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Lithofacies And Geochemical Properties Of Neogen Deposits At South Of Tuzgolu-Turkey

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Abstract

The Tuzgolu Basin located at the Central Anatolia (Turkey) is bounded by Ankara uplift at the north, the Kirsehir massif from at the east and the Sivrihisar-Bozdag massive at the west. In the study area which is located at the South of the Tuzgolu, the Paleogene and Mesozoic marine carbonates and igneous rocks underlies the Neogene sequences.Neogene deposits consist of Kizilbayir, Katrandedetepe and Bestepeler formations which are conformable with each other. 10 different lithofacies were identified within the Neogene sequence by considering sedimentation conditions, lithology, sedimentary structure and fossil content.; Grain-supported conglomerate facies (Gcu), Convolute bedded sandstone facies (Sk), Thick-bedded sandstone facies (St), Gray-purple colored thick layered mudstone facies (Mt), Oolitic limestone facies (OC), Alternating gypsum-anhydrite-mudstone-micritic limestone facies (Cmag), Bituminous shale facies (Bs), Halite-mudstone facies (Hm), Massive and parallel laminated tuff facies (Pmlt), Alternating mudstone-sandstone facies (Ms). The facies analysis show that sedimentation in the study area began with fluvial sediments (Kizilbayir formation) and followed by sediments of shallow lake which was often interrupted by sediments from land (Katrandedetepe formation) , and by the interbedded mudstone, sandstone, conglomerates and tuff at the closure of the lake (Bestepeler formation). According to the geochemical analysis results obtained from lake carbonate and evaporite deposits (Halite, anhydrite and gypsum), REE, LILE and HFSE values are more abundant in clayey samples than those in other evaporatic sediments. The Sr contents of halites (1-1539 ppm) are lower than sulfate (183-4378.04 ppm) and carbonates (922-12365 ppm). Halite minerals contain very high Cl (505686-615905 ppm) and low Br (5-637 ppm) indicating that they are products of dissolution, mixing and re-precipitation.

Keywords: *Tuzgolu, Lithofacies, Halite, Gypsum, Anhydrite*

1. INTRODUCTION

The Anatolian plateau was formed by the collision of the Arabian and Eurosian plates ([2] and ([3]). The study area is located at the Central Anatolia is an inner enclosed basin and is bounded by Ankara uplift in the north, the Kirsehir massif from in the east and the Menderes massif from the west (Figure.1). During this time, two major fault systems in the area, the Tuz Golu and the Sultanhani faults, developed as south-west dipping, NW–SE striking, normal faults. At some time in the Late Miocene-Early Pliocene, during regional subsidence, a previously unreported phase of contraction occurred, which led to the development of a north-east–vergent thrust sheet, the culmination of which forms the morphologic ridge to the east of the Tuz Golu Lake ([2], ([3], [4], [5], [6], [7], [8] and [9]).

The Tuz Golu Basin is located in the south-eastern part of Central Anatolia (Figure 1). Evaporitic and carbonate (limestone and dolomite) deposits are deposited from Na, Ca, Mg, Cl, CO_3, and SO_4 in different contents and most of them were precipitated inner continental basin, tectonically active (slump folding, chaotic structure and collapse deposits) and arid lacustrine environments which effected time to time intake of seawater ([1], [2], [3]). In this study area, more thicknesses of salt and soda than a few hundred meters were deposited during Miocene period.

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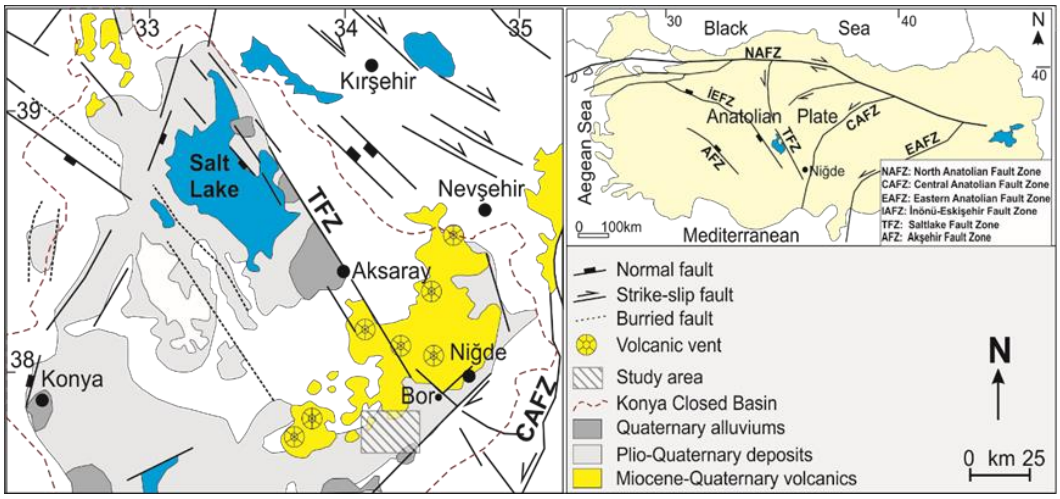

