A) Original Geometry - Split KT - Python Topography

B) Original Geometry - Split KT - Template Topography

C) Original Geometry - Split KT - No Topography

D) Original Geometry - Early KT - Python Topography

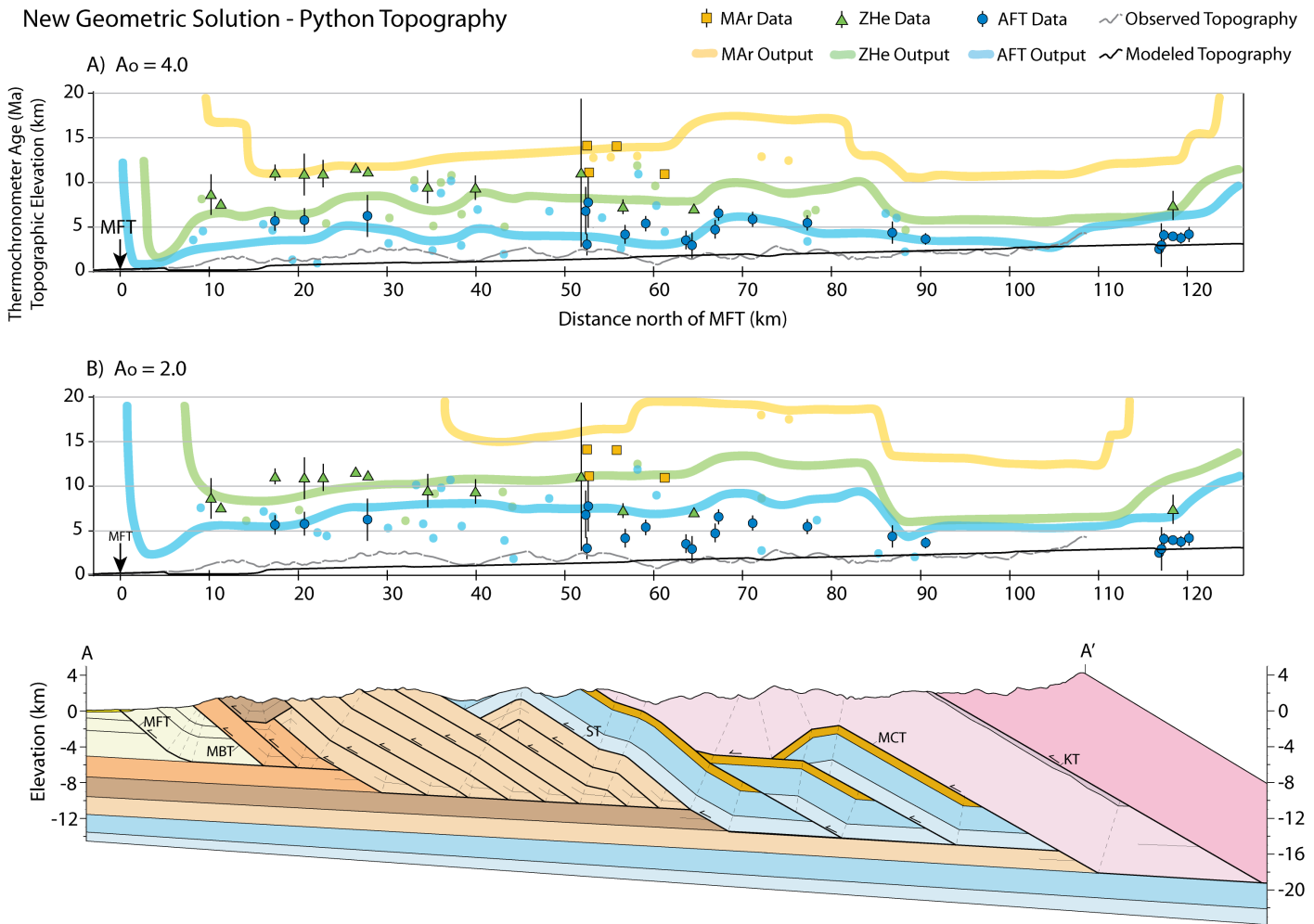
E) Original Geometry - Late KT - Python Topography

F) Modified Geometry - Split KT - Python Topography - Best Fitting Model

G) Modified Geometry - Split KT - No Topography

H) Modified Geometry - Split KT - Python Topography - Poor Thermal Fit

I) Modified Geometry - Split KT - Python Topography - Poor Structural Fit

Supplemental figure 1: Flexural modeling output of the Trashigang section for all models presented in Sections 4 and 5.

Supplementary Figure 2: Separate plots of predicted MAr, ZHe, and AFT cooling ages compared to published thermochronometer data using a thermal model with Ao of 2.0 μW/m³ (a) and 4.0 μW/m³ (b). The flexural model of the modified geometry used with Python Topography and Split KT scenario.

