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Mid-Maastrichtian Inoceramid Acme Event in NE Tethys margin: geochemical and paleontological evidence from Ropianka Formation (Skole Unit, Polish Carpathians)

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The late Early Maastrichtian global environmental changes resulted, among others, in rapid vanish of inoceramid fauna, one of the most important and dominant late Mesozoic marine bivalve group. Although the numerous hypotheses have been proposed so far, the reason of their vanishing is still disputable. For instance, some ideas pointed out, as a cause, force of non-biotic environmental changes such as global cooling, ocean chemistry or water masses circulation shifts, whilst other, refers it to predators or parasites increasing pressure. The outlined problem is not trivial, because the inocerams, which evolved since Permian period, suffered during their evolutionary history many environmental instabilities and marine biota extinction events. It was possible thanks to their exceptional strategy life and adaptation to different ecological niches. Despite this, they did not survive until the end-Cretaceous event and disappeared from stratigraphic record a few million years before the last dinosaurs. The mid-Maastrichtian Inoceramid Acme Event (IAE) seems to be their swansong.

The aim of this study is to determine ecological factors influencing environs inhabited by inocermas before, during and after IAE and answer why did these group of bivalves extinct so quickly.

The material for study, rock samples and Inoceramus (Platyceramus) salisburgensis shells, was collected along the Wiar river section close to village of Rybotycze (SE Poland). In general, the section studied embraces Ropianka Formation flysch deposits, i.e. clay-marlstone alteration interbedded by fine-grained sandstone layers. They contain 16th inocerams bearing horizons spanning through a few meters of the top part of the Wiar Member of Ropianka Formation (formerly known as Inoceramian Beds). This in-situ inocerams occurrence accumulation is their last one across the whole Carpathian flysch deposits section and stratigraphically is referred to IAE herein.

The geochemical data including bulk rock δ13C and δ18O stable isotope ratio measure are obtained from interturbidites, i.e. pelagic sediments or directly from inoceram shells. Additionally, cathodolouminescence (CL) and field emission scanning electron microscope (FE-SEM) were used to scrutinize internal shell structure.

The bulk rock δ18O stable isotope ratio measures shift fit well to record of abrupt cooling after a warming time, characteristic for IAE records known from other sections. In addition, paleoproductivity level calculated based on δ13C stable isotope ratio values indicates three separate trend lines. One of them may reflects low rate of oceanic primary organic production that occurred during the most intense inoceramid bivalve sea-floor colonization.

The shells (or their fragments) collected from all inoceram bearing horizons differ in size. They are well preserved showing low or medium influence of diagenetic processes. The inoceram shell carbonate δ13C and δ18O stable isotope ratio measures strongly differ between inoceram specimens of different horizons. Further, CL images and FE-SEM data reveals variety within internal shell structure with presence of laminae obscurae and laminae pellucidae in variable relationships to each other's. Different shell lamination of different inoceram specimens is interpreted as a sign of very frequent environmental changes that happened on the Skole Basin sea-floor during IAE.

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