Shorten, C.M., and Fitzgerald, P.G., 2021, Episodic exhumation of the Appalachian orogen in the Catskill Mountains (New York State, USA): Geology, v. 49, https://doi.org/10.1130/G48011.1

Shorten and Fitzgerald (2020), Episodic exhumation of the Appalachian Orogen in the Catskill Mountains (New York, USA), *Geology*

Supplemental Material

Table S1. Summary of apatite fission-track thermochronology results.

Sample (Strat. Age)	Lat. (°N), Long. (°W) Elev. (m)	No. of Grains	Standard Track Density (x 10^6cm^{-2})	Spontaneous Track Density (x 10^6cm^{-2})	Induced Track Density (x 10^6cm^{-2})	χ^2 prob. (%)	Var. (%)	Age (Ma) (±1σ)	Mean Track Length (μm)	Std. Dev. (μm)	D_{par} (μm)
CAT-1 (LD)	41.9989, -74.3852 1272	18	1.05 (6671)	1.3152 (862)	1.831 (1200)	20.1	12	133 ± 7	12.5 ± 0.2 (34)	1.4	2.34 (0.3)
CAT-2 (LD)	42.0023, -74.4022 1112	14	1.06 (6671)	0.8939 (399)	1.304 (582)	71.0	0	128 ± 9	12.9 ± 0.3 (22)	1.6	2.15 (0.3)
CAT-3 (LD)	42.0074, -74.4204 871	25	1.071 (6671)	1.556 (1705)	2.224 (2437)	66.1	0	132 ± 5	12.9 ± 0.2 (100)	1.6	2.22 (0.3)
CAT-5 (MD)	41.9318, -74.3359 441	21	1.081 (6671)	1.0485 (698)	1.648 (1097)	16.0	11	122 ± 7	12.8 ± 0.2 (40)	1.2	2.39 (0.4)
CAT-6 (MD)	41.9731, -74.3128 281	20	1.091 (6671)	1.0609 (449)	1.843 (780)	17.6	16	114 ± 8	13.1 ± 0.2 (32)	1.1	2.38 (0.4)

Samples listed numerically from highest to lowest elevation, with stratigraphic age: LD – Late Devonian (383-359 Ma); MD – Middle Devonian (393-383 Ma). Location, elevation, and number of grains counted for AFT age included. Standard and induced track densities were counted on mica external detectors and spontaneous track densities were counted on internal apatite mineral surfaces, with the track count in parentheses. All samples were crushed and apatites were separated using conventional heavy liquid and magnetic separation techniques. Apatites were mounted and prepared for AFT thermochronology using standard methods (e.g. Ketcham et al., 2015). Chi-square probability (χ^2 prob.) determines if grains are from a single age population; if the χ^2 value is >5%, it is likely that there is a single age population. Age variation (Var.) is the relative standard deviation of the central age and when variation is low (<~15%) the data are consistent with a single population. The external detector method and zeta calibration approach (Hurford and Green, 1983) was used with a zeta of 353 ± 13 (± 1σ) for Shorten. Central ages are reported (Galbraith and Laslett, 1993). When possible, 100 horizontal confined fission-track lengths per sample were measured using a projection tube and a digitizing tablet (number of tracks measured in parentheses) and standard deviation of fission-track lengths (Std. Dev.) is reported. Mean D_{par} calculated from D_{par} measurements on grains used for AFT age, with std. dev. in parentheses.

Table S2. Summary of (U-Th)/He results.

Grain #	Dim. Mass (mg)	r (µm)	length (µm)	U (ppm)	Th (ppm)	Sm (ppm)	eU	4He (nmol/g)	F_T	Raw Age (Ma)	Corr. Age (Ma)	Full Unc. (Ma)	Analytic Unc. (Ma)
CAT1, Honesdale Formation of the West Falls Group (Late Devonian), 41.9989 °N, -74.3852 °W, 1272 m elevation													
a1	2.9	50.27	124.80	6.78	23.57	17.68	12.3	6.025	0.711	89	124		5.9
a2	2.8	48.97	133.04	10.82	23.91	21.07	16.4	18.757	0.708	206	*288*		*9.8*
a3	5.4	63.79	186.75	0.18	2.25	1.36	0.7	1.281	0.758	323.66	*424*		*30.3*
a4	7.5	69.15	243.03	23.42	44.63	33.82	33.9	28.603	0.789	153	193		5.7
a5	8.7	75.88	194.29	0.11	3.05	32.58	0.8	9.593	0.792	1545.24	*1850*		*69.2*
Mean age ± 1 σ (% std. dev.) of all: 576 ± 721 (125%)													
Mean age ± 1σ (% std. dev.) of grain 1 & 5: 159 ± 49 (31%)													
CAT3, Upper Walton Formation of the West Falls Group (Late Devonian), 42.0074 °N, -74.4204 °W, 871 m elevation													
a1	6.0	64.34	133.12	14.30	74.99	31.06	31.9	14.933	0.769	85	111		3.5
Mean age ± 1σ (% std. dev.): 111 ± 3 (0%)													
CAT5, Moscow Formation of the Hamilton Group (Middle Devonian), 41.9318 °N, -74.3359 °W, 441 m elevation													
a1	1.3	39.02	168.79	26.92	25.60	75.61	32.9	14.750	0.637	81	126	20.39	1.1
a2	1.4	40.16	141.41	14.47	0.00	21.92	14.5	8.720	0.652	109	164	22.23	2.8
a3	9.2	81.00	273.30	1.54	12.39	12.86	4.5	6.271	0.806	251	*309*	*22.61*	*3.4*
a4	6.0	75.59	137.58	5.43	108.06	21.46	30.8	10.986	0.786	65	83	5.99	0.6
a5	2.5	53.56	169.22	22.55	107.94	22.66	47.9	26.276	0.714	100	140	10.23	1.2
Mean age ± 1σ (% std. dev.) of all: 164 ± 86 (52%)													
Mean age ± 1σ (% std. dev.) of grain 1, 2, 4 & 5: 128 ± 34 (27%)													

Analyses were completed by CU TRaIL. Dim. Mass = dimensional mass of grain calculated from crystal volume and average apatite density; r = radius of a sphere with equivalent surface area to volume ratio as the grain; l = longest dimension of the grain. Concentrations of U, Th and Sm measured via isotope dilution on an ICP-MS. eU is the effective Uranium, calculated as [U] + 0.235[Th] (e.g. Flowers et al., 2009). Grains were degassed by heating with a laser to determine the amount of ^{4}He (nmol/g) in the grain. Alpha ejection correction (F_T) is a measure of the amount of He ejected from the crystal, values <0.65 (grey) indicate that a significant amount of He was ejected (e.g. Ketcham et al., 2011). Each grain degassed was followed by a re-extract to ensure there was no ^{4}He gas remaining in the crystal. If residual ^{4}He was measured the sample was rejected, as this typically indicates the presence of [U]-rich inclusions. Ages and F_T were calculated using methods described in Ketcham et al. (2011). Raw Age = age calculated from isotope concentrations, without F_T correction; Corr. Age = age calculated from isotope concentrations, with F_T correction (outliers in red, italics); Error = 2σ analytical uncertainty (not incorporating F_T uncertainty). Summarized in italics is the mean age of the single-grain corr. ages with 1σ error on the ages and in bold italics the mean age and 1σ error without outliers, with coefficient of variation (% std. dev.) in parenthesis. Exclusion of outliers is discussed in text. Averaging grain ages and determining variation of single-grain ages is after: Ault, A.K., Flowers, R.M., and Bowring, S.A., 2013, Phanerozoic surface history of the Slave craton: Tectonics, v. 32(5), p. 1066–1083. Coefficient of variation (% std. dev.) is calculated from the ratio of the standard deviation to the mean and indicates the variation of single-grain ages from the mean age.

Table S3. CU TRaIL notes on apatite grains used for AHe analyses**.**

Grain #	Corr. Age (Ma)	Analytic Unc. (Ma)	Notes
CAT1, Honesdale Formation of the West Falls Group (Late Devonian), 41.9989 °N, -74.3852 °W, 1272 m elevation			
a1	124	5.9	broken segment, surface heavily pitted, tough to see inclusions, goes completely dark in XPL, fractures and brownish coloration
a2	288	9.8	broken segment, surface heavily pitted, tough to see inclusions, goes completely dark in XPL, fractures and brownish coloration
a3	*424*	*30.3*	broken end, many surface pits though interior appears clear. Crack visible inside. Goes completely dark in xpl, but may have small inclusions
a4	193	5.7	many surface pits, but interior appears clear. Fracture shines in XPL. Broken segment. May have inclusions
a5	*1850*	*69.2*	many surface pits, but interior appears clear. dark in XPL. Broken segment. Brownish coloration in the interior. May have small inclusions
			Mean age ± 1 σ (% std. dev.) of all: 576 ± 721 (125%) *Mean age ± 1σ (% std. dev.) of grain 1, 2 & 5: 202 ± 82 (41%)* ***Mean age ± 1σ (% std. dev.) of grain 1 & 5: 159 ± 49 (31%)***
CAT3, Upper Walton Formation of the West Falls Group (Late Devonian), 42.0074 °N, -74.4204 °W, 871 m elevation			
a1	111	3.5	large, 2 fractured ends, no visible inclusions, surface a bit marked but most is clear enough to see through
			Mean age ± 1σ (% std. dev.): 111 ± 3 (0%)
CAT5, Moscow Formation of the Hamilton Group (Middle Devonian), 41.9318 °N, -74.3359 °W, 441 m elevation			
a1	126	1.1	clear, no inclusions, looks like 2 pyr
a2	164	2.8	clear, no inclusions, looks like 1 pyr
a3	*309*	*3.4*	very rounded, heavily pitted, no obvious inclusions, some marks and fractures could obscure small incl., blue and reddish brown intf colors, seems to be apatite (lower relief than zircons in same sample)
a4	83	0.6	very rounded, heavily pitted, could be broken tip, no obvious inclusions, some marks and fractures could obscure small incl., blue and reddish brown intf colors, seems to be apatite (lower relief than zircons in same sample)
a5	140	1.2	very rounded, heavily pitted, no obvious inclusions, some marks and fractures could obscure small incl., blue and reddish brown intf colors, seems to be apatite (lower relief than zircons in same sample)
			Mean age ± 1σ (% std. dev.) of all: 164 ± 86 (52%) ***Mean age ± 1σ (% std. dev.) of grain 1, 2, 4 & 5: 128 ± 34 (27%)***

Inverse Thermal Modeling

Inverse thermal modeling is a valuable tool to convert thermochronologic data into interpretable information and it is crucial to include information on modeling inputs and parameters so others may evaluate and reproduce the results (e.g. Flowers et al., 2015). Flowers et al. (2015) recommends a model input table to standardized thermochronological modeling reporting. The table (below) includes information on the apatite fission track (AFT) and apatite U-Th/He (AHe) data, geologic constraints, and system- and model-specific parameters.

