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Insights on intraplate volcanism in the Central Pacific from satellite gravity data and laboratory experiments in a heterogeneous fluid

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The Pacific Ocean is marked by numerous volcanic structures associated with present and past magmatic activity. At present, the mechanisms involved in the different areas need to be clarified. In order to better understand the structure of the underlying mantle and to constrain the flow models, we analyzed high-quality satellite gravity data from the GRACE mission. Firstly, the gravity data were corrected for ocean lithosphere cooling and for the contribution of an isostasically compensated topography. Then, to underline the structures at different scales contained in the signal, we analyze the geoid with wavelets. We evidence positive geoid anomalies with different characteristics over Hawaii and over the Line Islands. To interpret these observations, we compare the observed geoid in the Pacific with a modelled geoid based on mantle density variations estimated from tomographic model S20RTS. Seismic traveltime residuals are converted to density contrasts assuming a linear relation between seismic velocity and density. Internal driving density anomalies lead to boundary deformations in a viscous Earth. So, to obtain the relationship between geoid and the mantle's dynamic response to internal buoyancy forces, we have calculated potential and radial deformation Love numbers. These quantities are obtained by the resolution of gravito-elasticity equations for a given viscosity depth profile. We show and discuss our preliminary results in terms of internal structure of the mantle.