



First Release of Gravimetric Geoid Model over Saudi Arabia Based on Terrestrial Gravity and GOCE Satellite Data: KSAG01

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A new gravimetric quasi-geoid, known as KSAG0, has been developed recently by Remove-Compute-Restore techniques (RCR), provided by the GRAVSOFTE software, using gravimetric free air anomalies. The terrestrial gravity data used in this computations are: 1145 gravity field anomalies observed by ARAMCO (Saudi Arabian Oil Company) and 2470 Gravity measurements from BGI (Bureau Gravimétrique International). The computations were carried out implementing the least squares collocation method through the RCR techniques. The KSAG01 is based on merging in addition to the terrestrial gravity observations, GOCE satellite model (Eigen-6C4) and global gravity model (EGM2008) have been utilized in the computations. The long, medium and short wavelength spectrum of the height anomalies were compensated from Eigen-6C4 and EGM2008 geoid models truncated up to Degree and order (d/o) up to 2190.

KSAG01 geoid covers 100 per cent of the kingdom, with geoid heights range from -37.513 m in the southeast to 23.183 m in the northwest of the country. The accuracy of the geoid is governed by the accuracy, distribution, and spacing of the observations. The standard deviation of the predicted geoid heights is 0.115 m, with maximum errors of about 0.612 m. The RMS of geoid noise ranges from 0.019 m to 0.04 m. Comparison of the predicted gravimetric geoid with EGM, GOCE, and GPS/Levelling geoids, reveals a considerable improvements of the quasi-geoid heights over Saudi Arabia.