., Earth Science Reviews 2023

Jovid Aminov, Diego Ruiz, Boris Gailleton



2. Interactive maps and databases



Poblete et al., Earth Science Reviews 2021

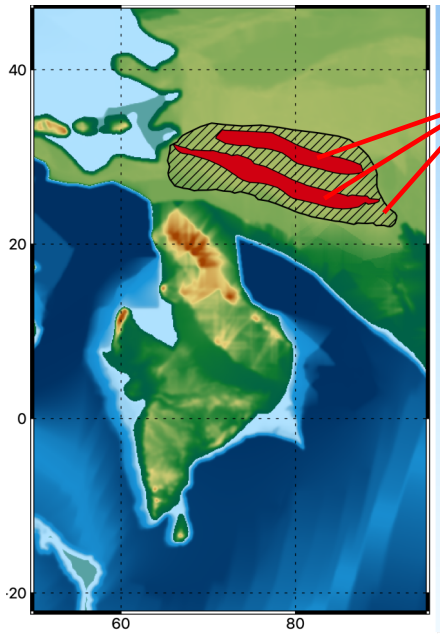
Fernando Poblete, Thomas van der Linden,…

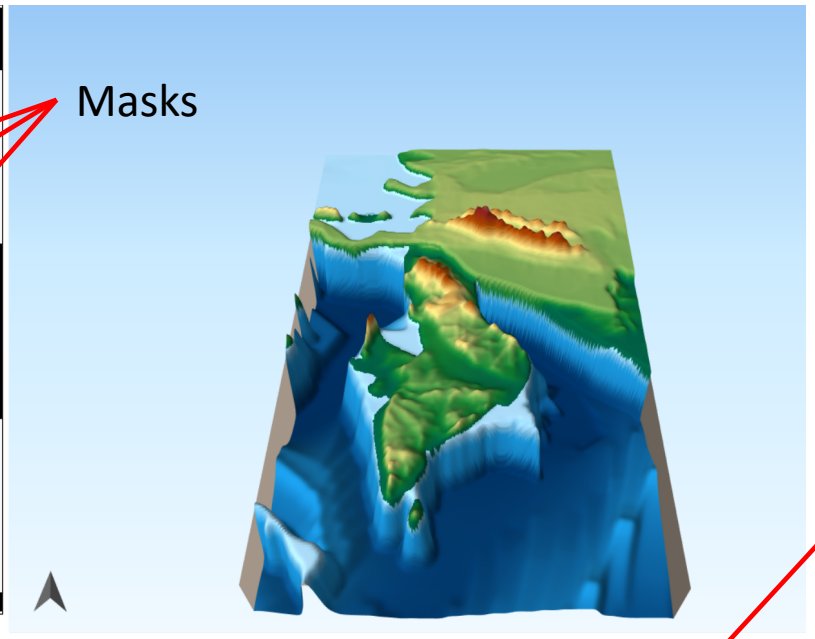

www.map.paleoenvironnment.eu

Create topography

Terra Antiqua

User-friendly and open-source plug-in for QGIS

