



**6TH INTERNATIONAL
ISTANBUL SCIENTIFIC
RESEARCH CONGRESS
PROCEEDINGS BOOK**

ISBN: 978-605-74191-8-7

**EDITORS
DR. ÖZERK YAVUZ
VUGAR QAHRAMANOV
TUBA FIRAT**

**FIRST EVIDENCE ON THE AGE OF THE KONYA FAULT ZONE AND ITS
ENVIRONMENTAL IMPACTS**

Arif DELİKAN

*Konya Technical University, Faculty of Engineering and Natural Sciences, Geological
Engineering, Konya, Turkey*
ORCID Code: 0000-0003-2895-2954

ABSTRACT

Konya region is located in the middle of Turkey and within the closed basin of Konya with an area of approximately 42 000 km². Konya settlement area is controlled by the Konya fault zone in the west, the Karaömerler Fault Zone in the north, and the Divanlar- Göçü faults in the east. Konya fault zone consist of more than four steps in Miocene and older sediments. The dip-slip faults forming the steps are inclined towards the east. The relative age of the Konya fault zone was obtained by age analysis of the caliche deposits. The Caliche formations in the Konya region are mostly related to the young and / or active faults, and the formation of the thick blocks at the edges of the fault blocks is observed. Especially Hatip location is located in Konya fault zone. As a result of both geochemical and field observations, Hatip formation have been formed by dolocrete and groundwater types of caliches under the influence of groundwater. The age of the dolocrete samples was determined by using ESR method as 292.86 ka. Konya settlement has collapsed about 1200 meters with normal faults within the Konya fault zone and still continues to collapse. Drought due to climate change has caused rapid drop of groundwater in the region. This situation has caused the formation of new fractures on the basin edges. In particular, newly formed surface cracks affect roads, settlements, topography and underground installations.

Keywords: Konya, Konya Fault zone, Surface Cracks, Climate Change

INTRODUCTION

Konya Closed Basin (KCB) is approximately 42.000 km². The Konya Graben located at east of the Konya settlement area, is controlled by the Konya fault zone in the west, the Karaömerler Fault Zone in the north, and the Divanlar - Göçü faults in the east (Figure 1). Konya region has been under the influence of the lacustrine regime since the Late Miocene period. Konya region has been deprived of today's surface wetlands under the influence of the arid climate regime for the last 12.000 years. In addition to the ongoing drought in the KCB, the groundwater table has decreased by approximately 45 meters in the last 20 years due to excessive and uncontrolled use of agricultural water. The wetlands and swamps in the immediate vicinity of the study area, as well as the last wetlands in the region such as Akyay Lake and Hotamış Lake in the south of the region, have completely dried up in the last 50 years. In the Karatay (Konya) region, there is the Late Miocene-Early Pliocene aged İnsuyu formation, which consists of intercalations of limestone, clayey limestone and marl-mudstone with clastic intercalations at the bottom. On top of the İnsuyu formation, sandy, silty clay and mudstones containing carbonate intercalations from Küpbasan, Sazlıpınar and Batakılık members of the Quaternary-Holocene aged Hotamış formation unconformably overlies. Sazlıpınar member of the Hotamış formation consists of mudstone-marl- and gypsum intercalations.

MATERIALS AND METHODS

For ESR analysis and dating studies, JEOL JES-FA300 X-band ESR spectrometer located in Selcuk University Advanced Technology Research and Application Center was used. The device allows measuring at a sensitivity of 7×10^9 spins / 0.1 mT in a magnetic field scanning range of 500 mT in the spectrometer temperature range of -150°C to +150°C. In order to age the Konya Fault Zone, samples were collected from 3 different areas in the region. Especially the samples taken from the orator region and the caliche samples were aged.

RESULTS

Stratigraphy

The stratigraphic development of the region is highly controversial in previous studies conducted in and around the study area (Wiesner, 1968; Göger, 1969; Görmüş, 1984; Özcan et al., 1990; Hakyemez et al., 1992; Eren, 1993; Eren, 1996).

The basic units in the study area were defined by Eren (1993, 1996). Hatip Ophiolitic mélangé and Çayırbağı ophiolites that tectonically overlie these units are the main allochthonous units belonging to the pre-Cenozoic basement in the region (Figure 2). When the units belonging to the foundation are listed from oldest to youngest; The Silurian-Early Carboniferous aged Bozdağ formation belonging to the Infiltration Group and the Devonian-Early Permian aged Bağrıkurt formation that overlies it laterally and vertically are the oldest units outcropping in the region. At the bottom of the Ardıçlı Group, which overlies them unconformably, the Late Permian (?) - Early Triassic aged Bahçecik formation is located laterally and vertically, the Late Permian (?) - Triassic Ertuğrul formation, the Late Permian - Early Jurassic Kızılören formation and the Late Triassic formation. It is overlain by the Early Cretaceous Lorasdağı formation. Late Cretaceous Hatip Ophiolitic mélangé and Çayırbağı ophiolites overlie other units with tectonic border as allochthon. They are unconformably overlain by the Late Miocene (?) - Pliocene aged Sille formation, Ulumuhsine, Küçükmuhsine, Sulutas Volcanics and at the top of the Yurukler formations. The Konya Group, which overlies these unconformably, has the Pleistocene (?) – Holocene aged Beşyüzevler formation at the bottom, while the Konya formation unconformably overlies this unit and is overlain by the Aşlımyayla, Göçü, Sakyatan and Karahüyük formations (Horosan, 2014).

