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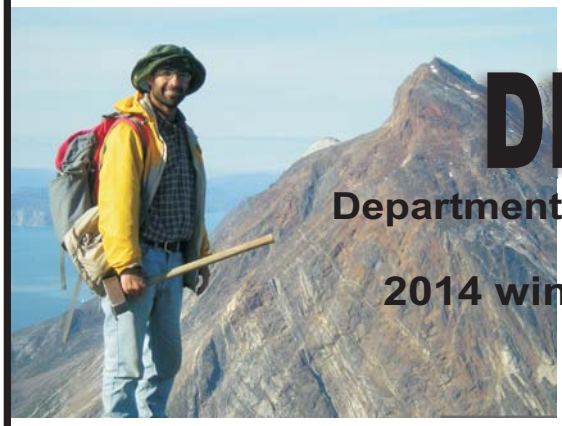
Geological Association of Canada 2014-2015

Hutchison Medal Lecture Tour



DR. ALI POLAT

Department of Earth and Environmental Sciences
University of Windsor
2014 winner of the W.W. Hutchison Medal

presents

"Archean Anorthosite Petrogenesis: A Case Study on the 2.97 Ga Fiskenæsset Layered Intrusion, West Greenland "

ABSTRACT

Among many Archean rock associations, anorthositic layered intrusions have unique mineralogical and lithological characteristics in that they range from calcic-plagioclase-dominated anorthosite cumulates to olivine-dominated dunite cumulates, providing a unique opportunity to study petrogenetic and geodynamic processes in the early Earth. The Fiskenæsset Complex, southwestern Greenland, is the best-known example of Archean anorthositic layered intrusions in the world. Despite multiple phases of deformation and metamorphism, the Fiskenæsset Complex contains well-preserved cumulate layers consisting of olivine, pyroxene, hornblende, plagioclase and chromite. Petrographic observations indicate that the order of crystallization was olivine, orthopyroxene, hornblende/clinopyroxene and plagioclase. Formation of abundant orthopyroxene-magnetite symplectitic (vermicular) intergrowths, mainly at the expense of olivine, is attributed to chemical reactions between late stage, residual hydrous melts and olivine. Whole-rock and mineral trace element and oxygen isotope data indicate that the complex has preserved its primary igneous chemistry. Large negative Nb anomalies in all major rock types and hornblendes suggest that the magmas of the Fiskenæsset Complex were derived from a hydrous sub-arc mantle peridotite, consistent with the formation of the complex in a supra-subduction zone geodynamic setting. The whole-rock samples from the complex yielded a Sm-Nd regression age of 2973±28 Ma, with an average initial eNd=+3.3, consistent with a long-term depleted mantle source. The complex is characterized by a modern mantle-like whole-rock O-isotope composition (d18O=+5.8±0.5‰; n=36). Average d18O values in olivine (d18O=+4.9‰), hornblende (d18O=+5.7‰), clinopyroxene (d18O=+6.5‰) and plagioclase (d18O=+6.4‰) are consistent with the fractionation of these minerals in magma chamber(s).

Date: **Tuesday, APRIL 21, 2015**

Time: **11:00 a.m.**

Place: **CB 3031** Coffee & cookies will be provided

Lakehead UNIVERSITY | Department of Geology