Figure 1. *Simplified geology map (after [1])*

2. RESULT AND DISCUSSION

2.1 STRATIGRAPHY

There are sediments of more than 3000 meters deposited in the Paleozoic-Quaternary period at the base of the Tuz Golu basin and various rock assemblages settled with volcanic activity (Figure 1).

2.2 Basment Rocks

Paleocene (Serenkaya formation), Eocene (guney formation) and Paleozoic aged metamorphic and sedimentary rocks (Asagigedigi formation) are found at the base of the late Miocene aged Lake formations (Figure 2 and 3)

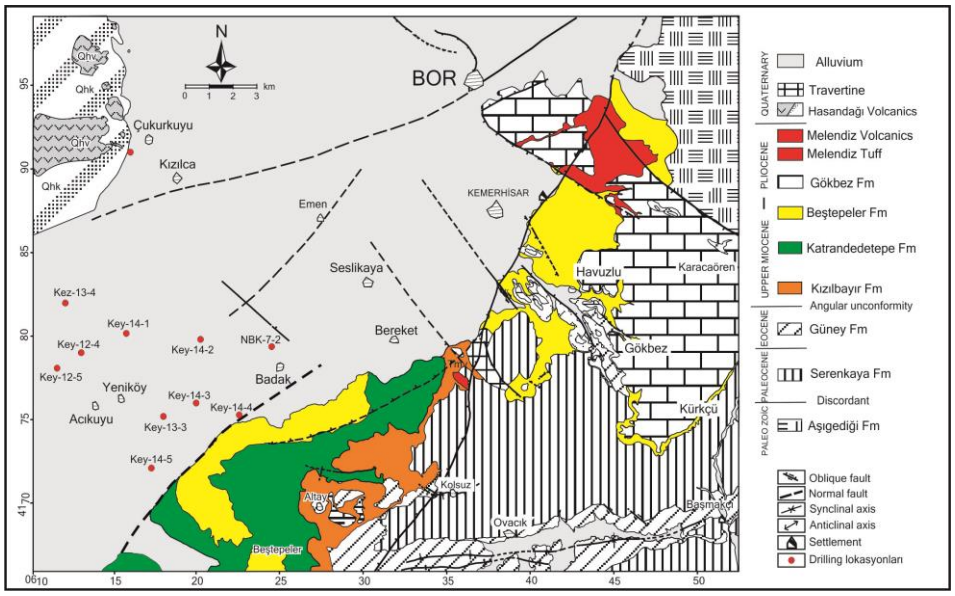

Figure 2 *Geological map of study area (from [4], [5], [6], [7],) and drill locations*

