$Chem_XSeer$: Cyber-tools for environmental chemistry and geochemistry

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Research in environmental chemistry and geochemistry is becoming increasingly collaborative in scope and approach. A main goal of the geochemistry and environmental chemistry research at Penn State (and, indeed, across the world) has been the integration of experimental, analytical, and simulation results performed on systems from molecular to field scales in order to better approximate the complex physical, chemical, and biological interactions controlling the fate and transport of environmental contaminants. E-science or cyberinfrastructure have become crucial for scientific progress. We will report here on our development of the $Chem_XSeer$ architecture as a portal for academic researchers in the area of environmental chemical kinetics, which integrates the scientific literature with experimental, analytical and simulation datasets. $Chem_XSeer$ offers unique aspects of search not yet present in other scientific search services: for example, we will demonstrate tools for the extraction of tables, figures, equations and formulae from scientific documents. Ultimately, $Chem_XSeer$ intends to provide a wide range of features including full text search; author, affiliation, title and venue search; figure search; table search; formulae search; citation and acknowledgement search; and citation linking and statistics. In this presentation, we will detail our progress to date, and discuss the future goals and implementation of this platform.

This work is supported by the NSF under grant CHE-0535656.

Eruption of discrete magma batches along a normal fault zone: The Poison Lake chain, Caribou Volcanic Field, southernmost Cascades

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The Poison Lake chain of small, monogenetic, calc-alkaline basaltic volcanoes is located east of the Cascade arc 30 km ENE of Lassen Peak. This chain comprises 41 mapped units in a zone 14 km long and 2 km wide trending NNW parallel to nearby Quaternary normal faults. The 41 units fall into 10 distinct groups based on stratigraphy, petrography and comprehensive major-element geochemistry. Petrographic differences among groups are expressed by different assemblages, amounts and proportions of phenocrysts. Many units contain only sparse olivine; a few units are distinctly porphyritic with olivine, clinopyroxene and plagioclase. MgO-SiO_2, K_2O-SiO_2 and TiO_2-SiO_2 variation diagrams illustrate clear differences in compatible and incompatible elements among the groups. Limited trace-element and $^{87}Sr/^{86}Sr$ data suggest little if any interaction with the upper crust. Paleomagnetic determinations indicate characteristic directions for each group except the oldest. Dated samples were chosen from stratigraphically constrained units with distinct paleomagnetic directions. Precise $^{40}Ar/^{39}Ar$ determinations show that the lavas erupted in three separate episodes at 100, 117 and 202 ka. Collectively, the data indicate that each group represents a small, discrete magma batch generated in the mantle and stored briefly in the lower crust. Episodic movement along a NNW normal fault zone provided transitory conduits for these batches to ascend to the surface and erupt as distinct volcanic groups, each aligned along a segment of the Poison Lake chain.