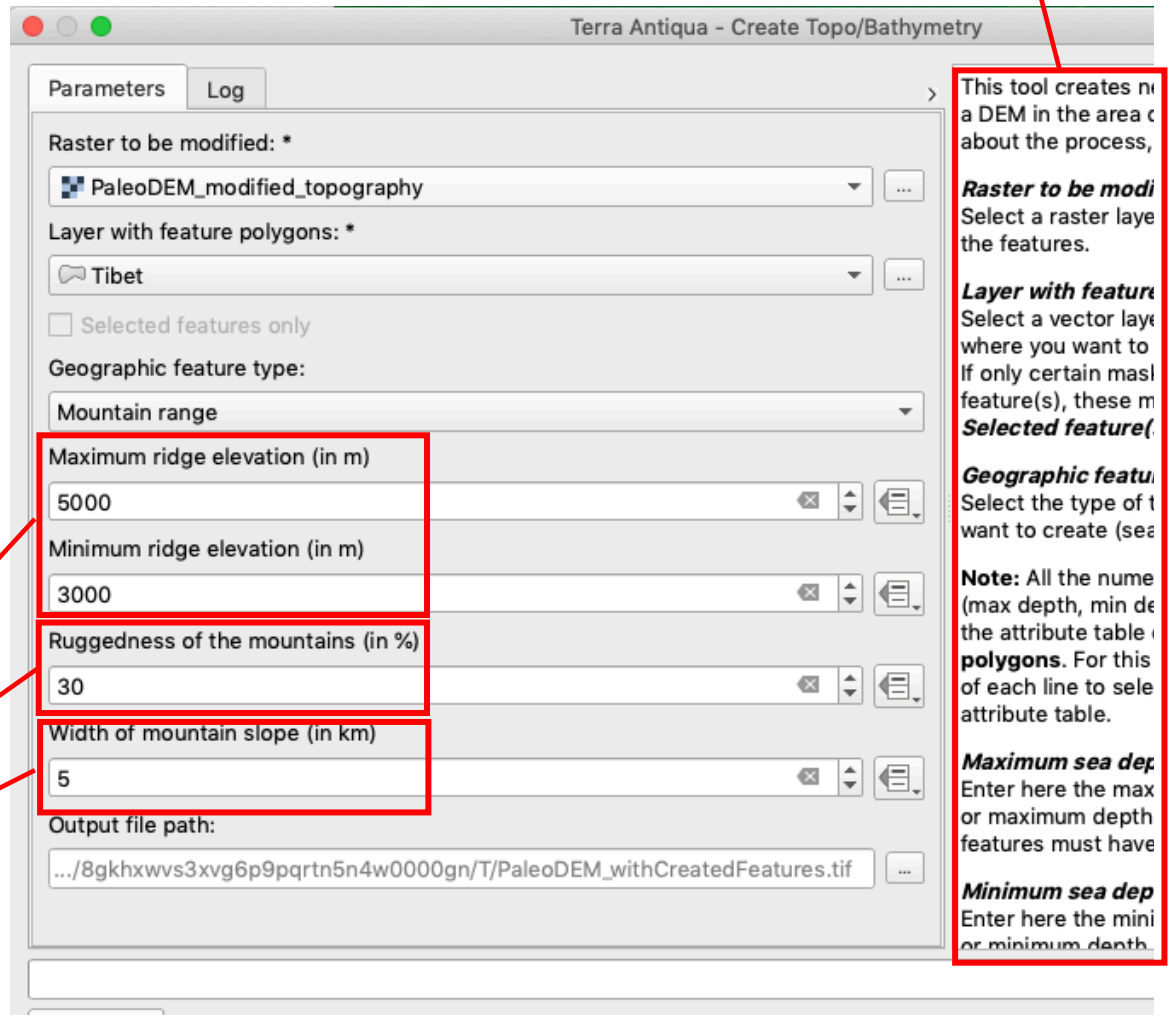




Max. and Min. ridge elevation

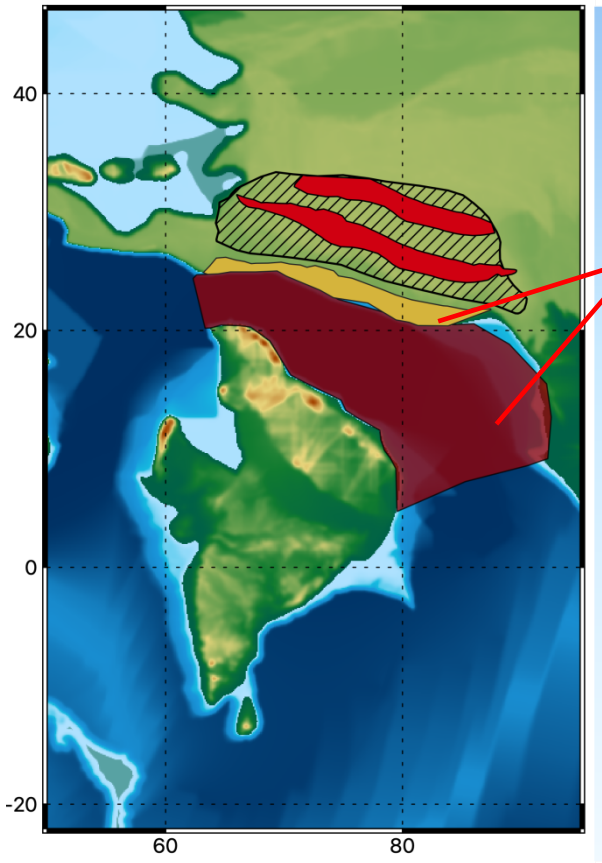
Ruggedness

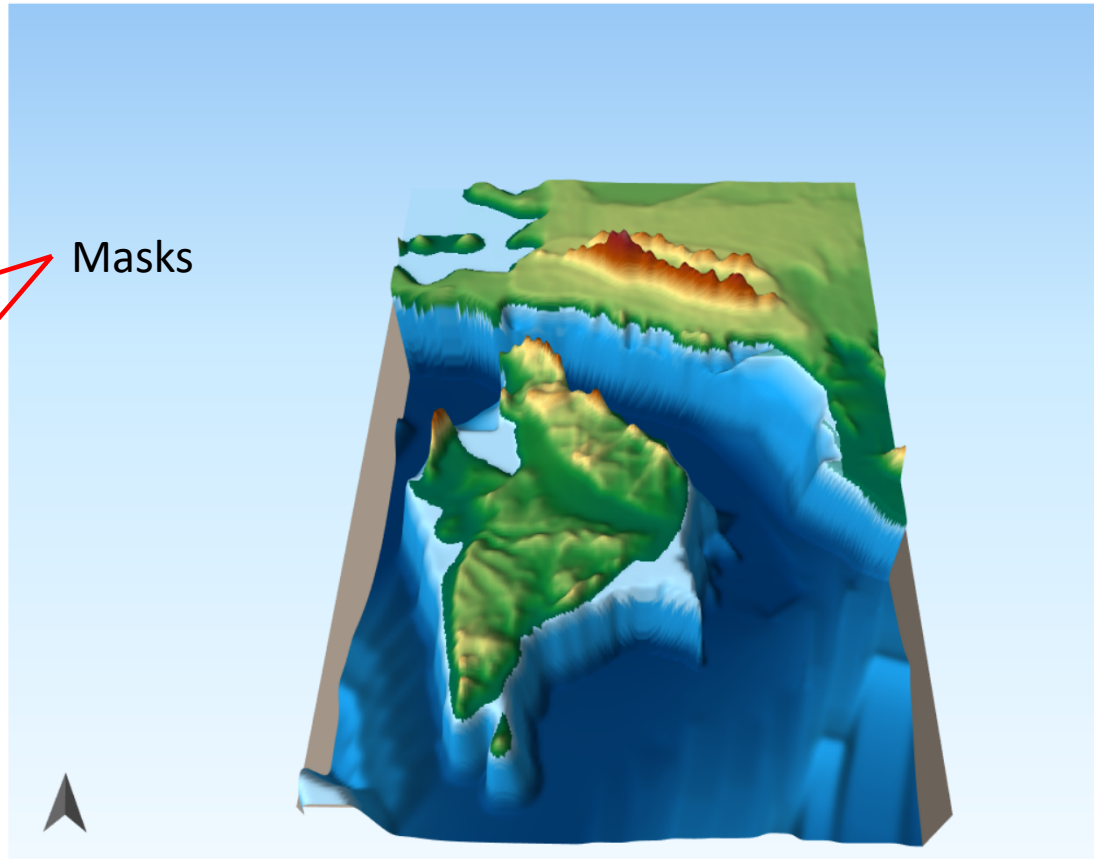
Width of mountain slope



Help manual

Create bathymetry





Geographic feature type:

Sea

Maximum sea depth (in m):

-5750

Minimum sea depth (in m):

-4000

Maximum shelf depth (in m):

-200

Shelf width (in km):

