

Previous GEO 392F/343Q Class Projects – Fundamentals and Applications of ICP-MS

*Affiliated [abstracts](#) and [publications](#)

Fall 2020

- The Snowball Earth: Mapping Oceanic Redox Variations during Neoproterozoic Sturtian and Marinoan Deglaciation
 - Risks associated with the COVID-19 pandemic made it impractical to have individual method projects. Instead, a class methods project was conducted, with each student participating in various sample preparation, processing, analysis, data reduction and interpretation components. Documentation was in the form of a web site (link). The project involved development of two solution mode ICP-MS methods (to assess sample preservation and redox proxy elements; especially REEs) and LA-ICP-MS for spatial analysis of samples (spots, line scans) in thin section. The sample set consisted of cap carbonate samples from eight global localities, spanning the Tonian and Cryogenian periods of the Neoproterozoic Era.

Fall 2019

- Investigating Yttrium and REE Zonation in Garnets Adjacent to diffusive Accessory Minerals using LA-ICP-MS (Daniel Campos – GeoSci/Undergrad)
- When do standards actually expire? Developing a method to determine elemental concentrations of expired vs unexpired multi-element standards in ICP-MS (Heather Gunn – GeoSci/Undergrad)
- Method for Optimizing ICP-MS Analysis of Trace Elements and Calcium in Carbonates (Tyler Logie – GeoSci/Undergrad)
- LA-ICP-MS method for determining the redox state of zircon by U/Ce isobarometry (Paul Redman – GeoSci/Grad)
- Application of LA-ICPMS method to study taphonomy of Early Jurassic fishes from Strawberry Bank Formation, UK (Sinjini Sinha – GeoSci/Grad)
- A Method for Multi-Element Soil Analysis Through Microwave Digestion and Inductively Coupled Plasma Mass Spectrometry (Byron Smith – Geography/Grad)

Fall 2018

- A method for analysis of hornblende amphibole in andesite from the Rumiqolqa Formation, Perú (Julia Earle – Anthropology/Grad)
- 2D trace element mapping of garnet by LA-ICP-MS: A new method toward enhanced petrochronology (Thomas Etzel – GeoSci/Grad)
- Sediment mixing in modern eolian environments with detrital zircon U-Pb geochronology and detrital feldspar REE geochemistry using LA-ICP-MS (Jaime Hirtz – GeoSci General)
- Trace element variations in cement and allochems of Pleistocene and Tertiary carbonate deposits, Little Cayman Island, Cayman Islands (Scarlette Hsia – GeoSci/Grad)
- A method for obtaining rare earth element concentrations in a speleothem and evaluating oxide correction in solution-mode ICP-MS (Hunter Manlove – GeoSci/Grad)
- Chemical characterization of Mendoza ceramics from Central Panama by ICP-MS and LA-ICP-MS (Ana María Navas Méndez – Anthropology/Grad)
- Using rare earth elements in clinopyroxenes of an ophiolite suite located in Dobsina, Slovakia (Gabriel Villasenor – GeoSci General)

Fall 2017

- Method to analyze REE, HFSE, LILE and U-Th-Pb in acid leached minerals from the pore network of polycrystalline diamond aggregates – Carbonado (Scott Eckley – GeoSci/Grad)
- LA-ICP-MS method to precisely determine elemental concentrations of *Buchia* bivalve and belemnite fossil from the Jurassic-Cretaceous boundary section of Grindstone Creek, California (James Hall – Geo/Geo Sci General)
- Evaluation of Pt, Pd and Rh in particulate matter and urban dust from high traffic avenues in the Monterrey Metropolitan Area, Mexico (Susana Hinojosa – Grad/visiting scholar)
- Microwave-assisted quantification of Pd and Au in Pd_xAu_{100-x} alloy nanoparticle-based heterogeneous catalysts using ICP-MS (Pranaw Kunal – Chem/Grad)
- Analysis of Red River Saline Water by ICP-MS (Jorge Luna – Geo/Geo Sci General)
- An ICP-MS Method to Tentatively Identify Meteoritic Contamination in a Potential Distal Impact Layer in the Arbuckle Anticline, Oklahoma, USA (Andrew Parisi - GeoSci/Grad)
- A Provenience Study of Terminal Classic and Post-Classic Ceramics from the Maya Site of Colha Using LA-ICP-MS (Sheldon Smith – LA/ Anthropology)
- Laser Ablation ICPMS Study of Trace Element Geochemistry in Molybdenite, Cave Peak Porphyry Mo Deposit (Mert Ugurhan - GeoSci/Grad)