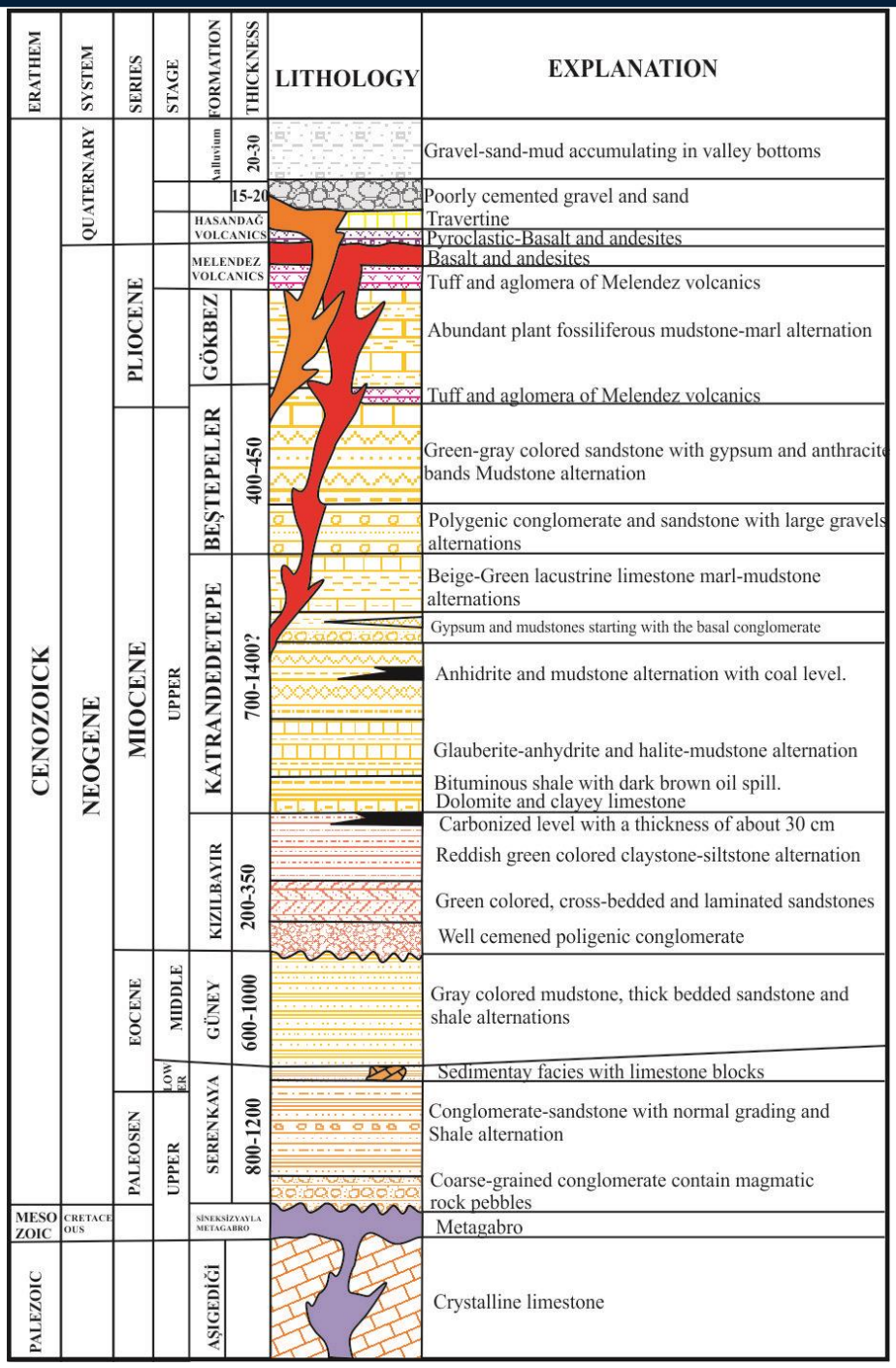

Figure 3*.Generalized stratigraphic section of the study area (from [4], [5], [6], [7]).*

2.3 Kizilbayir formation

The formation comprises reddish and yellow colored conglomerate, sandstone and mudstone. Additionally, in the drilling logs, normal grading of the conglomerates, cross bedding and lamination in the sandstones are observed.

The Kizilbayir formation was deposited in a tectonically very active basin so that depositional conditions changed frequently and several different facies were deposited.

Three lithofacies were defined within the Kizilbayir Formation;

1. Clast-supported conglomerate lithofachies (Figure 4)
2. Convolute bedding sandstone lithofacies (Figure 4)
3. Gray-claret colored thick-bedded mudstone lithofacies (Figure 4)

