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### **Education:**

***Post-Doctoral Research Scientist and Faculty Master of Arts in Teaching (MAT) Earth Science,***  
(September, 2012 - Present)

American Museum of Natural History, Departments of Earth and Planetary Science and Education, New York, New York *Advisors:* Prof. Denton S. Ebel and Rosamond Kinzler

***Post-Doctoral Research Associate,*** (September, 2009 - August, 2012)

Stony Brook University, Department of Geosciences, Stony Brook, New York *Advisor:* Prof. Hanna Nekvasil

#### ***Projects:***

- I. "Apatite - The Effect of Volatiles on Its Structure, Stability, and Thermodynamic Properties"
- II. "Volatiles in Martian Magmas"
- III. "Volatiles in Lunar Magmas"
- IV. "Experimental and Computational Investigations of Hydrothermal Formation of Martian Alteration Assemblages"

***Ph.D., Geology,*** (August, 2009)

University of Cincinnati, Department of Geology, Cincinnati, Ohio *Advisor:* Prof. Attila Kilinc

***Dissertation:*** "Application of Magma Recharge, Plagioclase Zoning, and Crystal Size Distribution (CSD) Theory to Natural Solid-Liquid Equilibria"

***M.S., Geology*** (September, 2004)

Ankara University, Dept of Geological Engineering, Ankara, Turkey

***M.S. Thesis:*** "Petrology and Geochemistry of Volcanic Rocks around Cubuk River Cubuk Dam"

***B.S. Geology*** (June, 2001)

Ankara University, Department of Geological Engineering, Ankara, Turkey

***Senior Thesis:*** "Petrology and Geochemistry of Volcanic Rocks from Galatea Volcanic Province"

### **Awards and Honors:**

- Geology Alumni Distinguished Doctoral Fellowship, Department of Geology, University of Cincinnati (2008-2007)
- Wycoff Fellowship, Department of Geology, University of Cincinnati (2008-2007)
- Graduate Student Summer Research Fellowship, Department of Geology, University of Cincinnati (2006-2008)
- Graduate Student Governance Association (GSGA) Summer Grant for Ph.D. Fieldwork, University of Cincinnati (2006)
- Geological Society of America (GSA) Student Travel Grant for Annual Meeting of GSA, Philadelphia (2005)

- President's Scholarships, Ankara University, Engineering Faculty (2004)
- TUBITAK (The Scientific and Technical Research Council of Turkey) Student Research Grant for Senior Thesis (1999-2001)

**Publications:**

- "The Effect of Magmatic Volatile Load (S, Cl, and H<sub>2</sub>O) on Mineral/Residual Melt Equilibria in Martian Magmas" (manuscript in preparation to *Geochimica et Cosmochimica Acta*)
- "Degassing Pathways of Cl-, F-, H<sub>2</sub>O-, and S- Bearing Magmas Near the Lunar Surface: Implications for the Composition and Cl Isotopic Signatures of Lunar Apatite" (In Revision, *EPSL*)
- "Crystal Size Distributions (CSDs) in a Basaltic Flow at the Small Hasandag Volcano, Central Turkey: Comparison of Calculated Residence Times of Plagioclase and Clinopyroxene Crystals" (In Revision, *International Journal of Earth Sciences*)
- "New Insights to the Processes Controlling Plagioclase Zoning" (In Revision, *Lithos*)
- "Origin of Galena and Sphalerite Mineralization in the Koru Volcanics, Biga Peninsula, Turkey: Insights from MELTS Modeling and SUPCRT Calculations", (accepted for publication in *International Geology Review*), 2012.
- "Differential Degassing of H<sub>2</sub>O, Cl, F, and S: Potential Effects on Lunar Apatite", *American Mineralogist*, V.96, 1650-1653, 2011.
- "The Role of Fractional Crystallization, Magma Recharge, and Magma Mixing in the Differentiation of the Small Hasandag Volcano, Central Anatolia, Turkey", *Lithos*, V .125, 984-993, 2011.
- "Some Thermal Characteristics of a Mineral Mixture of Palygorskite, Metahalloysite, Magnesite, and Dolomite", *Journal of Thermal Analysis and Calorimetry*, V. 89-1, 169-174, 2007.
- "Thermal Behavior of a Mineral Mixture of Sepiolite and Dolomite", *Journal of Thermal Analysis and Calorimetry*, V. 88-3, 813-817, 2007.