Fall 2016

- Determination of U-Pb and Pb-Pb ages of zircon using LA-ICP-Q-MS (Christian Baker - Geo/Geo Sci General)
- Determination of soil nutrient deposition and loss in fire effecting ecosystems (Sol Cooperdock – Geo Sci/Grad)
- Digestion and Dilution Method Comparison of Cell Samples for ICP-MS Analysis for Investigation of Native Metal Concentration (Audrey Fikes – Chem/Grad)
- Geochemical Characterization of Natural Waters at the Eel River Critical Zone Observatory by ICP-Q-MS (Katherine Meek – GeoSci/Grad)
- A Method for Elemental Analysis Including REE+ Y and Patterns in Carbonates Using ICP-Q-MS: A case study of basin water geochemistry using Permian shoreline deposits from West Texas and New Mexico (Ben Smith – Geo Sci/Grad)
 - [Smith, B.P. and Kerans, C., 2017. Assessing the Heterogeneity of Volcanic Ash Beds Through Trace Element Concentrations of Zircon Grains. Geological Society of America Abstracts with Programs. Vol. 49, No. 6.](#)
- (Stephanie Suarez – Geo/Geo Sci General)
- Is there a genetic connection between copper sulfides and free-gold grains in the Ertsberg-Grasberg District, Papua, Indonesia? An LA-ICP-MS trace element analysis of copper sulfides in porphyry and skarn deposits (Kylie Wright – Geo Sci/Grad)
 - [Wright, K.A., Miller, N.R., and Kyle, J.R., 2017. Correlating Cu-Fe Sulfides and Au Mineralization in the Ertsberg-Grasberg District of Papua, Indonesia using LA-ICP-MS: Comparing Bornite, Chalcopyrite, and Native Gold Trace Element Variation. Submitted for 2nd North American Laser Ablation Workshop, May 25-27, 2017, Jackson School of Geosciences, University of Texas at Austin, Austin, TX.](#)
 - [Wright, K.A., Miller, N.R., Ketcham, R. A., Kyle, J.R., 2016. Correlating Cu-sulfide and Au mineralization in the Ertsberg-Grasberg District using LA-ICP-MS and HRXCT. Submitted for 2016 AGU Fall Meeting, 12-16 December, San Francisco, California, USA.](#)
 - [Wright, K.A., Miller, N.R., Ketcham, R. A., Kyle, J.R., 2016. Correlating Cu-sulfide and Au mineralization in the Ertsberg-Grasberg District using LA-ICP-MS and HRXCT. Geological Society of America Abstracts with Programs. Vol. 48, No. 7](#)

Fall 2015

- Trace and REE analysis of hydrothermal tourmaline (Nemazgah aplitic intrusion, NW Turkey), by LA-ICP-MS (Kimberly Aguilera – Geo/Geo Sci General)
 - [Aguilera, K.N., Catlos, E.J., Oyman, T., Miller, N.R., and Etzel, T.M. 2016. Documenting trace elements in hydrothermal tourmaline: Nemazgah pluton, western Turkey. Geological Society of America Abstracts with Programs. Vol. 48, No. 7, doi: 10.1130/abs/2016AM-284552](#)

- Aguilera, K., Catlos, E.J., Oyman, T., Eylül, D., Bulvari, C. and Miller, N.R., 2015. Documenting rare earth and trace elements in hydrothermal tourmaline: Nemazgah pluton, western turkey. South-Central Section - 50th Annual Meeting (21-22 March 2016). **BEST STUDENT POSTER AWARD**
- Element distribution in deformed amphiboles showing subgrain boundaries using LA-ICP-MS (Christian Black – Geo/Geo Sci General)
- Geochemical analysis of wetland soils near the Maya site of Akab Muklil, Belize by ICP-MS (Samantha Krause – Anthropology/Grad)
- Element distribution through a fault-related pseudotachylyte vein using LA-ICP-MS (Daniel Ortega-Arroyo – Geo/Geo Sci General)
- Water chemistry in an active volcanic zone: ICP-MS analysis of the Jökulsá á Fjöllum Watershed, Eastern Iceland (Greta Wells – Anthropology/Grad)