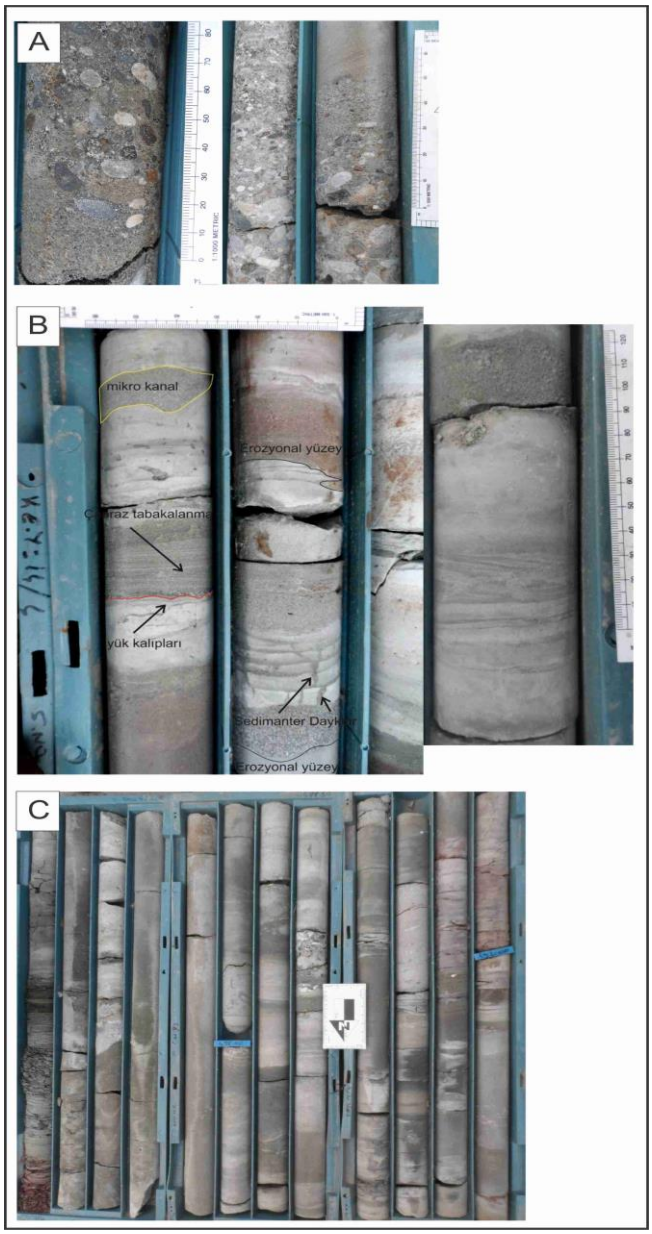

Figure 4 *Lithofacies of Kizilbayir formation; A. Clast-supported conglomerate lithofachies (Normal graded conglomerate), B. Convolute bedding sandstone lithofacies, C. Gray-claret colored thick-bedded mudstone lithofacies*

2.4 Katrandedetepe formation

Formation consists of halite, gypsum, anhydrite, gulberite, mudstone, limestone, dolomite, bituminous, petroliferous sandstone, siltstone and sandstone. The formation commonly contains deformational structures. Such as salt diapirs, slump folds, and load cast structures. Three lithofacies were defined within the Katrandedetepe formation;

1. Oolitic limestone lithofacies (Figure 5)
2. Anhydrite, gypsum –mudstone –micritic limestone lithofacies (Figure 5)
3. Bituminous, petroliferous sandstone (Figure 5)

