Doctoral thesis summary

Title: Application of the innovative full wavefield inversion (FWI) technology for velocity model building using examples from the Rakhine Basin, Myanmar

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This dissertation is an attempt of accurate and detailed modeling (and solution) of small-scale, shallow velocity anomalies and qualitative interpretation of mass transport systems. The main goal of the research is to highlight the key role of modern seismic modeling as an indispensable tool in the process of advanced seismic imaging for comprehensive and detailed seismic and geological interpretation. This research directly concerns the application of the innovative wave field inversion technology for velocity model building using examples from the Rakhine Basin, Myanmar.

Over the years, the FWI inversion of the wave field has been taken into account as the next logical step in seismic modeling research, but it was not until recently technological progress allowed its real application. FWI is a technically advanced method of model building using a wave approach propagating in both directions and overcoming the limitations of existing conventional methods (e.g. reflection tomography) using ray theory and back-projection of timing errors to build the model. To sum up, FWI is the reconstruction of a seismic records using simulation tools (computers), based on wave propagation physics through subsurface, seismic acquisition configuration and subsurface parameters needed to carry out the synthetic data simulation experiment to match to the observed (field) data.

This dissertation consists of three main parts:

- Chapters 2 and 3 cover theoretical issues regarding used method. The method and the role of modern seismic modeling in the process of advanced seismic imaging are presented here.
- In chapters 4 and 5, basic information about the geological structure of the area of interest is gathered and the computational and interpretation challenges related to the studied structures are highlighted. Chapter 5 is also an analysis of the area based on input data.
- Chapter 6 describes the research and process of modeling carried out. Based on the assumed seismic and geological models, optimal parameterization of the initial model is made, as well as simulations related to the appropriate conditioning of input data for the wave field inversion process. Tested methods resulting from the nature of the

analyzed seismic records are analyzed. An important aspect of the research is the impact of interpretation of individual stages of the performed analysis on the final result based on depth migrated data. The usefulness of tested parameters is analyzed based on an in-depth analysis of forward modeling and gradient function calculations.

This dissertation is a study of detailed seismic modeling (and solution) of small-scale, shallow anomalies of the velocity of the seismic wave propagation in the subsurface. To this end, the theoretical basis of this technique, supported by numerous examples, is presented as well as in-depth analysis of the applied seismic modeling solution.