Geophysical Research Abstracts
Vol. 14, EGU2012-5333, 2012
EGU General Assembly 2012

Extending the Double Difference location technique - improving depth resolution

L. Rudzinski (1) and W. Debski (2)

(1) Institute of Geophysics, Seismology and Physics of the Earth's Interior, Warszawa, Poland (rudzin@igf.edu.pl), (2) Institute of Geophysics, Seismology and Physics of the Earth's Interior, Warszawa, Poland (debski@igf.edu.pl)

An increase of a seismic hypocenter location accuracy is a subject of many analysis and is also the central issue of this presentation. The limited location accuracy follows not only from limited data quality as it is a case of any direct measurement but actually is a result of uncertainties introduced by inversion procedure used for processing of observational data. For example, data availability, a sensor network geometry, knowledge of the seismic velocity spatial distribution are factors of this sort. In case of mining applications, the planarity of seismic network operated usually at the exploitation level becomes also an important issue limiting estimation accuracy for hypocenter depths.

In this paper we consider a newly proposed Extended Double Difference (EDD) location technique which has been designed to avoid some limitations of the classical double difference (DD) technique. We demonstrate the proposed algorithm much more efficiently uses information on a network and seismic sources non-planarity than the DD algorithm. In consequence the EDD algorithm significantly improves the depth estimations in situations when network and sources are almost planar –which is typical situation for deep mines.

The presented theoretical analysis carried out in the framework of the probabilistic inverse theory is illustrated by a case study from the Rudna copper mine (Poland).