[PS]Petroleum Potential in the Gulf of Taranto*

Erlend M. Jarsve[1] and Antony Pedley[2]

Search and Discovery Article #10414 (2012)**
Posted June 25, 2012

*Adapted from poster presentation at AAPG Annual Convention and Exhibition, Long Beach, California, April 22-25, 2012

[1]Fugro Multi Client Services, Oslo, Norway (e.m.jarsve@fugro.no)
[2]Fugro Multi Client Services UK, Wallingford, United Kingdom

Abstract

Due to large-scale exploration and production throughout recent decades on the European continental shelf, most of the hydrocarbon provinces within this region are considered as mature in the hydrocarbon exploration terminology. One of the last remaining un-explored petroleum provinces left on the European shelf, and hence one of the few remaining frontiers, is the Italian Gulf of Taranto.

The Gulf of Taranto is located at the offshore elongation of the Italian Apennines mountain chain, stretching from the Alps in the northwest to the Mediterranean in the southeast. The geology of the Apennines is characterized with mainly Cenozoic compression of Mesozoic and Cenozoic sedimentary strata, mainly consisting of carbonate deposits. Recently acquired reflection seismic data, covering the entire Gulf of Taranto and western parts of the Ionian Sea, reveal a complicated tectonic setting in the region. The Gulf of Taranto experienced large-scale NE-SW compression during the Cenozoic, with a counter clockwise rotation. Relaxation along the established thrust faults prevailed during the Late Neogene, and is, in some places, still ongoing. Ongoing extension has given rise to the development of numerous normal faults and transverse faults striking NW-SE.

Direct analogs to onshore petroleum reservoirs have been identified in this study in the offshore record, and the petroleum system are believed to be similar to what is found onshore. The main reservoir intervals are represented by carbonates identified within the thrust sheets, surrounded by flysch sediments. Highly complex potential reservoirs are identified, where both back thrusting and transverse displacement makes up the trap. Also, anticlines are identified in connection with the NE-SW compression, representing potential major hydrocarbon reservoirs. Based on a modern 2D data set covering the whole gulf of Taranto, a complete interpretation of the main thrust sheets has been achieved, and the transverse movement's related to active extension has been mapped. The interpretation reveals a complex structural setting, with the potential of storing

vast quantities of hydrocarbon, similar to what is proven onshore.

Reference

Monaco, C., L. Tortorici, and W. Paltrinieri, 1998, Structural evolution of the Lucanian Apennines, Southern Italy: Journal of Structural Geology, v. 20, p. 617-638.

PETROLEUM POTENTIAL IN THE GULF OF TARANTO

By: Erlend M. Jarsve and Antony Pedley
Fugro Multi Client Services AS
e-mail: e.m.jarsve@fugro.no

Abstract
Due to large scale exploration and production throughout recent decades on the European continental shelf, most of the hydrocarbon provinces within this region are considered as mature in the hydrocarbon exploration terminology. One of the last remaining un-explored petroleum provinces left on the European shelf, and hence one of the few remaining frontiers, is the Italian Gulf of Taranto. The Gulf of Taranto is located at the offshore elongation of the Italian Apennines mountain chain, stretching from the Alps in the northwest to the Mediterranean in the southeast. The geology of the Apennines is characterized with mainly Cenozoic compression of Mesozoic and Cenozoic sedimentary strata, mainly consisting of carbonate deposits. Recently acquired reflection seismic data, covering the entire Gulf of Taranto and western parts of the Ionian Sea, reveal a complicated tectonic setting in the region. The Gulf of Taranto experienced large scale NE-SW compression during the Cenozoic, with a counter clockwise rotation. Relaxation along the established thrust faults prevailed during the Late Neogene, and is, in some places, still ongoing.

