



## **Verification of the Adjoint-tomography Inversion of the Small-scale Surface Sedimentary Structure: The Case of the Mygdonian Basin, Greece**

Filip Kubina (1), Peter Moczo (1,2), Jozef Kristek (1,2)

(1) Comenius University Bratislava, FMFI UK, Bratislava, Slovakia, (2) Geophysical Institute, Slovak Academy of Sciences, Slovakia

We apply the full-waveform inversion using the adjoint method to the Mygdonian basin, Greece, a local surface sedimentary basin. A canonical perturbation of the 2D EUROSEISTEST model is considered as a true (target) model and numerically simulated seismograms for the model as recorded seismograms. The 2D EUROSEISTEST model itself is taken as a starting model for inversion.

The point DC sources are located relatively deeply beneath the basin and receivers are at the free surface. Due to the configuration and relatively strong velocity gradient in sediments, direct waves propagate almost vertically and almost in the same way for all sources. As a consequence, the coverage of the basin by the source-receiver configuration cannot be considered favourable. Resolution of kernels based on direct arrivals in the vertical direction is therefore very weak. It is necessary to use the entire seismograms.

The complete wavefield in the basin is complicated and seismic motion considerably prolonged due to multiple reflections resulting in generation and propagation of local surface waves. Consequently, the corresponding kernel is very complicated. Large velocity contrasts and configuration of receivers imply kernel concentration in low-velocity layers near receivers.

The spatial complexity of a kernel strongly depends on a seismogram section used for evaluating misfit and can be simplified by smoothing and spatially dependent normalization. Without simplification the inversion may be not converging properly. On the other hand, the simplification reduces the resolution of the inversion. We investigate a balance between a reasonable level of kernel simplification and inversion resolution in order to find practical criteria for the inversion of the local surface sedimentary structures.