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# 3D gravimetric modelling of the Central Indian and Southeast Indian Ridges near the Rodriguez Triple Junction

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Hydrothermal vent fields along mid-ocean ridges are potentially metal-rich and thus of great importance for the industries in the future. By order of the German Federal Ministry of Economics and in coordination with the International Seabed Authority (ISA), BGR explores potential areas of the active spreading system in the Indian Ocean. A main goal is the identification of inactive seafloor massive sulfides (SMS) with the aid of modern exploration techniques. Important contributions could be expected from bathymetric, magnetic, and gravity datasets, which can be acquired simultaneously from the sea surface within relatively short ship time. The area of interest is located between 21°S and 28°S and includes the southern Central Indian Ridge (CIR) and the northern Southeast Indian Ridge (SEIR).

In this study we analyzed the marine gravity and bathymetric data acquired during six research cruises. The profiles running perpendicular to the ridge axis have a mean length of 60 km. Magnetic studies reveal that the parts of the ridges covered are geologically very young with the oldest crust dating back to about 1 Ma. To extend the area outside the ridges, the shipboard data were complemented with data derived from satellite radar altimeter measurements. We analyzed the gravity anomalies along sections which cross particular geologic features (uplifted areas, accommodation zones, hydrothermal fields, and areas with hints for extensional processes e.g. oceanic core complexes) to establish a correlation between the gravity anomalies and the surface geology. Subsequently, for both ridge segments 3D density models were developed. We started with simple horizontally layered models, which, however, do not explain the measured anomalies satisfyingly. The density values of the crust and the upper mantle in the ridge areas had to be reduced. Finally, the models show the lateral heterogeneity and the variations in the thickness of the oceanic crust. Maps of the crustal thickness are presented. There are areas characterized by crustal thickening related to magmatic accretion and areas of crustal thinning related to depleted accretion and exposure of OCCs.