

## Supporting Information for:

### Kinematic Evolution of the Tangra Yumco Rift, South-Central Tibet

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#### Introduction

The supporting information includes tables that provide detailed information for sample locations, raw U-Pb data, and raw zircon (U-Th)/He thermochronology data.

**Figure S1.** Compilation of previous studies reporting geo- and thermochronology data in and around the Tangra Yumco Rift.

**Figure S2.** Igneous zircon U-Pb weighted mean age plots for samples collected from TYC and Gangdese rift footwalls.

**Figure S3.** Zircon (U-Th)/He thermochronology plots of age versus grain size and age versus effective uranium (eU) .

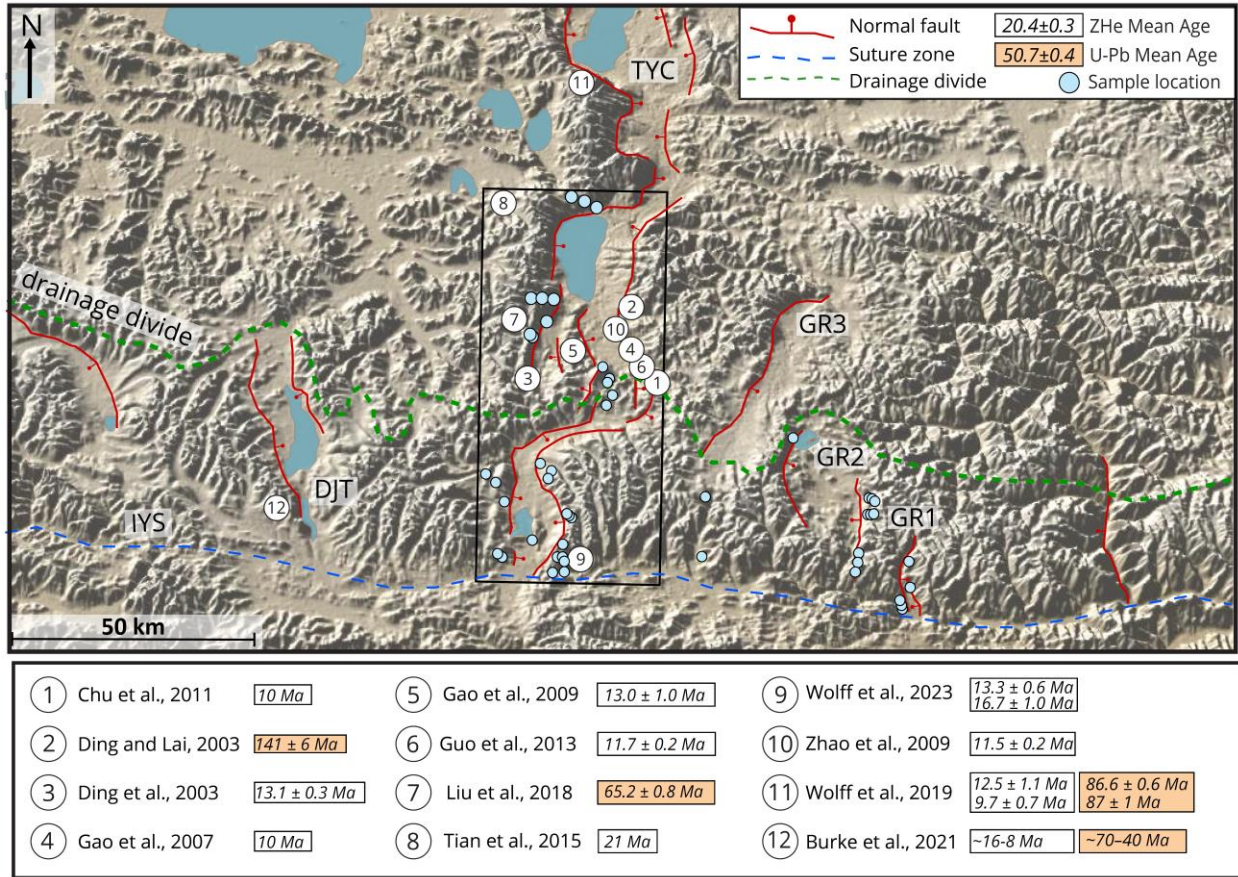
**Figure S4.** Complete HeFTy thermal modeling results for all samples with both Igneous Zircon U-Pb data results and Zircon (U-Th)/He thermochronology data results.