Also included, is a discussion on the development of the appropriate post-depositional constraint boxes and screenshots of HeFTy v1.9.3 inverse thermal models (Ketcham et al., 2007). The models include: temperature-time (*T-t*) path envelopes (good paths in purple and acceptable paths in green), best-fit path (black line), weighted mean path (thick blue line), constraint boxes (explained in the geologic constraints section of the table), AFT track length distributions (red) and modeled distribution (green line), modeled vs. measured AFT age and mean track length with goodness-of-fit (GOF), age of oldest fission track that has not been completely annealed (Old), AHe diffusion profile and GOF statistics when present, and vitrinite reflectance (%R_o) GOF statistics.

As discussed in the paper, all the AHe data contains single-grain age variation with significantly older outliers (Supplementary Table 2). Adding AHe data to models generally yielded better constrained "good" and "acceptable" *T-t* path envelopes through the AHe partial retention zone (~30-90 °C), although for sample C1 (CAT-1) there were no good or acceptable modeled paths when AHe was included. Given the significant variation of AHe single-grain ages and lack of kinetic parameter for that method, when the model was unable to produce paths with both AFT and AHe data, AFT data was used exclusively.

Thermal history model input table for Slide Mountain, Catskills, NY thermochronologic data

1. Thermochronologic data

Samples and data used in models

	Model: C1	C2	C3	C5	C6	Data Source	All data needed for modeling published?	
AFT data								
C1	X					Sup. Table 1	no	summative only, details given upon request
C2		X				Sup. Table 1	no	summative only, details given upon request
C3			X			Sup. Table 1	no	summative only, details given upon request
C4						Sup. Table 1	no	did not yield sufficient apatite grains for AFT
C5				X		Sup. Table 1	no	summative only, details given upon request
C6					X	Sup. Table 1	no	summative only, details given upon request
AHe data								
C1, a1	*					Sup. Table 2	yes	*model attempted to include this data but was unsuccessful
C1, a4	*					Sup. Table 2	yes	*model attempted to include this data but was unsuccessful
C3, a1			X			Sup. Table 2	yes	
C5, a4				X		Sup. Table 2	yes	

Data treatment, uncertainties, and other relevant constraints

AFT data	*Zeta calibration:* 353 ± 13 (Shorten) *Additional information on data included in supplementary table 1*
AHe data	*Analyses completed by CU TRaIL lab. Additional information on data and grain quality included in supplementary table 2 and 3.*

2. Additional geologic information

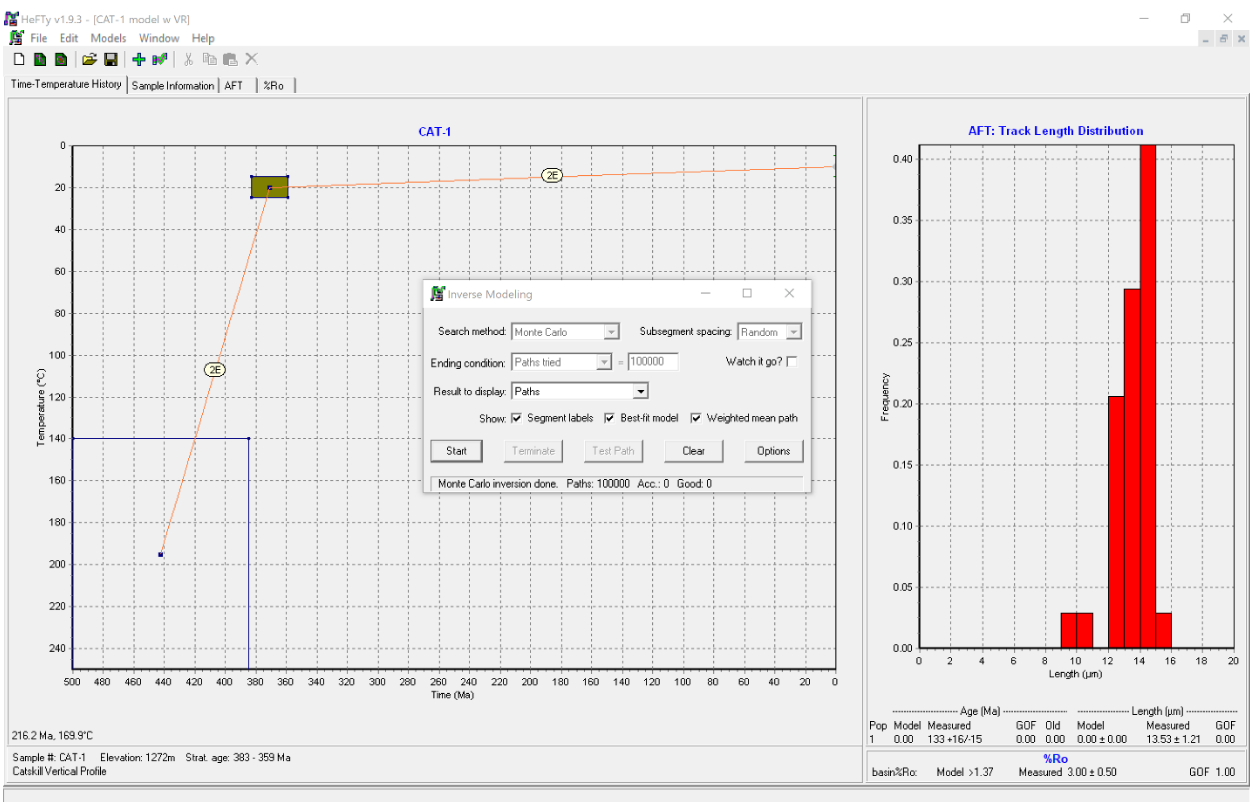
Constraint	***Explanation and data source***
Apatite sourced from >140 °C by ca. 385 Ma	Based on discussion in Ver Straeten (2013), also previously used in Shorten and Fitzgerald (2019).
Deposition at stratigraphic age and 20 ± 5 °C	Woodrow et al. (1973). Paleogeography/paleoclimate at the deposition sites of the Dev. Catskill… facies. GSA Bull., 84, 3051–
Peak temperatures were ~215-235 °C	Based on basin%Ro model (Nielsen et al., 2017) applied to %Ro isogrades from Ryder et al. (2013)
At surface temperature of 10 ± 5 °C by 0 Ma	Hijmans et al. (2005). Very high resolution interpolated climate surfaces for global land areas. Int. J. Climatol., 25, 1965–1978.

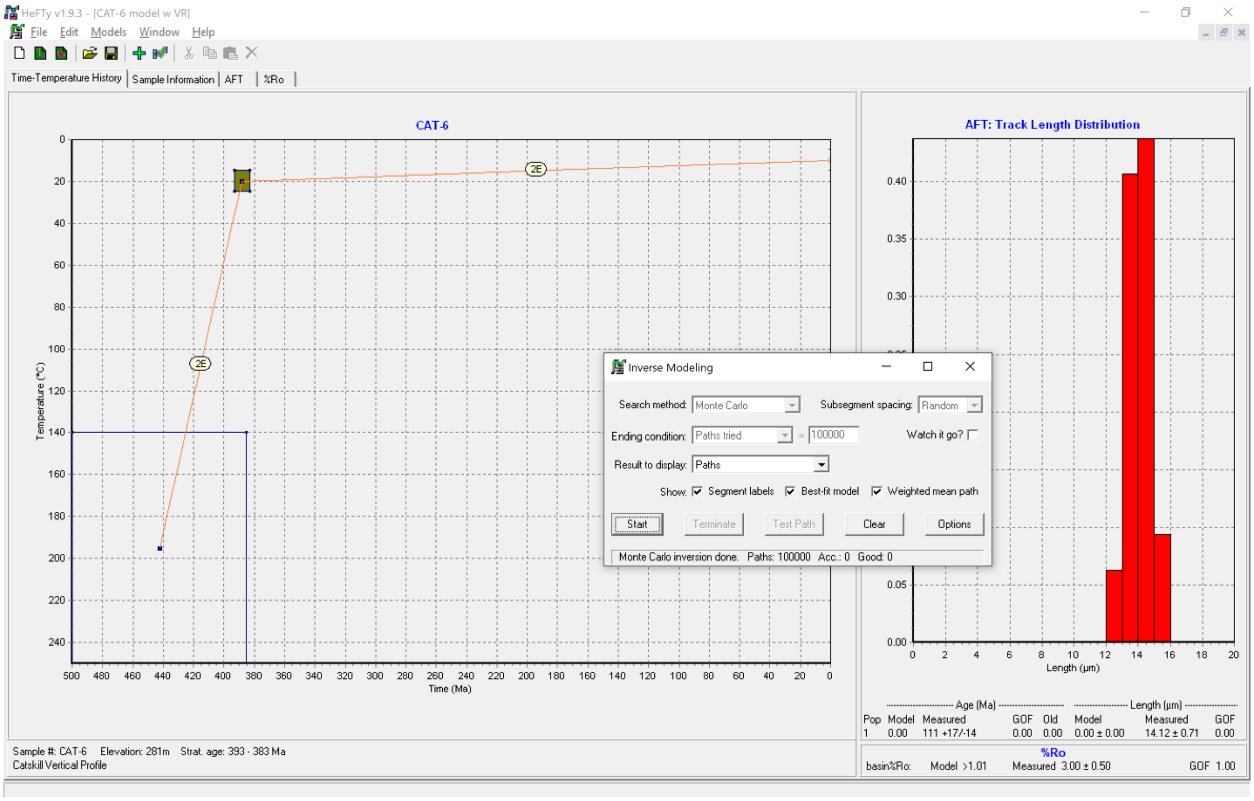
3. System- and model-specific parameters

