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Development of a global geoid model 2020 (GGM2020)

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We present an updated 5' ×5' global geoid model 2020 (GGM2020), which is determined based on the shallow layer method (or simply Shen method). We choose an inner surface S below the EGM2008 global geoid by 15 m, and the layer bounded by the inner surface S and the Earths geographical surface E is referred to as the shallow layer. We formulate the 3D shallow mass layer model using the refined 5' ×5' crust density model, CRUST1.0-5min, which is an improved 5' ×5' density model of the CRUST1.0 with taking into account the corrections of the areas covered by ice sheets and the land-ocean crossing regions. Based on the shallow mass layer model and the gravity field EGM2008 that is defined in the region outside the Earth's geographical surface E, we determine the gravity field model EGM2008S that is defined in the whole region outside the inner surface S. Based on the gravity field EGM2008S and the geoid equation W(P) =W0, where W0 is the geopotential constant on the geoid and P is the point on the geoid G, we established a 5' ×5' global geoid model GGM2020. Comparisons show that in average the GGM2020 fits the globally available GPS/leveling points better than the EGM2008 global geoid. This study is supported by NSFCs (grant Nos. 41721003, 41631072, 41874023, 41804012, 41429401, 41574007).