Zonal cooperative inversion of disparate geophysical data sets

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In many near-surface geophysical applications, it is now common practice to use multiple geophysical methods to explore subsurface structures and parameters. Such multimethod-based exploration strategies can significantly reduce uncertainties and ambiguities in geophysical data analysis and interpretation. To be effective, the different available data sets should be linked during the model-generation process, e.g., by cooperative inversion. We propose a 2D approach based on fuzzy c-means cluster analysis for the cooperative inversion of disparate geophysical data sets. We show that this approach results in a single zonal model of subsurface structures in which each zone is characterized by a set of different parameters. This finding implies that no further structural interpretation of geophysical parameter fields is needed, which is a major advantage compared with conventional inversions that rely on a single input data set and cooperative inversion approaches. In our presentation, we illustrate the applicability and flexibility of our novel approach using synthetic and field data examples.