Sample description

The sample used in this study (TB-14-093) was collected from a road-cut in the Trivandrum Block of south India (Fig. S1A) approximately 1 kilometre north of the town of Pechipari (008° 27' 06.9 N; 77° 18' 22.9" E). The sample is comprised of a granoblastic assemblage dominated by orthopyroxene and plagioclase with minor quartz and rare garnet (Fig. S1B-C). Garnet contains vermicular inclusions of quartz and appears to be growing at the expense of orthopyroxene. The sample does not display any evidence for partial melting and the thin section scale, however leucosomes are observed at the outcrop scale.

Zircon grains within the sample are typically oscillatory zoned with some displaying minor rim development, generally high-response CL zones that overprint the well defined oscillatory zoning (Fig. S1D). The grain morphology and zoning are typical of grains grown during the crystallisation of an igneous melt.

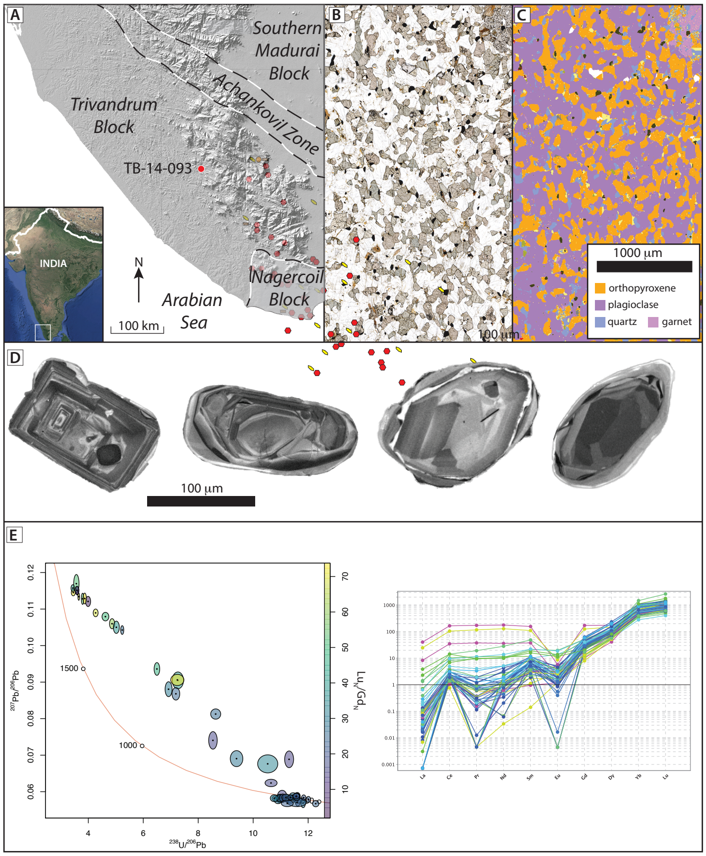

Figure S1. A) Map of Southern India showing the location of sample TB-14-093. B) Plane polarised light image of sample TB-14-093 illustrating the equigranular and granoblastic nature of the sample. C) Tescan TIMA image of the same field of view as Fig. S1B showing the distribution of minerals is the sample, note the inclusion rich garnet in the upper right corner of the image. D) Cathodoluminescence images of representative zircon grain highlighting the oscillatory zoning that is consistent with growth from a crystallising igneous melt. The grain in the left of the image shows some minor recrystallisation of the edge of the grain. (E) Concordia diagram and Matsuda REE plot of the data collected via laser ablation split stream analysis of zircon grains from sample TB-14-093.

10 Analytical methods

Analytical conditions for the collection of zircon data are reported in Table S1 with the results plotted in Fig. S1E. Full analytical results are tabulated in Table S2.

