

**Environmental Engineering**

**and Earth Sciences**

**EEES Department Seminar**

**Water-Rock Interactions in Upper Mantle Harzburgites: Insights from**

**Laboratory and Field Observations and**

**Theoretical Predictions**

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**Abstract:**

Dissolution of ultramafic rock forming earth’s upper mantle plays an important role in geologic processes including carbon cycle and serpentinization. As the rock matrix dissolves in the presence of CO2-bearing fluids, it increases the pH and the concentration of various ions in solution leading to precipitation of carbonate and hydrous minerals. Water-rock interaction at near neutral conditions is widely studied using crushed specimens but evolution of water composition during its exposure to an intact serpentinized harzburgite has rarely been investigated. In this study, an intact specimen of serpentinized harzburgite from Oman, a typical ultramafic rock with more than 60% lizardite mineral, was used to investigate its dissolution and buffering behavior, rock-water reaction path, and the ability of thermodynamic data to predict the rock-water system behavior, with focus on near-neutral conditions. The observed evolution of water composition was also compared with available groundwater compositions extracted from Oman ophiolite. The experiments demonstrated that (i) dissolution buffered the pH from 5.9 - 7.5 over a period of 4.5 months; (ii) dissolution increased the concentration of Mg, Ca, and Si in aqueous phase; (iii) the aqueous phase was undersaturated with respect to all carbonate and hydrous minerals; (iv) analysis of reaction products showed carbonate or hydrous minerals did not precipitate; and (v) thermodynamic data, at ambient temperature and low-pressure conditions, can successfully predict system behavior translation.

**3:30 PM – 4:30 PM**

**Monday, April 29, 2024**

**Rich Lab Auditorium**

***Attendance is strongly encouraged for graduate students enrolled in***

 ***EES 8610, EES 9610, and GEOL 8610.***

***Refreshments following seminar.***