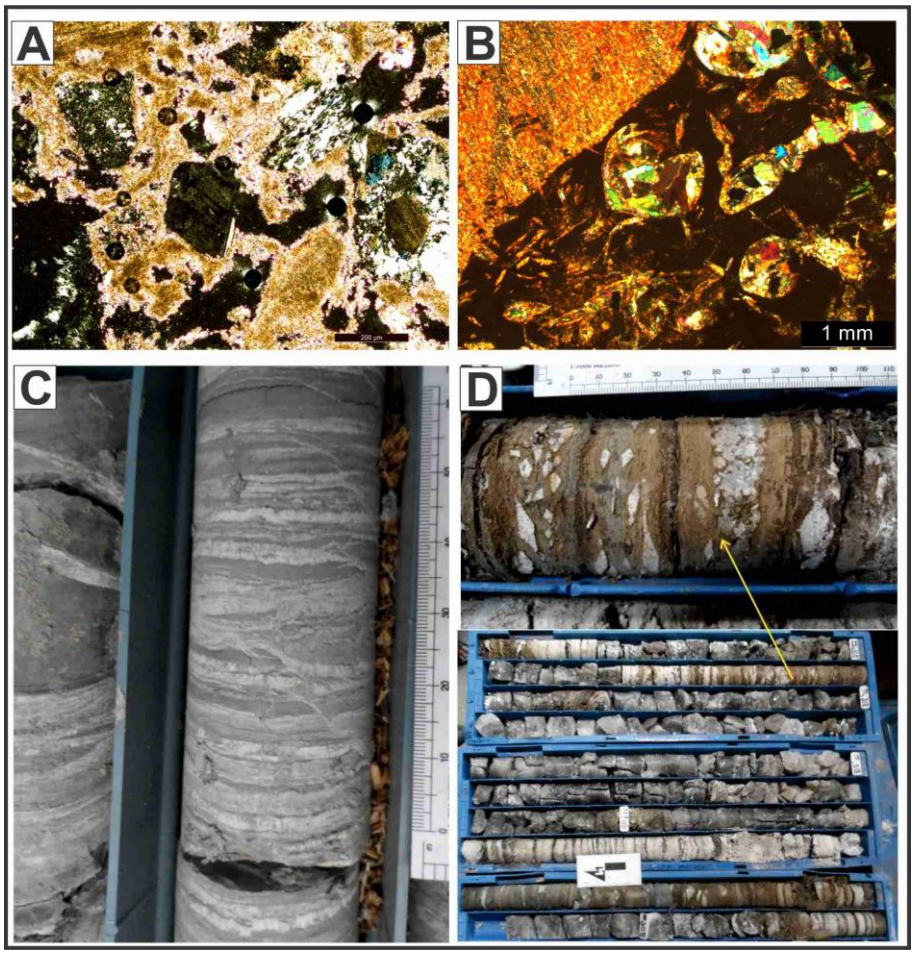

Figure 5 *Lithofacies of Katrandedetepe formation; A. Oolitic limestone lithofacies (Thin section photos), B. Anhydrite, gypsum –mudstone –micritic limestone lithofacies (Gastropoda shell was filled by anhydrite), C. Bituminous, petroliferous sandstone Lithofacies*

2.5 Bestepeler formation

The formation includes light green mudstone, siltstone, sandstone, conglomerate, cream colored tuff and tuffite.

Three lithofacies were defined within the Bestepeler formation;

1. Halite-mudstone-lithofacies (Figure 6)
2. Masiv and tabular bedding lapilli tuff lithofacies (Figure 6)
3. Mudstone-sandstone alternate lithofaciess (Figure 6)

Figure 6 *Lithofacies of Bestepeler formation; A. Halite-mudstone-lithofacies, B. Masiv and tabular bedding lapilli tuff lithofacies, C. Mudstone-sandstone alternate lithofaciess*

3. GEOCHEMICAL PROPERTIES

According to petrographic and geochemical analyzes, 3 groups of minerals were identified. distribution of minerals according to depths in drilling log (Figure 7). Three groups are Sulpfates, carbonates and Halite-Globerite

