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The major factors of seismic-gravity modeling limits of applicability determination

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Currently, the integration of seismic and "non-seismic" geophysical research methods is increasingly demanded by the practice of exploration. Further improvement of the efficiency of the complex of seismometry and gravimetry, its wide introduction into practice, requires both the creation of recommendations on the methodology of joint interpretation of these methods, and the determination of limitations on the scale of surveying and the specifics of the considered cross-sections, affecting the effectiveness of the methods of the studied geological structures. The aim of the presented work is to identify the main factors that determine the limits of applicability of seismic-gravity modeling.

The possibilities of seismic-gravity modeling in conditions of different physical and geological structure of the considered environment, scale, level and quality of the initial data were investigated on real objects. It is shown that it is impossible to totally formalize a single approach (algorithmize) to the creation of a seismic-gravity model. The modeling technique inevitably changes, adapts to the physical and geological situation and the completeness and detail of a priori information. Against the background of numerous positive examples of use, the situations difficult for seismic-gravity modeling are given and analyzed carefully and the reasons for the low efficiency of the method are revealed.

The experience of practical research has shown that the effectiveness of seismic-gravity modeling is primarily influence by such features of geological structure as the extent of compartmentalization of the reflector horizons' geometry, contrast and depth of the density boundaries, the accordance of seismic and gravity exploration (both field survey and target exploration intervals), the intricacy of the geological history of the region.

The findings are important at the design stage of field work to compile a set of geophysical methods, the most effective for this area of study.