Model	*Modeling program:* HeFTy v1.9.3 *Statistical fitting criteria:* Default. GOF values >0.05 are acceptable fits. GOF values >0.5 are good fit *Ending condition:* 10 Good Paths
AFT	*Annealing model:* Ketcham et al., 2007 *C-axis projection:* Ketcham et al., 2007, 5.0M; model used c-axis projected lengths *Default initial mean track length:* From Dpar (16.3 µm)*; Length reduction in standard: 0.893* *Kinetic parameter:* Dpar (µm), one kinetic population *Dpar Calibration:* 0.96*; Length Calibration:* 1.01
AHe	*Calibration:* RDAAM, Apatite (Flowers et al., 2009); *Precision:* Good *Stopping distances:* Ketcham et al., 2011; *Alpha calculation:* Redistribution *Age to report:* Corrected; *Alpha age correction:* Ketcham et al., 2011
%Ro	*Calibration:* basin%Ro (Nielsen et al., 2017)*; Data type: %Ro,max*

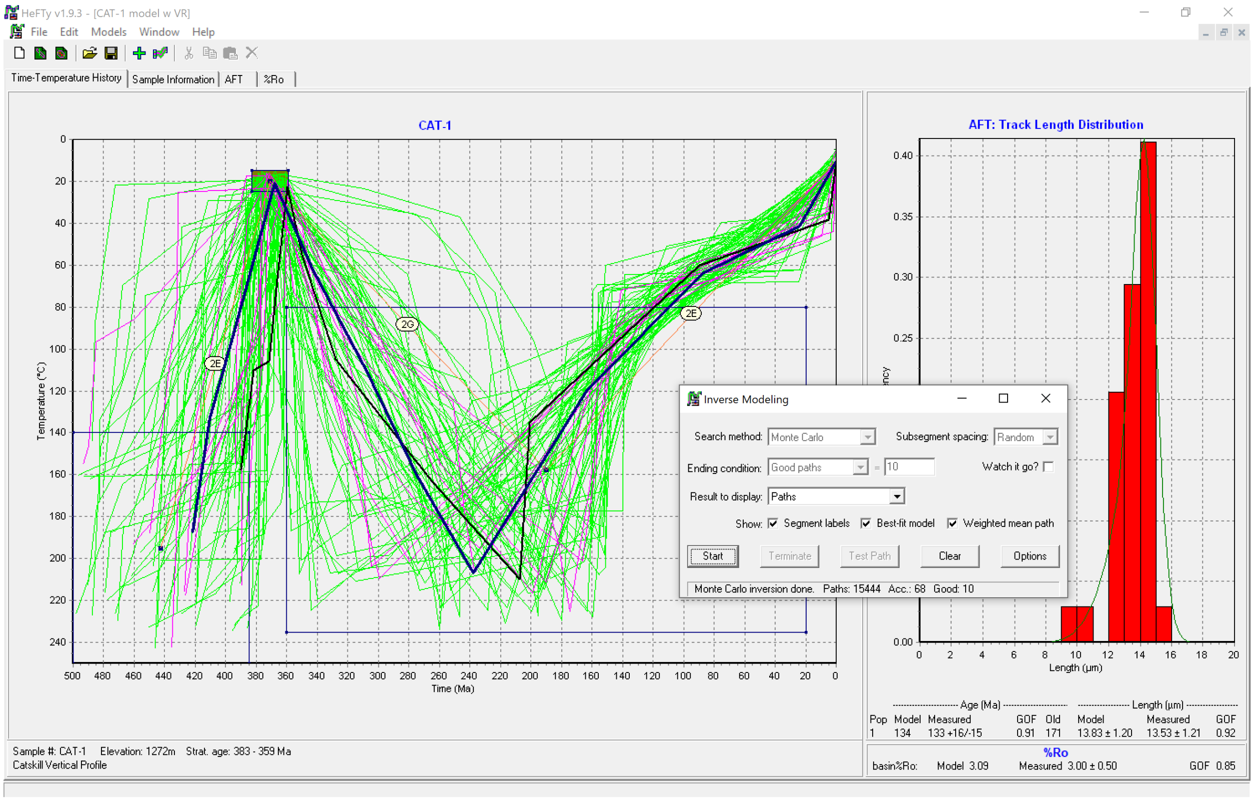
Development of post-depositional constraint boxes for inverse thermal modeling

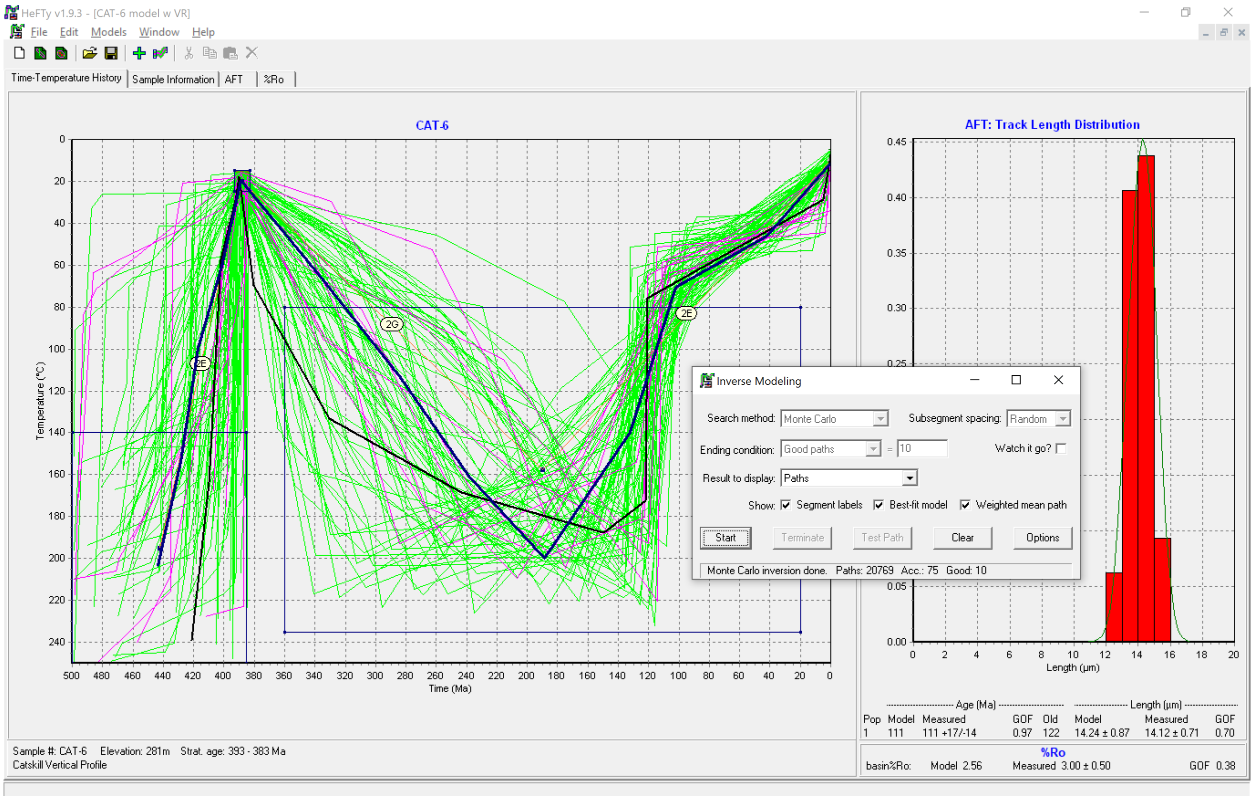
Several iterations of models were run to determine the most likely shape of post-depositional thermal histories and best define constraint boxes. Samples CAT-1 (C1) and CAT-6 (C6) are included in the discussion as representative model iterations, although the process was completed on all 5 samples. The first iteration included only constraint boxes for provenance (500-385 Ma, >140 °C; Ver Straeten, 2013), deposition (stratigraphic age, 20 ± 5 °C), and present day (0 Ma, 10 ± 5 °C). As shown below, no good or acceptable paths were produced by 10,000 path iterations.