**Meeting/Presentation Abstracts:**

- "Consequences of Magma Eruption Dynamics: Intraflow Variations in Petrography and Mineral Chemistry within a Single Eruptive Unit from Whitewater Canyon, Oregon" Presentation at American Geophysical Union (AGU) Fall Meeting, San Francisco, CA (Dec 3-7, 2012).
- "Unique Post-Doctoral Positions in Master of Arts in Teaching Earth Science Program at the American Museum of Natural History: Involving Early-Career Research Scientists in Earth Science Education" Presentation at American Geophysical Union (AGU) Fall Meeting, San Francisco, CA (Dec 3-7, 2012).
- "Collaboration Between Research Scientists and Educators in Implementation of a Masters Program for Training New Earth Science Teachers in New York State" Presentation at American Geophysical Union (AGU) Fall Meeting, San Francisco, CA (Dec 3-7, 2012).

- “Solid Solution in the Fluor-Chlor Apatite Anion Column” Presentation at Annual Meeting of the Geological Society of America (GSA), Charlotte, NC (Nov 4-7, 2012).
- “Experimental Degassing of Volatile Bearing Martian Magmas into a CO<sub>2</sub>-rich Atmosphere: Magmatic Vapor-Driven Surface Modification and Contribution to the Atmosphere” Presentation at American Geophysical Union (AGU) Fall Meeting, Mars System Science: Integrating Martian Planetary Processes from the Subsurface to the Surface Session, San Francisco, CA (Dec 5-9, 2011).
- “Mars as a System: The Role of Magmas in the Compositional Modification of the Martian Crust, Surface, and Atmosphere” Presentation at American Geophysical Union (AGU) Fall Meeting, Mars System Science: Integrating Martian Planetary Processes from the Subsurface to the Surface Session, San Francisco, CA (Dec 5-9, 2011).
- “Experimental Determination of Degassing Pathways from Lunar Magmas: New Insights from Time Studies” (A wet vs Dry Moon), Houston, TX (June 6-8, 2011).
- “Magmatic Degassing in Planetary Bodies: What Apatite Can Tell Us” Presentation at 42<sup>nd</sup> Lunar and Planetary Science Conference (LPSC), Woodland, TX (March 7-11, 2011).
- “Exploring the Effect of Cl, F, H<sub>2</sub>O, and S during Experimental Degassing of Lunar Magmas” Presentation at 42<sup>nd</sup> Lunar and Planetary Science Conference (LPSC), Woodland, TX (March 7-11, 2011).
- “Experimental Degassing of Cl, F, OH, and S Bearing Lunar Magmas” Presentation at American Geophysical Union (AGU) Fall Meeting, Changes in the Lunar Paradigm: Implications of Hydrous Magmatism on Lunar Evolution Session, San Francisco, CA (Dec 13-17, 2010).
- “Using Apatite to Assess Volatile Contents of Primary Lunar Magmas: Potential Pitfalls” Presentation at American Geophysical Union (AGU) Fall Meeting, Changes in the Lunar Paradigm: Implications of Hydrous Magmatism on Lunar Evolution Session, San Francisco, CA (Dec 13-17, 2010).
- “The Effect of Cl and S on Mineral Saturation in Interstitial Melts of the Chassigny Dunite: Experimental Results” Presentation at Meteoritics Conference, New York, NY (July 26-30, 2010)
- “The Effect of Cl and S on Mineral Saturation in Interstitial Melts of the Chassigny Dunite: Petrogenetic Implications” Presentation at Meteoritics Conference, New York, NY (July 26-30, 2010)
- “The Next Generation of Petrologic Study of Lunar Compositions: Exploring the Effects of Water, Cl, F, S and the Fluid Exsolution Processes that Have Affected Their Distribution” Presentation at Goldschmidt - Earth, Energy, and the Environment Conference, Knoxville, TN (June 13-18, 2010).
- “The Influence of Magmatism and Magmatic Fluids on the Geochemical Evolution of the Martian Crust” Presentation at Goldschmidt - Earth, Energy, and the Environment Conference, Knoxville, TN (June 13-18, 2010).
- “Experimental Simulation of Magmatic Hydrothermal Activity on Mars: I. High Temperature Alteration in the Presence of a Cl- and S- Enriched Fluid” Presentation at 41<sup>st</sup> Lunar and Planetary Science Conference (LPSC), Woodland, TX (March 1-5, 2010).

