

1D Petroleum Systems Modelling: An Application of McKenzie's Lithospheric Stretching Technique

Oluseyi Olajide¹ and Stephen L. Bend¹

¹Geology Department, University of Regina, Regina, SK, Canada

Abstract

Exhumation and paleobathymetry corrections are paramount to the authenticity of the total petroleum systems models of partially exhumed basins as applicable constraints, risk and the tendency to overestimate undiscovered resource potentials pose significant challenges. McKenzie lithospheric stretching technique is regarded as a valid framework for the evaluation of exhumation in intracratonic rift basins of which Williston Basin is a suitable example. This assessment applies a workflow that allows the continuous deterministic adjustment of paleobathymetry and the corresponding response of exhumation data within reported erosional episodes as observed water loaded basement subsidence and McKenzie's theoretical subsidence profiles converge at non erosional intervals. It further demonstrates how a general assumption of 100m paleo-water depth for most Williston basin Phanerozoic units with the exception of Bakken and Lower Lodgepole; a notion that suggests a negligible bathymetry effect could be applied to basin modelling, could introduce large uncertainty. Resulting estimations and models are more detailed and enhanced for accuracy.