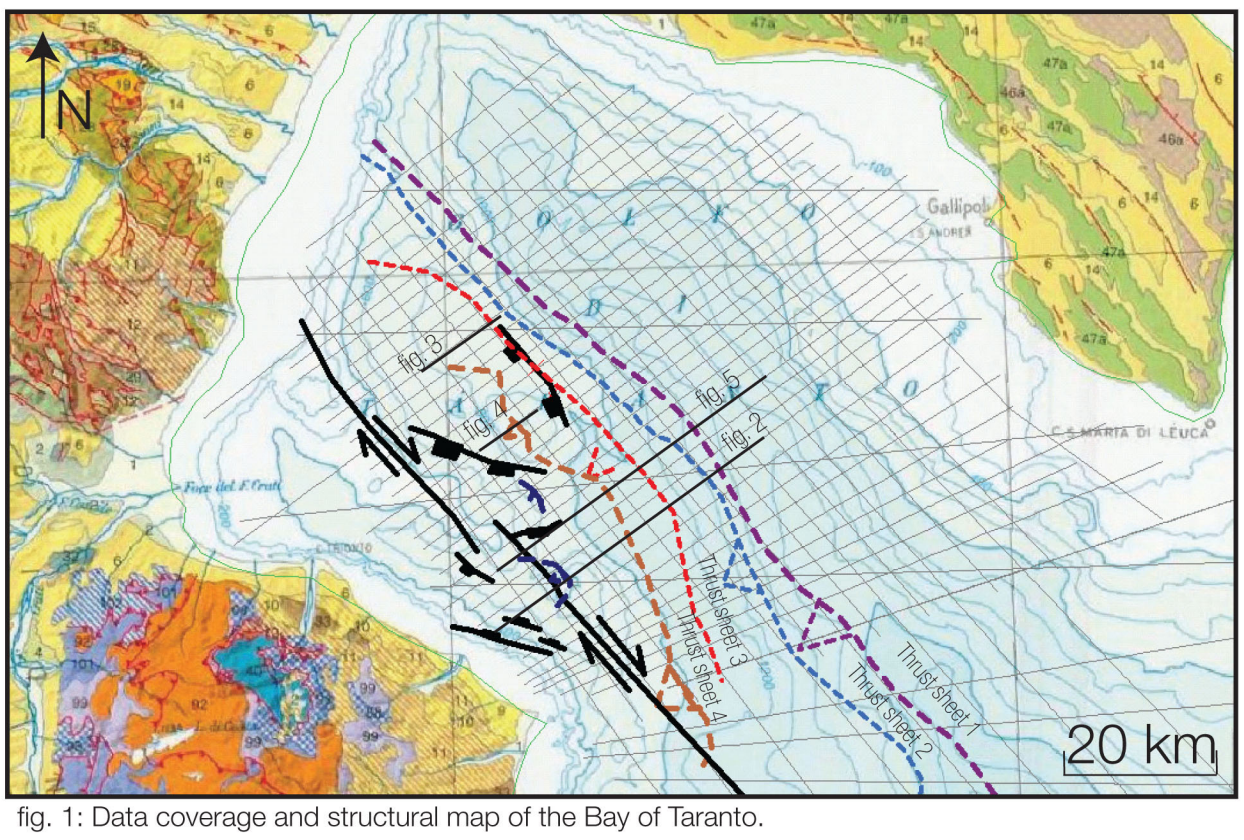

fig. 1: Data coverage and structural map of the Bay of Taranto.

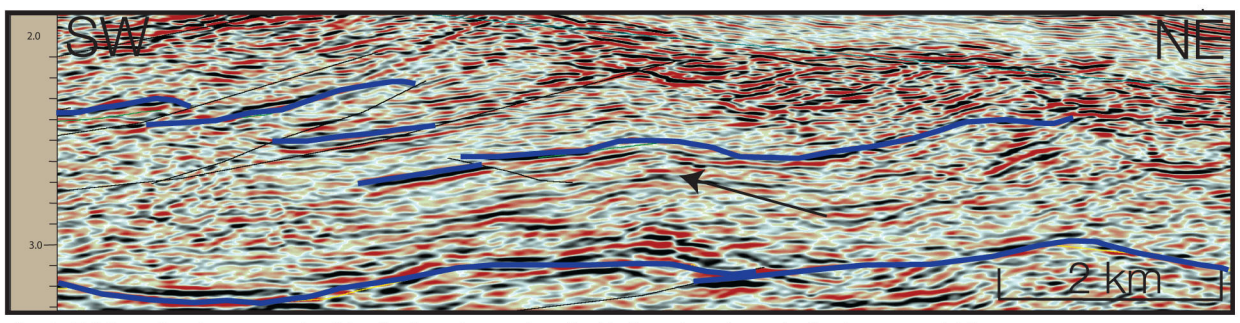

fig. 3: Folding of carbonate rocks (blue horizons) associated with thrusting. Arrow indicating potential flat spot.