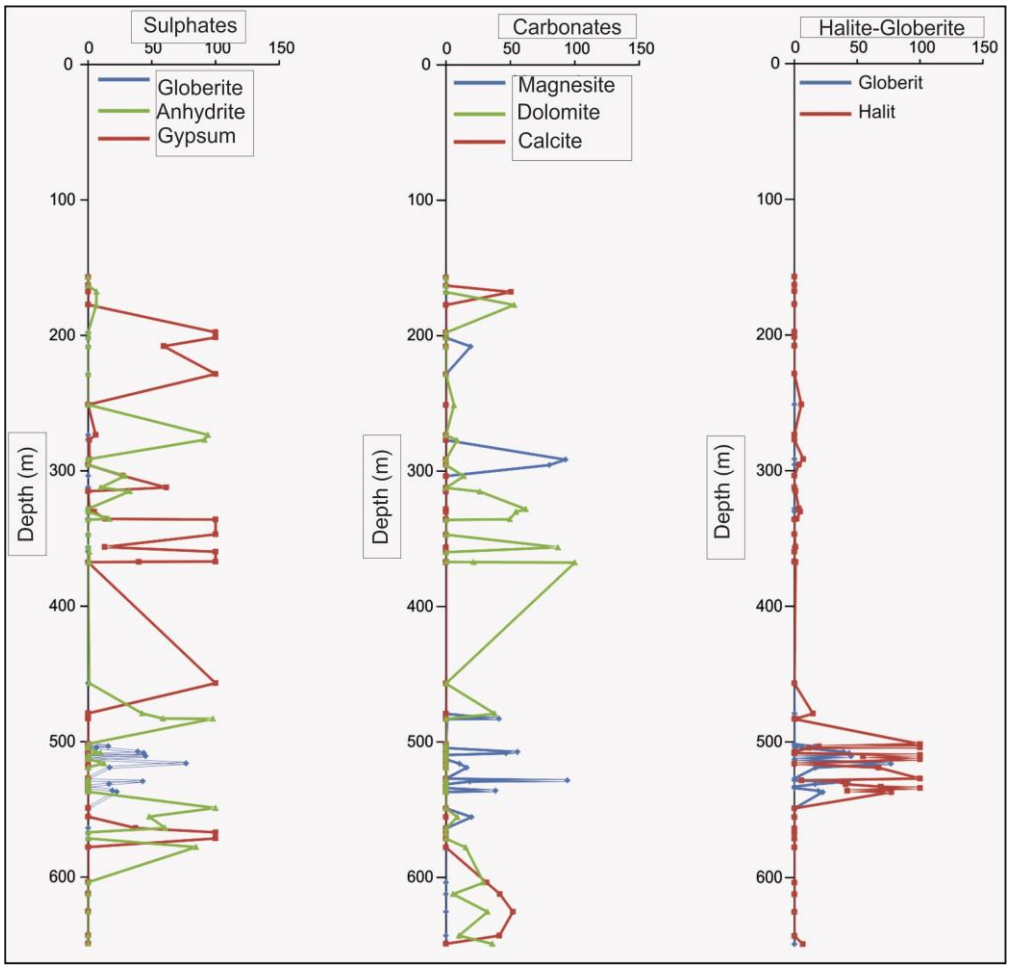

Figure 7. *Changes of mineral contents of TG3 drilling.*

4. CONCLUSION

1. The regional subsidence phase in the study area started in Tortonian times. A sediment sequences (Bestepe,Katrandedetepe and Kizilbayir formations) which is more than 1000 m thick deposited from Late Miocene and possibly into Pliocene times
2. Facies properties and the synsedimentary structures (such as slump folding, chaotic levels, sedimentary dykes ect.) in the Katrandedetepe formation show that the region was tectonically controlled.
3. The sequences comprise alternating evaporitic deposits (the cycle of the halite, gypsum, anhydrite) and siliciclastic deposits. This indicate that there was a continuous sedimentation which was mainly controlled by paleoclimatic changes

REFERENCES

[1] Goncuoglu, M. C., Turhan, N., Senturk, K., Uysal, S., Ozcan, A. & Isik, A. Orta Sakarya'da Nallihan Saricakaya Arasindaki Yapisal Birliklerin Jeolojik Ozellikleri. Maden Tetkik ve Arama Derleme Rapor No: 10094, Ankara (yayimlanmamis), 1996.
[2]. Fernández-Blanco, D., Bertotti, G., Ciner, T.A. 2013. "Cenozoic Tectonics of the Tuz Golu Basin (Central Anatolian Plateau, Turkey)", Turkish Journal of Earth Science, 22, 715-738.
[3] Yoldas, R. Ulukisla (Nigde) Bitumlu sist alaninin jeolojik ve ekonomik olanaklari, MTA rapor no: 5050, 1973.
[4] Oktay, F. Y. Stratigraphy and Geological evolution of the Ulukisla and Surrounding Area. Geological Bulletin of Turkey, vol. 25, pp 15-23, 1982. Physical Geography
[5] Demirtasli, E., Turhan, N., Bilgin, A. Z. & Selim, M. Geology of the Bolkar Mountains. In: Tekeli, O. & Goncuoglu, M.C. (Eds.), Geology of the Taurus Belt, Proceedings of the International Symposium on the Geology of the Taurus Belt, pp. 125-141, 1984.
[6] Goncuoglu, M. C. Geochronological data from the Southern Part (Nigde Area) of the Central Anatolian Massif: Bulletin of Mineral Research and Exploration Institute of Turkey (MTA), vol. 105/106, pp 111-124, 1986.
[7] Atabey, E. & Ayhan, A. Nigde-Ulukisla-Camardi-Ciftehan Yoresinin Jeolojisi, MTA Derleme no: 8064, 1986.
[8] Muller, D.W. & Mueller, P.A. Origin and age of the Mediterranean Messinian evaporites: implications from Sr isotopes. Earth Planet. Sci. Lett., vol. 107, pp 1-12, 1991.
[9] Gorur, N. & Tuysuz, O. Cretaceous to Miocene Palaeogeographic Evolution of Turkey: Implications for Hydrocarbon Potential. Journal of Petroleum Geology, vol. 24, pp 119-146, 2001,1.

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