Deepwater Play Types of the Black Sea: A Brief Overview*

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Abstract

The numerous, mostly untested deepwater Black Sea play types can be subdivided into syn-rift and post-rift plays. The largest targets are syn-rift fault blocks, such as the Andrusov and Tetyaev highs in Turkey and Ukraine, respectively. Although their internal stratigraphy is poorly constrained (i.e. proportion of pre-rift and syn-rift versus basement) translating to not only reservoir risk but also to reservoir quality risk, the trap sizes are very large. Also, the assumed lateral charge from the Miocene-Oligocene Maikop Formation and perhaps even from Eocene sources makes these structures extremely attractive. The overall structure of the Shatsky Ridge is not as clear as it has elements of an extremely large carbonate platform on top. The Polshkov High is unique in the sense that it represents a large rotated syn-rift fault block along the lower plate edge of the Western Black Sea in Bulgaria. On the conjugate upper plate margin, very large inverted syn-rift structures, such as the Kozlu Anticline, are recognized in the Turkish sector.

On top of most of the syn-rift highs described above, various typical carbonate geometries can be interpreted on seismic data such as backreef pinnacles, lowstand buildups, raised rims, backstepping, aggradation and prograding clinoforms. These syn-rift to post-rift carbonate platforms tend to grow on footwall blocks of syn-rift faults and can reach more than 800 meters in thickness. The age of these carbonate features is poorly constrained at present as to the exact opening age of the Black Sea basins, i.e. anywhere between Jurassic to Eocene.

Several intra-Tertiary reservoirs could be targeted in the compactional anticlines above the large syn-rift highs. Another play associated with Tertiary sands is that of the deepwater extension of the Subbotina discovery in Ukraine. The Subbotina structure is a compressional anticline situated in a dominantly Miocene, south-vergent folded belt offshore Kerch Peninsula. Similar folded belts are also known in the Russian, Georgian, Turkish and Bulgarian sectors of the Black Sea. Also, pure stratigraphic traps may exist in a widely recognized Eocene low-stand
wedge along the basin margins. However, reservoir quality is a definite risk for the Tertiary reservoir intervals in certain segments of the Black Sea as the function of the provenance area(s).

References


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AAPG Conference, Kiev, October 18, 2010
Black Sea Basin, depth to break-up unconformity

Robinson et al. (1996)
Russia, structures and Chevron/Rosneft block

Meisner and others (2009)
Shatsky High and Tuapse Trough, Russia

Meisner and others (2009)
Tetyaev High, syn- and post-rift plays, Ukraine

Image from www.vancoenergy.com
Polshkov High, Bulgaria, top pre-rift depth structure

Tari and others (2009)
Deepwater play types, NE Bulgaria

Tari and others (2009)
Typical vintage seismic line, Polishkov High

- BSR
- Hinge zone
- Base Oligocene
- Intra-Maykop1
- Intra-Maykop3
- Top pre-rift
- Polishkov High

Line BS92-11

10 KM
Jurassic-Lower Cretaceous reefs(?), Polskhov High

Tari and others (2009)
Outcrop analogue of Jurassic carbonates, Crimea

Courtesy of Stephen Vincent, CASP
Sudak Folded belt, offshore Crimea, Ukraine

Crimea Peninsula

Top Middle Paleocene Depth Structure

Sudak Foldbelt

Subbotina Oil Discovery

Lead A

Shatsky Ridge

Tetyaev Play

Andrusov Ridge

Tetyaev 3D Survey

Sudak 3D Survey

Tetyaev High, exploration analogue, offshore Ukraine

Image from www.vancoenergy.com
Seismic profile across Lead A, deepwater Ukraine

Prykerchenska Block

Sudak Fold Belt

Lead A

Top Maykop

Base Maykop

Linked shale-detachment system, Romania

Bega and Ionescu (2009)
Surmene (TPAO)
BBSPA Conference, 15 April 2010, Vienna, presentation by Yurdal Öztaş, TPAO
Post-rift stratigraphic traps, Akcakoca area, Turkey

Menlikli and others (2009)
Conclusions

- Large number of deepwater play types, which could be classified as pre/syn-rift and post-rift plays

- Pre/syn-rift play types:
  - fault blocks on a marginal ridge, e.g. Andrusov High
  - rotated/tilted fault block at the margin, e.g. Polishkov High
  - inverted syn-rift structure, e.g. Kozlu High
  - syn-rift carbonate platform, e.g. Shatsky Ridge

- Post-rift play types
  - Tertiary folded belts, e.g. Sudak
  - Tertiary detachment systems, e.g. Neptun
  - Compactional anticlines, e.g. Sürmene(?)
  - Tertiary fans, e.g. deepwater Akcakoca

- Most of these play types are untested to date, but some of them are being targeted by the ongoing deepwater drilling campaign (i.e. Sinop, Yassihöyük, Sürmene, Samsun, etc. wells)