

Sumith Abeykoon

Experimental geoscientist · Petrology and volcanology

CNR-ISSMC, Faenza · CNR research unit (Unità di Ricerca presso Terzi) and GLASS lab, Roma Tre University, Rome

sumith.abeykoon@cnr.it · sumithabeykoon.com · ORCID [0000-0002-9060-6203](https://orcid.org/0000-0002-9060-6203)

Experimental geoscientist specialising in petrology and volcanology. I recreate the conditions of planetary interiors in the laboratory and combine high-pressure, high-temperature experiments with a broad suite of analytical techniques to study how deep planetary processes regulate magmatic systems, volcanic activity and planetary evolution.

Key competencies

- Synthesis of silicate glasses and melts for experiments
- High-P-T experimental techniques: operation, installation, calibration and management
- Chemical and structural characterisation of silicate materials, experimental and natural
- Thermal analysis of silicate glasses and melts
- Characterisation of volcanic products by 3D microtomography (porosity and texture)
- Planning, designing and executing in situ experiments at synchrotron and neutron facilities

Education and professional experience

2026 -	Researcher, Consiglio Nazionale delle Ricerche, ISSMC, Faenza, Italy Experimental volcanology; volcanic ash to ceramics, with the materials groups in Faenza and Trento. Based in Rome, in the CNR research unit (URT) and the GLASS lab at Roma Tre University.
2024 - 2026	Postdoctoral researcher, University of Camerino, Geology Division, Italy Micro- and nano-crystallisation kinetics of magmas: laboratory and real-time in situ observations, and what they mean for fragmentation.
2022 - 2024	Postdoctoral researcher, CRPG, CNRS / Université de Lorraine, Nancy, France Two years on the origin of carbonatite magmas: stepwise fractional crystallisation of Oldoinyo Lengai's parental nephelinite in the piston cylinder, until a carbonate liquid separated from it. Also commissioned the laboratory's new automated piston-cylinder press and co-supervised a master's project on Raman spectroscopy of melt inclusions.
2018 - 2022	PhD, Experimental Geoscience, Bayerisches Geoinstitut, University of Bayreuth, Germany German-Japanese IRTG "Deep Earth Volatile Cycles". Thesis: Experimental constraints on the compositions of sulphides and aqueous fluids in the Earth's interior. Committee: D. J. Frost, C. McCammon, A. Audétat.
2019 - 2020	Special Research Student, Tohoku University, Sendai, Japan Deuterium in iron sulphide at high pressure and temperature, by in situ neutron diffraction at J-PARC.
2016 - 2018	MSc, Experimental Geosciences, Bayerisches Geoinstitut, University of Bayreuth, Germany Thesis: Oxygen content of mantle sulphides. Supervisors: V. Laurenz, D. J. Frost.
2014	Research assistant, Department of Geology, University of Peradeniya, Sri Lanka Groundwater-seawater interaction in a coastal sandy aquifer, Panama, Sri Lanka.
2013 - 2014	Visiting research student, AIST, Tsukuba, Japan Trace elements in South Indian and Sri Lankan waterways.
2012 - 2013	Research assistant, Ecological Association of Sri Lanka
2008 - 2013	BSc, Geology, University of Peradeniya, Sri Lanka Thesis: Effect of forest management on soil carbon sequestration, Maragamuwa biodiversity conservation site, Naula.

Prizes

- SIMP Doctoral Thesis Prize 2024 (Miglior Tesi di Dottorato), Società Italiana di Mineralogia e Petrologia, Bari, September 2024

Grants and awarded proposals

2026	AVEXT-3D, the data: pore networks from 27 tomograms (EXCITE2)
2025	AVEXT-3D — volcanic rock textures by 3D X-ray microtomography (EXCITE2)
2025	HYDROETNA — glass and melt properties of hydrous Etna trachybasalt

Technical skills

Experimental	Multi-anvil apparatus; piston cylinder; Paris-Edinburgh cell; cold-seal and TZM rapid-quench pressure vessels; gas-mixing furnace
Analytical	EPMA; SEM; LA-ICP-MS; Raman spectroscopy; conventional and flash DSC, TGA, TMA; in situ high-P-T neutron diffraction; powder XRD; Mössbauer spectroscopy; synchrotron and laboratory micro-CT

Laboratory and instrument experience

- Testing and commissioning of an automated end-loaded piston cylinder (MAVO PRESS LPC 250-300/50, Voggenreiter) at CRPG, Nancy
- Troubleshooting and repair of a QUICKpress piston cylinder (Depths of the Earth) at the University of Camerino
- Design and testing of a modified 18 mm multi-anvil assembly with a LaCrO₃ resistive heater, Bayerisches Geoinstitut
- Design and testing of a modified Paris-Edinburgh cell for high-P-T experiments at SOLEIL (PSICHE) and ESRF (ID27)

