ABSTRACT

We have performed 3D ambient noise tomography of the Bohemian Massif. We invert adopted inter-station dispersion curves of both Love and Rayleigh waves in periods 4-20 s, which were extracted from ambient noise cross-correlations, using a two-step approach. In the first step, the inter-station dispersion curves are localized for each period into the so-called dispersion maps. To account for finite-frequency effects, gradient method employing Fréchet kernels is used. Assuming membrane wave approximation of the surface wave propagation at each period, the kernels were calculated using the adjoint method. To reduce the effect of data noise, the kernels were regularized by Gaussian smoothing. The proper level of regularization is assessed on synthetic tests. In the second step, the phase-velocity dispersion maps are inverted into a 3D S-wave velocity model using the Bayesian approach. The posterior probability density function describing the solution is sampled by more than one million models obtained by Monte-Carlo approach (parallel tempering). The calculated variance of the model shows that the well resolved part corresponds to the upper crust (i.e., upper 20 km). The mean velocity model contains mainly large scale structures that show good correlation with the main geologic domains of the Bohemian Massif. Furthermore, in the well-studied area of Western Bohemia our model agrees well with S-wave velocity models published by other authors.