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# Assessment of geodynamic predictions with surface-wave tomography in the Pacific upper mantle accounting for full 3D resolution and robust uncertainties.

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Surface-waves carry important information about upper mantle structure, especially in poorly sampled areas such as oceanic regions. Surface-wave tomography models can be used to assess geodynamic simulations by comparing observed and predicted structures. However, surface-wave data are noisy and sparse resulting in tomography models being noisy and blurred pictures of the Earth's structure. As a result, tomography models can hardly be compared directly to geodynamic predictions which aim to predict the true structure of the Earth. Although challenging, assessing geodynamic simulations with surface-wave tomography requires accounting for full 3D resolution and robust uncertainties.

In this study, we present a workflow to quantitatively assess geodynamic model predictions using surface-wave tomography. Specifically, we measure dispersion data for paths crossing the Pacific ocean and estimate data uncertainties including measurement and theoretical errors. We use a finite-frequency forward theory to linearly relate data to the three-dimensional Vsv structure in the upper mantle. Subsequently, we apply the SOLA (Backus-Gilbert-style) method in 3D to control and produce the full three-dimensional resolution and robust model uncertainties together with the Vsv tomography model. Equipped with this, we assess predictions for the Pacific upper mantle from a set of geodynamic simulations based on different input parameters.

Preliminary results highlight physical parameters of mantle convection influencing significantly the misfit between observed and predicted structure in the Pacific upper mantle; and, for quantitative parameters, inform us on values that provide the best fits.