Table S1. Laboratory and analytical conditions

Parameter	Details
Laboratory & Sample Preparation	
Laboratory name	GeoHistory Facility, John de Laeter (JdL) Centre, Curtin University
Sample type/mineral	Zircon
Sample preparation	1-inch epoxy mounts
Imaging	Optical/LM, CL Tescan Mira3
Laser Ablation System	
Make, Model & type	ASI Resolution M50A-LR
Ablation cell & volume	Laurin Technic S155 large format dual volume cell
Laser wavelength (nm)	193 nm
Pulse width (ns)	$\sim$20 ns
Fluence (J.cm^{-2})	2 J.cm^{-2}
Repetition rate (Hz)	6 Hz
Ablation duration (secs)	40 secs
Ablation pit depth / rate	$\sim$30 μm pit depth (optically observed)
Spot diameter (μm) nominal/actual	50 μm split stream
Sampling mode / pattern	Static spot ablation
Carrier gas	He + N carrier gas
Cell carrier gas flow (l/min)	320 ml/min He, 1.2 ml/min N
ICP-MS Instrument	
Make, Model & type	Nu Plasma2 HR Multicollector (U–Pb) + Agilent 8900 QQQ (Trace Elements)
Sample introduction	Ablation aerosol combined with co-aspiration of desolvated Tl-235U tracer
RF power (W)	1300 W
Make-up gas flow (l/min)	Ar gas flow from both Nu2 and Agilent 8900 $\sim$1 l/min
Detection system	Faraday-multiple ion counting array (Nu) + quadrupole (Agilent)
Masses measured	Nu Plasma 2 – 232, 238 (Cups); 204, 206, 207, 208 (Ion Counters)
	Agilent – 49, 89, 93, 139, 140, 146, 147, 153, 157, 163, 165, 166, 169, 172, 175, 178, 232, 238
Integration time per peak/dwell times	0.03 s for each isotope on quadrupole; Nu2 – continuous measurement
Total integration time per datapoint	$\sim$0.7 secs
Data Processing	
Calibration strategy	GJ-1 primary reference for U–Pb age and trace elements; 91500 and Plešovice as secondaries
Reference Material info	91500 (Wiedenbeck et al., 1995), Plešovice (Sláma et al., 2008)
	GJ1 ^{206}Pb/^{238}U 0.097877 $\pm$ 0.07%, ^{207}Pb/^{206}Pb 0.060171 $\pm$ 0.08% (in-house CA-TIMS)
	Internal standardization for trace elements using 43.14 wt% Zr in GJ-1, NIST610 and NIST612 as secondaries
Data processing software / LIEF correction	Iolite4 U–Pb and trace element IS DRS; assumes identical behavior of samples and reference materials
Common-Pb correction	No common-Pb correction applied
Uncertainty level & propagation	Ages at 2σ absolute; propagation by quadratic addition following Horstwood et al. (2016)
	Additional propagated uncertainty (1.5%) applied based on Plešovice reproducibility
Quality control / Validation	Plešovice: 335 $\pm$ 1.24 Ma (n=40/40; MSWD=6.5, pre-error propagation), additional 1.5% propagated uncertainty
	91500: ^{206}Pb/^{238}U age of 1060 $\pm$ 2.6 Ma (n=39/40; MSWD=1.6)

Table S2: U-Pb analytical data from CSV file `TB14_093.csv`.

