Contribution ID: **121** Type: **ORAL**

INVESTIGATION OF THE GEOLOGICAL PROCESSES WHICH CONTROL THE GENESIS OF UNCONFORMITY-TYPE URANIUM DEPOSITS USING PARALLELIZED NUMERICAL SIMULATION ON A SUPERCOMPUTER

Tuesday 26 June 2018 09:00 (20 minutes)

Uranium deposits of the Athabasca Basin, Canada and Alligator Rivers region, Australia are located near subhorizontal unconformities between polydeformed/metamorphosed Archean/Paleoproterozoic rocks and overlying essentially undeformed Proterozoic sedimentary rocks. Most deposits are associated with basement-rooted faults; however the location of uranium mineralization to the unconformity is quite variable. Athabasca Basin deposits occur at/above/below the unconformity. Conversely, all discovered deposits in the Alligator Rivers region occur below the unconformity. Conceptual models for these deposits invoke sandstone-sourced oxidised fluids moving down into the basement (basement mineralisation), or basement-sourced reduced fluids moving up into the sandstone (sandstone mineralisation); driven by topography, deformation or thermal buoyancy. This study focuses on deformation-driven flow, using numerical simulations to explore fluid flow controls. The model is subjected to horizontal shortening, and fluid flow directions are explored by varying fault dip, shortening direction, strain rate, basement rock strength, or permeability. Over 300 finite-element simulations were performed using MOOSE simulation framework. The results indicate that shallow fault dip, high strain, and fault-perpendicular shortening favour downward flow, whereas steep fault dip, low strain, and low-angle-to-fault shortening favour upward flow. These results are used to predict new mineralization targets.

Country or International Organization

Australia

Primary author: Dr SCHAUBS, Peter (CSIRO Mineral Resources, Kensington, WA 6151, Australia)

Co-authors: Dr SHELDON, Heather (CSIRO Mineral Resources, Black Mountain, ACT 2601, Australia); Dr ANNESLEY, Irvine R. (ENSG, Universite de Lorraine and Department of Geological Sciences, University of Saskatchewan)

Presenter: Dr ANNESLEY, Irvine R. (ENSG, Universite de Lorraine and Department of Geological Sciences, University of Saskatchewan)

Session Classification: Advances in Exploration

Track Classification: Track 4. Advances in exploration