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Towards 3D geodynamic modelling of the dynamics of the Altiplano-Puna Magma System

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The Altiplano-Puna Magma Body (APMB) in the central Andes is considered to be the largest active melt zone in the Earth's crust today. For the past decades, multiple research projects have looked at the uplift rates above the APMB and successfully reproduced the observations with 2D or 3D numerical models, using simplified (elastic) rheologies and/or source geometries.
Yet, rocks are not just elastic but have a temperature-dependent viscoelastic rheology. Here, we therefore develop 3D models of the system using such more realistic rheologies, while also taking observed gravity anomalies into account. By forward modelling the gravitational effect of the APMB and the thickened Andean crust, we try to unite geometries inferred from S-wave tomography with crustal density models and bouguer data. The resulting 3D setup and the 3D thermo-mechanical finite difference code LaMEM is then used to make predictions about surface deformation which can be compared to observations made by InSAR and GPS studies. The ultimate goal is the creation of a numerical model which is consistent with a large amount of geophysical data and can be used to better constrain the geometry and geophysical properties of the APMB as well as to understand why uplift rates at the surface above it have decreased since the mid-2000s.