Konya fault Zone

The Konya Fault zone has a length of approximately 50 km (Figure 1). The last severe earthquake on the fault occurred in 2009. Konya Fault zone mostly consists of dip-slip normal faults. However, there are reverse faults parallel to the main fault (Figure 3).

DISCUSSION

Konya Fault zone has been relatively aged by ESR method. Carbonate crystals taken from the fault line have been measured to be about 292 ka. This shows that the age of the fault is more than 292 thousand years. Deformations and surface fractures observed in the Konya region between 25-75 thousand years old indicate that there are earthquakes with an intensity greater than 6 in the Konya region. In the Konya region, there are building stocks on the Konya Fault zone and on loose alluvial ground. Considering that severe earthquakes may occur in the region; these regions may be in danger. Earthquake risk should be taken into consideration while constructing the zones to be developed and new building stocks to be built in the region.

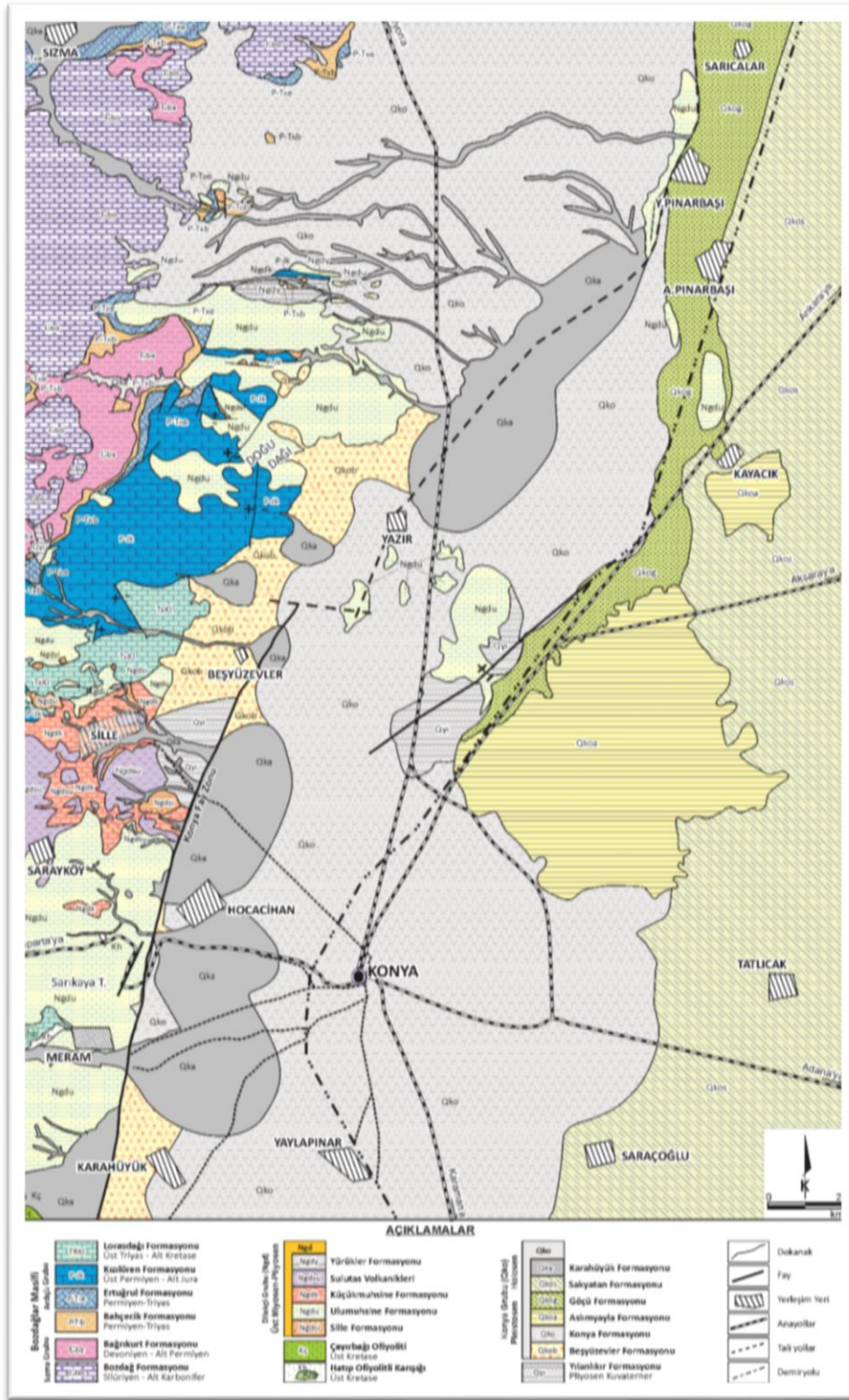


Figure 1. Geological map of Konya Area (Horosan, 2014)

