

Efe Akkaş, PhD

VOLCANOLOGY · PETROLOGY · MINERALOGY

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Brief Summary of My Profession

As a member of the Volcanatolia volcanology research team and a collaborator of the PÜSKÜRÜM project with a research/teaching assistant role at Hacettepe University's Dept. of Geological Engineering, I use a wide range of mineralogical and petrological data sets to analyze magmatic processes. My expertise also includes investigating and exploring secondary clay minerals linked to hydrothermal alteration processes and conducting intensive field studies to examine the physical activity of volcanoes and eruptive products on the physical volcanology aspect. Additionally, I am skilled in providing computational modeling using MATLAB to simulate common petrological phenomena. I am proficient in operating and maintaining advanced analytical techniques (SEM-EDS & X-Ray μ -CT) to gather and integrate complex petrological data on rocks and minerals.

Detailed Research & Teaching Background

My post-graduate studies mainly focus on modeling magma evolution and characterizing the evolutionary stages of crystal cargo. During my MSc, I investigated the petrological relationship between glass-bearing crystalline inclusions and their host explosive products of Gölcük Caldera (Isparta, SW Turkey). In my PhD, I have evaluated petrological correlations, micro/mesoscale reconstruction, and differentiation processes along the polybaric mush column in the magmatic reservoir/s at distinct volcanic centers located on the margins of the Sultansazlığı pull-apart basin (Central Anatolia- Turkey). In addition to the my postgraduate studies, I contributed to intense field studies and geological mapping of the Cappadocia Region, characterization and rule-based identification of alteration minerals, monitoring disintegration rates and predicting possible impact areas of fibrous zeolites through laboratory-based weathering experiments and air dispersion models (Hysplit), respectively. I also participated in the applications of some analytical examinations such as quantifying fibrous materials by a phase-contrast microscope, X-Ray μ -CT examinations on fixated analog caldera model, and analysis of XRD and FTIR patterns for various alteration minerals.

Recently, I've been conducting intensive field trips and laboratory experiments for investigations, explorations, and characterizations of post-magmatic hydrothermal activity-related secondary mineralization zones located mostly in Central and Western Anatolia to determine the economic potential of alteration minerals for Niğtaş A.Ş.. I am also collaborating on field studies and sharing knowledge for the MSCA PÜSKÜRÜM project, which consists of investigations, differentiate and characterize the pyroclastic products from explosive eruptions from the most recent volcanoes (Mt.Hasan & Erciyes) and renowned Acıgöl caldera at the Central Anatolia.

Advanced applications of rule-based algorithms and machine learning technique/s are other areas that I desire to further utilize for future mineralogical research. During my post-graduate education, I have also been fortunate to obtain long-term teaching experience at both undergraduate and graduate levels through field camps, laboratory courses in mineralogy & petrography, laboratory applications of SEM-EDS & X-Ray Micro-CT at the Hacettepe University Dept. of Geological Engineering and Core Facilities. Software such as MATLAB, and ArcGIS enables me to handle analyzing and visualizing complex data sets effectively. I have also participated in a series of worldwide congresses and training programs to improve my understanding of research subjects that my interested in and develop my technical skills in Austria, Italy, South Africa, and Belgium as a presenter and participant.

Instrument & Software Knowledge

- Advanced level user of Carl Zeiss EVO 50 EP Scanning Electron Microscope and integrated Bruker AXS X-Flash 3001 Silicon Drift Detector (SDD) Energy Dispersive X-ray Spectrometer (EDS) with visualizing detectors (BSE-SE)
- Advanced level user (certificated by Bruker) SKYSCAN 1272 High-Resolution X-Ray Micro-CT Instrument with reconstruction and image processing applications and software.
- Advanced user for ArcGIS · Adobe Illustrator · Adobe Photoshop · Match XRD analysis software · Microsoft Office · LaTeX · MATLAB · HYSPLIT · MELTS

Work Experience

Research-/Teaching Assistant · Hacettepe University Mineralogy - Petrography Division in Dept. of Geological Engineering · Sept. 2012 to present

- Preparation of descriptive mineralogy-petrography reports for a wide variety of rock samples especially highly hydro-thermally altered rocks for national/international companies working on mostly mining and construction.
- Maintenance and operations of SEM-EDS and X-Ray Micro-CT laboratories at the Dept. of Geological Engineering and Core Facilities for four and two years, respectively between 2013 - 2017.
- Sample preparation for various analytical techniques at the laboratories of the thin section-polishing and mineral liberation.
- Obtaining high-resolution view, elemental analysis, mapping, and mineral/material determination using SEM-EDS research purposes, projects, thesis, and some problematic (ultra-fine powders and charging materials) samples.
- Teaching and assisting graduate/undergraduate laboratory courses in mineralogy (optical-systematical), petrography (igneous, metamorphic, sedimentary), laboratory of X-Ray mineral micro-analysis (SEM-EDS), and X-Ray Micro-CT.
- Teaching and assisting field camps and physical geology for six years between 2012-2018

Advisor during MSc and PhD: Assoc. Prof. Dr. H. Evren ÇUBUKÇU · ecubukcu@hacettepe.edu.tr Tunnel Engineer · Limak Group of Companies Ltd · Central Tauride Göksu River Daran I-II HPP Energy Tunnel · 2011 - 2012

- Organising excavations, fortifications, and applications of concreting program for 7.5 and 2.8 km, 5 mt in diameter Energy Tunnels.
- Present cross-section and stratigraphical position report to provide vital insights for excavation project implementation and organization.
- Conducted field surveys and partly organize fortification and construction processes.