Fall 2014

- Determination of metal binding properties of proteins by ICP-MS (Christopher Crittenden – Chemistry/Grad)
- Characterization of fluid-rock interactions by analyzing Li, B, Sr, Ba and Rb using ICP-MS (Rebecca deGraffenried – Geo/Geo Sci General)
- ICP-MS for measuring gadolinium in wastewater treatment plant effluent (Curtis Feronti – Environmental and Water Resources Engineering/Grad)
- Investigation of dissolution in Late Holocene planktonic foraminifer utilizing trace metals (Victoria Fortiz – Geo/Geo Sci General)
- Characterization of otolith Sr/Ca and Ba/Ca in a commercially important fish species (*Cynoscion othonopterus*) from the Gulf of California (Erin Reed – Marine Science/Grad)
- Trace and REE measurement and detection in biotite: LA-ICP-MS study on thin sections, Menghai granite batholith, SW China (Enrique Reyes – Geo/Geo Sci General)
- Slipping through the cracks: using LA-ICP-MS to determine trace element concentrations (Mn and REEs) as proxies for fluid source and evolution in fractured carbonates from the North Anatolian Fault, Turkey (Colin Sturrock - Geo Sci /Plan II Honors)
 - Sturrock, C.P., Catlos, E.J., Miller, N.R., Akgun, A., Fall, A., Gabitov, R., Yilmaz, I.O., and Larson, T., I., accepted. Fluids along the North Anatolian Fault, Nixsar Basin, north central Turkey: Insight from stable isotopic and geochemical analysis of calcite veins. *Journal of Structural Geology*.
- An examination of ancient Mayan ceramic specialization through LA-ICP-MS (Angelina Sweeney – Anthropology/Grad)

Fall 2013

- Seasonal temperature reconstruction using trace-element values of a stalagmite (Richard Casteel – Geo Sci/Grad)
 - Casteel, R.C. and J.L. Banner, 2015, Temperature-driven seasonal calcite growth and trace element variations in drip waters from a well-ventilated cave in central Texas, U.S.A.: Implications for speleothem paleoclimate studies, *Chemical Geology* 392, 43–58.
- Spatial constraints on rare earth and high field strength elements in Alpine serpentinites: Progress on a LA-ICP-MS method to quantitatively measure concentrations in magnetite and chromite (Emily Goldstein– Geo Sci/Grad)
- Trace elements in plate calcite by solution mode and laser ablation ICP-MS (Rosemary Hatch)
- Characterizing Guam groundwater composition using geochemical data from and ICP-MS (Michelle Hulewicz– Geo Sci/Grad)
- A new method for concentrating fresh to slightly-brackish acid mine drainage (AMD) for ICP-MS analysis of rare earth elements (REEs) (L. Joy Mercier– Geo Sci/Grad)

- Identifying spatial heterogeneity in the elemental concentration of Early Jurassic dinosaur bones: Implications for the direct radiometric dating of fossil bone (Adam Marsh– Geo Sci/Grad)
- Use of trace elements for establishing least-altered Neoproterozoic carbonate compositions in the Kahar Formation, Northern Iran (Riken Patel– Geo/Geo Sci General)
- Geochemical tracers and stable isotope analysis of scales reveal variation in diadromy in Atlantic Tarpon *Megalops atlanticus* (Matthew Seeley– Marine Sci/Grad)
 - Seeley, M., Miller, N.R., and Walther, B., 2015. High resolution profiles of elements in Atlantic tarpon (*Megalops atlanticus*) scales obtained via cross-sectioning and laser ablation ICP-MS: a review and novel approach for scale analyses. *Environmental Biology of Fishes*. doi:10.1007/s10641-015-0443-z

Fall 2011

- U-Pb and Lu-Hf zircon geochronology and Ti-in-zircon thermometry of the Salta Rift basement, Argentina (Mariya Levina– Geo Sci/Grad)
- Analytical comparison of relative ages of detrital zircons using zircon standards of drastically different ages (Caleb Rhatigan– Geo Sci/Grad)
- Improved methods of laser ablation ICP-MS for apatite: determining uranium content for fission-track chronometry (Sean Sanquineto– Geo Sci/Grad)
- Rare earth element analysis of zircon by LA-Q-ICP-MS (Spencer Seaman– Geo Sci/Grad)
- Can a trend for cationic tracers of urbanization be established corresponding to a watershed experiencing outdoor watering regulations? A study examining Cu, Ni and Pb via ICP-Q-MS (Jeff Senison– Geo Sci/Grad)

Summer 2011

- What do rare earth element distributions in pelagic and hemipelagic sequences reveal about deposition and diagenesis? (Ryan Cahalan – Geo/ Geo Sci/ Honors program)
 - Miller, N.R. and Cahalan, R., 2011. What do rare earth element distributions in pelagic and hemipelagic sequences reveal about deposition and diagenesis? *Geological Society of America Abstracts with Programs* 43, 610.
 - Cahalan R C, Kelly E D, Carlson W D, 2014. Rates of Li diffusion in garnet: Coupled transport of Li and Y+REEs. *American Mineralogist* 99, 1676-1682.