

Numerical simulation of the drag force from the mantle convection on the deformation pattern of the northeastern margin of the Tibetan Plateau

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Based on the recent observation and research results, including lithosphere velocity, rheological structure and crustal deformation, we established a 3D finite element model of the northeastern Qinghai Tibet Plateau, in which, the control effect, consist of the plateau gravity, block horizontal interaction, the main active fault, drag force from the mantle convection and some other internal and external conditions are considered. The simulation results are shown as follows: Continuous deformation is the main characteristic of current tectonic activity in northeastern margin of the Tibetan Plateau; Block horizontal interaction, plateau accumulated gravity, especially small-scale mantle convection drag force have important influence on the characteristics of surface deformation; Taking into account the view of the coupling of lithosphere / asthenosphere and decoupling of upper mantle, we put forward the rheological experiment on rock mechanical properties of the upper mantle decoupling mechanism, considering intensity factor ratio and coefficient of viscosity, we find that the simulation results is well agree with observation of GPS. The simulation results further support coupling mechanism of the northeastern margin of the Qinghai Tibet Plateau deformation; meanwhile, the calculation method of the mantle convection drag force is proposed, i.e., Transverse inhomogeneity of rheological properties of lithosphere at different block should be taken account in the calculation.

Keywords: northeastern margin of the Tibetan Plateau, the mantle convection drag force, Numerical simulation