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## Effect of Gravity Data Coverage on the Gravity Field Recovery: Case Study for Egypt (Africa) and Austria

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The coverage of the gravity data plays an important role in the geoid determination. This paper tries to answer whether different geoid determination techniques would be affected similarly by such gravity data coverage. The paper presents the determination of the gravimetric geoid in two different countries where the gravity coverage is quite different. Egypt (representing the same situation in Africa) has sparse gravity data coverage over relatively large area, while Austria has quite dense gravity coverage in a significantly smaller area. Two different geoid determination techniques are tested. They are Stokes' integral with modified Stokes kernel, for better combination of the gravity field wavelengths, and the least-squares collocation technique. The geoid determination has been performed within the framework of the non-ambiguous window remove-restore technique (Abd-Elmotaal and Kühtreiber, 2003). For Stokes' geoid determination technique, the Meissl (1971) modified kernel has been used with numerical tests to obtain the best cap size for both geoids in Egypt and Austria. For the least-squares collocation technique, a modelled covariance function is needed. The Tscherning-Rapp (Tscherning and Rapp, 1974) covariance function model has been used after being fitted to the empirically determined covariance function. The paper gives a smart method for such covariance function fitting. All geoids are fitted to GNSS/levelling geoids for both countries. For each country, the computed two geoids are compared and the correlation between their differences versus the gravity coverage is comprehensively discussed.