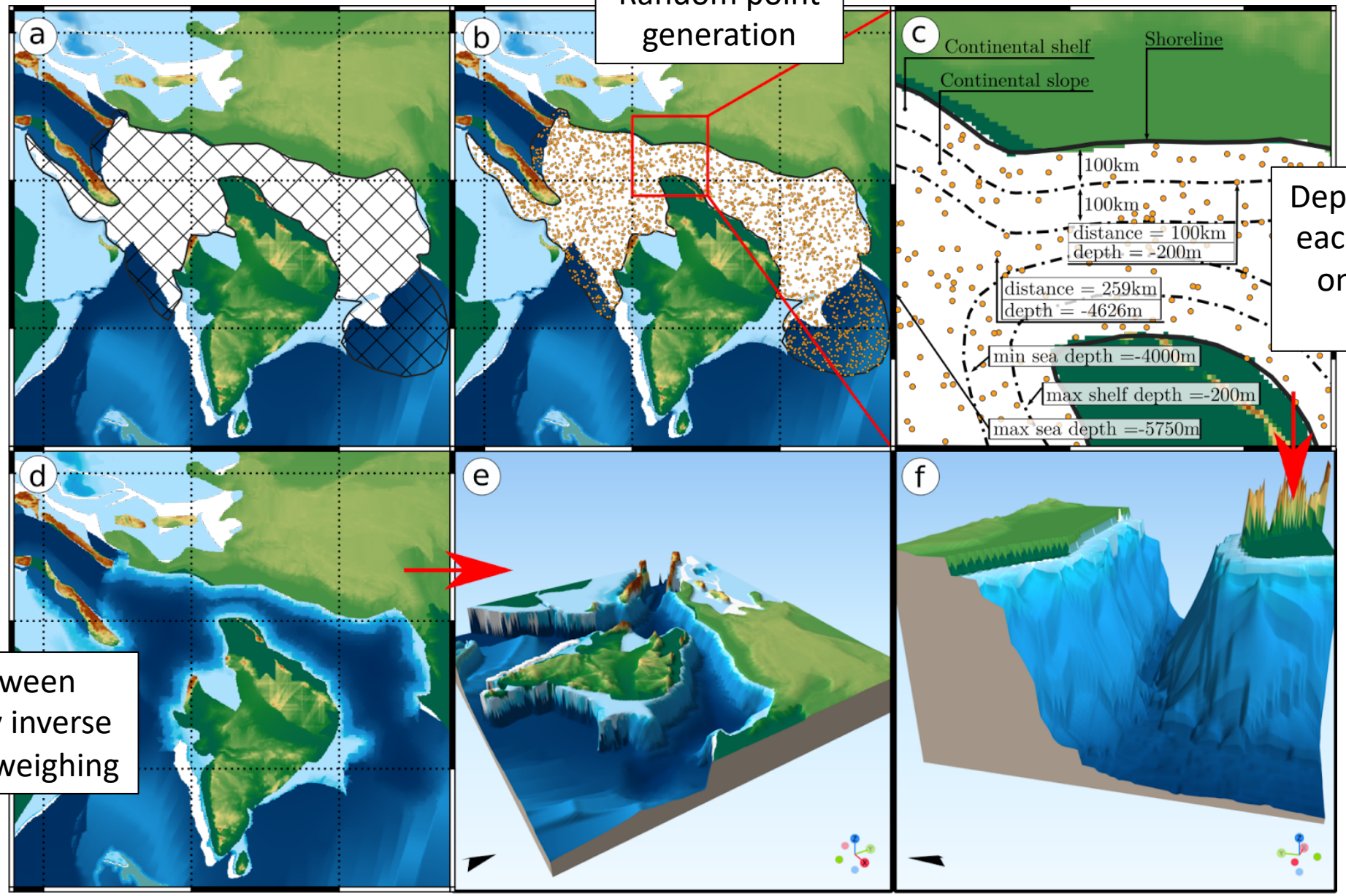
150

Width of continental slope (in km):