**Table S1.** Sample location and lithology data.

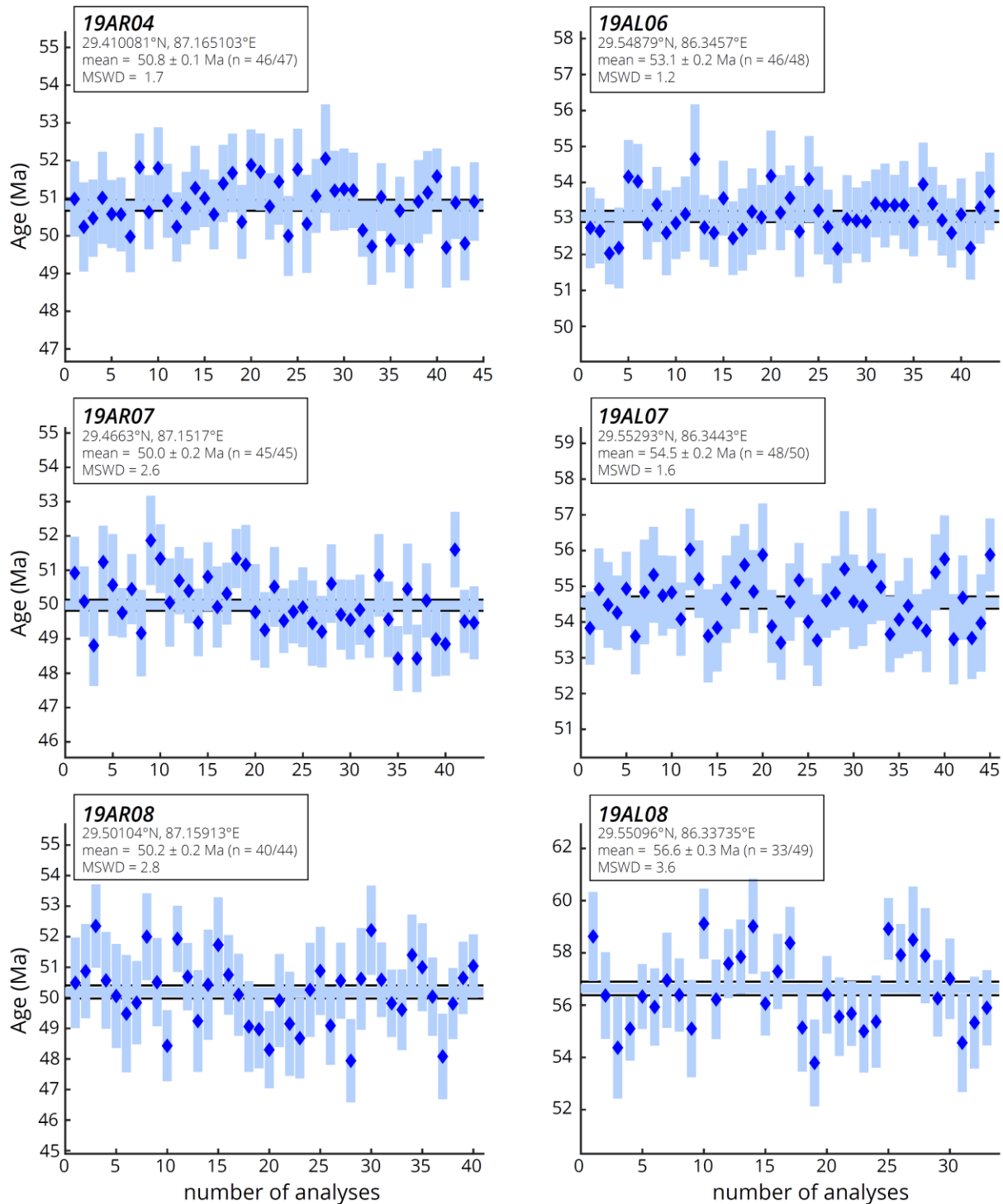
**Table S2.** Igneous Zircon U-Pb data.

