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Comparison of Displacements Due to Surface Temperature Variation and GPS Observations

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We investigate the displacement field induced by temperature variation with the 2013 global model finished by Ming Fang, which is within a spherical thermal boundary layer under an Earth-like condition of surface heating by deriving analytical solutions on a uniform elastic sphere under the constraint that its centre of mass remains stationary in space. Then the displacement induced by temperature variation is compared with the displacement in GPS observations, and the displacement induced by mass load (mainly contents atmosphere, ocean, and snow) is deducted from the GPS observations firstly. Results show that the amplitude of the thermally induced surface deformation in global scale is at the millimeter level with the largest ∼3mm for radial displacement and∼1mm for transverse displacement. Comparative analysis shows that the thermal surface deformation is a good explanation for the remaining displacement in GPS observations, especially in the Americas region.