

GEODYNAMICS OF CONTINENTAL RIFTING: INSIGHT FROM THE BAIKAL, EAST AFRICAN, DEAD SEA AND RIO GRANDE RIFTS

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In the frame of Project IGCP 400 "Geodynamics of Continental Rifting", a comparison of the tectonic structure and kinematic evolution of a series of active continental rift systems was made. Both the pre-rift and the syn-rift evolution was considered, to highlight common factors in the processes responsible for the initiation and development of intracontinental rifts. The comparison involves the Baikal, East African, Dead Sea and Rio Grande rifts. They are all active rift systems composed of a narrow chain of deep depressions, formed in a cold and strong crust, in response of a long tectonic history. The comparison shows that the pre-rift history and rifting initiation are of crucial importance for the development of rift systems. Location of rifts is favored by the presence of strong lithospheric contrasts, typically along the margin of old cratons and characterized by elongated shear belts, often weakened by repeated reactivations in lower greenschist conditions. In the course of rifting, the stress field tend to evolve to more extensional conditions during rifting, due to the onset of locally generated buoyancy extensional forces related to the development of lateral density heterogeneities in the lithosphere. The typical sequence of stress field evolution with time is: transpressional, transtensional, pure extensional and radial extensional. However, once initiated, the rift system are more sensitive to intraplate stress field fluctuations of far-field origin. Rift systems can also become inactive for some periods of time, then reactivated later once the stress conditions become more favorable.