

The geology and geophysics of the Iskenderun Basin, offshore Southern Turkey

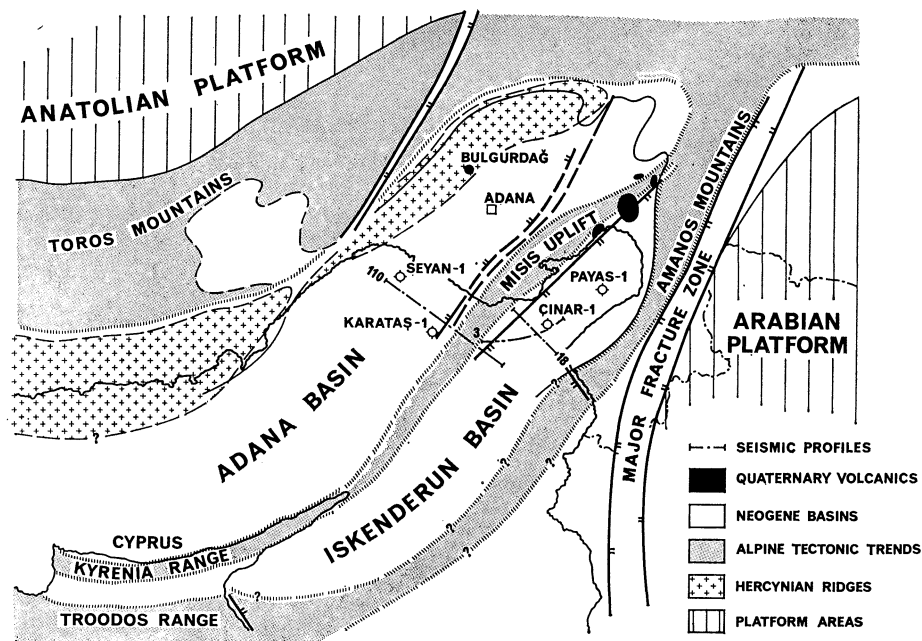
by

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This presentation summarizes the work carried out by the Turkish Gulf Oil Company between 1968 and 1971 in an offshore petroleum exploration permit jointly held by Gulf and the Turkish National Company T.P.A.O.

The work consisted essentially of field geology, marine magnetic, gravity and seismic surveys, and the drilling of three exploratory wells. The interpretation was made by the staff of Turkish Gulf Oil and by the geophysical section of Gulf Research and Development Company.

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Regional setting

The Adana and Iskenderun Basins are located in the midst of a pronounced and complicated alpine orogenic folded belt, and they are separated by the Misis range, and bounded by the Taurus and Amanos Mountains. Geophysical data indicate that the Misis uplift extends southwest in the Mediterranean, and is connected in an arcuate manner with the Kyrenia Range of Cyprus. Similarly, the Amanos Mountains follow a parallel trend, and are correlative with the Troodos Massive of Cyprus.

Rapp. Comm. int. Mer Médit., 23, 4a, pp. 31-33, 2 figs., (1975).

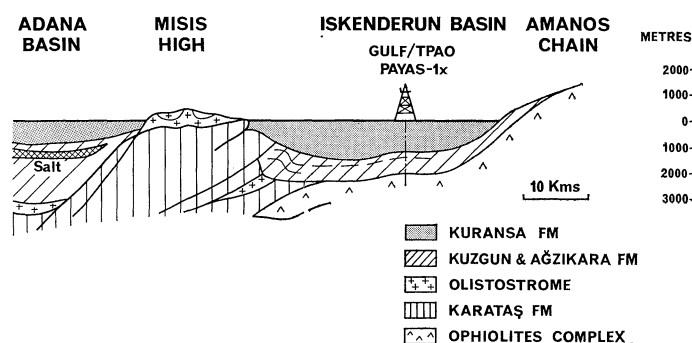
Cenozoic stratigraphy and geological history

At the end of the Cretaceous, the basin developing along the margin of the Anatolian and Arabian masses received thick deposits of carbonates and ophiolites. At the beginning of the Tertiary, the carbonate sedimentation of the Arabian shelf reaches the Amanos trough, while flysch, turbidites and large olistostromes filled the Misis and Taurus throughs.