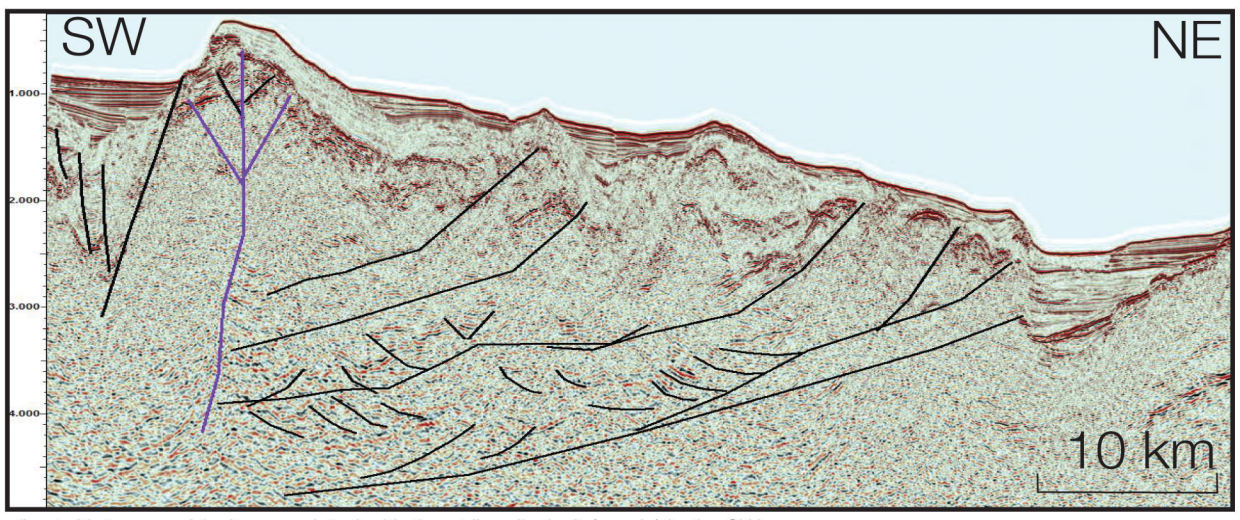

fig. 4: Note normal faults associated with the strike-slip fault (purple) in the SW.

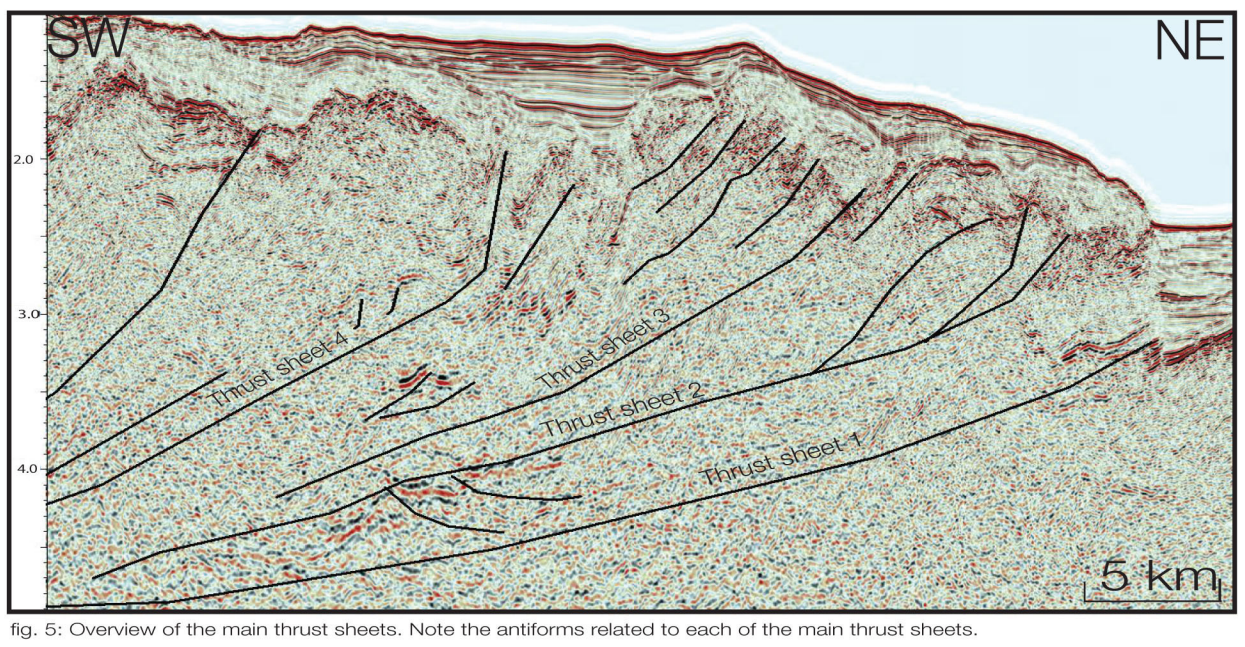

fig. 5: Overview of the main thrust sheets. Note the antiforms related to each of the main thrust sheets.

