

EARTH SCIENCES 4470B/9550B, Global Metallogenic Cycles in Crustal Evolution

Description: Advanced-level study of the global distribution of ore deposits. Problems of metal source, transport and deposition are discussed within the context of crustal evolution. Ore types sensitive to secular changes in the earth's lithosphere-hydrosphere-atmosphere-biosphere are emphasized. A field excursion to a major ore district may be arranged. **0.5 course**

Prerequisites: ES 3370A and 3371B, or permission of the department

2 lecture hours, Mon. & Wed 11:30-12:30 Room 34 PAB

3 tutorial hours, Fri. 10:30-1:30 1065 B&G

Instructor: Prof. Norman A. Duke, nduke@uwo.ca, 519-661-3199, Off. 1081 B&G

Course Outline: Lecture Topics

- 1) Introduction to global metallogenic cyclicality
- 2) Geological time and primordial geochemistry of Earth

Archean Metallogeny

- 3) Archean oceanic volcanism, sedimentation
- 4) Accretionary history of the Superior Province
- 5) Accretionary history of the Slave Province
- 6) Other Archean cratonic nuclei
- 7) Kenorland: The first Supercontinent
- 8) The Archean/Proterozoic transition

Paleoproterozoic Metallogeny

- 9) The Circum-Superior Rift
- 10) The TransHudson Orogen
- 11) The Penokean Orogen
- 12) The Bear Province
- 13) The Assembly of Laurentia

Mesoproterozoic Metallogeny

- 14) Anorogenic magmatism
- 15) Continental rifting (the Keewanawan)
- 16) Assembly of the Rodinia

Neoproterozoic Metallogeny

- 17) Opening and closing of Pan-African rifts/oceans
- 18) Assembly of Gondwanaland

Paleozoic Metallogeny

- 19) Global explosion of life at the PC/C boundary
- 20) The opening and closing of Iapetus
- 21) The Assembly of Pangea

Mesozoic Metallogeny

- 22) The Cordillera/Alpine/Himalaya Chain
- 23) Native, suspect and exotic terranes
- 24) Larimide collision and post collisional collapse

Actualistic Metallogeny

- 25) Modern plate tectonic metallogenic theory
- 26) Ore preservation in the geological record

Text: No text, key reference papers provided

Marks: 50% paper on global metallogenic evolution, 50% final exam

Tutorial Topics

Metallogenic modeling
Origin of the solar system

Metallogeny of the Superior
and Slave Provinces

The Kenoran Orogenic
Lode Gold Event

Paleoproterozoic mobile belts

Collisional plate boundaries
Metallogeny of the
Hudsonian Cycle

Olympic Dam-type deposits
Sedex Pb-Zn, Redbed Cu
The Grenville Cycle

Metallogeny of
the Pan-African Cycle

Metallogeny of the
Appalachian orogenic system

Metallogeny of the
Cordilleran orogenic system