Supplemental Table 1:

a)
Published Thermochronologic Data Along Trashigang Cross-Section: Spatial Information

Study	Sample	Unit	Elevation (m)	Longitude (°E)	Latitude (°N)	Distance N of MFT (km)
Long et al. [2012]	BU07-53	Pzg	655	91.48011	26.86572	10.2
Long et al. [2012]	BU07-54	Pzd	700	91.48028	26.87497	11.3
Long et al. [2012]	BU07-33	Pzd	1710	91.54794	26.93311	17.4
Long et al. [2012]	BU07-35	Pzb	1580	91.54761	26.95992	20.7
Long et al. [2012]	BU07-36	Pzb	1785	91.53083	26.97442	22.8
Long et al. [2012]	NBH-18	Pzb	1815	91.52072	27.01200	26.5
Long et al. [2012]	BU07-37	Pzb	2385	91.50142	27.02675	27.8
Long et al. [2012]	BU07-42	Pzb	2165	91.52089	27.08486	34.6
Long et al. [2012]	BU07-43B	Pcd	2315	91.56708	27.13450	39.9
Long et al. [2012]	BU07-55	Pzj	2350	91.52122	27.24222	51.9
Grujic et al. [2006]	BH53	GHlo	2405	91.548083	27.237361	52.5
Grujic et al. [2006]	BH52	GHlo	2350	91.554667	27.236056	52.5
Stuwe & Foster [2001]*	8	GHlo	2540	91.53157	27.24116	52.5
Stuwe & Foster [2001]*	9	GHlo	2480	91.52660	27.24549	52.5
Stuwe & Foster [2001]*	11	GHlo	1750	91.54075	27.27539	55.8
Long et al. [2012]	BH-57	Pcd	605	91.44656	27.27869	56.5
Grujic et al. [2006]	BH60	Pzj	795	91.480667	27.282361	56.8
Grujic et al. [2006]	BH61	GHlo	780	91.491000	27.303417	59.1
Stuwe & Foster [2001]*	12	GHlo	1060	91.54378	27.32288	61.2
Grujic et al. [2006]	BH90	GHlo	910	91.574528	27.344972	63.6
Grujic et al. [2006]	BH64	GHlo	825	91.554472	27.350056	64.3
Long et al. [2012]	BH-78	Pzc	1000	91.63897	27.35144	64.5
Grujic et al. [2006]	BH324	GHlo	1995	91.59683	27.374361	66.9
Grujic et al. [2006]	BH94	Pzc	2050	91.599833	27.375333	67.3
Grujic et al. [2006]	BH100	GHlo	905	91.563722	27.411389	71.1
Grujic et al. [2006]	BH72	GHlo	1420	91.554722	27.465000	77.3
Grujic et al. [2006]	BH66	GHlo	930	91.561139	27.551361	86.8
Grujic et al. [2006]	BH70	GHlo	1760	91.499528	27.584167	90.6

Coutand et al. [2014]	BH-363	GHh	3610	91.37263	27.96956	117.0
Coutand et al. [2014]	BH-351	GHh	3870	91.30357	27.97318	117.1
Coutand et al. [2014]	BH-352	GHh	3880	91.29016	27.97416	117.4
Coutand et al. [2014]	BH-357	GHh	4085	91.29827	27.98563	118.3
Coutand et al. [2014]	BH-355	GHh	4275	91.2987	27.99005	119.3
Coutand et al. [2014]	BH-362	GHh	4300	91.29901	27.99750	120.2

b)

Published Thermochronologic Data Along Trashigang Cross-Section: Cooling Ages

Sample	Central AFT Age (Ma)	2σ Analytical Error (Ma)	Mean ZHe Age (Ma)	2σ Variability Range (Ma)	Reported MAr Age (Ma)	2σ Analytical Error (Ma)
BU07-53	-	-	8.65	2.22	-	-
BU07-54	-	-	7.61	0.28	-	-
BU07-33	5.69	1.04	11.12	0.85	-	-
BU07-35	5.82	1.28	10.91	2.29	-	-
BU07-36	-	-	11.00	1.47	-	-
NBH-18	-	-	11.60	0.03	-	-
BU07-37	6.27	2.34	11.25	0.50	-	-
BU07-42	-	-	9.54	1.82	-	-
BU07-43B	-	-	9.43	1.33	-	-
BU07-55	-	-	11.07	8.27	-	-
BH53	6.9	2.6	-	-	-	-
BH52	7.8	2.8	-	-	-	-
8	-	-	-	-	14.1	0.2
9	3.1	1.2	-	-	11.1	0.4
11	-	-	-	-	14.1	0. 4
BH-57	-	-	7.30	0.77	-	-
BH60	4.2	1.0	-	-	-	-
BH61	5.4	0.8	-	-	-	-
12	-	-	-	-	11.0	0.4
BH90	3.6	1.0	-	-	-	-
BH64	3.0	1.4	-	-	-	-
BH-78	-	-	7.09	0.28	-	-
BH324	4.8	1.0	-	-	-	-

BH94	6.6	0.8	-	-	-	-
BH100	5.9	0.8	-	-	-	-
BH72	5.5	0.8	-	-	-	-
BH66	4.4	1.2	-	-	-	-
BH70	3.7	0.6	-	-	-	-
BH-363	2.5	0.4	-	-	-	-
BH-351	3.0	2.4	-	-	-	-
BH-352	4.1	0.6	-	-	-	-
BH-357	4.0	0.4	7.42	1.56	-	-
BH-355	3.8	0.6	-	-	-	-
BH-362	4.2	0.8	-	-	-	-

Supplementary Table 1: Thermochronometer sample locations and original analysis studies (a), and reported cooling ages (b) used in this study. ZHe ages are based on the mean reported age among all aliquots for each sample; 2σ error shown for ZHe includes variability among aliquots. Reported AFT and MAr data include 2σ analytical error. *Latitude and longitude of samples from Stüwe and Foster [(2001]) were estimated using ESRI ArcMap WGS84 datum.