Database
This study was completed using Fugro's non-exclusive database of seismic and potential fields data acquired between 1999 and 2009. This database represents the only modern data acquired in the region covering the area from the Malta Escarpment in the west, across the Calabrian Arc and the Gulf of Taranto to the Ionian Sea in the east. The available database consists of 11,044km of long offset seismic with associated marine potential fields data.

Structural Geology
Four main thrust sheets were identified and interpreted throughout this study. These have a top-to-the-northeast transportation, with numerous minor thrusts splaying out with similar orientation (fig. 1). The major thrust sheets are identified and recorded by folding of sedimentary strata, amplitude anomalies and potential fields interpretation suggesting the presence of Mesozoic carbonates, and hence potential source and reservoir rocks (figs 2 & 3). In the southwestern parts of the Gulf of Taranto, transverse faults are identified, with associated normal faults (fig. 4). Deformation of the seabed (fig. 4), indicates that these strike-slip faults are active at present. The slip directions along these faults are difficult to constrain in the seismic record, although orientation of normal faults, associated with the strike-slip faults, may be taken as an indication of right-lateral displacement (figs. 1 & 4). This is opposite of what is recorded in the onshore structural record, where the strike-slip faults have left-lateral displacement (e.g. Monaco et al. 1998).

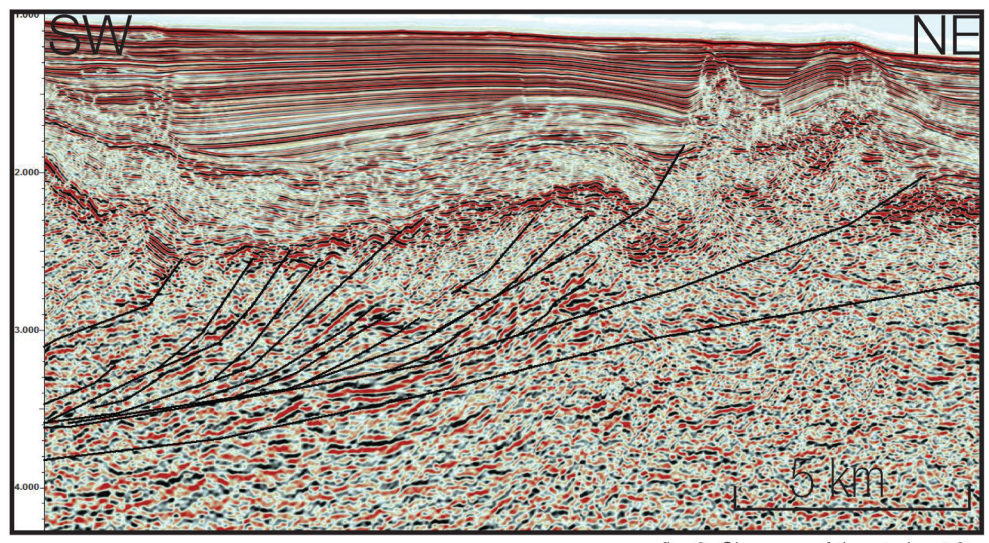

fig. 2: Close-up of thrust sheet 3.

Petroleum play and potential
Direct analogs to onshore petroleum reservoirs have been identified in this study in the offshore record, and the petroleum systems are believed to be similar to what is found onshore. The main reservoir intervals are represented by carbonates identified within the thrust sheets, surrounded by flysch sediments. Highly complex potential plays are identified, where both back thrusting and transverse displacement makes up the trap (Figs. 2, 3, 4 and 5). Also, anticlines are identified in connection with the NE-SW compression, particularity in the frontal parts of the thrust sheets representing potential major hydrocarbon reservoirs (figs. 2, 3, 4 and 5). The direct analogs to onshore geology indicates that the Gulf of Taranto shows similar prospectivity as the Apennines mountain chain overall.

Conclusion
The Bay of Taranto shows the same structural settings as the onshore Apennines Mountain Chain do overall. This itself indicates a potential similar petroleum play as in the onshore structural record. Analysis of the main structural elements indicates numerous leads, where antiforms in connection with the thrust sheets represents the main structural traps. These may contain similar amounts of petroleum as proven onshore. Ongoing extension has given rise to the development of numerous normal faults and transverse faults striking NW-SE. Based on a modern 2D data set covering the whole gulf of Taranto, a complete interpretation of the main thrust sheets has been achieved, and the transverse movement's related to active extension has been mapped. The interpretation reveals a complex structural setting, with the potential of storing vast quantities of hydrocarbon, similar to what is proven onshore.

References
Monaco, C., Tortorici, L. and Paltrinieri, W. (1998) Structural evolution of the Lucanian Apennines, southern Italy. Journal of Structural Geology, 20, 617-638.