GRAND JUNCTION GEOLOGICAL SOCIETY

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SEPTEMBER MEETING

WEDNESDAY, SEPTEMBER 18, 2019
Joint meeting with the CMU Geology Students
7:30 PM
Saccomanno Lecture Hall
(In the Wubben-Science Building)

Jay R. Scheevel
Scheevel Geo Techonologies LLC.
Grand Junction

Will Speak On

"Cryptodynamic Potential (CP): A Thermal Engine Capable of Driving Geodynamic Processes"

Guests Are Always Welcome

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Cryptodynamic Potential (CP): A Thermal Engine Capable of Driving Geodynamic Processes.

Part 1. Development of Theory and Application to Basinal Hydrodynamics

JAY R. SCHEEVEL (Scheevel Geo Technologies LLC.)

The fact that a temperature gradient can induce a parallel fluid flow has long been known. The driving mechanism has typically been explained within a framework of linear cross coefficients (e.g. Onsager, 1931) as opposed to explaining the mechanism phenomenologically. The fluid flow is in response to the spontaneous conversion of thermal energy to work (then expressed as fluid flow). This phenomenon has been observed experimentally as temperature-gradient induced flow of water through confined soil in experiments by Taylor and Cary in 1960.

We propose a molecular-scale phenomenological model illustrating a mechanism that impels flow like that observed in Taylor and Cary's experiments, then we validate the model by simulating their experimental results. The term Cryptodynamic Potential (CP) is introduced to describe the driving mechanism. We propose that the CP model (CP engine) can be directly extrapolated to geological dimension and time scales, predicting a significant influence on fluid-flow systems. The extrapolations demonstrate that the CP engine qualifies as a primary driving mechanism that has not been previously recognized.

The CP model explains long-lived continuous flow of fluids driven by a temperature gradient in basinal hydrologic systems.

This presentation will cover the development of the CP model concepts and how they apply to fluid flow. We also show how to determine the magnitude of the CP model when scaled to basinal dimensions, and how CP induced flow may affect typical basins' fluid pressure regimes.

Although not presented here, the CP engine, when adapted to solid materials, may potentially resolve previously unresolved or perplexing geodynamic problems.

For example, in thrust belts, the model could predict internal driving forces large enough to dislodge and transport long flat thrust sheets intact, without the application of large externally-applied boundary forces, provided there is a sufficiently long-lived lateral thermal gradient within the thrust sheet.

The model might predict similar results when applied to any large geologic system that demonstrates a persistent lateral temperature gradient, including but not limited to the driving of lithospheric plates.