**Table S3.** Zircon (U-Th)/He thermochronology data.

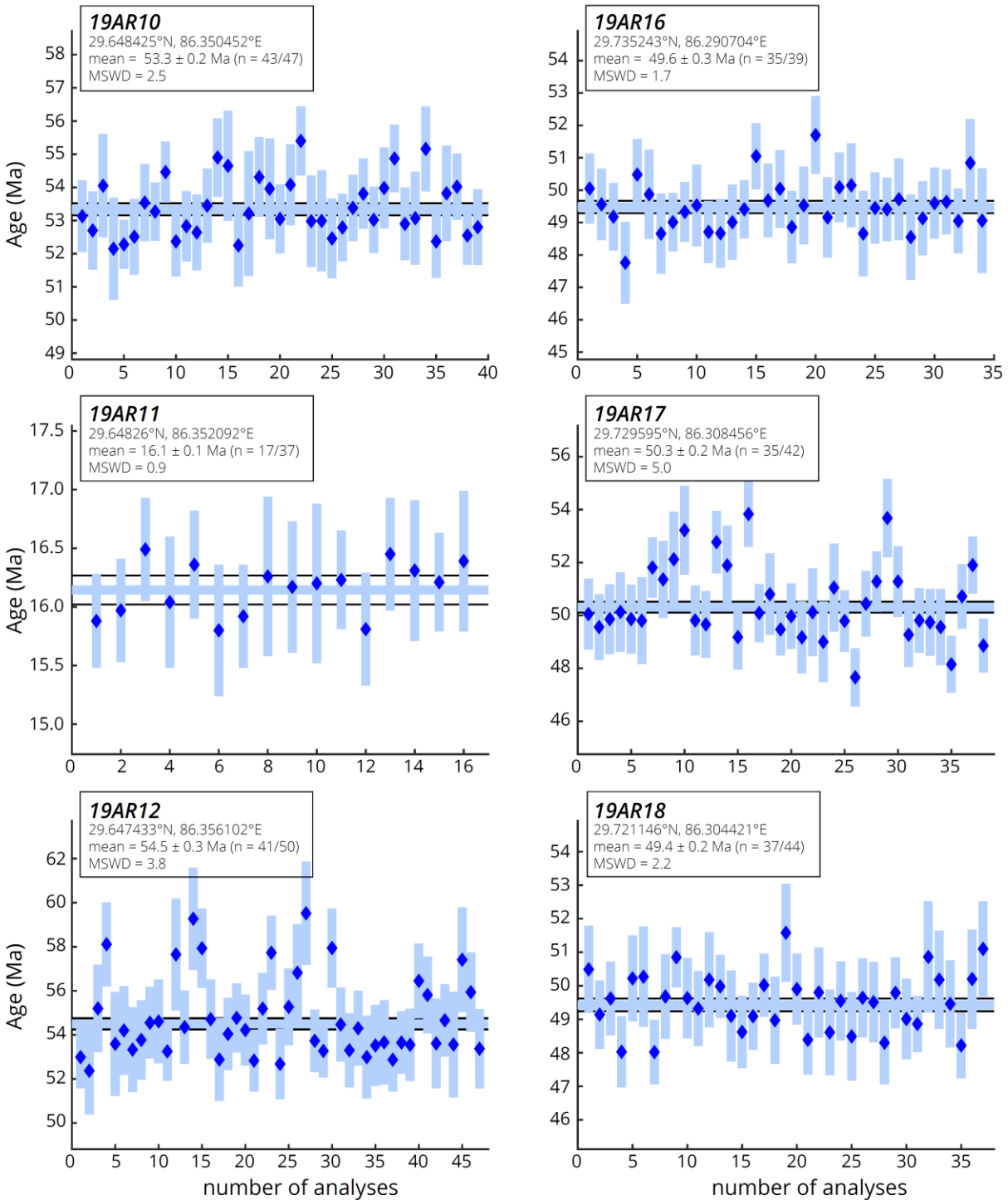
**Table S1, Table S2, and Table S3 can be accessed at the following source:** Reynolds, A. (2023). Kinematic Evolution of the Tangra Yumco Rift, South-Central Tibet: Supplementary Data Tables [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.10003843>