Synchrotron and neutron campaigns

Feb 2026	ESRF ID14 — Mössbauer spectroscopy (ES-1817)
Jul 2025	ESRF BM18 — Phase-contrast micro-CT (ES-1647)
Apr 2025	ESRF ID27 — HP-HT falling-sphere viscometry (ES-1631)
Oct 2024	SOLEIL PSICHE — HP-HT falling-sphere viscometry
Mar 2020	J-PARC PLANET — HP-HT neutron diffraction
Jan 2020	SPring-8 BL35XU — Inelastic X-ray scattering (2019B1323)
Jan 2020	SPring-8 BL10XU — HP-HT X-ray diffraction (2019B1323)
Dec 2018	ESRF ID18 — Mössbauer spectroscopy (ES-884)

Student supervision

- Co-supervision, master's research project, Bayerisches Geoinstitut, 2022-2023: the role of NiS in controlling the oxygen content of sulphide melts in the upper mantle
- Co-supervision, master's (M2) research project, CRPG Nancy, 2024: Raman spectroscopy of melt inclusions in volcanic rocks

Publications

- 2026 S. Abeykoon, L. Calabrò, D. Di Genova, A. Kurnosov, E. C. Bamber, D. Bondar, P. Valdivia, A. Vona, M. R. Carroll, C. Romano, F. Arzilli. Viscosity of trachytic melt constrained by integrated rheological and in situ spectroscopic analyses: Insights from the Agnano-Monte Spina eruption (Campi Flegrei, Italy). *Journal of Geophysical Research: Solid Earth*, 131, e2026JB033754. doi:10.1029/2026JB033754
- B. Bonechi, F. Arzilli, M. Polacci, A. Fabbrizio, G. La Spina, E. Michailidou, E. Biagioli, R. Brooker, J. L. Hazemann, R. C. Atwood, D. Di Genova, S. Abeykoon, D. Neave, R. Almeev, M. Burton. Superheating in mafic magmas controls clinopyroxene nucleation delay and magma ascent dynamics. *Nature Communications*, 17, 4962. doi:10.1038/s41467-026-73352-1
- E. Califano, S. Mollo, M. Brenna, A. Pontesilli, J. Wu, P. Marks, D. Eul, M. Nowak, S. J. Cronin, F. Di Fiore, A. Vona, S. Abeykoon, D. Di Genova, C. Romano, P. Scarlato. Experimental and thermodynamic constraints on the magmatic variables governing pre-eruptive conditions at Hunga volcano: Development of a new equilibrium orthopyroxene-clinopyroxene thermometer. *Chemical Geology*, 123328. doi:10.1016/j.chemgeo.2026.123328
- V. Stopponi, G. Giuliani, L. Calabrò, D. Bondar, S. Abeykoon, C. Romano, D. B. Dingwell, D. Di Genova. Viscosity and structure of Na₂O-enriched haplogranitic melts: a DSC shift-factor calibration for peralkaline rhyolites. *Chemical Geology*, 123196. doi:10.1016/j.chemgeo.2025.123196
- 2025 G. Giuliani, L. Calabrò, V. Stopponi, D. Bondar, S. Abeykoon, C. Romano, D. B. Dingwell, D. Di Genova. Aluminium control on viscosity and structure of haplogranitic melts: Implications for rhyolitic melt viscosity and its determination. *Chemical Geology*, 123127. doi:10.1016/j.chemgeo.2025.123127
- D. Di Genova, G. Giuliani, S. Abeykoon, K. Dadwal, S. Sharma, A. Khanna, A. Zandoná, D. Bondar, S. Meyer, J. Deubener. Intralaboratory calibration of the DSC shift-factor approach for melt viscosity determination: A case study on lead metasilicate glass. *Journal of Non-Crystalline Solids*, 666, 123709. doi:10.1016/j.jnoncrysol.2025.123709
- E. Fanesi, D. Di Genova, P. Valdivia, D. Bondar, S. Dominijanni, S. Abeykoon, G. Giuliani, A. Kurnosov, G. Giordano, M. Cassetta, A. Vona, C. Romano, F. Arzilli. A review of the differential scanning calorimetry shift-factor approach: Application to Colli Albani melt viscosity and implications for mafic Plinian eruptions. *Journal of Volcanology and Geothermal Research*, 108276. doi:10.1016/j.jvolgeores.2025.108276
- 2023 S. Abeykoon, C. Howard, S. Dominijanni, L. Eberhard, A. Kurnosov, D. J. Frost, T. Boffa Ballaran, H. Terasaki, T. Sakamaki, A. Suzuki, E. Ohtani, A. Sano-Furukawa, J. Abe. Deuterium content and site occupancy in iron sulphide at high pressure and temperature determined using in situ neutron diffraction measurements. *Journal of Geophysical Research: Solid Earth*, 128, e2023JB026710. doi:10.1029/2023JB026710
- S. Abeykoon, V. Laurenz, D. J. Frost, N. Miyajima, C. McCammon. An experimental investigation of factors controlling the oxygen content of sulphide melts in the Earth's upper mantle. *Contributions to Mineralogy and Petrology*, 178, 13. doi:10.1007/s00410-023-01992-3
- 2022 S. Abeykoon, A. Audétat. The single-crystal diamond trap (SCDT): a new method to determine the composition of high-P-T fluids. *Contributions to Mineralogy and Petrology*, 177, 24. doi:10.1007/s00410-021-01882-6
- 2021 I. Blanchard, S. Abeykoon, D. J. Frost, D. C. Rubie. Sulfur content at sulfide saturation of peridotite melt at upper mantle conditions. *American Mineralogist*, 106 (11). doi:10.2138/am-2021-7649