Final Pb207/Pb206 mean	Final Pb207/Pb206 2SE (prop)	Final U238/Pb206 mean	Final U238/Pb206 2SE (prop)
$1.15\cdot10^{-1}$	$9.52\cdot10^{-4}$	$3.60\cdot10^{0}$	$3.77\cdot10^{-2}$
$5.73\cdot10^{-2}$	$9.97\cdot10^{-4}$	$1.16\cdot10^{1}$	$7.41\cdot10^{-2}$
$5.87\cdot10^{-2}$	$1.35\cdot10^{-3}$	$1.11\cdot10^{1}$	$1.38\cdot10^{-1}$
$5.82\cdot10^{-2}$	$8.07\cdot10^{-4}$	$1.12\cdot10^{1}$	$1.27\cdot10^{-1}$
$1.17\cdot10^{-1}$	$6.57\cdot10^{-3}$	$7.28\cdot10^{0}$	$5.29\cdot10^{-1}$
$8.13\cdot10^{-2}$	$1.13\cdot10^{-3}$	$8.64\cdot10^{0}$	$1.47\cdot10^{-1}$
$6.91\cdot10^{-2}$	$1.77\cdot10^{-3}$	$9.40\cdot10^{0}$	$1.84\cdot10^{-1}$
$1.15\cdot10^{-1}$	$7.11\cdot10^{-4}$	$3.45\cdot10^{0}$	$5.76\cdot10^{-2}$
$7.41\cdot10^{-2}$	$1.93\cdot10^{-3}$	$8.54\cdot10^{0}$	$1.25\cdot10^{-1}$
$5.67\cdot10^{-2}$	$7.04\cdot10^{-4}$	$1.23\cdot10^{1}$	$9.37\cdot10^{-2}$
$5.77\cdot10^{-2}$	$6.50\cdot10^{-4}$	$1.16\cdot10^{1}$	$1.34\cdot10^{-1}$
$1.13\cdot10^{-1}$	$8.05\cdot10^{-4}$	$3.65\cdot10^{0}$	$2.44\cdot10^{-2}$
$1.04\cdot10^{-1}$	$9.63\cdot10^{-4}$	$5.23\cdot10^{0}$	$4.64\cdot10^{-2}$
$5.83\cdot10^{-2}$	$8.50\cdot10^{-4}$	$1.10\cdot10^{1}$	$1.22\cdot10^{-1}$
$5.81\cdot10^{-2}$	$8.77\cdot10^{-4}$	$1.10\cdot10^{1}$	$1.05\cdot10^{-1}$
$1.13\cdot10^{-1}$	$1.23\cdot10^{-3}$	$3.79\cdot10^{0}$	$3.80\cdot10^{-2}$
$1.06\cdot10^{-1}$	$1.12\cdot10^{-3}$	$4.87\cdot10^{0}$	$7.55\cdot10^{-2}$
$5.88\cdot10^{-2}$	$8.08\cdot10^{-4}$	$1.16\cdot10^{1}$	$8.66\cdot10^{-2}$
$6.76\cdot10^{-2}$	$1.99\cdot10^{-3}$	$1.05\cdot10^{1}$	$2.95\cdot10^{-1}$
$1.16\cdot10^{-1}$	$7.54\cdot10^{-4}$	$3.44\cdot10^{0}$	$5.33\cdot10^{-2}$
$5.69\cdot10^{-2}$	$1.02\cdot10^{-3}$	$1.18\cdot10^{1}$	$6.61\cdot10^{-2}$
$1.05\cdot10^{-1}$	$1.36\cdot10^{-3}$	$5.02\cdot10^{0}$	$8.72\cdot10^{-2}$
$1.17\cdot10^{-1}$	$2.03\cdot10^{-3}$	$3.57\cdot10^{0}$	$7.81\cdot10^{-2}$
$1.12\cdot10^{-1}$	$1.13\cdot10^{-3}$	$3.99\cdot10^{0}$	$7.30\cdot10^{-2}$
$5.82\cdot10^{-2}$	$7.10\cdot10^{-4}$	$1.09\cdot10^{1}$	$1.57\cdot10^{-1}$
$5.78\cdot10^{-2}$	$8.59\cdot10^{-4}$	$1.09\cdot10^{1}$	$1.19\cdot10^{-1}$
$1.08\cdot10^{-1}$	$9.41\cdot10^{-4}$	$4.62\cdot10^{0}$	$1.00\cdot10^{-1}$
$5.82\cdot10^{-2}$	$5.02\cdot10^{-4}$	$1.16\cdot10^{1}$	$9.16\cdot10^{-2}$
$1.13\cdot10^{-1}$	$1.19\cdot10^{-3}$	$3.87\cdot10^{0}$	$4.79\cdot10^{-2}$
$1.11\cdot10^{-1}$	$1.74\cdot10^{-3}$	$4.04\cdot10^{0}$	$8.46\cdot10^{-2}$
$6.89\cdot10^{-2}$	$1.84\cdot10^{-3}$	$1.13\cdot10^{1}$	$1.31\cdot10^{-1}$
$5.83\cdot10^{-2}$	$7.82\cdot10^{-4}$	$1.10\cdot10^{1}$	$1.14\cdot10^{-1}$
$5.79\cdot10^{-2}$	$8.52\cdot10^{-4}$	$1.13\cdot10^{1}$	$1.57\cdot10^{-1}$
$1.15\cdot10^{-1}$	$9.06\cdot10^{-4}$	$3.59\cdot10^{0}$	$5.80\cdot10^{-2}$
$1.89\cdot10^{-1}$	$1.24\cdot10^{-2}$	$5.33\cdot10^{0}$	$2.76\cdot10^{-1}$
$5.71\cdot10^{-2}$	$9.37\cdot10^{-4}$	$1.16\cdot10^{1}$	$2.77\cdot10^{-1}$
$9.05\cdot10^{-2}$	$1.85\cdot10^{-3}$	$7.26\cdot10^{0}$	$1.65\cdot10^{-1}$
$5.84\cdot10^{-2}$	$5.44\cdot10^{-4}$	$1.13\cdot10^{1}$	$6.20\cdot10^{-2}$
$5.83\cdot10^{-2}$	$8.93\cdot10^{-4}$	$1.11\cdot10^{1}$	$9.73\cdot10^{-2}$
$5.84\cdot10^{-2}$	$5.87\cdot10^{-4}$	$1.14\cdot10^{1}$	$9.33\cdot10^{-2}$
$9.36\cdot10^{-2}$	$1.40\cdot10^{-3}$	$6.50\cdot10^{0}$	$8.20\cdot10^{-2}$
$5.91\cdot10^{-2}$	$5.32\cdot10^{-4}$	$1.15\cdot10^{1}$	$1.01\cdot10^{-1}$