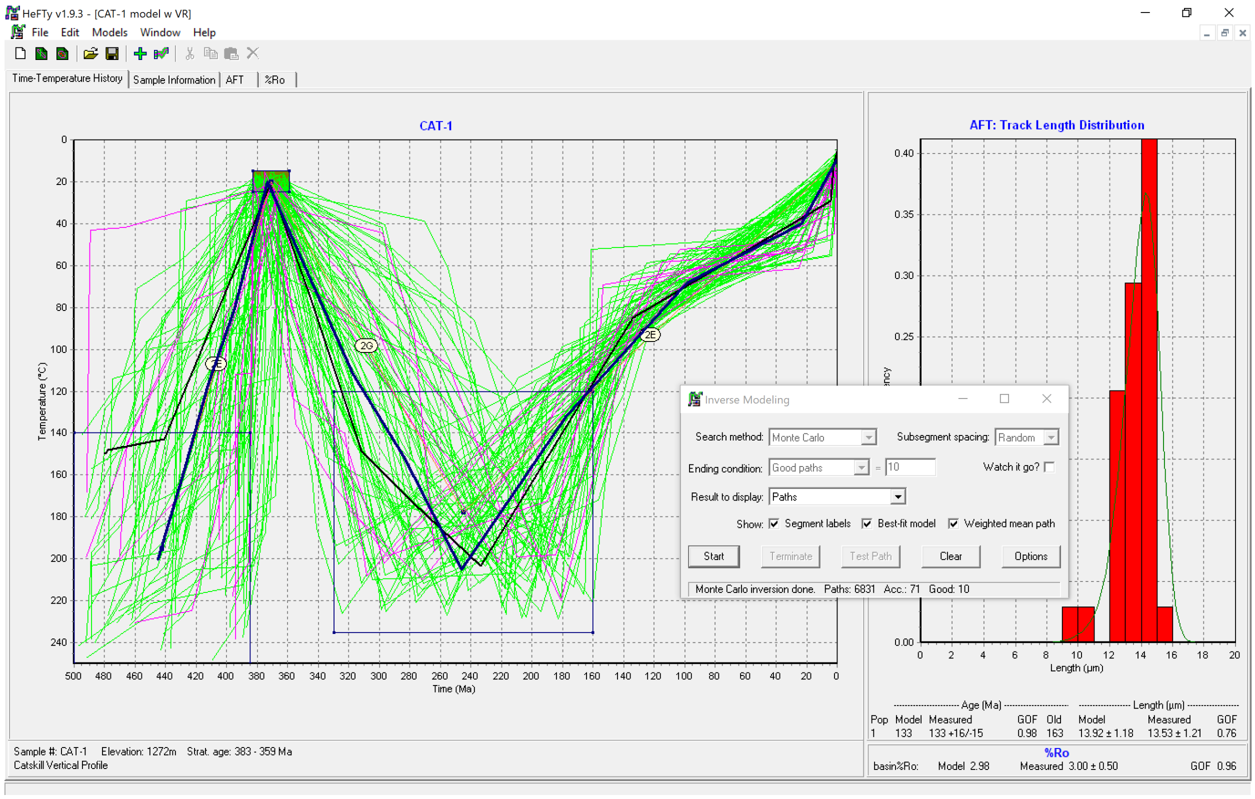

HeFTy v1.9.3 - [CAT-6 model w VR]
File Edit Models Window Help
Time-Temperature History
Sample Information
AFT
%Ro
CAT-6
Temperature (°C)
Time (Ma)
AFT: Track Length Distribution
Length (µm)
Inverse Modeling
Search method: Monte Carlo
Subsegment spacing: Random
Ending condition: Paths tried = 100000
Watch it go?
Result to display: Paths
Show: Segment labels Best-fit model Weighted mean path
Start
Terminate
Test Path
Clear
Options
Monte Carlo inversion done. Paths: 100000 Acc.: 0 Good: 0
Age (Ma)
Length (µm)
Pop Model Measured GOF Old Model Measured GOF
1 0.00 111 +17/-14 0.00 0.00 0.00 ± 0.00 14.12 ± 0.71 0.00
%Ro
basin%Ro: Model >1.01 Measured 3.00 ± 0.50 GOF 1.00
Sample #: CAT-6 Elevation: 281m Strat. age: 393 - 383 Ma
Catskill Vertical Profile

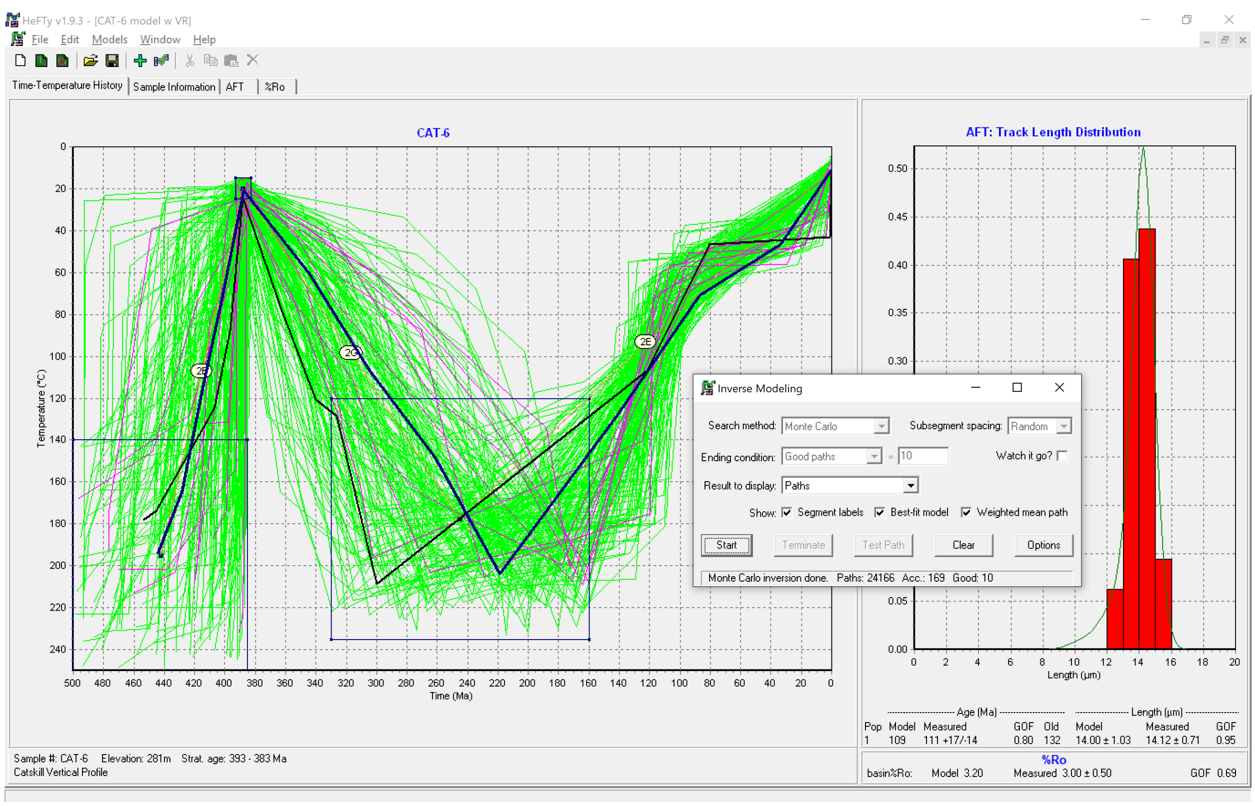
The addition of a large post-depositional constraint box (360-20 Ma, 80-235 °C) allowed the models to explore the *T-t* space and begin to constrain good and acceptable paths.



