MAGNET in Hawaii: The Future of Active Teaching and Learning in Geochemistry is in the Field

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Experiential learning in the field, when combined with the positive impacts of peer learning, engages participants and increases their knowledge base, while also developing critical communication and problem-solving skills. The Multidisciplinary Applied Geochemistry Network (MAGNET), an NSERC Collaborative Research and Training Experience (CREATE) initiative in Canada, has experimented with this approach over 6 years during annual field workshops. For the final workshop in Hawaii (Feb 2018), 27 geochemistry graduate students and post-doctoral fellows were tasked with planning, organizing, and running activities with a focus on geochemical questions where analytical techniques could be employed directly in the field. Over a two-month period, group proposals were developed, evaluated, and finalized. Six field activities were conducted, extending across the island of Hawaii from Mauna Kea to off-shore Kona and from active lava flows on Kilauea to thick red soils on Kohala, on a wide range of topics (Mars analog site, geothermal energy, volcanic gases, lava chemistry and stone tool provenance, volcanic soils, aquatic geochemistry). Experiments in the field involved use of an array of instrumentation, including a handheld XRF spectrometer, a multi-component gas analyzer system (multi-GAS), mobile differential optical absorption spectroscopy (DOAS), pH/conductivity measurements of soils. We will highlight the successes and challenges of the field workshop, both participant and instructor feedback done each day, and the results of pre- and post-surveys. The MAGNET experience with peer learning in the field, specifically focusing on performing analytical techniques in the outdoor environment and interpreting their results in real time, can be readily adapted to the design of effective experiential strategies for activities, workshops, and courses in geochemistry outside of the laboratory globally.