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Dynamic capillary pressure changes required to quantify upward migration of methane during seismic chimney formation in the Southern Viking Graben

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Seismic chimneys are anomalies in seismic data and likely hosting residual methane accumulations. These anomalies are generally interpreted as focused fluid flow structures in the Nordland Group in the Southern Viking Graben. Thus, they can act as potential fluid leakage pathways in geological subsurface utilization, but also significantly contribute to geogenic greenhouse gas emissions into the atmosphere. The aim of the present study is to enhance the hydromechanical simulations undertaken by Kempka et al. (2016) by means of a dynamic capillary pressure scaling relationship in addition to the previously implemented porosity and permeability scaling, derived from volumetric strain changes. Our simulation results demonstrate that dynamic capillary pressure changes have to be taken into account to improve the understanding on seismic chimney formation by upward migration of methane in the Nordland Group.

Kempka, T., Unger, V., Kühn, M. Seismic Chimney Formation Induced by Upward-migrating Methane in the Nordland Group, Southern Viking Graben, Energy Procedia, 97, 2016, 427-432, DOI:10.1016/j.egypro.2016.10.040.