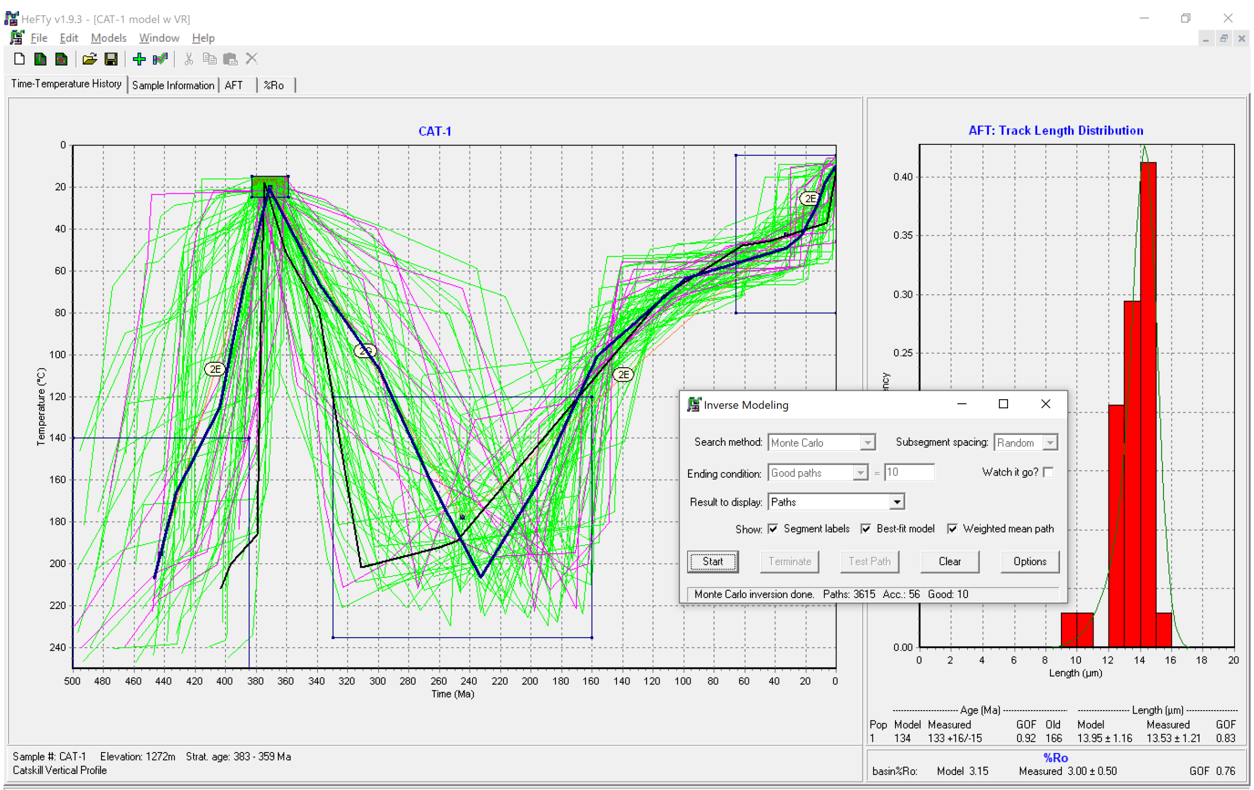


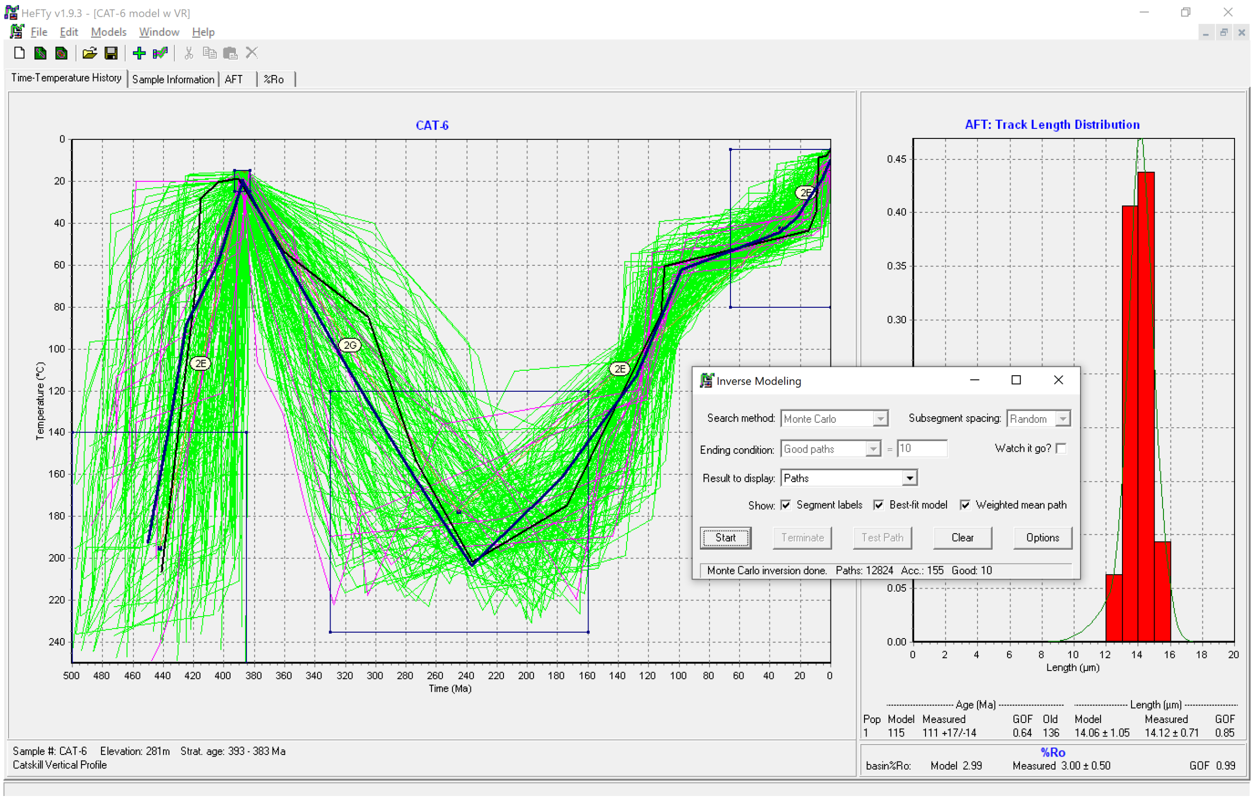
Then, based on vitrinite reflectance (%Ro) values and the base of the partial annealing zone (PAZ, 120 °C), we further constrained the box to correspond with maximum paleotemperatures reached during or shortly after the Alleghenian orogeny and by the onset of rifting (330-160 Ma, 120-235 °C; Ettensohn, 2008; Ver Straeten, 2013). Using the base of the PAZ, this box allows fission tracks to be fully reset before cooling.


HeFTy v1.9.3 - [CAT-1 model w VR]
File Edit Models Window Help
Time-Temperature History
Sample Information
AFT
%Ro
CAT-1
Temperature (°C)
Time (Ma)
AFT: Track Length Distribution
Length (µm)
Inverse Modeling
Search method: Monte Carlo
Subsegment spacing: Random
Ending condition: Good paths = 10
Watch it go?
Result to display: Paths
Show: Segment labels Best-fit model Weighted mean path
Start Terminate Test Path Clear Options
Monte Carlo inversion done. Paths: 6831 Acc.: 71 Good: 10
Age (Ma) Length (µm)
Pop Model Measured GOF Old Model Measured GOF
1 133 133 +16/-15 0.98 163 13.92 ± 1.18 13.53 ± 1.21 0.76
%Ro
basin%Ro: Model 2.98 Measured 3.00 ± 0.50 GOF 0.96
Sample #: CAT-1 Elevation: 1272m Strat. age: 383 - 359 Ma
Catskill Vertical Profile


HeFTy v1.9.3 - [CAT-6 model w VR]
File Edit Models Window Help
Time-Temperature History
Sample Information
AFT
%Ro
CAT-6
Temperature (°C)
Time (Ma)
AFT: Track Length Distribution
Length (µm)
Inverse Modeling
Search method: Monte Carlo
Subsegment spacing: Random
Ending condition: Good paths = 10
Watch it go?
Result to display: Paths
Show: Segment labels Best-fit model Weighted mean path
Start Terminate Test Path Clear Options
Monte Carlo inversion done. Paths: 24166 Acc.: 169 Good: 10
Age (Ma) Length (µm)
Pop Model Measured GOF Old Model Measured GOF
1 109 111 +17/-14 0.80 132 14.00 ± 1.03 14.12 ± 0.71 0.95
%Ro
basin%Ro: Model 3.20 Measured 3.00 ± 0.50 GOF 0.69
Sample #: CAT-6 Elevation: 281m Strat. age: 393 - 383 Ma
Catskill Vertical Profile

Given the lack of Cenozoic AFT and AHe ages documented in this study, and other studies (e.g. West et al., 2008; Roden-Tice et al., 2009; McKeon et al., 2014), we added a constraint box to refine the Cenozoic history (66-0 Ma, 80-5 °C). The max temperature was set to allow paths to still reside within the AFT PAZ and/or AHe partial retention zone (PRZ). As discussed in the paper the *T-t* paths do not constrain the timing of the transition of the samples from peak burial to "rapid" Jurassic cooling (phase 1a) because these Catskills samples have been too deeply buried. However, that transition at ca. 200-150 Ma is clearly shown in samples to the west where samples have not been buried enough to completely reset tracks (phase 1; see Shorten and Fitzgerald, 2019).

