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The Common Characteristics of Regional Deformation Abnormity in Medium-Term Phase of Strong Earthquake and Prediction Meaning

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Geodetic deformation is the image on earth surface reflected by crust tectonic movement. The regional deformation abnormity related to structure obtained by geodetic measurement of regional GPS and leveling, is the exterior features after certain phase of development of strong earthquake. It is quantitative and intuitive, and has clear physics meaning. However, considering that most areas where earthquakes took place before the middle 1990s only had vertical deformation datathe areas where earthquakes took place after the late 1990s just have at least two-phase GPS data. Therefore, in our study process, according to support degree of datamajored in the northeastern Qinghai-Xizang block, compared with earthquakes examples of other areas, the common characteristics and its mechanism of regional deformation abnormity before many strong earthquakes with accumulation of geodetic deformation data are analyzed and discussedso is the meaning of prediction of strong earthquake position combined with the study of background of new tectonic movement. So two aspects of results are obtained as following: (1)The regional deformation abnormity of medium-term phase (1-3 years or more) before earthquake usually appears three aspects of common characteristics: (a)for regional vertical deformation, it shows distribution features of abnormal apophysis area and dense belt-high gradient belt of vertical difference deformation (some of them reflect distribution of four quadrants) related to tectonics; (b)for horizontal movement, it shows features of centralized high strain area (or zone) of dominating shear deformation related to active block and faults(c)commensal features of regional vertical deformation abnormity area and high strain distribution area of horizontal deformation. Having analyzed formation mechanism of these common characteristics of abnormity, it concludes that: these are results, controlled by basic united tectonic stress field of large-range, caused by stress-strain accumulation and certain phase development of strong earthquake, according to deformation difference brought about on tectonic position in the boundary zone and inner second-order faults of active blocks by unstable and inharmonious features for movement of block system of different levels and deformation of boundary. (2) According to support degree of regional crust deformation data, it has practice meaning of medium-term predicting especially earthquake position to understand, grasp and apply above common features of deformation abnormity. First, if the high strain distribution situation of horizontal movement and deformation of active blocks and their boundaries, especially high strain region related to activity difference of tectonic fracture of

block boundary is analyzed, it is helpful to determine tectonic region where earthquake will take place. Second, time-space scale and trend transformation of abnormal apophysis area and high gradient belt of vertical difference deformation (or distribution of four quadrants) under the background of strengthened inherit vertical difference movement related to tectonics with long-time data accumulation are helpful to determine stress-strain status of medium-term phase of strong earthquake and earthquake tectonic region. Third, according to the commensal features (needing the support of two kinds of data) of regional vertical deformation abnormity area and centralized high strain distribution area of horizontal deformation, especially laying attention to the relationship between shear dislocation status reflected by regional deformation abnormity and background of activity of tectonic fractures, it is helpful to determine the place where strong earthquake will take place.