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Magnetostratigraphic dating of late Miocene megalake regressions in Central Eurasia

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The largest megalake in the record formed in Eurasia during the late Miocene, when the epicontinental Paratethys Sea became tectonically-trapped and disconnected from the global ocean. The Paratethys megalake was characterized by several episodes of hydrological instability and partial desiccation, but the chronology, magnitude and impacts of these paleoenvironmental crises are poorly known. The Panagia section on the Taman Peninsula of Russia is the only place known to host a continuous sedimentary record of the late Miocene hydrological crises of Paratethys. Paleomagnetic measurements allow the development of a polarity pattern that can be used to date the regression events. The Panagia polarity pattern consists of 17 polarity intervals, 9 of normal polarity and 8 of reversed polarity, plus 4 additional short-term polarity fluctuations, that are inferred to correspond to the 11-7.5 Ma interval. We identified four major regressions that correlate with aridification events, vegetation changes and faunal turnovers in large parts of Europe. Our paleogeographic reconstructions reveal that Paratethys was profoundly transformed during the regression episodes, losing ~1/3 of the water volume and ~70% of its surface during the most extreme events. The remaining water was stored in a central salt-lake and peripheral desalinated basins while vast regions (up to 1.75 million km²) became emerged land, suitable for the development of forest-steppe landscapes. The dry episodes of the megalake match with climate, food-web and landscape changes throughout Eurasia but the exact triggers and mechanisms remain to be resolved.