

# Facies Changes and Stratal Geometry in the Upper Albian Hasler, Goodrich and Cruiser formations, NE British Columbia

Piotr J. Angiel, A. Guy Plint

In this poster we present preliminary outcrop-to-subsurface correlation of the strongly cyclical rocks that are assigned to the lithostratigraphic Hasler, Goodrich and Cruiser formations. These rocks are time-equivalent to Allomember VD of the Viking alloformation, and the overlying Westgate and Fish Scales alloformations as defined by Roca et al (2008) in Alberta. Our new correlations illustrate lateral facies changes from the western shoreline in the proximal foredeep to the forebulge in central Alberta. The main sedimentary packages and erosion surfaces defined in the Westgate and Fish Scales alloformations in Alberta (Roca et al. 2008) can be traced northward and westward, in which directions the whole formation greatly thickens. Within the study area, Viking allomember VD, the Westgate and Fish Scales alloformations thicken from 340 m at the Alberta border to about 500-600 m close to the BC foothills. For the purposes of this presentation, we will retain the standard lithostratigraphic terminology to facilitate comparison with previous studies.

Strongly cyclical sandier-upward transgressive-regressive successions, typically 5-20 m thick, characterize the Hasler, Goodrich and Cruiser formations. These successions are readily traceable in subsurface for > 200 km. From west to east, the sediment character gradually changes from storm dominated nearshore and shoreface sandstone and conglomerate in the west, to increasingly muddy sediments in the east. Subsurface mapping shows that the formations do not develop a clinoform geometry (as does the Dunvegan Formation for example), showing that the basin had an extremely low-gradient topography, and water depth was no more than a few tens of metres for hundreds of kilometres offshore.

A previously un-described section through the upper part of the Hasler Formation was measured on Johnson Ridge, in which the transition from the Hasler to the Goodrich Formation can be observed. An outcrop on Dokie Ridge, that lies 20 km west of a well-log cross-section, shows that the Goodrich Formation comprises a mixed succession of wave-dominated shoreface sandstones interstratified with fluvial sandstones, mudstones and thin coals. The nearest well log does not indicate the presence of alluvial facies, suggesting that the position of the shoreline underwent little lateral movement. This implies a balance between the rates of subsidence and sediment supply, leading to vertical aggradation of facies belts.

This study offers a new opportunity to investigate facies transitions from nearshore sandstone to offshore mudstone under the influence of rapid flexural subsidence and also high-frequency eustatic oscillations. The study will investigate the detailed stratal geometry of shelf mudstones, and consider possible mechanisms by which mud was transported far offshore. The new work will also make it possible produce a much more detailed paleogeographic reconstruction of the Goodrich 'delta', and also to establish how the enigmatic 'Fish Scales Sandstone' can be related to coeval coastal deposits. The position of the Albian-Cenomanian boundary may be better established as a result of these correlations.

## References

Roca, X., Rylaarsdam, J.R., Zhang, H., Varban, B.L., Sisulak, C.F., Bastedo, K. and Plint, A.G. 2008, An allostratigraphic correlation of Lower Colorado Group (Albian) and equivalent strata in Alberta and British Columbia, and Cenomanian rocks of the Upper Colorado Group in southern Alberta. *Bulletin of Canadian Petroleum Geology*, **56**, 259-299.