Effect of Bioturbation in Low Permeability Gas Charged Reservoirs - A Case Atudy from the Upper Cretaceous Milk River Fm., Western Canada

Ryan Lemiski*
University of Alberta, Edmonton, AB, Canada
rlemiski@ualberta.ca

and

Jussi Hovikoski, S. George Pemberton, Murray Gingras and Robert Olexson
University of Alberta, Edmonton, AB, Canada

Despite the fact that burrow-associated permeability is evident in the rock record, it receives surprisingly little consideration. Perhaps one reason is the matter of scale. The permeability of geological media is a bulk character. However, the bulk permeability of sediment dominated by small-scale heterogeneities—such as worm burrows—is difficult to observe, assess and numerically model. Overlooking the potential impact of biogenic structures can lead to inaccurate assessments of the permeability of a sedimentary rock, and non-recognition of permeability streaks in a hydrocarbon reservoir. This is especially important in gas-prone reservoirs where slight variations in permeability can have dramatic effects on storativity and deliverability. For example, in the Trinidad TP 50 Sequence significant gas production has come from ‘poor-quality bioturbated facies’.

A developing play in North America revolves around low permeability gas-prone non-associated reservoirs. These fields produce from shallow zones (less than 1000 metres) in thin bedded or muddy units. Such zones can be laterally extensive and continuous and in most cases are interbedded with (or *are*) the source rock. The gas is biogenic in origin and may have been generated recently. Therefore the gas does not have to migrate into the reservoir but will accumulate internally where permeability and porosity enhancement are present (such as burrow systems). The upper Cretaceous Milk River Fm (“Alderson Member”), western Canada, is an example of such, giant low permeability gas-play. In this study, we describe its key facies, and measure the effect of bioturbation on the distribution of permeability in these strata.