



Mantle dynamics and Geocenter variations

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We investigate the influence of the mantle dynamics on the degree one deformations at the geological time-scale. We first compute the degree one deformations of the Earth induced by internal loads, in a reference frame related to the centre of mass of the planet, using a theoretical approach (Love numbers formalism) at geological time-scale, where the Earth has a viscoelastic behavior.

Then we quantify the degree-one deformations induced by upwelling domes and subducted plates sinking into the mantle, using a simple model in which the slabs are modeled as blobs diving vertically through the mantle at the surface plate velocity and, in which the domes are assumed to be stable over the last 120 Ma and modeled from tomography within the lower mantle. The temporal evolution of the geocenter is plotted since 120 Ma. At the present, we find that there is a discrepancy of about a few hundred meters between the center of figure and the center of mass of the Earth and we compute the associated shift of this geocenter motion. Finally, we discuss our results in comparison with the geodetical observations.