Palaeo-circulation and paleogeographic changes in the Late Coniacian - Early Santonian (Late Cretaceous) of Europe, as based on ammonites and stable carbon and oxygen isotopes

Gruszczynski, M., Marshall, J.[1], Remin, Z.[2,*]

1) Department of Earth, Ocean and Ecological Sciences, University of Liverpool, Liverpool, UK
*2) University of Warsaw, Warsaw, Poland, *E-mail: zbyh@uw.edu.pl*

Ammonite distribution patterns and carbon and oxygen stable isotopes from the Lipnik-Kije (Poland) and Dubovcy (Ukraine) sections, in combination with literature data from other European sections, allow us to propose a model of sea water paleo-circulation for the Coniacian–Santonian transition. A key to understand the biogeographic dynamics of the ammonite faunas in Europe was the material from the sections of the Lipnik-Kije (SW margin of the Holy Cross Mountains, central Poland) and Dubovcy (western Ukraine) surveyed recently by REMIN (2010) and REMIN et al. (2016). The dominance of Tethyan ammonite forms at Lipnik-Kije, in an area typically included into the Boreal Province (central Poland), led to the hypothesis that warm Tethyan currents penetrated areas far to the north, reaching the territory of present central Poland. In contrast, the more southerly located section of Dubovcy in Ukraine is dominated by Boreal forms. The paleotemperature estimates calculated for the Lipnik-Kije section appear to be higher than in East Kent (UK), which was a part of Boreal Atlantic, but also higher than paleotemperature estimates obtained for sections in northern Spain, which was definitely a part of the northern Tethyan area (REMIN et al., 2016). In order to reconcile faunal and paleotemperature data, we propose a new paleogeographic interpretation, which assumes the presence of a land area (Łysogóry-Dobrogea Land or Krukienic Island), functioning as a paleobiogeographic barrier in SE Poland and western Ukraine between the Lipnik-Kije and Dubovcy sections. Both sections (Lipnik-Kije and Dubovcy) were located on opposite (respectively south and north) sides of the postulated land area.

The presented model of oceanic paleo-circulation in Europe at the Coniacian/Santonian transition is confirmed independently by (1) biotic data (ammonites, foraminifera, calcareous nannoplankton) and (2) geochemical data (stable oxygen isotopes). The stable oxygen isotope values, despite showing evidence for a slight diagenetic overprint, are in accordance with the biotic data and support the proposed paleo-circulation model. This indicates that bulk carbonate $\delta^{18}O$ data, at least to some extent, retain original paleotemperature signatures. These data allow the recognition of the end-Coniacian–Early Santonian cooling event, resulting from cold currents flowing from the north, which is traceable, with different magnitude, in several European sections.

REMIN, Z., 2010. Cretaceous Research, **31**, 154–180.
REMIN, Z. et al., 2016. Acta Geologica Polonica, **66**/1, 107–124.