The Miocene begins with a transgressive basal carbonate containing in places reef developments (the reservoir of the Bulgurdag oil field.) The transgression continues with the Agzikara Formation, generally shaly with minor sands present near the basin edge. Orogenic activity started near the beginning of the Middle Miocene during the deposition of the Kuzgun Formation and produced the uplifting of the Taurus and Amanos Mountains, together with the Misis chain which totally separates the Adana basin from the Iskenderun basin.

In the period following the orogeny, evaporites are deposited in the Adana basin, and possibly in the outer part of the Iskenderun basin. Although there is some evidence of evaporites, no massive salt was encountered in the Cinar 1 and Payas 1 wells drilled by Gulf/TPAO in the Iskenderun Bay. The Upper Kuzgun is represented in the Iskenderun Basin by a marine molasse-type section, which is overlaid by brackish to fresh water sediments of Pliocene and Pleistocene age. During the Plio-Pleistocene the final thrusting of the Misis Range took place, accompanied by volcanic eruptions along the margin of the basin, in connection with a NE-SW fracture zone.

STRUCTURAL SECTION ACROSS ISKENDERUN BASIN BASED ON GEOPHYSICS & WELL DATA



Geophysical interpretation

Gravity and seismic data show clearly the continuation to the southwest of the Misis Uplift. Steep gravity gradients on the east and west of the range define major fault and/or flexure zones.

Abrupt change in magnetic character along the entire eastern margin of the Misis Uplift also shows a major fault zone and the separation between two different basement provinces. The *Adana Basin* has a non-magnetic homogeneous basement, probably consisting of metamorphosed sediments buried at a depth of 9 to 15 kilometers. Below the *Misis Range*, magnetic data show that the basement is not involved in the folding, and that its depth is less than 3 kilometers. The *Iskenderun Basin* is characterized by strong anomalies and shows a highly magnetic basement, composed of ophiolites, which are outcropping in the Amanos Range. The ophiolites have been found in the Payas 1 well 2 kilometers below sea level, and could be as deep as 8 kilometers along the basin axis. The entire substratum of the Iskenderun Basin seems to be a part of the Amanos Troodos ophiolitic belt.

Discussion

Zarudzki : Did you observe any diapiric structures in evaporites?

Beltrandi : No, diapirs were found in the Adana and Iskenderun basins but halokinetics are known to exist further west.

Biju-Duval : In your opinion which is the origin of the olistostromes of Misis area? of which area did the ophiolites of Misis come? Do you think that the distinction between Karotas fan and Isali fan is valid?

How is it possible to say that the olistostromes come to the NW? Because in the Adana Basin the lower Miocene (age of the setting of the gravity slidings of Misis) is very quiet not disturbed by olistostromes. We have to find another origin.

Beltrandi : Reference to a paper by Shell geologists in the book of Petroleum Exploration Society of Libya on Turkey.

Matthews D. : In Cyprus there is a marked facies change between the tertiary rocks above the Troodos complex and their temporal equivalents in the Kyrenia range. Do you see the same change between the Iskenderun Basin, the Missis Uplift and how far south do you guess that the rocks of Missis (Kyrenia) have been thrust?

Beltrandi : The only lithological change that we can record is that the formations present in the Iskenderun Basin are in general less coarsely clastic than the one outcropping on the edge of the Misis uplift. We have no indication as to the horizontal displacement of the thrust.

Hsü : What is the age of pre-Miocene ophiolite? What is the nature of the Miocene ophiolite contact?

Beltrandi : The age of the pre-Miocene ophiolite is Eocene or older. The Miocene-ophiolite contact is probably a disconformity in the Payas-1 well.

Closs H. : Can you extrapolate from your studies in the eastern Mediterranean to the submarine ridge west of Cyprus.

Beltrandi : Nous n'avons pas poursuivi nos travaux dans cette direction.

Woodside J. : The question concerned the continuity of the Misis with the Taurus beneath the Adana basin. The answer was that there is evidence that the Misis does extend beneath the Adana Basin near Turkey but that as get there is no information about continuity with the Kyrenia.

Beltrandi : There are geophysical evidences that the Misis Mountains Range extends under the Neogene Sediments of the Adana Basin. The geophysical data available at the time of the drilling do not permit to recognise a continuity with the Taurus Range. The Misis uplift was clearly recognised on the marine seismic lines, trending NE-SW in the general direction of the Kyrenia Range.

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