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1-D receiver function model construction and resolution analysis: New insights and remaining issues.

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Receiver functions play a growing role when arrays of 3-component seismometers, temporary and semi-permanent, target structures ranging from shallow sediments over crustal and deep lithosphere complexity to mantle phase transitions.

Quantitative *inversion modelling* of seismic velocities is not well established, mainly due to the notorious *nonlinearity and nonuniqueness* of the linearized inversion.

We show that a dramatic improvement in linearity and uniqueness is achieved by application of *stratification in delay time*. This *new insight* implies that the inversion of receiver functions into 1D velocity stratification is *no longer to be regarded as highly nonlinear and lacking absolute S-velocity recovery*. Owing to the enhanced linearity, proper linearized error propagation and resolution analysis is now at hand.

This presentation discusses and ranks *several remaining issues to be understood and resolved*: The recovery of low frequencies in the receiver function is important for resolution of deep velocity. How well do present-day instrumentation and common receiver function estimation procedures honour this? Inversion error estimation requires design of regularization and possible prior model covariance as well as quantification of data noise amplitudes and correlations, including not only ambient noise but also

effects of deconvolution, of 2D/3D scattering, and of anisotropy.