

**AAPG Annual Meeting
March 10-13, 2002
Houston, Texas**

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Recovery of Seismically Invisible Top Ca2 via Geostatistics - a Case Study from the Polish Zechstein Basin

The studied area is located in the Permian Basin of the Polish Lowlands. The porous reef type structures of the Zechstein Limestone (Ca1) were the target of enhanced 3D seismic survey. Unexpected discovery of commercial gas in the Main Dolomite (Ca2) in the result of drilling targeted at Ca1 reef led to the revision of views on hydrocarbons accumulations in these strata.

In the studied area Ca2 is covered by Base Anhydrite (A2). On the seismic section only the top of the A2 is visible. Very poor velocity contrast between the Ca2 and the A2, and very small thickness of A2 (15-30m) which is beyond the vertical seismic resolution are observed. They make difficulties in the mapping of the top of the Ca2. During sedimentological analysis of the lower part of the Zechstein section strict facies pattern dependence on the morphology of the Zechstein substratum was noticed. In order to map the thickness of A2 it was decided to take an advantage of possibilities offered by statistic methods, especially by the Hampson-Russell's GEOSTAT program.

The isopach map of A2 and the structural map of the top of Ca2 gave reason for the correction of well locations. The precision (error<0.1%) in determination of desired values confirmed the geological hypothesis on which applied methodology is based. Comparison of geostatistical prognoses with original drilling results showed that cokriging of seismic data with well data predicted thickness of A2 with unexpected accuracy.