3-D Characterization and Volcanic Eruption Phases of Volcanic Rocks in Southern Songliao Basin

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ABSTRACT

Deep volcanic reservoirs have been the key target of the exploration in southern Songliao basin. Problems such as detection and discrimination of volcanic bodies, description of volcanic reservoirs heterogeneity, and prediction of its eruption phases are challenges of the present time. 3D seismic data play an important role to describe external and internal complexities of volcanic reservoirs away from a well and to define geometric description of structural and stratigraphic aspects of the reservoirs. The volcanic bodies were carefully interpreted on the basis of seismic characteristics, in particular high reflection amplitude, dome-shaped or eye-shaped, local transgressive segments, and abrupt reflection termination. Extracting and analyzing acoustic impedance and amplitude attenuation, guided by a time window focused on the bottom of the Huoshiling formation, resulted in an understanding of the key seismic volcanic bodies framework. A method of seismic amplitude and variance cube thresholding display is proposed to enhance the description of the spatial and temporal distribution of volcanics and eruption phases in our study, on the basis of the contrasting seismic reflections between volcanic channel facies (low continuity and week seismic amplitude) and overflow facies (high continuity and strong seismic amplitude). It is an optimal method in delineating the distribution of volcanic bodies, and that is expected to facilitate further development of the reservoir and the field.