- “The Effect of S and Cl on Mineral Stability in Martian Magma” Presentation at 41<sup>st</sup> Lunar and Planetary Science Conference (LPSC), Woodland, TX (March 1-5, 2010).
- “Constraints on the Nature of Hydrothermal Magmatic Fluids that Can Produce Sulfate-Rich Alteration Assemblages on Mars” Poster Presentation at American Geophysical Union (AGU) Fall Meeting, A Detailed Look at Alteration Processes at Mars Session, Planetary Sciences, San Francisco, CA (Dec 14-18, 2009).
- “Role of Fractional Crystallization, Magma Recharge, and Magma Mixing in the Differentiation of the Small Hasandag Volcano, Central Anatolia, Turkey” Presentation at American Geophysical Union (AGU) Fall Meeting, Geochemistry and Petrology General Contributions Session, San Francisco, CA (Dec 14-18, 2009).
- “Crystal Size Distributions (CSDs) in a Basaltic Flow at the Small Hasandag Volcano, Central Turkey: Comparison of Calculated Residence Times of Plagioclase and Clinopyroxene Crystals” Presentation at Annual Meeting of the Geological Society of America (GSA), Portland, OR (Oct 18-24, 2009).
- “Oscillatory Zoning in Plagioclase: Effect of Pressure, Temperature, and Partial Molal Volumes of Na<sub>2</sub>O and CaO in the Melt” Presentation at American Geophysical Union (AGU) Joint Assembly, Volcanology, Geochemistry and Petrology General Contributions Session, Toronto, Canada (May 24-27, 2009).
- “The Processes That Control Compositional Zoning in Plagioclase Phenocrysts” Presentation at American Geophysical Union (AGU) Fall Meeting, Geochemistry and Petrology General Contributions Session, San Francisco, CA (Dec 15-19, 2008).
- “The Role of Isobaric Fractional Crystallization and Isobaric-Isenthalpic Magma Mixing in the Differentiation of Small Hasandag Volcano, Central Anatolia, Turkey” Presentation at Annual Meeting of the Geological Society of America (GSA), Houston, TX (Oct 4-9, 2008).
- “A New Explanation for Oscillatory Zoning in Plagioclase Phenocrysts” Presentation at American Geophysical Union (AGU) Fall Meeting, Geochemistry and Petrology General Contributions Session, San Francisco, CA (Dec 10-14, 2007).
- “The Role of Low Pressure Fractionation in the Differentiation of Calc Alkaline Ankara Volcanics” Presentation at Annual Meeting of the Geological Society of America (GSA), Philadelphia, PA (Oct 22-25, 2006).
- “The Effect of Hexylamine Adsorption on Some Physicochemical Properties of a Smectite Mineral” Presentation at 12<sup>th</sup> International Clay Symposium, Van Yuzuncu Yil University, Van, Turkey (Sept 5-9, 2005).
- “Nonclay Minerals Found in Clays” Presentation at 12<sup>th</sup> International Clay Symposium, Van Yuzuncu Yil University, Van, Turkey (Sept 5-9, 2005).
- “Evaluation of Alteration Indices and Validity of Geochemical Discriminant Diagrams as Applied to Altered Volcanics: An Example from Ankara Volcanics, Turkey”, Presentation at 32<sup>nd</sup> International Geological Congress, Florence, Italy (Aug 20-28, 2004).
- “Macroscopic and Microscopic Features Databank for Sulfate Group Minerals-I, Presentation at 32<sup>nd</sup> International Geological Congress, Florence-Italy (Aug 20-28, 2004).

