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(Submit for contributed talk or poster session. No more than 300 words, plain text)

**Title: Bayesian estimation of global glacial isostatic adjustment for sea level rise re-evaluation**

Glacial isostatic adjustment (GIA) is the viscous response of the solid Earth to past ice loading, primarily during the last Glacial period. It plays a crucial role on changing regional sea level and is, therefore, important for predicting future trends. In general, estimates of the GIA process have been obtained from numerical model simulations (forward models) with assumptions about the Earth structure and ice loading history. These models often lead to significant regional discrepancies due to incomplete information on the true 3-D Earth properties and ice loading history. In this study, we propose an inverse, data-driven approach to provide a GIA estimate that synthesises global model solutions with GPS observations of vertical land motion. GIA is treated as a time invariant Gaussian process on the sphere, with a local Matern covariance function. Following a full Bayesian approach and the principle of stable inference, we use a GIA estimate derived from the forward model ICE-6G (VM5a) as the prior mean, and parameterise the covariance function in terms of a variance and a correlation length. For computational feasibility, we use a sparse matrix representation induced by a Gaussian Markov random field (GMRF) approximation, and a parallel updating algorithm which exploits the conditional independence structure of the GMRF. The result is a new global GIA reconstruction, with a full assessment of uncertainty.