Manager: Bora BORAN · Senior Geologist and Chief of Tunnel Engineers · linkedin.com/in/bora-boran-676146b3

Education

Ph.D. on Petrology, Magmatic Reservoir Modelling, Dynamic Evolution of Magmas · Mineralogy - Petrography Division

- PhD thesis: "Petrological Correlations of Mio-Pliocene Volcanic Products at Sultansazlığı (Kayseri) Basin Margins"

MSc on Mineralogy, Mineral Thermobarometry and Petrology · Mineralogy - Petrography Division

- Thesis: "Petrological Investigation of Magmatic Xenoliths Observed in Hydrovolcanic Deposits of Quaternary Gölcük Volcanism (Isparta)"

BSc Geological Engineering · Ankara University Dept. of Geological Engineering

- Dissertation: Heavy mineral potential of Sakarya River Delta at the Western Black Sea region - (Karasu) Turkey.

Publications

- Akkaş, E. and Çubukçu, H.E., 2023. Magmatic differentiation within the transc crustal magma reservoir of Develidağ volcano, Central Anatolia (Turkey). *Journal of Asian Earth Sciences*, 252: 105688. 10.1016/j.jseaes.2023.105688.
- Aydar, E. and Akkaş, E., 2021. The emission of natural harmful particulate matters by wind erosion and possible impact areas, Cappadocia province, Central Anatolia, Turkey. *Bulletin of Engineering Geology and the Environment*, 81(1): 20. 10.1007/s10064-021-02540-8.
- Ulusoy, İ., Diker, C., Şen, E., Aydın, E., Akkaş, E., Gümüş, E., Çubukçu, H.E. and Erkut, V., 2020. Surface expressions of morphostructural features at Hasandağ stratovolcano on DEM datasets. *Mediterranean Geoscience Reviews*, 3(2): 175-191. 10.1007/s42990-020-00044-3.
- Esenturk, G., Akkas, E., Cubukcu, E., Nagas, E., Uyanik, O. and Cehreli, Z.C., 2020. A micro-computed tomographic assessment of root canal preparation with conventional and different rotary files in primary teeth and young permanent teeth. *Int J Paediatr Dent*, 30(2): 202-208. 10.1111/ipd.12587.
- Akkaş, E., Akin, L., Evren Çubukçu, H. and Artuner, H., 2015. Application of Decision Tree Algorithm for classification and identification of natural minerals using SEM-EDS. *Computers & Geosciences*, 80: 38-48. 10.1016/j.cageo.2015.03.015.

Certification

- Bruker Micro-CT User Training, 23-27 Nov 2016, Kontich-Belgium, Organized by Bruker microCT – Kartuizersweg 3B – 2550 Kontich

Scholarships & Projects

Two-year scholarship supported by The Scientific and Technological Research Council of Turkey (TUBITAK) · Project No: 113Y439, April 2014- June 2016, · Project Title: Investigation of Alteration Properties of Middle Miocene - Late Quaternary Ignimbrites of Cappadocian Volcanism

Undertaken responsibilities and tasks

- Sampling of rock pieces and dust through intensive field studies.
- Geological mapping of ten ignimbrite sheets, effusive-extrusive products, and intercalated fluviolacustrine sediments to determine alteration zones, alteration agents, and mechanism.
- Sample preparation (epoxy-stub mounting, thin sections, and application of clay separation techniques for powders of altered rocks) to determine both juvenile and secondary alteration minerals and mineral chemistry using both SEM-EDS and XRD.

- Reporting spatial concentrations of alteration minerals on the geological map and mineral chemistry of juvenile and alteration minerals (mostly zeolites, clay minerals, sulfides, and amorphous silica gel).
- Application of laboratory test to monitor physical disintegration rates of fibrous zeolites from the surface of the altered rocks through freezing-thawing and wetting-drying tests.
- Visualising and quantifying disintegration rates of fibrous zeolites using both 2D and 3D imaging techniques using optical phase contrast microscopy and high-resolution X-Ray Micro-CT techniques.