100

Create “random” topo /bathymetry

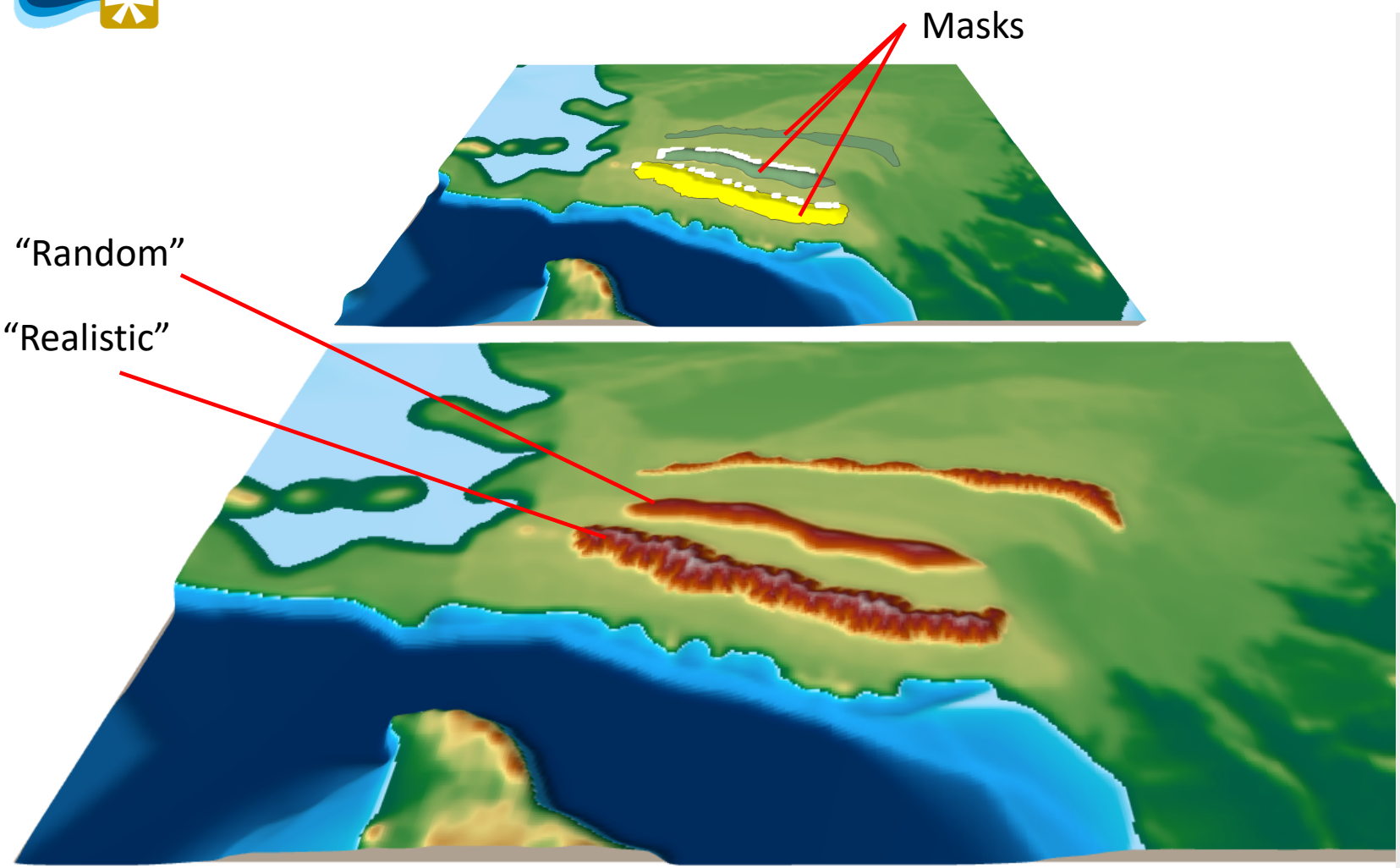
Random point generation



Depth assigned to each point based on distance to shoreline

fill between points by inverse distance weighing

Create “realistic” topography



Geographic feature type:

Mountain range (fractal)

Maximum ridge elevation (in m):

5000

m exponent of the Stream power law:

0.45

n exponent of the Stream power law:

1.00

Rock erodability (K):

0.0000200000000

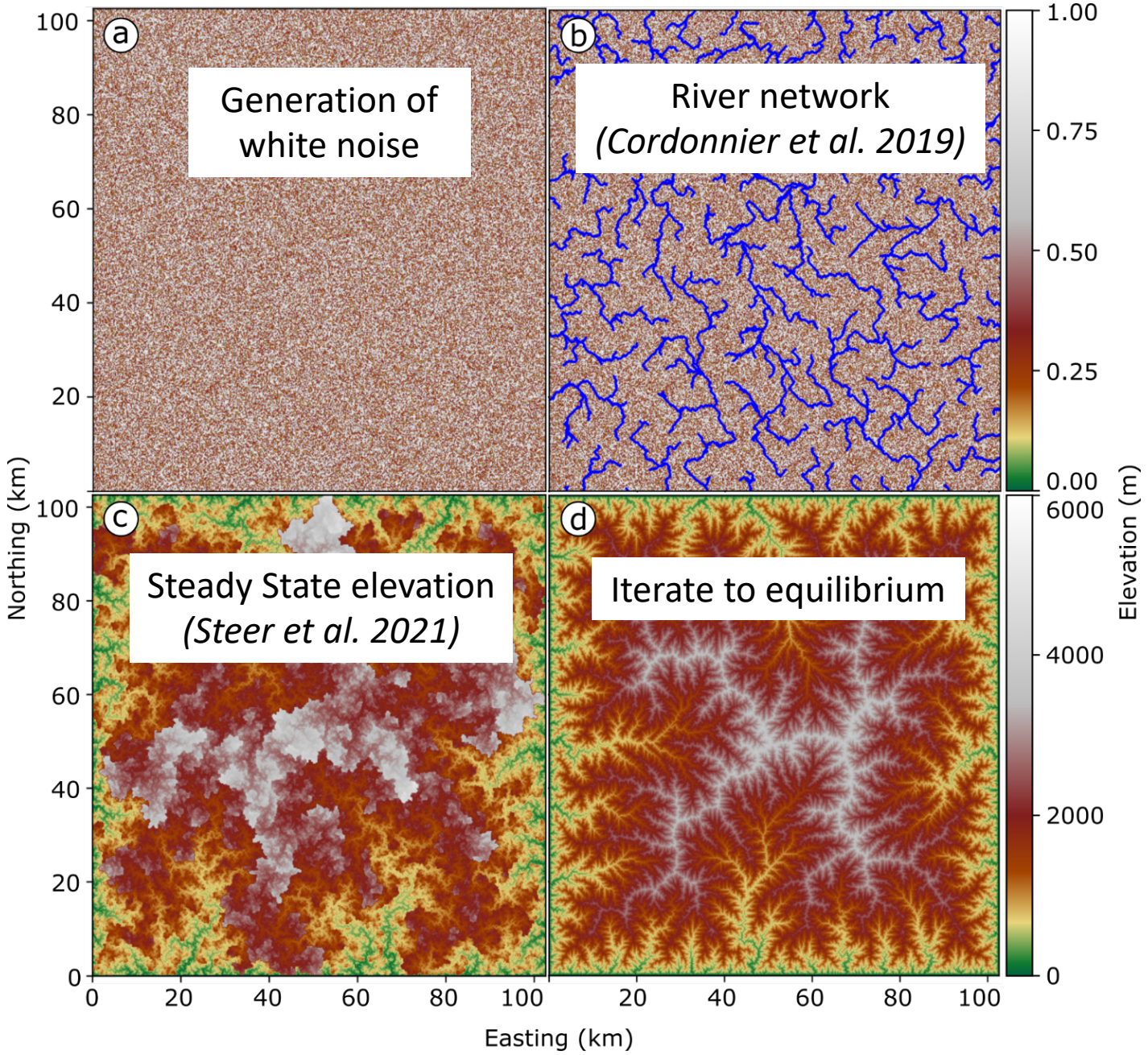
Upstream drainage area (A):

