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Advances in understanding the Neogene Mediterranean-Paratethyan System

Paleoenvironmental evolution of Eastern Paratethys: anoxic events, salinity fluctuations and marine incursions

Dan V. Palcu[1,2,3], Zhanhong Liu[4], Wei Wei[5], Sergey Popov[6], Larisa Golovina[7],Iuliana Vasiliev[8], Wout Krijgsman[2], and Thomas Algeo[5,9,10]

[1]National Institute of Marine Geology and Geo-ecology, GeoEcoMar, Bucharest, Romania

[2]Fort Hoofddijk Paleomagnetic Lab, Department of Earth Sciences, Utrecht University, Netherlands

[3]Department ofGeological Oceanography, Oceanographic Institute, University of São Paulo, Brazil

[4]Hubei Key Laboratory of Marine Geological Resources, College of Marine Science and Technology,China University of Geosciences, Wuhan, 430074, China

[5]State Key Laboratoriesof Biogeology and Environmental Geology & Geological Processes and MineralResources, China University of Geosciences, Wuhan 430074, China

[6]Geological Institute, Russian Academy of Sciences, Pyzhevskiy per. 7, Moscow 119017, Russia

[7]Borissiak Paleontological Institute, Russian Academy of Sciences, Profsoyuznaya ul. 123, Moscow117997,

[8]Senckenberg Biodiversity and Climate Research Centre (SBiK-F), Frankfurt am Main, Germany.

[9]Department of Geosciences, University of Cincinnati, Cincinnati, Ohio 45221, USA

[10]State Key Laboratory of Oil and Gas Reservoir Geology and Exploitation & Institute of Sedimentary Geology, Chengdu University of Technology, Chengdu 610059, China

During the Oligocene to Miocene, the Paratethys Sea emerged as the northern offshoot of the Tethys Ocean, separated from its southern Mediterranean counterpart by the imposing Alpine-Himalaya Mountain range. The dynamic processes of opening, restriction, and eventual closure of its marine gateways triggered a series of profound paleoenvironmental transformations within the Paratethys region, leading to episodes of extreme anoxia, hypersalinity, and freshwater conditions. To date, assessments of salinity fluctuations during the Paratethys' history have predominantly relied on faunal and lithological data, yet a comprehensive quantification has remained elusive. In this study, we aim to elucidate the paleosalinity variations in Paratethys by employing elemental proxies, specifically the boron/gallium (B/Ga), strontium/barium (Sr/Ba), and sulfur/total

organic carbon (S/TOC) ratios. These proxies are applied to key sections (Belaya, Panagiya, Zhelzhnyi Rog) in the northern Caucasus and Taman Peninsula of Russia. These sections collectively span the 42-million-year time interval, comprising Eocene-Oligocene-Miocene marine marls and black shales, Late Miocene lacustrine mudrocks and Miocene-Pliocene shales of the recent Black Sea domain. Our analysis involves a comparison of the observed salinity variations with the Paratethys paleogeographic and paleoenvironmental reconstructions, along with a discussion of potential correlations with alterations in hydrology and marine connectivity.