Two-year scholarship supported by The Scientific and Technological Research Council of Turkey (TUBITAK) · Project No: 116Y167, April 2017- June 2019, · Project Title: Investigation of the Hydrothermal and Thermal Activity of Mt. Hasan by Geophysical and Remote Sensing Methods

Undertaken responsibilities and tasks

- Sampling of rock pieces and dusts around the summit area both Small and Great Mt.Hasan through three mounts field studies.
- Sample preparation (epoxy-stub mounting) to determine fumarolic activity related secondary alteration minerals using, SEM-EDS, FTIR, and XRD methods.
- Determining the type of alteration minerals and relative concentrations on the surface.
- Participate intensely (25mt. interval), Self-Potential (SP), temperature, and CO2 mapping survey through six different decline routes from the peak to the peripheral zone of the mountain.
- Conducting alteration mapping through in situ field observations and satellite imagery.

Conferences

Poster Presentations

- Aydın, E., Ulusoy, İ., Akkaş, E., Analogue and Numerical modeling of double-piston piecemeal calderas, poster presentation, Cities on Volcanoes 10, Napoli-Italy, 2-7 September 2018
- Diker, C., Ulusoy, İ., Akkaş, E., Şen, E., Çubukçu, H., Gumus, E., Başar, O., Aydın, E., Erkut, V., Kaygısız, N., Hydrothermal fluid circulation and structural discontinuities on Mount Hasan, Turkey: preliminary results., EGU General Assembly 2018, Vienna-Austria, April 2018.
- Akkaş, E., Çubukçu, H.E., Akin, L., Erkut, V., Yurdakul, Y., Karayiğit, A., Identification of Some Zeolite Group Minerals by Application of Artificial Neural Network and Decision Tree Algorithm Based on SEM-EDS Data., EGU General Assembly 2016, Vienna-Austria, April 2016.
- Akin, L., Akkaş, E., Çubukçu, H.E., Petrology and Geochemistry of Pyroclastic Flow and Phreatomagmatic Deposits in Gölcük Area, Isparta., EGU General Assembly 2016, Vienna-Austria, April 2016.
- Akkaş, E., Çubukçu, H.E. Artuner, H., Application of decision tree algorithm for identification of rock-forming minerals using energy dispersive spectrometry. EGU General Assembly 2014, Vienna-Austria, May 2014.
- Akkaş, E., Çubukçu, H.E. Artuner, H., Real Time Automated Mineral Classification Using Energy Dispersive Spectroscopy. 67th Geological Congress of Turkey, April 2014

Oral Presentations

- Akkaş, E., Çubukçu, H.E., Erkut, V., Akin, L., Yurdakul, Y., Ulusoy, İ., Şen, E., Microscopic Monitoring of Laboratory Based Physical Disintegration Ratio of Fibrous Zeolite Crystals from Cappadocian Altered Ignimbrites (Turkey), Cities on Volcanoes 10, Napoli-Italy, 2-7 September 2018”
- Akkaş, E., Çubukçu, H.E. Akin, L., Interstitial Glass Bearing Pyroxenitic and Monzonitic Lithics: Possible magmatic origin of Gölcük Volcanism (Isparta-Turkey), XXI International Congress of the Carpathian Balkan Geological Association (CBGA), Salzburg-Austria, 10-13 September 2018
- Diker, C., Ulusoy, İ., Akkaş, E., Şen, E., Çubukçu, H., Gumus, E., Aydın, E., Erkut, V., Kaygısız, N., Self-Potential, Surface Temperature, CO2 measurements and related structural discontinuities on Mount Hasan, Turkey., Cities on Volcanoes 10, Napoli-Italy, 2-7 September 2018
- Akkaş, E., Çubukçu, H.E., Akin, L., Patchy Zoned Clinopyroxenes of Pyroxenite Enclaves Observed in Pyroclastic Deposits: Implications of Decompression during Ascend of Magma, 35 th International Geological Congress, Cape Town-South Africa 27 August - 4 September 2016.
- Çubukçu, H.E., Şen, E., Yurdakul, Y., Akin, L., Akkaş, E., Ulusoy, İ., Carcinogen Erionite bearing ignimbrites in Cappadocia, Turkey, Cities on Volcanoes 8, Yogyakarta-Indonesia, 9-13 September 2014.

Workshop & Courses

- National Micro-CT Summer School organized by Bruker and İnönü University, 30 May - 03 June 2016, Malatya - Turkey
- International Workshop on Convergent Margins, 21-23 May 2014, Trabzon - Turkey
- Postgraduate Summer School of Magmatism and Geodynamic, 25- 29 Sep 2013, Antalya - Turkey

Languages

- English full professional proficiency
- Turkish native

Interests

- Coding
- Planetary science
- Machine learning
- Website design

Hobbies & Sports

- Amateur basketball playing, swimming, skiing, cycling, kite-surfing;
- Licensed professional player in table tennis and one-star licensed scuba-diver;

- Playing chess, books (history, biographies, and novels)

References

- **Assoc. Prof. Dr. H. Evren Çubukçu**
 - Mineralogy - Petrography Division at Hacettepe University
 - Assistant Director of Core Facilities at Hacettepe University
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- **Prof. Dr. Axel K. Schmitt**
 - Institute of Earth Sciences Ruprecht-Karls-Universität Heidelberg
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