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Low Degree Gravitational Changes from GRACE – Validation and Comparison with Earth Rotation and Geophysical Models

J.L. Chen [1], C.R. Wilson [1,2], and B.D. Tapley [1]

[1] Center for Space Research, University of Texas, Austin, TX78712
[2] Department of Geological Sciences, University of Texas, Austin, TX78750

E-mail: chen@csr.utexas.edu, Tel: 512-232-6218, Fax: 512-471-3570

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Abstract: We estimate low degree gravitational variations C21, S21, and C20 using accurately measured Earth rotational data and advanced geophysical models, including the NCEP reanalysis climate model, the ECCO data-assimilating ocean general circulation model, and a land data assimilation recently developed at NCEP Climate Prediction Center. These independent estimates are compared with some preliminary monthly solutions from the Gravity Recovery And Climate Experiment (GRACE) mission. The Earth rotation-derived degree 2 gravitational changes agree very well with geophysical model predictions, in particular in the two non-zonal terms (i.e., C21 & S21). The GRACE observations show encouraging agreement with Earth rotation and model-based estimates, especially in S21 and C20. We will characterize the comparison and analyze uncertainties of these estimations.