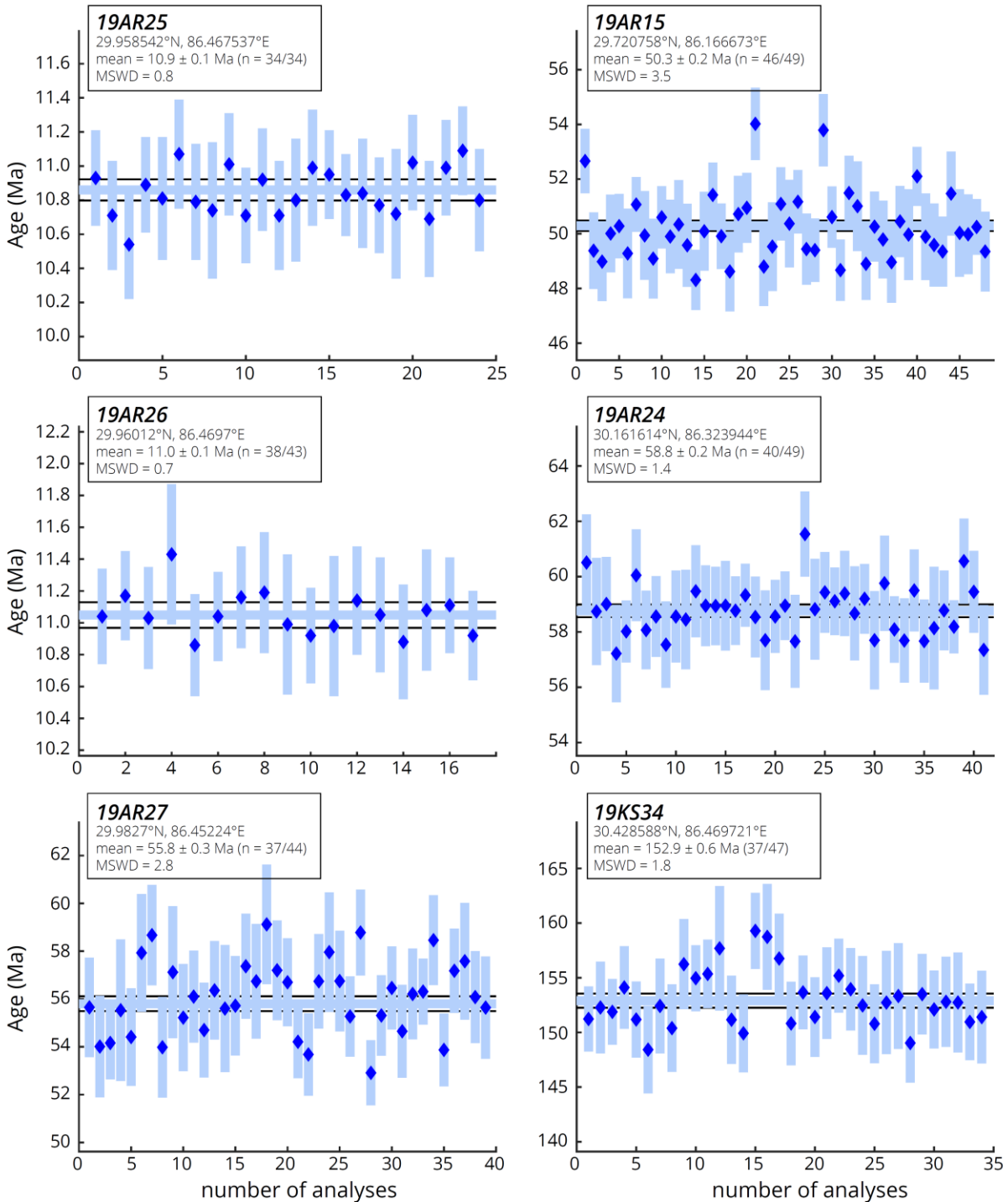
**Figure S1.** Digital elevation model of the South-Central Tibetan Plateau, showing locations of the drainage divide along the crest of the Gangdese Range (green), Tangra Yumco Rift (TYC; Wolff et al., 2018; this study), Gangdese Rifts cutting the high topography of the Gangdese Range including the Daijaimang Tso rift (DJT; Burke et al., 2021) and other previously unnamed rifts (e.g., GR1, GR2, GR3). The black box shows the extent of geologic mapping in South TYC (Fig. 5). Suture zones shown as dashed blue lines; BNS = Bangong- Nujiang suture; IYS = Indus-Yarlung suture. The black box shows the extent of geologic mapping in South TYC (Fig. 5). Fault traces primarily from HimaTibet database (Styron et al. 2010). Topography from GeoMapApp, VE = 4. Data source: Tibetan Magmatism Database, Chapman & Kapp, 2017 (doi: 10.1002/2017GC007217).



