Apatite fission-track data from the watershed area of the Northern Apennines (Italy)

(https://doi.org/10.5880/fidgeo.2024.047)

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1. Licence

2. Citation

When using the data please cite:

Balestrieri, M. L.; Bonini, M.; Maestrelli, D.; Montanari, D.; Sani, F. (2024): Apatite fission-track data from the watershed area of the Northern Apennines (Italy). GFZ Data Services. https://doi.org/10.5880/fidgeo.2024.047

The data are supplementary material to:

Bonini, M.; Maestrelli, D.; Montanari, D.; Sani, F.; Balestrieri, M. L. (2025): Formation of latestage passive-roof duplexes in fold-and-thrust belts: Thrusting sequence and thermochronologic constraints from the Northern Apennines (Italy). Submitted to Geoscience Frontiers. https://doi.org/10.1016/j.gsf.2025.102048

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3. Data Description

This data-set contains nine apatite fission-track data from samples collected at strategic locations to constrain the age of deformation along an ideal transect crossing the main Apennine watershed (from the north-eastern margin of the Casentino Basin to the Romagna Apennines.

3.1.Sampling method

Apatite grains for fission-track analysis were separated from ~5 kg bulk samples. Four of them were collected from the Falterona Sandstones (Chattian-Aquitanian) and five in the Marnoso- Arenacea

Formation (Burdigalian-Tortonian). Apatite grains were separated using standard heavy liquids and a magnetic technique. Details on the samples and their location are provided in the Appendix.

3.2.Analytical procedure:

Laboratory: Fission Track Laboratory (IGG-CNR, Italy)

For fission-track analysis, apatite grains were mounted in epoxy. Mounts were grounded, polished, and etched with 5N HNO3 at 20 °C for 20 s to reveal the spontaneous tracks. Samples were then irradiated with thermal neutrons in the Lazy Susan facility of the Triga Mark II reactor of the University of Pavia (Italy). After irradiation the low-U muscovite detectors were etched in 40% HF at 40 °C for 8 min to reveal induced fission tracks.

3.3.Data processing

Apatite fission-track ages were measured and calculated using the external-detector and the zeta-calibration methods (Hurford and Green, 1983) with a zeta value (referred to Fish Canyon Tuff and Durango apatite standards, Hurford, 1990) of ζ= 335.5 ± 7.0 for dosimeter CN5. Track-pit opening diameters parallel to the crystallographic c-axis (Dpar) were measured for each grain as a proxy for the compositional control on fission track annealing kinetics (Donelick et al., 2005). Due to the sample's young apparent ages and the low to normal apatite U contents, the spontaneous track density of the samples is low. Consequently, no AFT length data were obtained.

3.4.File inventory

The data are provided in Excel and tab-delimited text formats

File 2024-047_Balestrieri-et-al_AFT_single-grain-age.xls contains the apatite fission-track age for each single apatite grain analyzed.

Column header	unit	Description
SampleID		
Cryst		number of analyzed apatite crystals
Ns		number of tracks on mineral surfaces
Area	μm^2	Area on which tracks are counted
Rhos	10^5 tracks cm^{-2}	spontaneous track densities on internal mineral surfaces
Rhoi	10^5 tracks cm^{-2}	induced track densities measured on mica external detectors
Age	Ma	Apatite fission-track age of the single grains
1sd	Ma	1 standard deviation
U	ppm	content in Uranium
Dpar	μm	mean etch pit diameter

4. References

Donelick, R.A., O'Sullivan, P.B., Ketcham, R.A, 2005. Apatite fission-track analysis. Re-view in Mineralogy and Geochemistry, 58, 49-94. https://doi.org/10.2138/rmg.2005.58.3

Hurford A.J., 1990. Standardization of fission track dating calibration: recommendation by the Fission Track Working Group of the I.U.G.S. Subcommission on Geochronology. Chem-ical Geology, 80, 171-178. https://doi.org/10.1016/0168-9622(90)90025-8

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

Appendix: Sample overview

Sample name	Latitude [DDMMSS]	Longitude [DDMMSS]	Latitude [degree]	Longitude [degree]	Elev. [m a.s.l]	Rock type	Stratigraphic Age	Formation
BIB1	43°45'19.09"	11°49'38.90"	43.755303	11.827472	474	m-c-ss	Chattian-Aquitanian	Falterona Sandstones
BIB2	43°46'20.62"	11°50'54.58"	43.772394	11.848494	612	m-f-ss	Chattian-Aquitanian	Falterona Sandstones
BIB3	43°46'16.09"	11°51'48.92"	43.771136	11.863589	710	m-c-ss	Chattian-Aquitanian	Falterona Sandstones
BIB4	43°47'29.75"	11°52'39.22"	43.791597	11.877561	840	m-c-ss	Chattian-Aquitanian	Falterona Sandstones
BIB5	43°47'34.80"	11°53'11.00"	43.793000	11.886389	835	m-c-ss	Burdigalian-Tortonian	Marnoso-Arenacea Fm.
BIB6	43°47'47.50"	11°53'17.10"	43.796528	11.888083	970	m-ss	Burdigalian-Tortonian	Marnoso-Arenacea Fm.
BIB7	43°45'50.60"	11°54'53.70"	43.764056	11.914917	1170	m-c-ss	Burdigalian-Tortonian	Marnoso-Arenacea Fm.
BIB8	43°48'37.90"	11°56'30.50"	43.810528	11.941806	814	m-c-ss	Burdigalian-Tortonian	Marnoso-Arenacea Fm.
BIB9	43°49'26.76"	11°57'28.82"	43.824100	11.958006	510	m-c-ss	Burdigalian-Tortonian	Marnoso-Arenacea Fm.

Table 1: Sample overview: latitude and longitude in WGS84; rock types: m medium; c coarse; f fine; ss: sandstones