

## **On the Accuracy of Fault Sealing Calculations**

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### **Abstract**

While assessment of fault sealing is important to hydrocarbon exploration and production as well as to safe storage of CO<sub>2</sub> in the subsurface, surprisingly little work has been addressing the accuracy of such assessments. We have performed analyses of this accuracy by back-calculating fault sealing capacity from exploration and production data and have varied the most important parameters in such calculations to assess the impact of their uncertainty to the calculated fault-sealed column heights. The parameters we varied included seismic interpretation, quantification of clay in the fault planes, and probabilities for sand continuity from wells to faults.

We performed a detailed sealing analysis at the Njord Field offshore mid Norway. This analysis concluded that the impact of burial depth is here larger than previously thought, whereas the impact of clay content in the fault planes (in the 15-40% SGR range) has been overemphasized. This result emerged both from analyses of pre-production pore pressure and column height data across the field, and of analyses of fault multipliers from history matching from the same field. These results are consistent with published laboratory data. We argue that some previously noted relationships between in-situ observations of fault sealing and clay content may have other causes than a causal relationship between these two parameters in the investigated SGR range.

Analyses of the consequences of uncertainties inherent in seismic interpretation and clay content quantification were in some cases seen to be sufficiently large to completely change the main conclusion of fault sealing assessment. We suggest such uncertainties have to some extent been neglected because interpreted seismic lines and the bases for clay content calculations are rarely published.