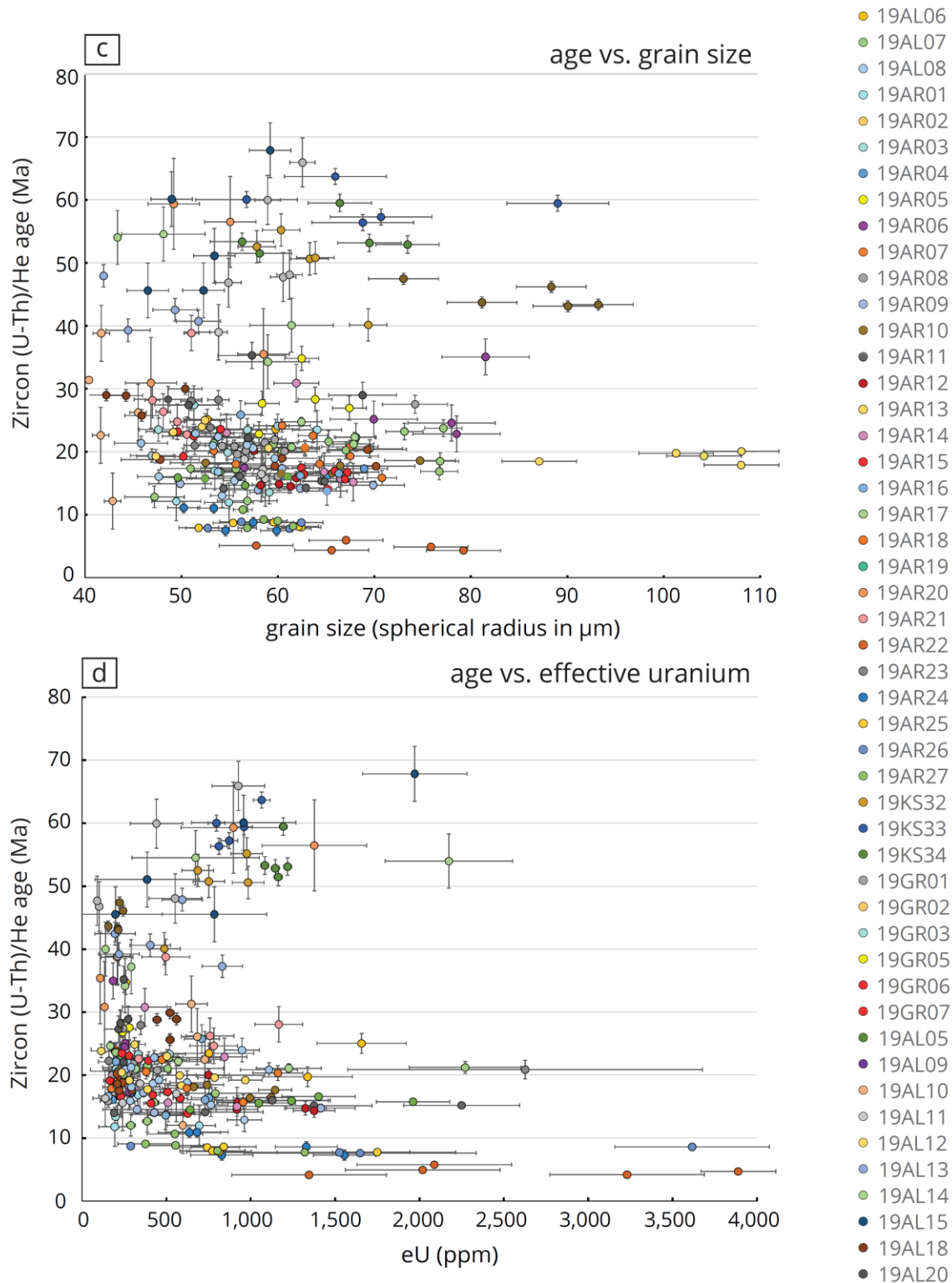
**Figure S2.** Igneous zircon U-Pb weighted mean age plots for samples collected from TYC and Gangdese (19AR04, 19AR07, 19AR08) rift footwalls. Ages reflect the timing of latest crystallization with plots for samples 19AR11, 19AR25, and 19AR26 representing youngest age populations (Fig. 6). Grains with >1000 ppm Uranium and ages outside of  $2\sigma$  error were considered outliers and not plotted or included in MSWD calculations. Sample locations shown on geologic map (Fig. 4).



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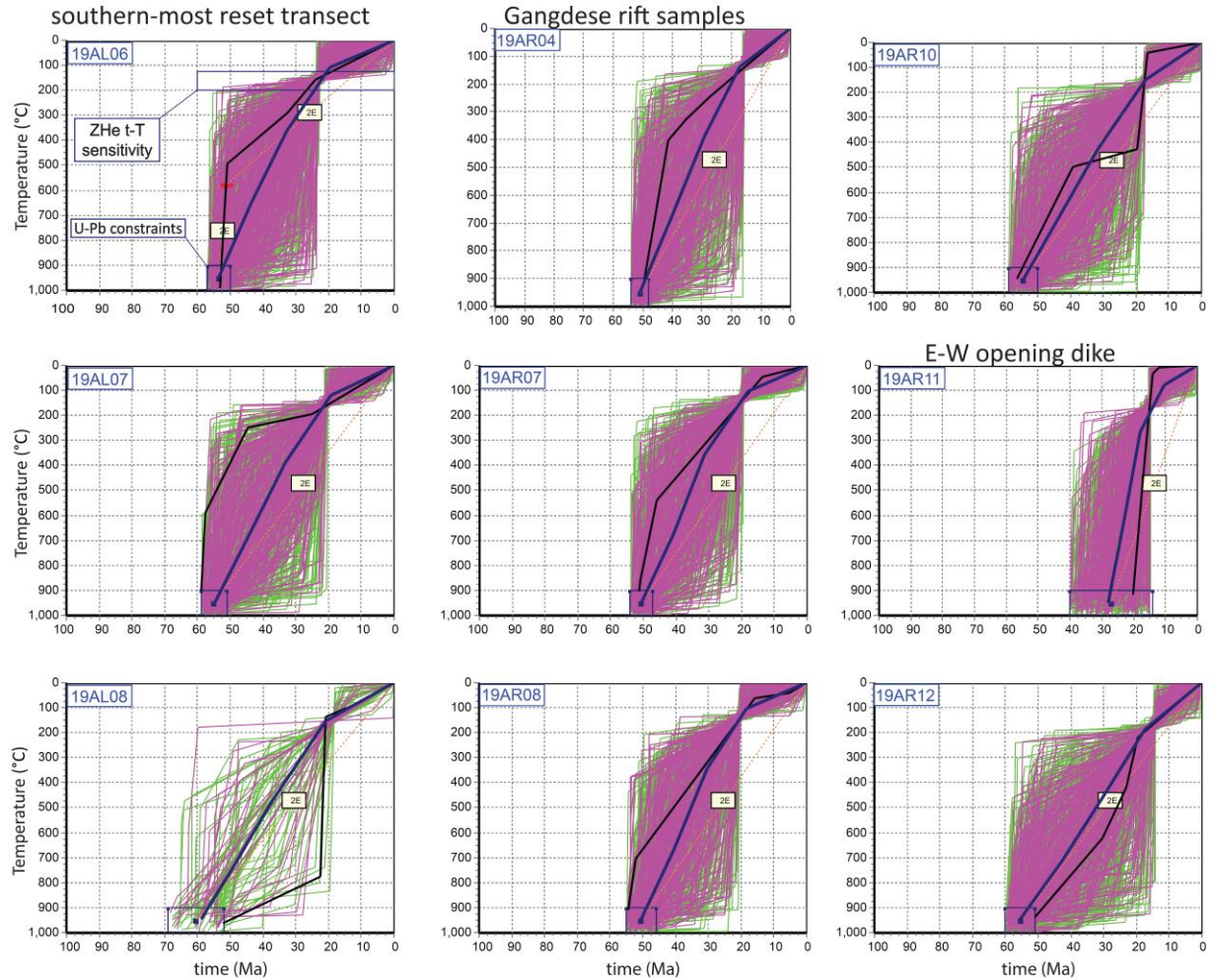