- 2018 N. Miyajima, Y. Li, S. Abeykoon, F. Heidelbach. Electron channelling contrast imaging of individual dislocations in geological materials using a field emission scanning electron microscope equipped with an EBSD system. *European Journal of Mineralogy*, 30 (1), 5-15. doi:10.1127/ejm/2017/0029-2683
- D. I. Joshua, S. Abeykoon, I. Watanabe, L. Paszek, K. Balakrishna, M. Akiba, K. S. Guruge. Seasonal movement of trace-element discharge in a typical south-Indian suburban community. *Water Science & Technology*, 77 (4), 1035-1047. doi:10.2166/wst.2017.618
- 2017 K. S. Guruge, P. Goswami, I. Watanabe, S. Abeykoon, V. P. Prabhasankar, K. R. Binu, D. I. Joshua, K. Balakrishna, M. Akiba, N. Munuswamy. Trace element distribution and risk assessment in South Indian surface waterways. *International Journal of Environmental Science and Technology*, 14, 1-18. doi:10.1007/s13762-016-1129-6
- 2016 S. Diyabalanage, S. Abekoon, I. Watanabe, C. Watai, Y. Ono, S. Wijesekara, K. S. Guruge, R. Chandrajith. Has irrigated water from Mahaweli River contributed to the kidney disease of uncertain etiology in the dry zone of Sri Lanka?. *Environmental Geochemistry and Health*, 38, 679-690. doi:10.1007/s10653-015-9749-1
- 2014 R. Chandrajith, D. Chaturangani, S. Abeykoon, J. A. C. Barth, R. van Geldern, E. Edirisinghe, C. B. Dissanayake. Quantification of groundwater-seawater interaction in a coastal sandy aquifer system: a study from Panama, Sri Lanka. *Environmental Earth Sciences*, 72, 867-877. doi:10.1007/s12665-013-3010-y

Selected conferences, talks and training

- EMPG XIX, Orléans, 2025 — two posters (Agnano-Monte Spina trachyte melt structure and viscosity; trace-element partitioning along nephelinite and melilitite liquid lines of descent)
- WITec Raman microscopy advanced training, Ulm, 2024
- 6^a Conferenza Alfred Rittmann, Catania, 2024
- EGU General Assembly, Vienna, 2024 — poster on fractional crystallisation of melilitite and Mg-nephelinite at 1 GPa and carbonatite petrogenesis
- EMPG XVIII, Milan, 2023 — poster on carbonatite petrogenesis
- International School “Understanding Oxygen Fugacity in Geoscience”, Trieste, 2022
- Goldschmidt 2021 (online) — talk on deuterium in iron sulphide and the oxidation of the early mantle
- EGU General Assembly 2020 (online) — talk on sulphide oxygen content as a mantle geothermometer
- GeoMünster 2019 and Goldschmidt 2019, Barcelona — talks on a sulphide-inclusion geothermometer
- International Workshop on Deep Volatile Cycling, Tokyo, 2019 — talk on the single-crystal diamond trap
- JpGU 2019, Chiba — poster; Goldschmidt 2017, Paris — poster on sulphide-silicate partitioning

Generated from sumithabeykoon.com, October 2026.