



## **Covariance operator and tomography by travel time analysis**

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Performing accurate travel time tomography requires numerous data sets and leads to solve very large linear algebraic systems, which is currently carried out through the LSQR method. However, this method, when used in the model space, cannot easily allow for a priori information on the model.

In this communication, we present a flexible approach to tomography by travel time analysis which can take account of any a priori covariance kernel and any correlation lengths. Our approach is based on the GMRES algorithm which is related to a Krylov subspace method in the data space. We show how to determine the optimal correlation length of the velocity model according to the scale of the problem, and how to invert jointly for source locations and local crustal thickness. We also outline a way to evaluate uncertainties in the model at different scales.

Finally, we illustrate our approach at different scales.