

Fold and Thrust Belts Seismic Imaging and Interpretation

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Abstract : Plate tectonics is of very great significance as it represents the spatial relationships of volcanic rock suites at plate margins, the distribution in space and time of the conditions of different metamorphic facies, the scheme of deformation in mountain belts, or orogens, and the association of different types of economic deposit. Orogenic belts are characterized by extensive thrust faulting, movements along large strike-slip fault zones, and extensional deformation that occur deep within continental interiors. Within oceanic areas there also are regions of crustal extension and accretion in the backarc basins that are located on the landward sides of many destructive plate margins. Collisional orogens develop where a continent or island arc collides with a continental margin as a result of subduction. collisional and noncollisional orogens can be explained by differences in the strength and rheology of the continental lithosphere and by processes that influence these properties during orogenesis. Seismic Imaging Difficulties-In triangle zones, several factors reduce the effectiveness of seismic methods. The topography in the central part of the triangle zone is usually rugged and is associated with near-surface velocity inversions which degrade the quality of the seismic image. These characteristics lead to low signal-to-noise ratio, inadequate penetration of energy through overburden, poor geophone coupling with the surface and wave scattering. Depth Seismic Imaging Techniques-Seismic processing relates to the process of altering the seismic data to suppress noise, enhancing the desired signal (higher signal-to-noise ratio) and migrating seismic events to their appropriate location in space and depth. Processing steps generally include analysis of velocities, static corrections, moveout corrections, stacking and migration. Exploration seismology Bow-tie effect -Shadow Zones-areas with no reflections (dead areas). These are called shadow zones and are common in the vicinity of faults and other discontinuous areas in the subsurface. Shadow zones result when energy from a reflector is focused on receivers that produce other traces. As a result, reflectors are not shown in their true positions. Subsurface Discontinuities-Diffractions occur at discontinuities in the subsurface such as faults and velocity discontinuities (as at "bright spot" terminations). Bow-tie effect caused by the two deep-seated synclines. Seismic imaging of thrust faults and structural damage-deepwater thrust belts, Imaging deformation in submarine thrust belts using seismic attributes, Imaging thrust and fault zones using 3D seismic image processing techniques, Balanced structural cross sections seismic interpretation pitfalls checking, The seismic pitfalls can originate due to any or all of the limitations of data acquisition, processing, interpretation of the subsurface geology, Pitfalls and limitations in seismic attribute interpretation of tectonic features, Seismic attributes are routinely used to accelerate and quantify the interpretation of tectonic features in 3D seismic data. Coherence (or variance) cubes delineate the edges of megablocks and faulted strata, curvature delineates folds and flexures, while spectral components delineate lateral changes in thickness and lithology. Carbon capture and geological storage leakage surveillance because fault behave as a seal or a conduit for hydrocarbon transportation to a trap, etc.

Keywords : tectonics, seismic imaging, fold and thrust belts, seismic interpretation

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