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A Corner-Point-Grid-Based Voxelization Method for Complex Geological Structure Model with Folds

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3D voxelization is the foundation of geological property modeling, and is also an effective approach to realize the 3D visualization of the heterogeneous attributes in geological structures. The corner-point grid is a representative data model among all voxel models, and is a structured grid type that is widely applied at present. When carrying out subdivision for complex geological structure model with folds, we should fully consider its structural morphology and bedding features to make the generated voxels keep its original morphology. And on the basis of which, they can depict the detailed bedding features and the spatial heterogeneity of the internal attributes. In order to solve the shortage of the existing technologies, this work puts forward a corner-point-grid-based voxelization method for complex geological structure model with folds. We have realized the fast conversion from the 3D geological structure model to the fine voxel model according to the rule of isocline in Ramsay's fold classification. In addition, the voxel model conforms to the spatial features of folds, pinch-out and other complex geological structures, and the voxels of the laminas inside a fold accords with the result of geological sedimentation and tectonic movement. This will provide a carrier and model foundation for the subsequent attribute assignment as well as the quantitative analysis and evaluation based on the spatial voxels. Ultimately, we use examples and the contrastive analysis between the examples and the Ramsay's description of isoclines to discuss the effectiveness and advantages of the method proposed in this work when dealing with the voxelization of 3D geologic structural model with folds based on corner-point grids.