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Physical modeling of formation of the Southern Kerguelen Plateau and the Princess Elizabeth Trough

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Analysis of the geological-geophysical data suggest that the southern part of the Kerguelen Plateau is composed of continental crust and represents an isolated microcontinent. This raises several questions concerning its origin. How did the transition from continental rifting to oceanic spreading? How did the geological structure of Eat Gondwana (like the Lambert-Mahanady rift system) and the Kerguelen hot-spot influence on geometry of the break-up and sea-floor spreading? To answer these questions, a physical simulation was conducted. Rift structure between India and Antarctica and identified magnetic anomalies were taken into account for initial modeling parameters. The experimental simulation showed four options in isolation of the Southern Kerguelen Plateau . The first model a parallel or oblique rifting and spreading coming from the opposite direction. This mechanism leads to separating microcontinent crustal deformations and microcontinent rotation. The second model is linked to the presence of a local source of heat (hot spot), which influence caused the movement of rift/spreading centers towards a hot spot and to generate a significant amount of magmatic material that could substantially alter the original continental structure of the microcontinent. The third model shows the interaction of rifting/spreading with the lithosphere-scale structural barrier depending on the angle of lithosphere heterogeneity.