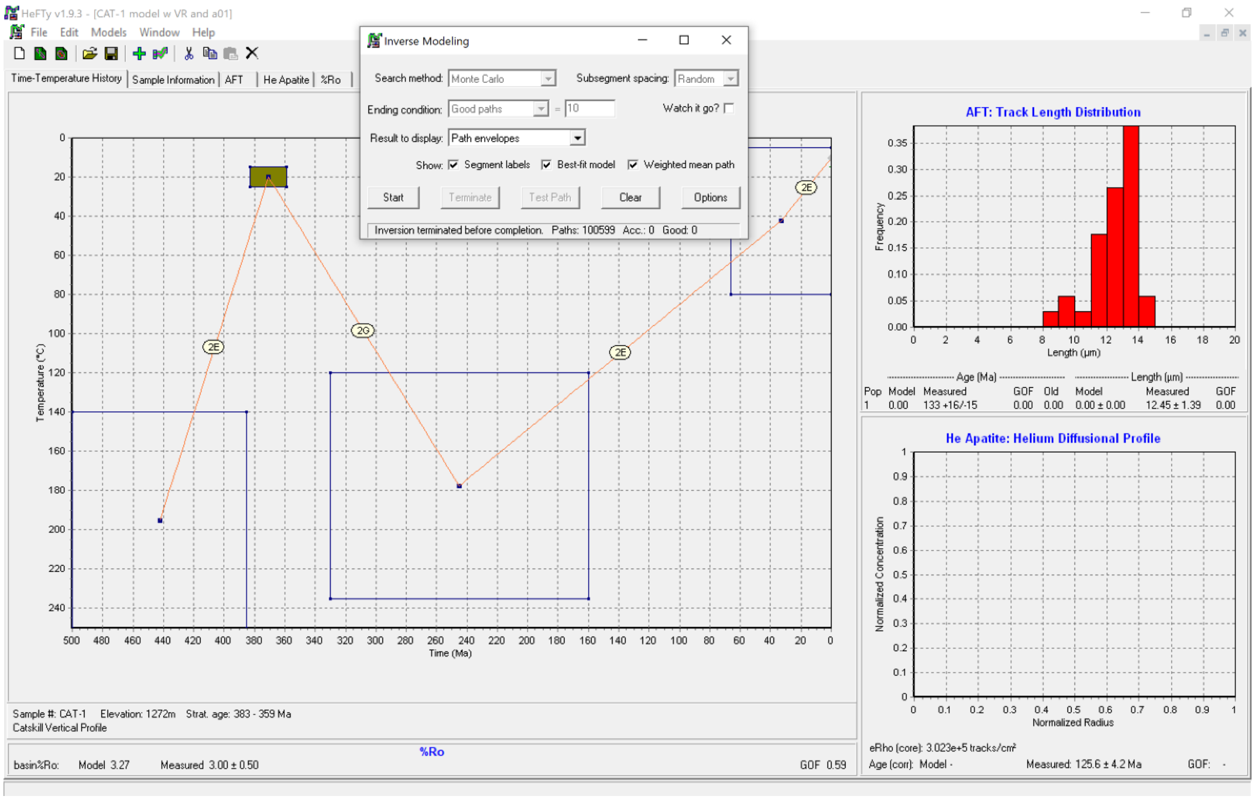




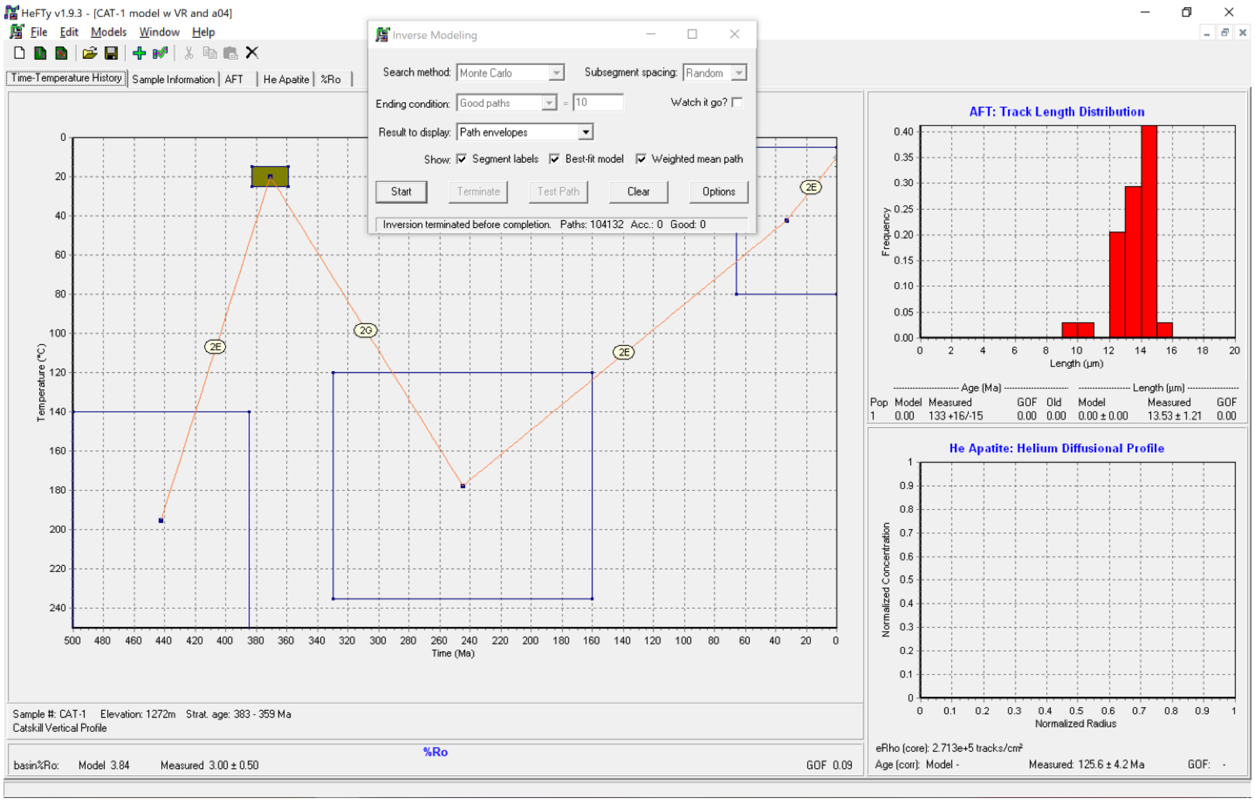
The final constraint boxes are: (1) provenance (500-385 Ma, >140 °C), (2) deposition (stratigraphic age, 20 ± 5 °C), (3) maximum paleotemperature (330-160 Ma, 120-235 °C), (4) Cenozoic (66-0 Ma, 80-5 °C), and present day (0 Ma, 10 ± 5 °C). These constraint boxes are the appropriate post-depositional boxes based on geologic and thermochronologic information, while still allowing the model to freely explore *T-t* space.

HeFTy inverse thermal models

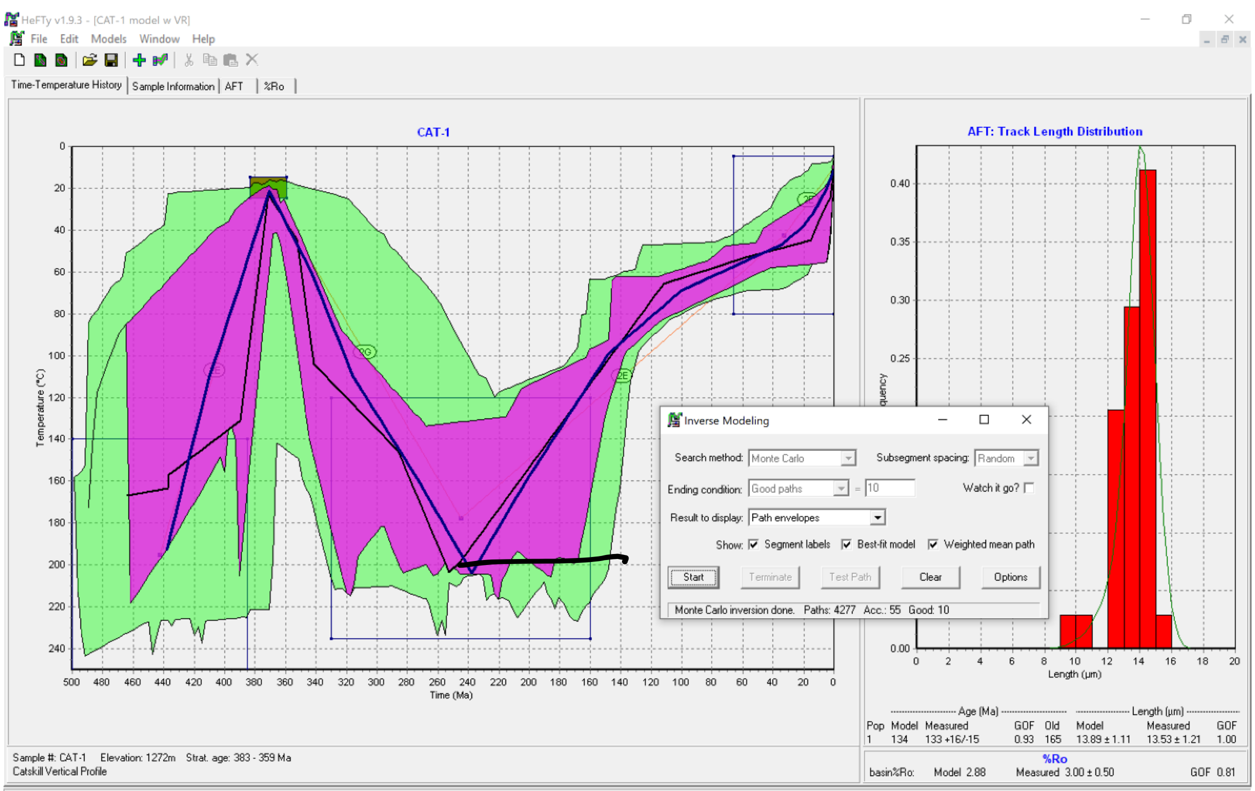
CAT-1 (C1)



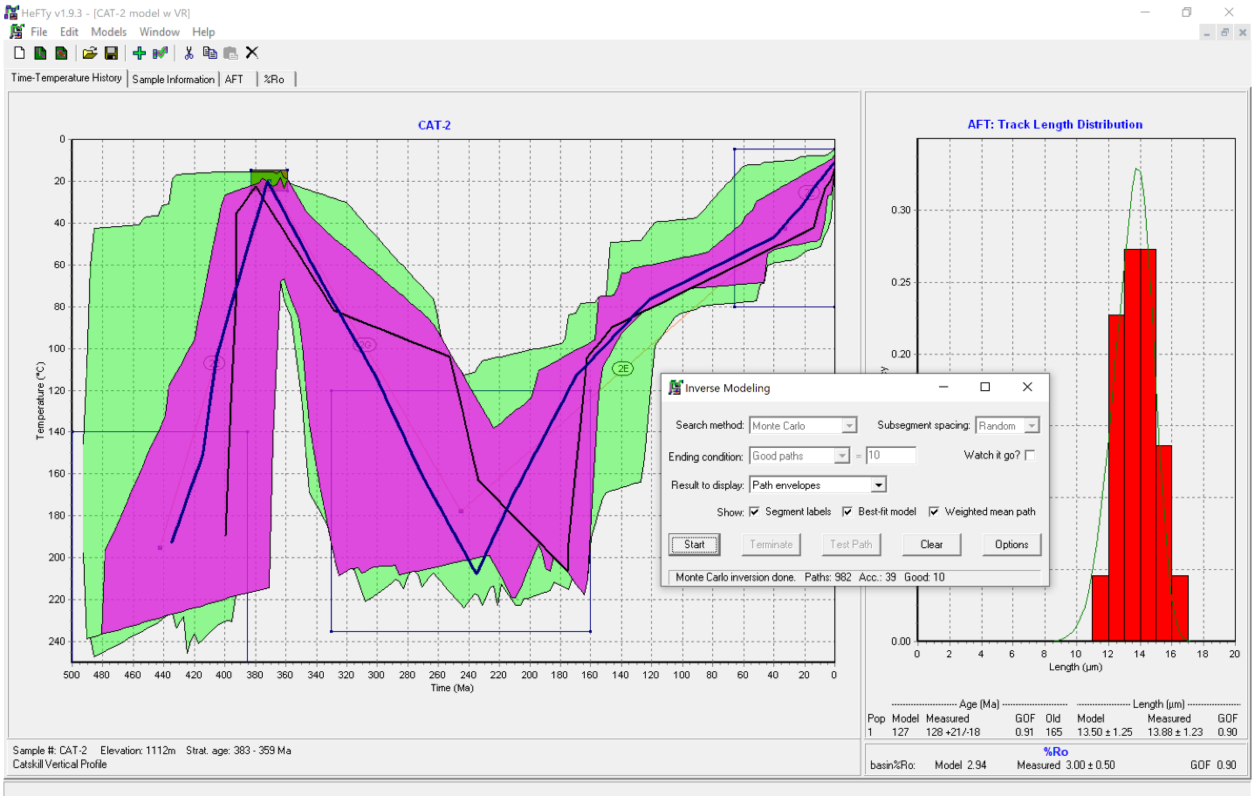
C1 model was unable to produce good or acceptable paths with AHe data included.