20000.00

Channel slope (S):

0.60

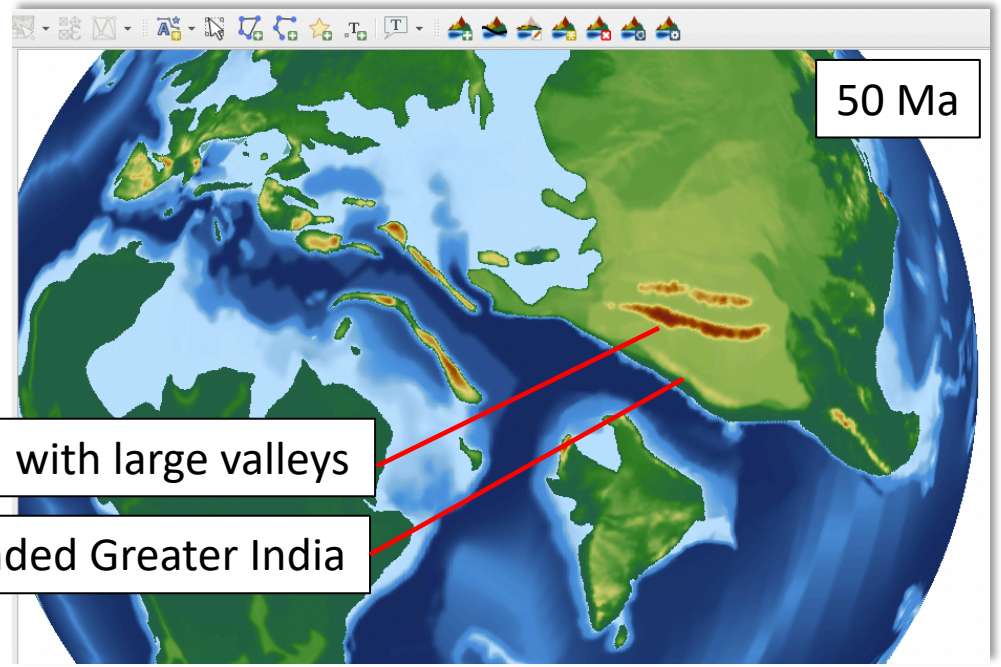
Create “realistic” topography



Preliminary conclusions and perspectives

Preliminary conclusions

- The database is coherent with high plateau and small Tibetan valleys.
- Later (30-20 Ma) regional uplift is coherent with extended Greater India and Arc collision.



Perspectives

- Time slices at 60, 50, 40, 30, 20 Ma.
- Test paleogeographies with numerical simulations (climate, earth surface, source to sink, biotic).
- Refine Terra Antiqua!