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Effect of the curvature parameter on least-squares prediction within poor data coverage: case study for Africa

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In the framework of the IAG African Geoid Project, there are a lot of large data gaps in its gravity database. These gaps are filled initially using unequal weight least-squares prediction technique. This technique uses a generalized Hirvonen covariance function model to replace the empirically determined covariance function. The generalized Hirvonen covariance function model has a sensitive parameter which is related to the curvature parameter of the covariance function at the origin. This paper studies the effect of the curvature parameter on the least-squares prediction results, especially in the large data gaps as appearing in the African gravity database. An optimum estimation of the curvature parameter has also been carried out. A wide comparison among the results obtained in this research along with their obtained accuracy is given and thoroughly discussed.