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Strain variations in Sardinia induced by Glacio-Isostatic Adjustment and hydrological loads

The aim of this work is obtaining a preliminary estimate of expected crustal deformation in Sardinia due to geodynamical processes acting on local and regional scales in response to the past and present variations of surface loads. Solving the "Sea Level Equation"for a spherically symmetric, self-gravitating visco-elastic Earth, we characterize the ongoing vertical and horizontal movements in the western Mediterranean region, in delayed response to the melting of the Holocene ice sheets. An up-to-date chronology for the ice sheets is used in conjunction with a steady state rheological profile for the Earth's mantle and lithosphere. The surface response in the western Mediterranean and in Sardinia is also characterized in terms of variations of the rate of change of the strain tensor, which are compared to those obtained in regions located in central Europe, closer to the margins of the former ice sheets. We provide quantitative assessments of the glacial isostatic strain rates and compare them to those caused by other sources of local deformation, as the ongoing variations in the surface loads associated with major artificial reservoirs. The displacements induced by the latter are computed through an elastic rebound modeling approach, with which we also provide an estimate of the vertical and horizontal displacements and corresponding perturbations of the strain tensor.

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