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The Early opening of the Indian Ocean: An African Perspective

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The timing and causes that led to Gondwana break-up remains controversial to date. An earlier opening of the Central Atlantic (ca. 200 Ma) has been recently suggested, and new published models of the East Gondwana evolution allows a breakup timing closer to Karoo volcanism.
In this contribution we revise the early evolution of the Indian Ocean with an emphasis on the opening of the West Somali basin. It is generally accepted that the continental breakup of Gondwana in the East African region began with the onset of the southward drift of Madagascar (then connected with Antarctica and India) along the Davie Fracture Zone probably during the Middle Jurassic, and subsequently led to the opening of the western Somali Basin. Although published kinematic models are able to explain and date some of the broad scale features of the Somali and Mozambique oceanic basins, the exact timing of rifting, the early stages of seafloor spreading and the timing of seafloor cessation in the western Somali Basin remain debatable. Our new study aims to investigate the relationship between the long history of rifting along the East African margins and the breakup structures by constructing a consistent database that contains structural elements and information about their evolution from updated published literature. A thorough investigation of the potential field data (magnetic and gravity anomalies) and an analysis of multichannel seismic reflection helped to identify deep crustal structure and continent-ocean transition zone in the study area. Magnetic anomaly data is re-analyzed and compared with published results in adjacent basins.
The evolution of the East African margin (along Somali and Mozambique basins) is shown in a regional framework where consequences of an independent motion of the Madagascar plate are discussed. In addition, the timing of an Early Jurassic breakup of East Gondwana and possible mechanisms are presented within a regional geological context.