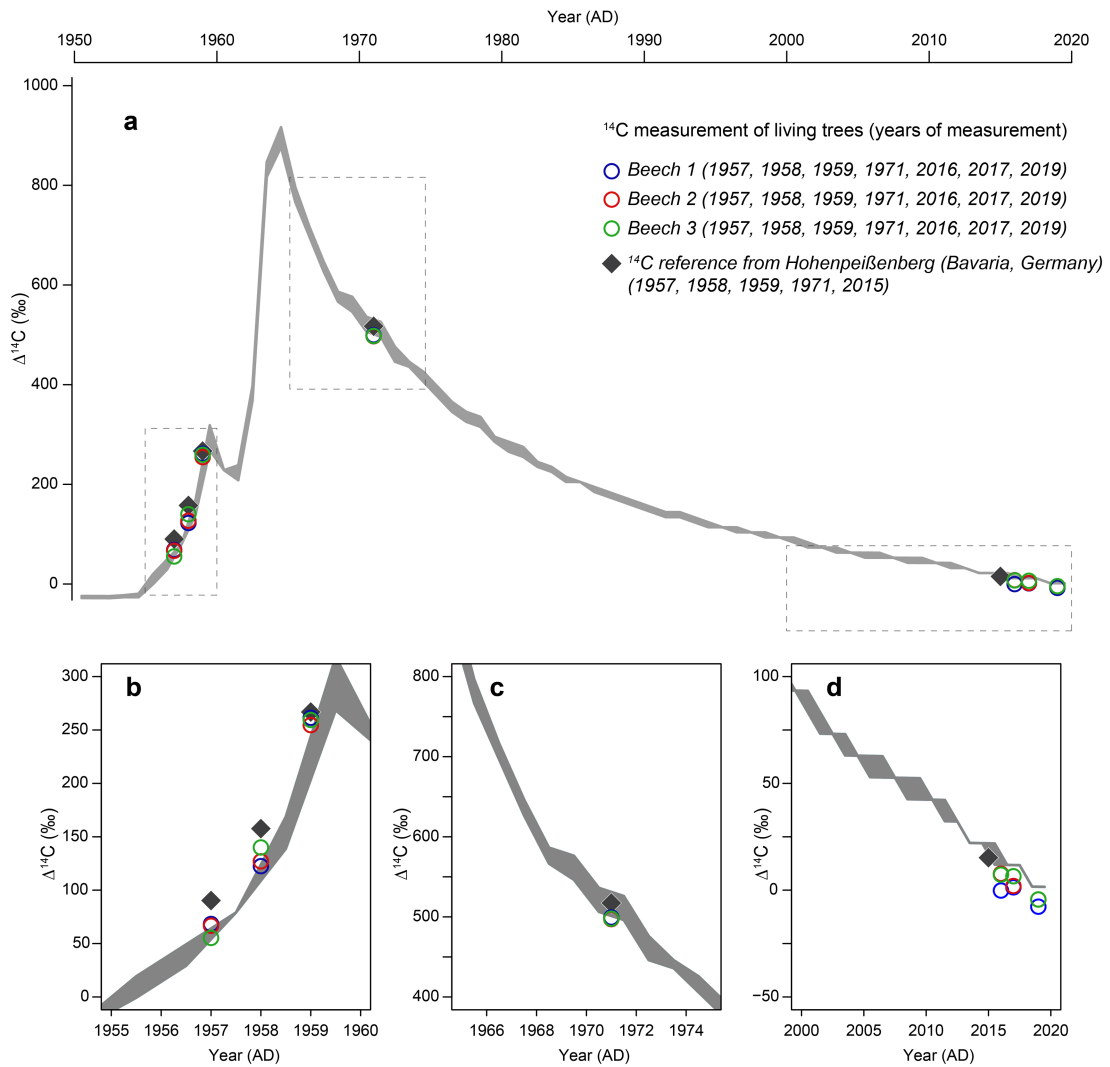


Extended Data Fig. 1 | Late Glacial radiocarbon (¹⁴C) data. High-resolution Laacher See ¹⁴C measurements from three tree-ring sequences (a-c) recovered from LST deposits and wiggle-matched to the Swiss Late Glacial reference SWILM-¹⁴C on the ¹⁴C timescale, cal BP (1950)². Data are shown with 1σ errors.



Extended Data Fig. 2 | Modern radiocarbon (¹⁴C) data. Comparison of Laacher See $\Delta^{14}\text{C}$ measurements of dendrochronologically dated living beech trees (colored circles) growing at the eastern shore of Laacher See in the immediate vicinity of CO_2 fumaroles to reference measurements from

Hohenpeißenberg, Bavaria, and the IntCal20 calibration curve (shaded grey line; ref. 10) over the period from 1950 to 2020 (a) and details of selected periods of measurements (b-d).

