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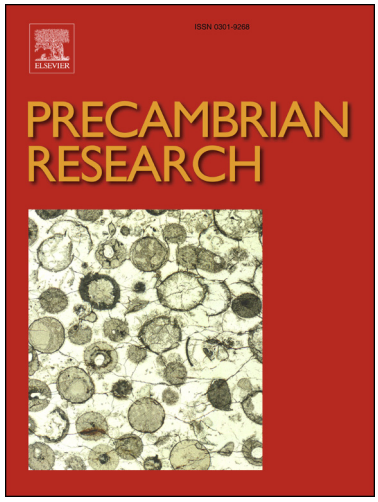

Exceptional preservation of hopanoid and steroid biomarkers in Ediacaran sedimentary rocks of the East European Craton

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ACCEPTED MANUSCRIPT

Exceptional preservation of hopanoid and steroid biomarkers in Ediacaran sedimentary rocks of the East European Craton

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ABSTRACT

Thermally unstable hopanes with a biological 17β,21β (H)- configuration ($\beta\beta$ hopanes), hopenes, hopanoic acids and hopanols were identified as important constituents of Ediacaran to Cambrian sedimentary rocks of the East European Craton. Relatively high abundances of $\beta\beta$ hopanes in relation to $\alpha\beta$ hopanes were identified in the Petersburg area and eastern Belarus, while in Volyn samples these compounds were found in traces. In addition, polar hopanoids including hopanols and hopanoic acids were found in most of the Petersburg and some Belarus and Volyn sedimentary rocks. The estimated equivalent of vitrinite reflectance for samples of lower maturity, measured based on $C_{31}\beta\beta/(\alpha\beta\,S + \alpha\beta\,R + \beta\beta)$ ratio is in the range 0.28–0.49% Rr, while for those of higher thermal maturity this parameter corresponds to 0.41–0.57% Rr. The values of the C_{31} 22S/(S + R) ratio are in agreement with above data and are in the range of 0.1–0.3 for the Belarus and Petersburg samples, of 0.3–0.4 for Volyn, and of 0.4–0.5 for Lithuania, where $\beta\beta$ hopanes and hopanols were not detected or are present as traces. Moreover, there is good correlation ($R^2 = 0.8$) between $C_{31}\beta\beta/(\alpha\beta\,S + \alpha\beta\,R + \beta\beta)$ and C_{31}ENE/(H + ENE) ratio values (defined as ratio of C_{31} hopenes to $\alpha\beta$ hopanes), which proves that less-stable $\beta\beta$ hopanes and hopenes are enriched in the same immature sedimentary rocks. The remarkable occurrence of a significant portion of sedimentary hopanes retaining the biological stereochemical configuration confirms that exceptionally immature Precambrian rocks can be found in some instances when these strata have undergone only a mild burial temperature history.

INTRODUCTION

Hopanes are pentacyclic biomarkers originating from a wide range of prokaryotic organisms. Their precursors are bacteriohopanepolyols (BHPs), compounds contained in the lipid cell membranes of diverse bacteria (e.g. Ourisson et al., 1984; Rohmer et al.,1984, 1992;

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