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## **Influence of volcanic eruptions on the sedimentary filling of a continental rift basin — A case study of the Yingcheng Formation in the Changling faulted depression in the Songliao Basin, China**

**Hongyu Wang**, Haoyu Zhang, and Ao Liu

China University of Geosciences (Beijing), China ([wanghy@cugb.edu.cn](mailto:wanghy@cugb.edu.cn))

The development of continental rift basins is often accompanied by multiple episodes of volcanic activity. The impact of these volcanic eruptions on the sedimentary filling process of the basin is a geological problem worth considering. This relationship is not only the premise for reasonably explaining the binary filling characteristics and development of sequences of volcanic rocks and sedimentary rocks in rift basins but also the key geological basis for the prediction of volcanic and sedimentary rock reservoirs in rift basins. On the basis of a large amount of three-dimensional seismic data, logging data and lithology data, we estimated the volcanic eruption period, volcanic rock mass and spatial shape of the Changling faulted depression in the Songliao Basin. We then studied the spatial distribution characteristics of lithofacies and sedimentary facies in the basin. Finally, we assessed the influence of volcanic eruptions on the type of sedimentary filling, the distribution of sedimentary facies and the spatial stacking of sedimentary strata. This study revealed that during the rapid rifting stage (Yingcheng Formation depositional period), the Changling faulted depression developed mainly fan delta, braided river delta and lacustrine sedimentary systems and experienced four phases of volcanic eruptions. The lithology, scale and spatial distribution of volcanoes were directly related to the activity and location of the basement faults in this area, reflecting the control that basement fault activity had on the volcanic eruptions. Moreover, the stacking form and eruption scale of volcanic rocks played a substantial role in the paleogeomorphology of the basin, which in turn affected the form of the source channel of the basin, causing changes in the sedimentary facies type and spatial distribution and changes in the spatial overlapping pattern of the sedimentary sequence. Moreover, volcanic eruptions provided different sources of debris to the continental lake basin. The differences in location and delivery methods of these materials complicate the rock structure and reservoir properties of the basin sandstone.