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Effect of Burgers Rheology in Glacial Isostatic Adjustment models

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The phenomenon by which Earth deforms after a change in ice surface loading, called Glacial Isostatic Adjustment (GIA), depends on ice loading history, as well as Earth rheology. Considering it occurs on time scales ranging from a hundred years to a thousand hundred years, a viscoelastic behavior is usually assumed and modeled by a Maxwell material.
However, if the Earth elastic properties are relatively well known from the seismology field, the viscosity parameter still remains a rough estimation. In addition, the time-dependent continental ice distribution for the last glacial cycle is assessed by sea level data and geological markers contouring the ice caps, however the resulting constrains are too weak to validate a single model.
These considerations lead us to test non-classical assumptions on the Earth rheology to improve current GIA models. If a Maxwell behavior seems appropriate for most homogeneous rock materials, the Earth's internal material, at a fixed depth, is essentially a mix of homogeneous materials, therefore heterogeneous. Rather than a Maxwell behavior, a Burgers model describes such material.
With the ultimate goal of performing an inversion of both the viscosity profile and the ice loading distribution using GPS, space gravimetry and paleo sea-level data, we will first try to estimate how the Burgers rheology affects the Earth's response.