

Bayesian Approach to Tomographic Imaging of Rock-mass Velocity Heterogeneities

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A b s t r a c t

Detailed imaging of the Earth subsurface structure has both scientific and practical aspects. From a scientific point of view knowledge of the Earth's structure is necessary for understanding various processes. Practical aspects include such issues as localization and description of natural resources deposits. Although huge progress has been made in this field, there are still a lot of questions not answered yet. One of them is the question of a relation between observed seismicity and the earth's structure. In this paper we address this issue and argue that the probabilistic (Bayesian) approach should be used. Since this inversion method introduces some additional complexity to the already difficult seismic tomography technique, we decided to describe the basic steps of Bayesian tomographic imaging from data preparation to analysis of imaging results. The methodological considerations are illustrated by examples of imaging for four mining regions within the Rudna (Poland) copper mine.

Key words: seismic tomography, Bayesian inversion, MCMC, induced seismicity.