- “Classifications, Physical and Chemical Characterizations of Hydrous Sulfate Group Minerals”, Presentation at Mersin 10<sup>th</sup> Anniversary Symposium, Mersin, Turkey, (Oct 12-15, 2003).
- “Crystal Structures of Tremolite, Actinolite, and Ferro-Actinolite Types of Amphibole Group Asbestos Minerals”, Presentation at the Second International Symposium on Medical Geology, Nutrition, and Cancer, Istanbul, Turkey, (Mar 31-Apr 3, 2003).
- “Data Bank for Petrology and Geochemistry: Volcanics of Vicinity of Ankara, Central Anatolia, Turkey”, Presentation at the 18<sup>th</sup> General Meeting IMA, Igneous and Metamorphic Petrology Session, Edinburg, Scotland, (Sep 1-6, 2002).
- “Data Bank for Petrology and Geochemistry of Volcanics from Erciyes Mountain, Central Anatolia, Turkey”, Presentation at 9<sup>th</sup> International Symposium on Experimental Mineralogy, Petrology, and Geochemistry (EMPG IX), Zurich, Switzerland, (Mar 24-27, 2002).
- “Comparison of Crystal Structures of Bentonites from Different Environments”, Presentation at 21<sup>st</sup> Meeting of International Association of Sedimentologists (IAS), Davos, Switzerland, (Sep 3-5, 2001).
- “Crystal Structures of Carbonate Group Minerals”, Presentation at 4<sup>th</sup> International Symposium on Eastern Mediterranean Geology, Isparta, Turkey, (May 21-25, 2001).
- “Re-calculation of Structural Formula of Amphibole Standards”, Presentation at 53<sup>th</sup> Geological Congress of Turkey, (Apr 1-4, 2000).

**Research Interests:**

- Experimental Planetary Petrology
- Computational Petrology and Geochemistry
- Volcanology
- High Temperature - Pressure Geochemistry

**Research Experience:****A. Experimental Research:**

- Low pressure (<1 bar) degassing experiments to investigate the effect of first boiling on Cl, F, OH, and S Bearing Lunar Magmas
- Phase equilibrium investigations of the effect of volatiles on crystal/melt equilibria in lunar magmas
- Phase equilibrium experiments to characterize the nature of Martian magmas and how they evolved
- Alteration experiments to evaluate the effects of fluids (exsolving during first boiling of magmas) on the formation of Martian alteration assemblages (both high T metamorphic assemblages and lower T hydrothermal assemblages)
- Apatite synthesis, structural characterization, and thermodynamic modeling

**B. Computational Research:**

- Extensive use of software such as the MELTS algorithm of Ghiorso and Sack (1995) to test various hypotheses about the formation and differentiation of calc-alkaline magmas. Modeling of evolution path of calc-alkaline magmas under several conditions (i.e., isobaric, isochoric, and decompressional) of crystal fractionation and magma mixing.

- Computational studies to gather information, to test hypotheses and generate new data on the development of normal, reverse, and oscillatory zoning in plagioclase crystals.
  - Combination of Crystal Size Distribution (CSD) Theory with MELTS algorithm to study calc-alkaline magmas.
  - Extensive use of low temperature fluid geochemistry programs such as SUPCRT for calculation of:
    - Phase boundaries and P-T paths for various mineral systems,
    - Equilibrium constants (K) and gas fugacities for a variety of chemical reactions at P and T,
    - Equilibrium constants for reactions involving both pure and impure solid-solution minerals,
- C. Field Research** - Detailed fieldwork involving
- Geological mapping of a volcanic terrain,
  - Interpretation of aerial photographs,
  - Collection and description of lava flows and pyroclastic materials

**Research Locations and Field Trips:**

- Central Anatolia, Turkey (Erciyes and Hasandag Volcano)
- Cascade Range - Western Washington and Oregon (Columbia Gorge - *Multnomah Falls*, Mt St Helens - *Debris avalanche and lahars*, NewBerry - Obsidian Flow and the Crater Rim, Mt Hood)
- Mt Jefferson Volcano, Oregon