C1 model was unable to produce good or acceptable paths with AHe data included.

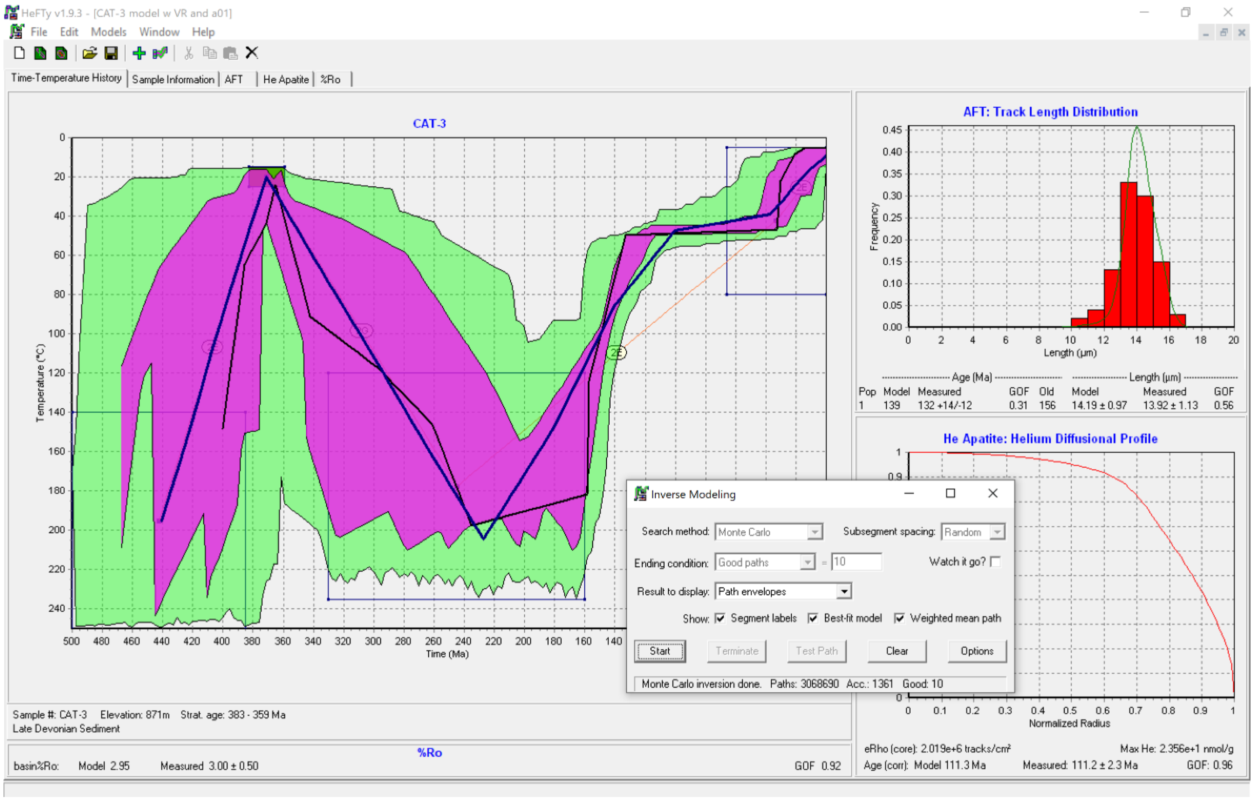


CAT-2 (C2)



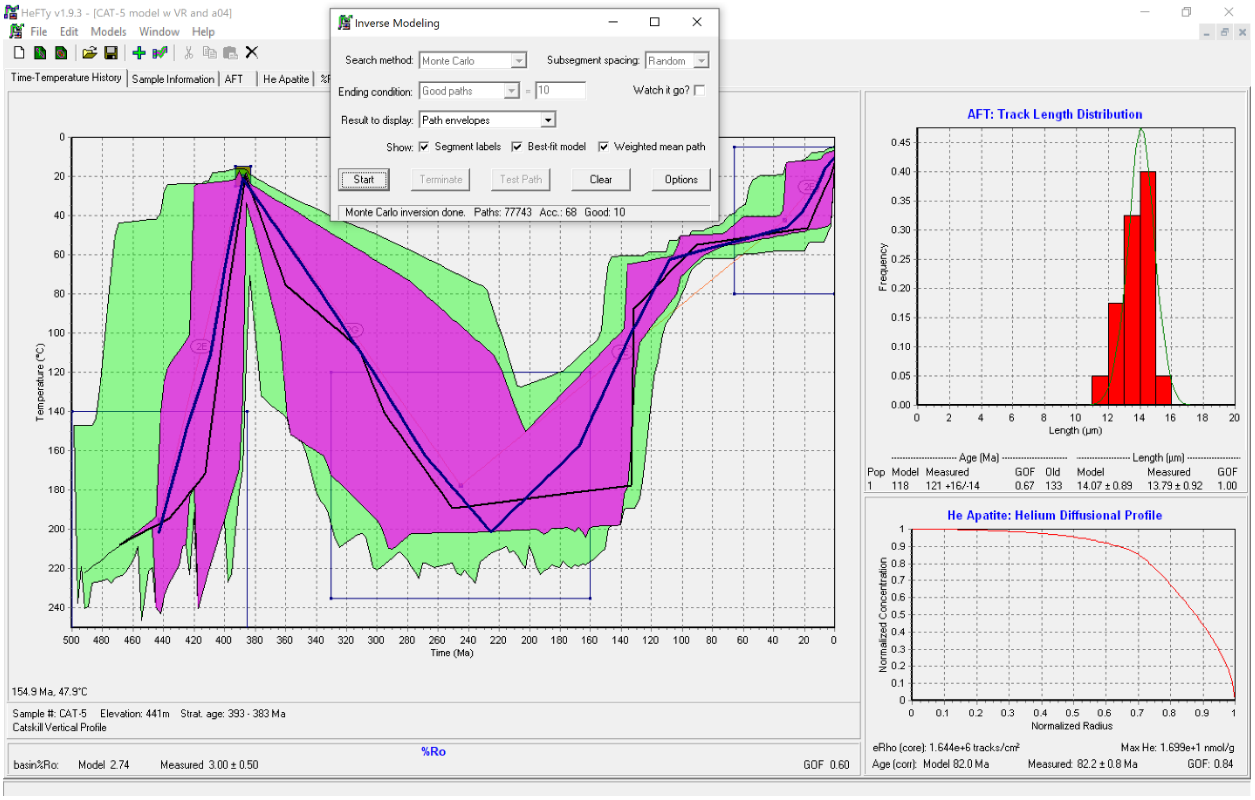
HeFTy v1.9.3 - [CAT-2 model w VR]
File Edit Models Window Help
Time-Temperature History
Sample Information
AFT
%Ro
CAT-2
Temperature (°C)
Time (Ma)
AFT: Track Length Distribution
Length (µm)
Inverse Modeling
Search method: Monte Carlo
Subsegment spacing: Random
Ending condition: Good paths = 10
Watch it go?
Result to display: Path envelopes
Show: Segment labels Best-fit model Weighted mean path
Start
Terminate
Test Path
Clear
Options
Monte Carlo inversion done. Paths: 982 Acc.: 39 Good: 10
Age (Ma)
Length (µm)
Pop Model Measured GOF Old Model Measured GOF
1 127 128 +21/-18 0.91 165 13.50 ± 1.25 13.88 ± 1.23 0.90
%Ro
basin%Ro: Model 2.94 Measured 3.00 ± 0.50 GOF 0.90
Sample #: CAT-2 Elevation: 1112m Strat. age: 383 - 359 Ma
Catskill Vertical Profile

CAT-3 (C3)



HeFTy v1.9.3 - [CAT-3 model w VR and a01]
File Edit Models Window Help
Time-Temperature History
Sample Information
AFT
He Apatite
%Ro
CAT-3
Temperature (°C)
Time (Ma)
AFT: Track Length Distribution
Frequency
Length (μm)
Age (Ma)
Length (μm)
Pop Model Measured GOF Old Model Measured GOF
1 139 132 +14/-12 0.31 156 14.19 ± 0.97 13.92 ± 1.13 0.56
He Apatite: Helium Diffusional Profile
Normalized Radius
Inverse Modeling
Search method: Monte Carlo
Subsegment spacing: Random
Ending condition: Good paths = 10
Watch it go?
Result to display: Path envelopes
Show: Segment labels Best-fit model Weighted mean path
Start
Terminate
Test Path
Clear
Options
Monte Carlo inversion done. Paths: 3068690 Acc.: 1361 Good: 10
Sample #: CAT-3 Elevation: 871m Strat. age: 383 - 359 Ma
Late Devonian Sediment
%Ro
basin%Ro: Model 2.95 Measured 3.00 ± 0.50 GOF 0.92
eRho (core): 2.019e+6 tracks/cm²
Max He: 2.356e+1 nmol/g
Age (corr): Model 111.3 Ma Measured: 111.2 ± 2.3 Ma GOF: 0.96

CAT-5 (C5)