$5.86\cdot10^{-2}$	$8.31\cdot10^{-4}$	$1.16\cdot10^{1}$	$1.01\cdot10^{-1}$
$5.84\cdot10^{-2}$	$7.89\cdot10^{-4}$	$1.12\cdot10^{1}$	$1.24\cdot10^{-1}$
$1.09\cdot10^{-1}$	$8.49\cdot10^{-4}$	$4.27\cdot10^{0}$	$7.17\cdot10^{-2}$
$8.68\cdot10^{-2}$	$1.38\cdot10^{-3}$	$7.19\cdot10^{0}$	$1.13\cdot10^{-1}$
$5.79\cdot10^{-2}$	$6.66\cdot10^{-4}$	$1.20\cdot10^{1}$	$6.50\cdot10^{-2}$
$6.24\cdot10^{-2}$	$8.18\cdot10^{-4}$	$1.07\cdot10^{1}$	$1.77\cdot10^{-1}$
$5.68\cdot10^{-2}$	$7.12\cdot10^{-4}$	$1.12\cdot10^{1}$	$1.74\cdot10^{-1}$
$5.88\cdot10^{-2}$	$6.07\cdot10^{-4}$	$1.16\cdot10^{1}$	$9.48\cdot10^{-2}$
$5.84\cdot10^{-2}$	$5.87\cdot10^{-4}$	$1.14\cdot10^{1}$	$7.39\cdot10^{-2}$
$5.82\cdot10^{-2}$	$7.66\cdot10^{-4}$	$1.08\cdot10^{1}$	$1.16\cdot10^{-1}$
$5.84\cdot10^{-2}$	$5.90\cdot10^{-4}$	$1.18\cdot10^{1}$	$6.21\cdot10^{-2}$
$9.06\cdot10^{-2}$	$1.24\cdot10^{-3}$	$7.24\cdot10^{0}$	$1.93\cdot10^{-1}$
$8.81\cdot10^{-2}$	$1.65\cdot10^{-3}$	$6.92\cdot10^{0}$	$1.02\cdot10^{-1}$

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