

Delta Paleogeography and Stratigraphic Traps Defined Using 3D Seismic. Examples from the Miocene Vienna Basin, Austria

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Paleogeographic mapping using 3D seismic plays a key role in the discovery and exploitation of deltaic stratigraphic traps in the Vienna Basin. At the scale of a single depositional-sequence (up to 100m thick, 10's km wide), three-dimensional displays of two-way time isochron grids are draped with various seismic attributes and horizon slices to show regional paleogeography. Elements identified include the shelf-edge, localised shelf-edge deltas, shelfal delta lobes, slope channels and submarine fans.

Shelfal delta lobes (1km wide, 3km long) form stratigraphic traps in the Ebenthal - Spannberg area, and are delineated by mapping individual clinofolds. The amplitude of the clinofold reflection is a function of sand thickness, porosity, and fluid type. Gas and oil can both cause bright spots, and gas sands show a Class 3 AVO response. Paleogeographic elements recognised from seismic at this scale include distributary mouth bars, various delta front/slope facies, interdistributary bays, and the prodelta.

Acoustic impedance (inversion) data was successfully used to predict deltaic sub-facies within a single delta lobe. An undrilled mouth bar sand targeted by the well Ebenthal-16 was oil bearing and had reservoir properties an order of magnitude better than previously seen. The geological interpretation was confirmed by core data.

Stratigraphic traps are limited to delta lobes that built into shelfal water depths of about 30m or more. Trapping is often restricted to the outer mouth bar and delta front/slope sands. Lobes deposited in shallower water tend to coalesce and lack lateral seal.