HeFTy v1.9.3 - [CAT-5 model w VR and a04]
File Edit Models Window Help
Time-Temperature History
Sample Information
AFT
He Apatite
Inverse Modeling
Search method: Monte Carlo
Subsegment spacing: Random
Ending condition: Good paths = 10
Watch it go?
Result to display: Path envelopes
Show: Segment labels Best-fit model Weighted mean path
Start Terminate Test Path Clear Options
Monte Carlo inversion done. Paths: 77743 Acc.: 68 Good: 10
Temperature (°C)
Time (Ma)
154.9 Ma, 47.9°C
Sample #: CAT-5 Elevation: 441m Strat. age: 393 - 383 Ma
Catskill Vertical Profile
%Ro
basin%Ro: Model 2.74 Measured 3.00 ± 0.50
GOF 0.60
AFT: Track Length Distribution
Frequency
Length (μm)
Age (Ma)
Length (μm)
Pop Model Measured GOF Old Model Measured GOF
1 118 121 +16/-14 0.67 133 14.07 ± 0.89 13.79 ± 0.92 1.00
He Apatite: Helium Diffusional Profile
Normalized Concentration
Normalized Radius
eRho (core): 1.644e+6 tracks/cm²
Max He: 1.699e+1 nmol/g
Age (corr): Model 82.0 Ma Measured: 82.2 ± 0.8 Ma GOF: 0.84

CAT-6 (C6)

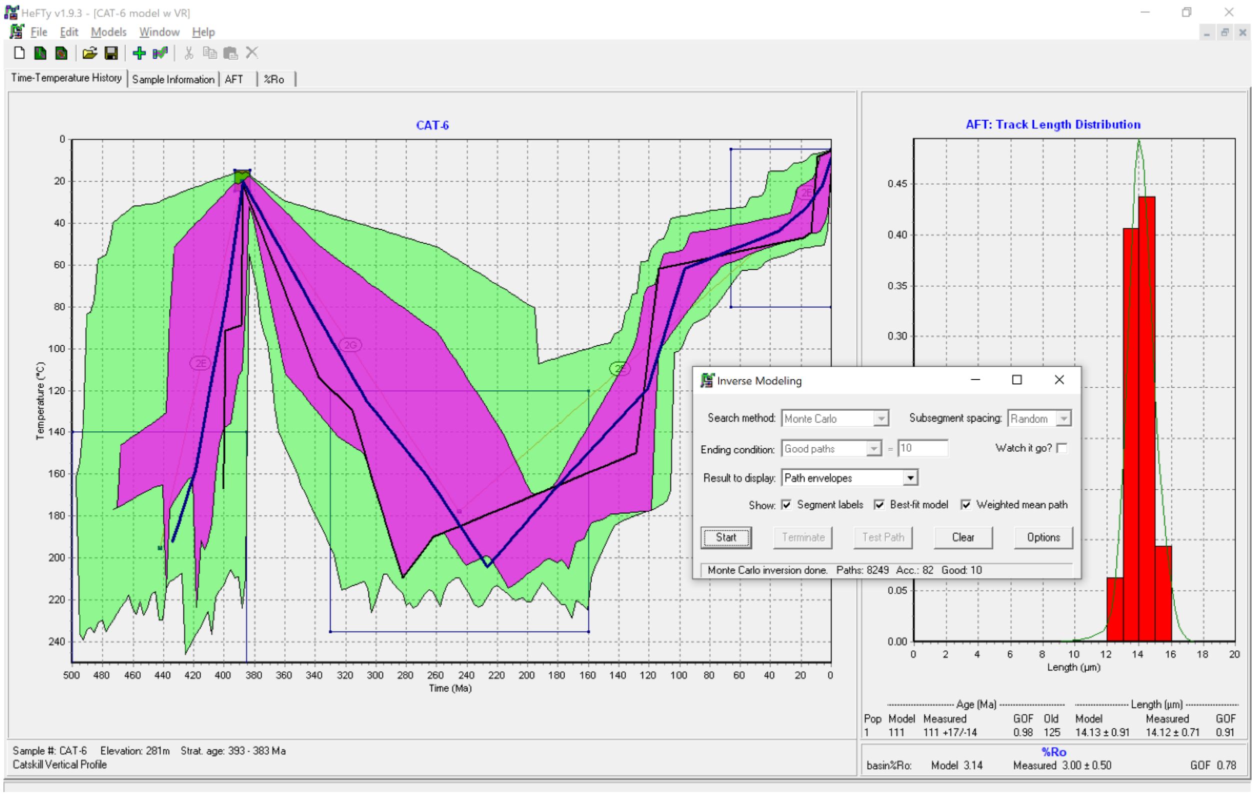
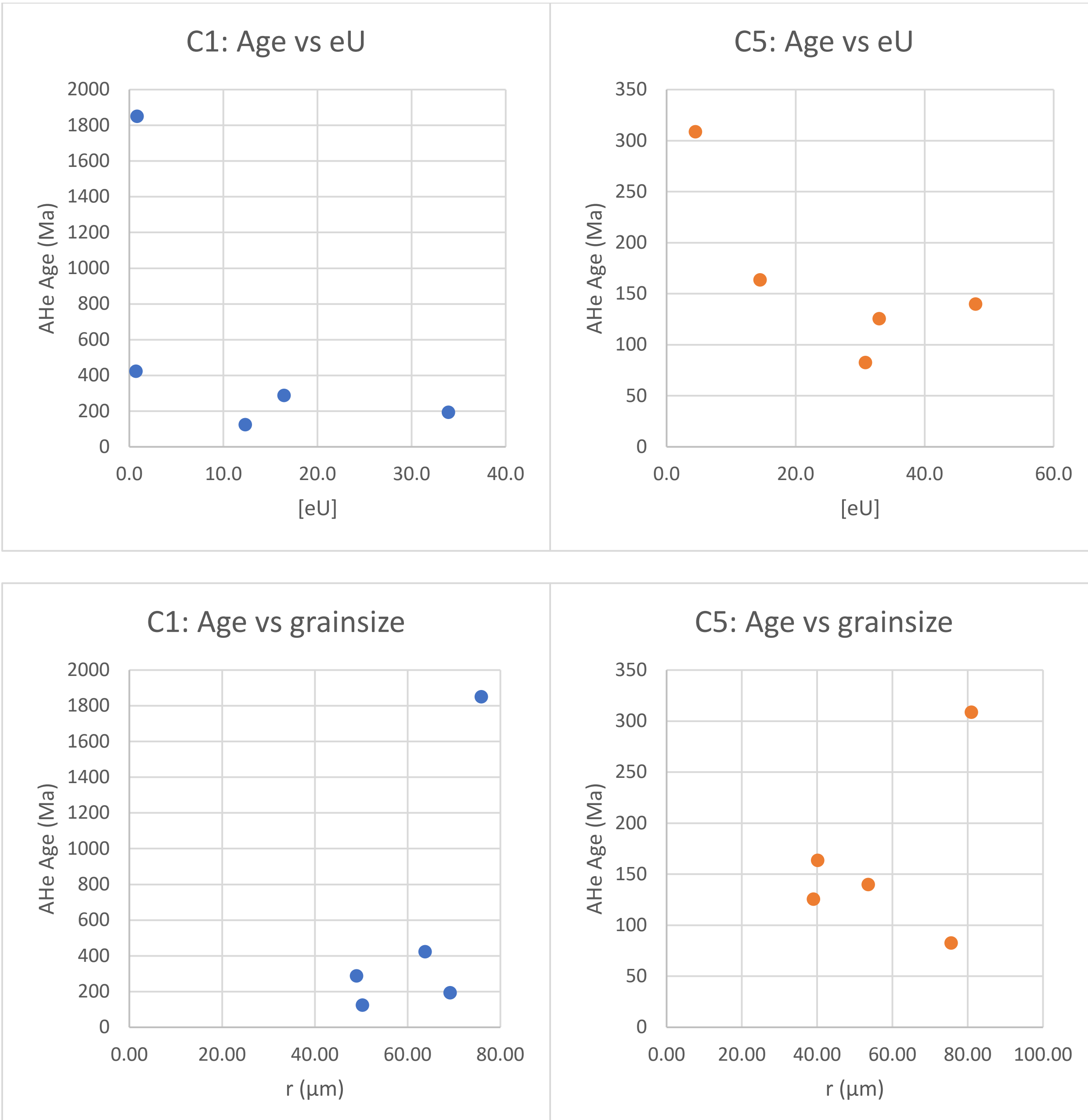

HeFTy v1.9.3 - [CAT-6 model w VR]
File Edit Models Window Help
Time-Temperature History
Sample Information
AFT
%Ro
CAT-6
Temperature (°C)
Time (Ma)
AFT: Track Length Distribution
Length (µm)
Inverse Modeling
Search method: Monte Carlo
Subsegment spacing: Random
Ending condition: Good paths
= 10
Watch it go?
Result to display: Path envelopes
Show: Segment labels
Best-fit model
Weighted mean path
Start
Terminate
Test Path
Clear
Options
Monte Carlo inversion done. Paths: 8249 Acc.: 82 Good: 10
Age (Ma)
Length (µm)
Pop Model Measured GOF Old Model Measured GOF
1 111 111 +17/-14 0.98 125 14.13 ± 0.91 14.12 ± 0.71 0.91
Sample #: CAT-6 Elevation: 281m Strat. age: 393 - 383 Ma
Catskill Vertical Profile
basin%Ro: Model 3.14 Measured 3.00 ± 0.50 GOF 0.78

Figure S1. Apatite (U-Th)/He Data Trends



AHe single-grain ages vs. effective urainium [eU] display a weakly negative to no trend. AHe single-grain ages vs. grain size (approximated by "r": radius of a sphere with an equivalent surface area to volume ratio as the apatite grain) also display no trend.

References Cited

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Galbraith, R.F., and Laslett, G.M., 1993, Statistical models for mixed fission track ages: Nuclear Tracks and Radiation Measurements, v. 21, p. 459–470, https://doi.org/10.1016/1359-0189(93)90185-C.

Hurford, A.J., and Green, P.F., 1983, The zeta age calibration of fission-track dating: Chemical Geology, v. 41, p. 285–317, https://doi.org/10.1016/S0009-2541(83)80026-6.