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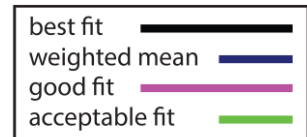


**Figure S3.** Plots of Zircon (U-Th)/He (ZHe) age versus grain size (c) and ZHe age versus effective uranium (d). Samples show no clear correlation between age and grain size or age and effective uranium. Sample locations shown on geologic map (Fig. 4) and reported in supplementary data (Table S1).

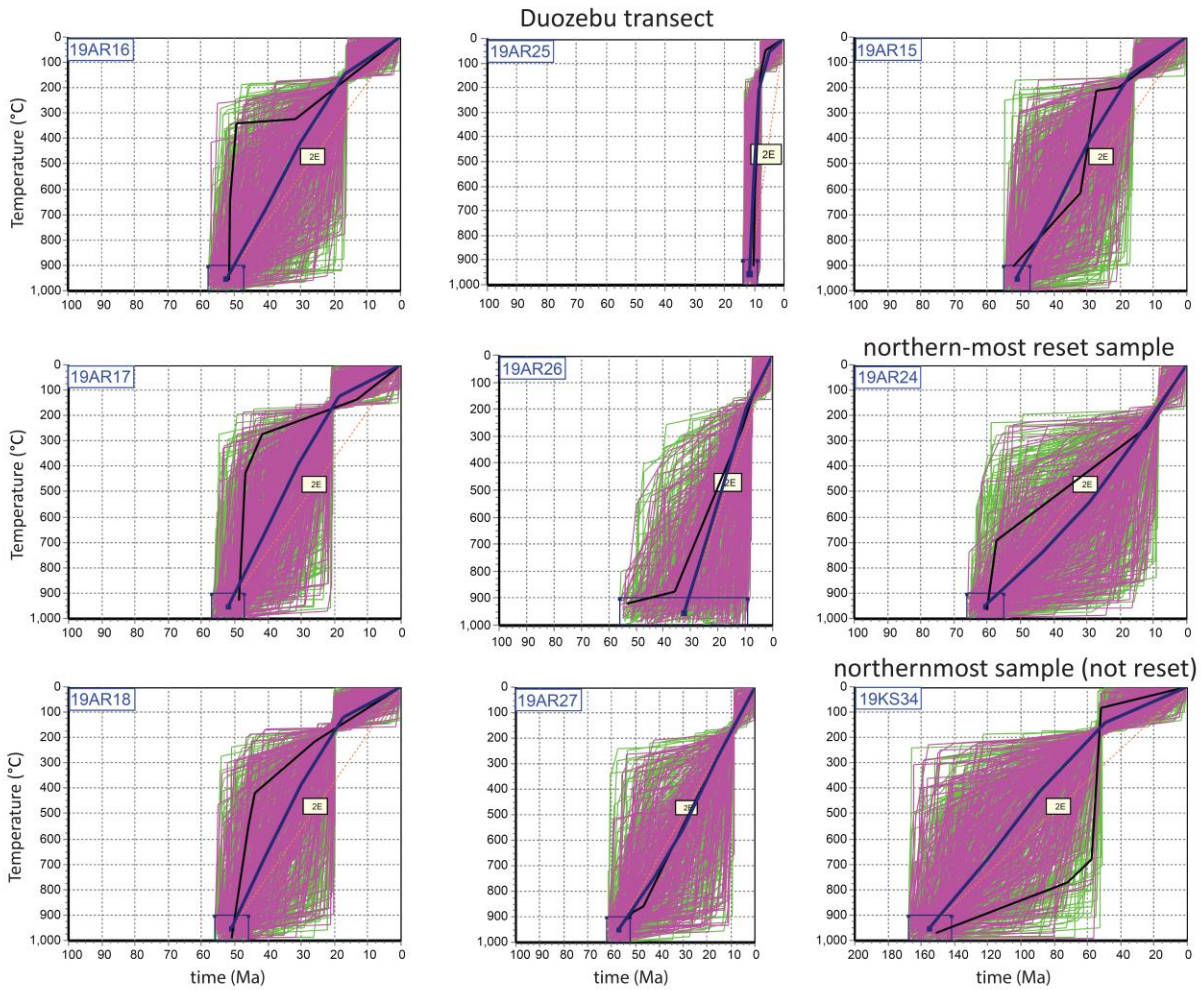
## HeFTy Modeling Results (paths)



