High-frequency, shallow marine clastic sequences across the Turonian - Coniacian boundary, correlated between the Bohemian Cretaceous and Western Canada basins

Plint, G.[1], Uličný, D.[2,*], Čech, S.[3], Walaszczyk, I.[4], Gröcke, D.R.[5], Laurin, J.[1], Shank, J.A.[6], Jarvis, I.[7]

1) Department of Earth Sciences, London, Ontario, Canada
*2) Institute of Geophysics, Czech Academy of Sciences, Prague, Czech Republic, *E-mail: ulicny@ig.cas.cz*
3) Czech Geological Survey, Prague, Czech Republic
4) Faculty of Geology, University of Warsaw, Warszawa, Poland
5) Department of Earth Sciences, Durham, UK
6) Esso Resources Canada Ltd., Calgary, Canada
7) School of Geography, Geology and the Environment, Kingston Univ. London, Kingston upon Thames, UK

The Turonian-Coniacian (T-C) boundary is associated with a well-defined succession of inoceramids and other faunal biostratigraphic markers recognized in a number of key sections in Europe and North America. In carbon-isotope chemostratigraphy the boundary has mostly been associated with the negative trough of the Navigation C-isotope Event. A fall in sea level somewhere in the broader T-C boundary interval has been interpreted by a number of studies. However, problems with stratigraphic resolution and the incompletness of many records due to hiatuses and unconformities have prevented a reliable, detailed correlation between basins which is necessary to address the potential eustatic history across this boundary. Our study focuses on a comparison of clastic depositional systems from two basins, in which 2D-3D physical stratigraphic frameworks were complemented by detailed biostratigraphic and chemostratigraphic data. In the Bohemian Cretaceous Basin of Central Europe, rapid tectonic subsidence combined with abundant sediment supply provided a rare opportunity to study an expanded succession across the T-C boundary, recorded both in offshore hemipelagic facies and nearshore coarse-grained deltas. The transgressive-regressive history of the deltaic system was established with resolution better than 100 kyr in some cycles, based on a detailed biostratigraphic framework and carbon-isotope data from several cores. The T-R history of this interval from the Bohemian Basin was compared to a high-resolution regional stratigraphic framework of the Cardium Formation in the Western Canada Basin, correlated distally to the Niobrara Formation in Pueblo, CO. Despite different tectonic regimes and vastly different dimensions of the basin-fills compared, a majority of the high-frequency T-R cycles in the study interval can be correlated in surprising detail, particularly in the uppermost Turonian, which strongly suggests a pattern of high-frequency eustatic fluctuations across the T-C boundary. Our results emphasize the importance of very high stratigraphic resolution that allows high-frequency cyclicity to be recognized. A comparison of longer-term stacking patterns would be misleading because they contain a stronger signature of the basinal subsidence and supply history in time and space.