Extended Data Table 1 | Selected radiocarbon (¹⁴C) dates from samples stratigraphically near the Laacher See tephra (LST) and shortly before the Laacher See Eruption (LSE)

Site	Distance to center of LS	Sample	Age relative to LSE	Lab-code	¹⁴ C age	Reference
Krumpa	~335 km ENE	Kru - 16	+ few yrs directly above LST	Hd - 17132	11055 ± 23	ref. ⁶
Laacher See Eruption						
Miesenheim 2	~9 km E	Poplar*	-0 yrs, bark* immediately prior LSE	KN - 3518*	11080 ± 220	ref. ⁴
Miesenheim 2	~9 km E	Poplar*	-0 yrs, bark* immediately prior LSE	KN - 3519*	11040 ± 220	ref. ⁴
Near Laacher See monastery	<0.5 km	Poplar 1	-1 yr	ETH - 92276	11068 ± 21	ref. ²
Near Laacher See monastery	<0.5 km	Poplar 1	-2 yrs	ETH - 92018	11002 ± 21	ref. ²
Near Laacher See monastery	<0.5 km	Poplar 1	-3 yrs	ETH - 92275	11092 ± 22	ref. ²
Near Laacher See monastery	<0.5 km	Poplar 1	-4 yrs	ETH - 92274	11051 ± 21	ref. ²
Near Laacher See monastery	<0.5 km	Poplar 1	-5 yrs	ETH - 92273	11100 ± 22	ref. ²
Near Laacher See monastery	<0.5 km	Poplar 1	-6 yrs	ETH - 92272	11044 ± 22	ref. ²
Near Laacher See monastery	<0.5 km	Poplar 1	-7 yrs	ETH - 92271	11072 ± 22	ref. ²
Near Laacher See monastery	<0.5 km	Poplar 1	-8 yrs	ETH - 92270	11054 ± 22	ref. ²
Near Laacher See monastery	<0.5 km	Poplar 1	-9 yrs	ETH - 92269	11060 ± 21	ref. ²
Miesenheim 4	~ 10.5 km E	uncharred wood	-few yrs immediately prior LSE	UtC - 4815	11040 ± 60	ref. ⁵
Krufft	~5 km SSE	Poplar #8	-few yrs, outer rings immediately prior LSE	Hd - 18438	11065 ± 22	ref. ^{4,7}
Krufft	~5 km SSE	Poplar #9	-few yrs, rings 41-50 immediately prior LSE	Hd - 19037	11075 ± 28	ref. ^{4,7}
Krumpa	~335 km ENE	Kru - 18C	-few yrs directly below LST	Hd - 17171	11058 ± 22	ref. ⁶

* - identical sample; *Italics*: not dated via high-precision AMS dating.

Matters arising

Extended Data Table 2 | Radiocarbon results from living beech trees growing at the eastern shore of Laacher See in the immediate vicinity of CO₂ fumaroles and reference measurements from Hohenpeißenberg, Bavaria, Germany

Tree Sample Label	Sample year (AD)	Lab number	F ¹⁴ C	Uncertainty (± 1 σ)
Beech 1	1957	ETH - 113320	1.0693	0.0019
Beech 1	1958	ETH - 113321	1.1236	0.0019
Beech 1	1959	ETH - 113322	1.2628	0.0021
Beech 1	1971	ETH - 113323	1.5030	0.0024
Beech 1	2016	ETH - 113324	1.0078	0.0018
Beech 1	2017	ETH - 113325	1.0095	0.0018
Beech 1	2019	ETH - 113326	1.0006	0.0018
Beech 2	1957	ETH - 113327	1.0676	0.0019
Beech 2	1958	ETH - 113328	1.1281	0.0019
Beech 2	1959	ETH - 113329	1.2559	0.0022
Beech 2	1971	ETH - 113330	1.5010	0.0024
Beech 2	2016	ETH - 113331	1.0157	0.0018
Beech 2	2017	ETH - 113332	1.0101	0.0018
Beech 2	2019	ETH - 113333	1.0040	0.0019
Beech 3	1957	ETH - 113334	1.0562	0.0019
Beech 3	1958	ETH - 113335	1.1411	0.0021
Beech 3	1959	ETH - 113336	1.2608	0.0022
Beech 3	1971	ETH - 113337	1.5015	0.0024
Beech 3	2016	ETH - 113338	1.0153	0.0018
Beech 3	2017	ETH - 113339	1.0147	0.0018
Beech 3	2019	ETH - 113340	1.0040	0.0018
Hohenpeißenberg reference	1957	ETH - 113341	1.0912	0.0019
Hohenpeißenberg reference	1958	ETH - 113342	1.1587	0.0020
Hohenpeißenberg reference	1959	ETH - 113343	1.2682	0.0021
Hohenpeißenberg reference	1971	ETH - 113344	1.5211	0.0024
Hohenpeißenberg reference	2015	ETH - 113345	1.0232	0.0018