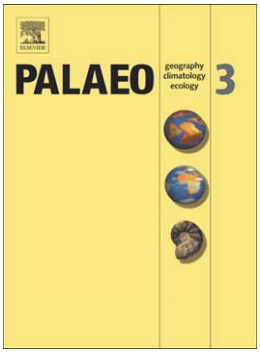

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Response of Mediterranean circulation to Miocene shoaling and closure of the Indian Gateway; A model study

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Abstract

In this regional ocean model study we explore the effect of the Early to Middle Miocene shoaling and closure of the Indian Gateway on Mediterranean circulation and its exchange with the adjacent oceans. For this we use the regional ocean circulation model "sbPOM" and a collection of bathymetries created from an early Burdigalian paleogeographical base map in which the depth of the Indian Gateway is set to 1000, 450, 200, or 0 m. A significant improvement of this work relative to previous regional modeling studies is that we also consider the possibility that the Indian and Atlantic gateways accommodated net westward flow—as reported in many global climate model studies. To this end we superimpose net westward flows of different magnitudes to the gateways. Because the Early-Middle Miocene climate is uncertain, we start with atmospheric conditions based on the present and subsequently explore alternative atmospheric forcings. Similarly, we first assume a relatively shallow Atlantic Gateway of 500 m depth and then