Department of Geology
Seminar Series

Uranium Deposits as Proxies for Global Tectonic Events

Location:
Science 411

Wednesday,
October 6
1:00 pm

Dr. Mostafa Fayek
Department of Earth Sciences
University of Manitoba

Exciting developments in an important new approach to precisely dating tectonic and basinal fluid-flow events

Dr. Fayek's research expertise includes:

- Isotope Geochemistry
- Mineral Deposits
- Environmental Mineralogy
- Archaeometry

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Abstract

Zoned minerals such as zircon and monazite have traditionally been used to determine the age of paleo-fluids associated with major tectonic and metamorphic events. Other minerals (e.g., micas) when combined with an appropriate geochronometer (e.g., Ar-Ar or Rb-Sr) have provided valuable information regarding the timing of large-scale fluid events that can be important to the formation of mineral deposits. Instruments such as SIMS and LA-ICP-MS offer the capability of measuring isotope ratios on a spatial resolution of 1-100 μm. These instruments have been used to measure radiogenic isotopes in cores and rims of these minerals, thus providing an unprecedented understanding of fluid evolution related to orogenic and metamorphic events. However, uraninite is one mineral that has been largely overlooked as a mineral proxy for large-scale fluid and tectonic events. Recent techniques and standards have improved precision and accuracy to a level that approaches those of conventional techniques for U-Pb isotopic analyses of U-bearing minerals. SIMS work suggests that on the microscale, U-deposits can provide a detailed record of continental-scale tectonic events at a single location, with a potential time-depth extending to before 2.0 Ga. For example, unconformity-related U deposits, Canada and Oklo-Okélobondo natural fission reactors, Gabon are some of the few places in the world that record a nearly complete tectonic history of the continents over the past 2.0 Ga. Thus, if the chronologic detail suggested by these studies proves to be common to U-deposits in ageneral, they will provide an important new approach to precisely dating tectonic and basinal fluid-flow events.

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