**D. Analytical Research:**

- Investigation of crystallized melt inclusions in martian and lunar meteorites
- Investigation of apatite volatile contents in lunar and martian meteorites

**Teaching Experience/Training:**

**A. Igneous and Metamorphic Petrology:**

- Gave guest lectures for undergraduate Introductory Geology classes at Stony Brook University (Spring Semester 2011)
- Gave guest lectures on subduction zone magmatism for undergraduate Petrology classes at Stony Brook University (Fall Semester 2009)
- Served as teaching assistant for graduate Metamorphic Petrology (Fall 2005) and undergraduate Igneous Petrology and Environmental Volcanology classes (Spring 2006) at University of Cincinnati

**Duties:** Collaborated on development of syllabus, lab exercises, weekly homework assignments, in-class research projects, field-trips, and exams. Led weekly lab sessions, maintained online class content using Blackboard Course Management system, met with students during office hours and by appointment, and graded all written work.

**B. Mineralogy:**

- Served as teaching assistant for undergraduate Mineralogy class (Winter 2007 and 2008) at University of Cincinnati
- Taught undergraduate Optical Mineralogy class (Spring Semester 2002-2004) at Ankara University
- Served as teaching assistant for graduate Modern Methods of Mineral Identification class (Spring Semester 2003 & 2004) at Ankara University

**Duties:** Collaborated on development of syllabus, lab exercises, field-trips, and exams. Lectured as primary instructor for weekly lab sessions. Met with students during office hours and by appointment, assisted students with their oral and poster presentations, and graded all written work.

**C. Introductory Courses:**

- Served as teaching assistant for undergraduate Introductory Geology 101-102-103 classes (Spring 2008, Fall 2007, Spring 2007, and Winter 2006) at University of Cincinnati
- Served as teaching assistant for undergraduate Oceanography class (Fall 2006) at University of Cincinnati

**Duties:** Collaborated on development of syllabus, lab exercises, weekly homework assignments, and exams. Led weekly lab sessions, maintained online class content using Blackboard Course Management system, met with students during office hours and by appointment, and graded all written work.

**Technology/Software Used for Teaching:**

- Blackboard Course Management, MINPET, IGPET, MELTS, Kaleidegraph, Deltagraph, SigmaPlot Multimedia Classroom.

**Training:**

- NAGT Teaching and Learning Workshops (Spring 2011)
- Preparing Future Faculty Seminars, University of Cincinnati (Spring 2008)
- Center for Enhancement of Teaching and Learning Workshops, University of Cincinnati (Spring 2008)
  - Blackboard Tools Workshop
  - Syllabus Development Workshop

**Professional Activities and Service:**

**Co-Convener and Co-Chair – special session** “Mars System Science: Integrating Martian Planetary Processes from the Subsurface to the Surface” at American Geophysical Union Fall Meeting 2011, San Francisco, CA (with Nekvasil, H. and Sharp T.H.)

**Professional Memberships:**

- American Geophysical Union

- Mineralogical Society of America
- Geological Society of America
- Sigma Xi

**Internship:**

- **Turkish National Petroleum Corporation (TPAO) Research Center** (2000): Experienced in quantitative characterization of rock forming minerals using SEM-EDS, powder XRD and ICP-MS techniques.

**Professional References:**

1. Dr. Hanna Nekvasil (Post doctoral advisor, Research and Education Reference)  
Professor  
Department of Geosciences, Stony Brook University  
Ph: (631) 632-8201, Email: [hanna.nekvasil@stonybrook.edu](mailto:hanna.nekvasil@stonybrook.edu)
2. Dr. Attila Kilinc (PhD advisor, Research Reference)  
Professor  
Department of Geology, University of Cincinnati  
Ph: (513) 556-3732, Email: [Attila.Kilinc@uc.edu](mailto:Attila.Kilinc@uc.edu)
3. Dr. Roger L. Nielsen (Research collaborator, Research Reference)  
Professor  
Department of Geosciences, Oregon State University  
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