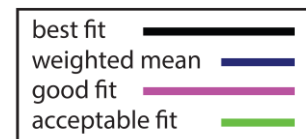
**Figure S4:** HeFTy models for samples from the TYC rift showing best fit (black), weighted mean (dark blue), good fit (pink), and acceptable fit (green) paths. Model paths ( $n = 50,000$ ) initiate within time-Temperature constraints from U-Pb dating ( $>900^{\circ}\text{C}$ , blue boxes). Paths end at the surface ( $20\text{--}0^{\circ}\text{C}$ ) at present day ( $0\text{ Ma}$ ) and are dominantly constrained by ZHe t-T sensitivities established by age and diffusion parameters specific to the median grain for each sample.



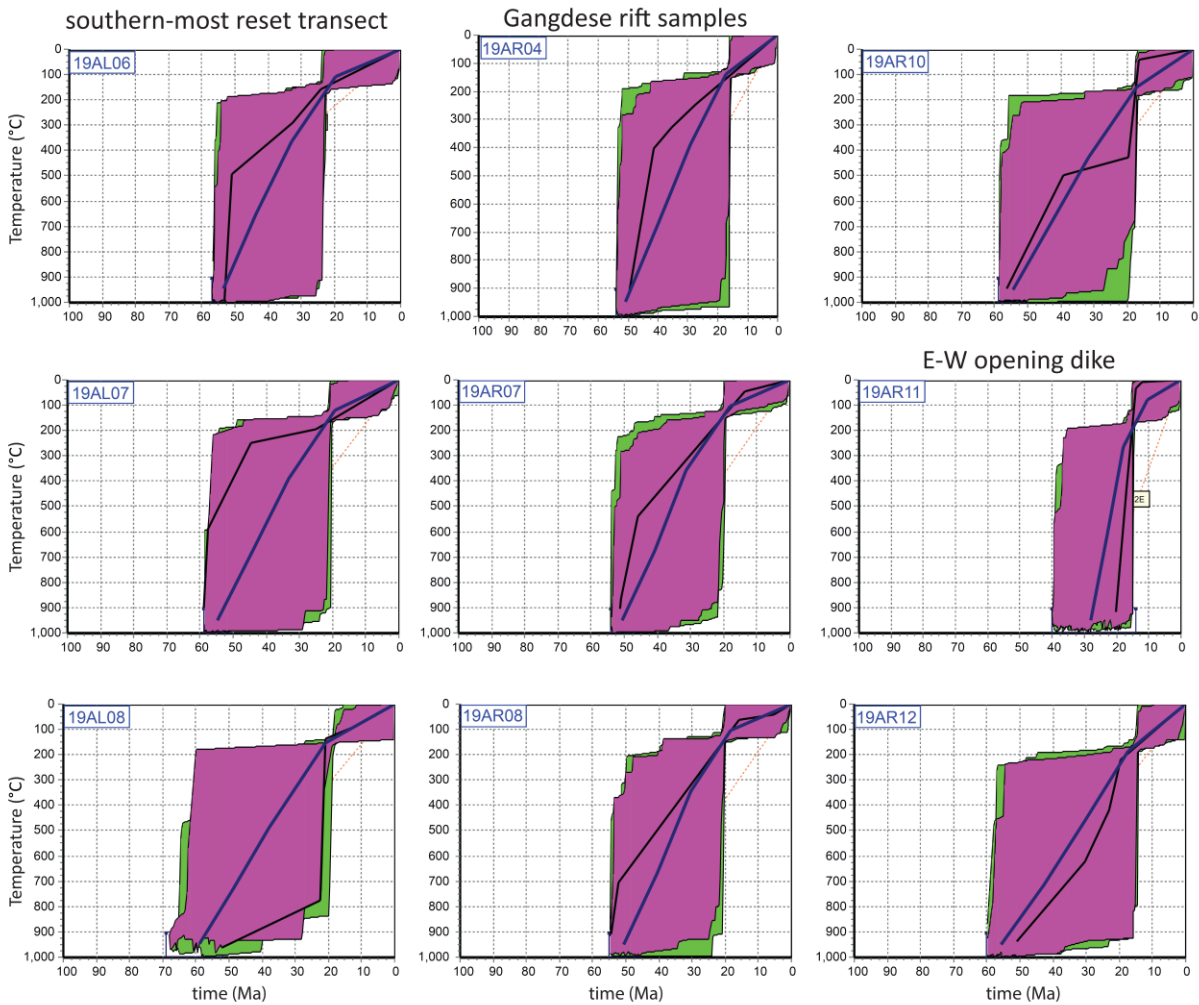
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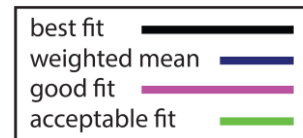
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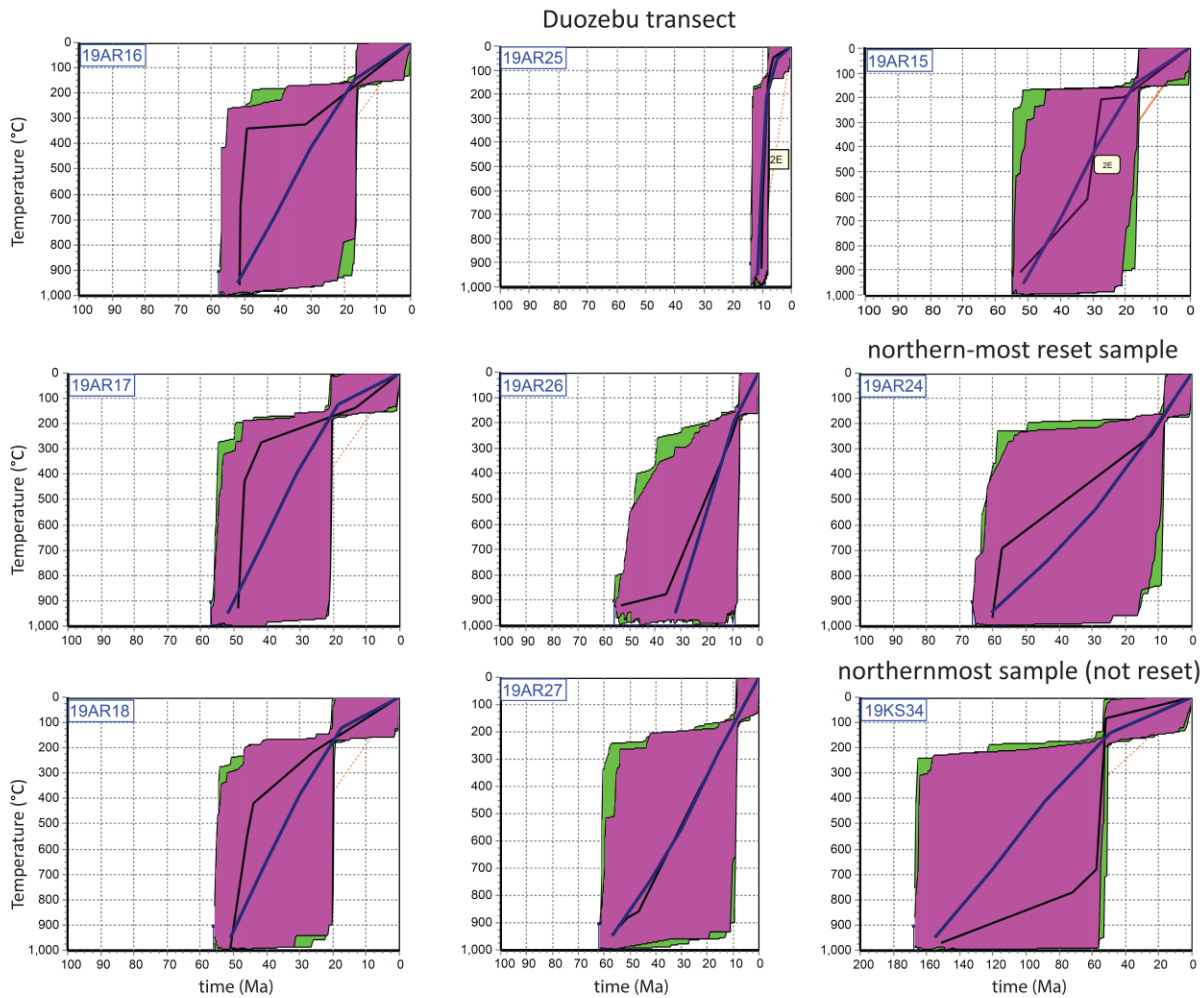
## HeFTy Modeling Results (path envelopes)



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