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## Joint inversion of the lithospheric density structure in the North China Craton based on GOCE satellite gravity gradient data and surface gravity data

Yu Tian<sup>1,2,3</sup> and Yong Wang<sup>2,3</sup>

<sup>1</sup>Ocean College, Minjiang University, Fuzhou 350108, China

<sup>2</sup>State Key Laboratory of Geodesy and Earth's Dynamics, Institute of Geodesy and Geophysics, Chinese Academy of Sciences, Wuhan 430077, China

<sup>3</sup>University of Chinese Academy of Sciences, Beijing 100049, China

The North China Craton (NCC) is one of the oldest cratons in the world. Currently, the destruction mechanism and geodynamics of the NCC still remain controversial. All of the proposed views regarding the issues involve studying the internal density structure of the NCC lithosphere. Gravity field data are one of the most important data in regard to investigating the lithospheric density structure, the gravity gradient data and the gravity data possess their own advantages. Given the inconsistency of the on orbit GOCE satellite gravity gradient and surface gravity observation plane height, also effects of the initial density model upon of the inversion results, the joint inversion of gravity gradient and gravity are divided into two integrated processes. By using the preconditioned conjugate gradient (PCG) inversion algorithm, the density data are calculated using the preprocessed remaining gravity anomaly data. The newly obtained high resolution density data are then used as the initial density model, which can be served as the constraints for the subsequent gravity gradient inversion. Downward continuation, terrain correction, interface undulation correction and long wavelength correction are performed for the four gravity gradient tensor data ( $T_{xx}$ ,  $T_{xz}$ ,  $T_{yy}$ ,  $T_{zz}$ ) of the Gravity field and steady-state Ocean Circulation Explorer (GOCE) satellite, after which the remaining gravity gradient anomaly data ( $T'_{xx}$ ,  $T'_{xz}$ ,  $T'_{yy}$ ,  $T'_{zz}$ ) are used as the new observation quantity. Finally, the ultimate lithospheric density distribution within the depth range of 0–180 km in the NCC is obtained using the same PCG algorithm.