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Inversion of Love wave traveltimes in Czech Republic using adjoint method

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The paper presents ongoing work on seismic tomography of crust in Bohemian massif using adjoint method. The main advantage of adjoint method consists in revealing the areas, which most affect fit to data, so-called sensitivity kernels. The kernels are obtained after two calculations of wave propagation: forward propagation from source to receiver and adjoint calculation where data residuals are backpropagated through the studied medium. Since these kernels are identical to integral kernels of Fréchet derivatives of misfit with respect to model parameters, they are, moreover, used for iterative improvements of model by conjugate gradient technique. The dataset used in inversion consists of surface wave traveltimes between pairs of stations obtained by crosscorrelations of ambient seismic noise, filtered for different periods in ranges 2-20s. Assuming that surface waves can be approximated by membrane waves, the propagation of Love waves along surface is then efficiently calculated in 2D domain for each frequency separately. For the numerical computation we use adjoint version of finite element code SeisSol, which solves elastodynamic equation system using the discontinuous Galerkin method with high order ADER time integration (known as ADER-DG). We present application to synthetic data as well as first attempts on real data.