ÜST SİSTEM	S E N O Z O Y İ K		M E S O Z O Y İ K		P A L E O Z O Y İ K			
	SİSTEM	SERİ	TRİYAS - JURA - KRETASE	SİLÜRİYEN - PERMİYEN	SİZMA GRUBU	LADIK METAMORFİKLERİ		
	KUVATERNER	Pleyistosen - Holosen	Üst Kretase	Üst Permiyen-Alt Kretase				
	KONYA GRUBU		Üst Miyosen - Pliyosen	ARDIÇLI GRUBU	LADIK METAMORFİKLERİ	Karahüyük	Qka	Çamur destekli kumlu, köşeli çakıl ve bloklar UYUMSUZLUK
		Sakyatan				Qkos	Yer yer jips ara katkılı beyaz ve gri killi karbonat ve marnlar	
		Göçü				Qkog	İnce çakıllı, iyi boylanmış orta tutturulmuş çakıltaşı ve kumtaşı	
		Aslımayla				Qkoa	Tuz ve jips içerikli kilitaşı ve çamurtaşı bantlı az tutturulmuş çakıltaşı,	
		Konya				Qko	Tutturulmamış ince kum, sil ve kil UYUMSUZLUK	
		Beşyüzevler				Qkob	Sıkı tutturulmuş karbonatlı çakıltaşı UYUMSUZLUK	
	DİLEKÇİ GRUBU		Üst Miyosen - Pliyosen	LADIK METAMORFİKLERİ	LADIK METAMORFİKLERİ	Yılanlıkır	Qyi	Orta boylanmış çakıltaşı ve kumtaşı UYUMSUZLUK
		Yürükler				Ngdy	Alüvyal yelpaze (moloz, çamur akması) UYUMSUZLUK	
		Sulutas Volkanikleri				Ngdsu	Kirli beyaz, gri, pembe, andezit ve dasitlerle az oranda riyodasit ve riyolitler	
		Küçükmuhsine				Ngdk	Beyaz, gri, pembe, andezitik ve dasitik tüf, tüfit, aglomera ve volkanojenik kumtaşları	
		Ulumuhsine				Ngdu	Bej, gri renkli gösel kireçtaşı, killi kireçtaşı, marn, kumtaşı ve kilitaşları	
		Sille				Ngdsi	Kırmızı, gri ve kahverenkli konglomera, kumtaşı, çamurtaşı UYUMSUZLUK	
			Üst Kretase	LADIK METAMORFİKLERİ	LADIK METAMORFİKLERİ	Çayırbağı Ofiyoliti	Kç	Yeşil, grimsi yeşil, kahverenkli magnezit içeren yer yer serpantinleşmiş peridotit, gabro ve diyabaz BİNDİRME
						Hatıp Ofiyolitli Melanji	Kh	Çamurtaşı, radyolarit, ofiyolitik matriksin içinde değişik yaş ve boyutta kireçtaşı blokları BİNDİRME
			Üst Permiyen-Alt Kretase	LADIK METAMORFİKLERİ	LADIK METAMORFİKLERİ	Lorasdağı	Tr-Kl	Gri, siyah renkli laminalı, breşik dolomit ve dolomitik kireçtaşları
						Kızılören	P-Jk	Sarı, gri, boz renkli sık kıvrımlı kalkışit, meta-karbonat, fillit ve metakumtaşı aralanması
						Ertuğrul	P-Tr e	Laminalı kalkışit arakatlı, mor, kırmızı, bordo renkli ince yapraklanmalı meta kırıntılılar UYUMSUZLUK
						Bahçecik	P-Tr b	Rekristalize karbonat blokları içeren yeşil renkli fillitlerle aratabakalı, metakırıntılılar ve metaçört aralanması
			Silüriyen-Alt Permiyen	LADIK METAMORFİKLERİ	LADIK METAMORFİKLERİ	Bağrikurt	S-Pb	Siyah, koyu - açık gri, mavimsi gri, bej renkli rekristalize kireçtaşı, dolomitik kireçtaşı, dolomit ve mermer
						Bozdağ	S-Cb	

Figure 1. Tectono-stratigraphic column section of the units cropping out in the study area (Horosan, 2014).

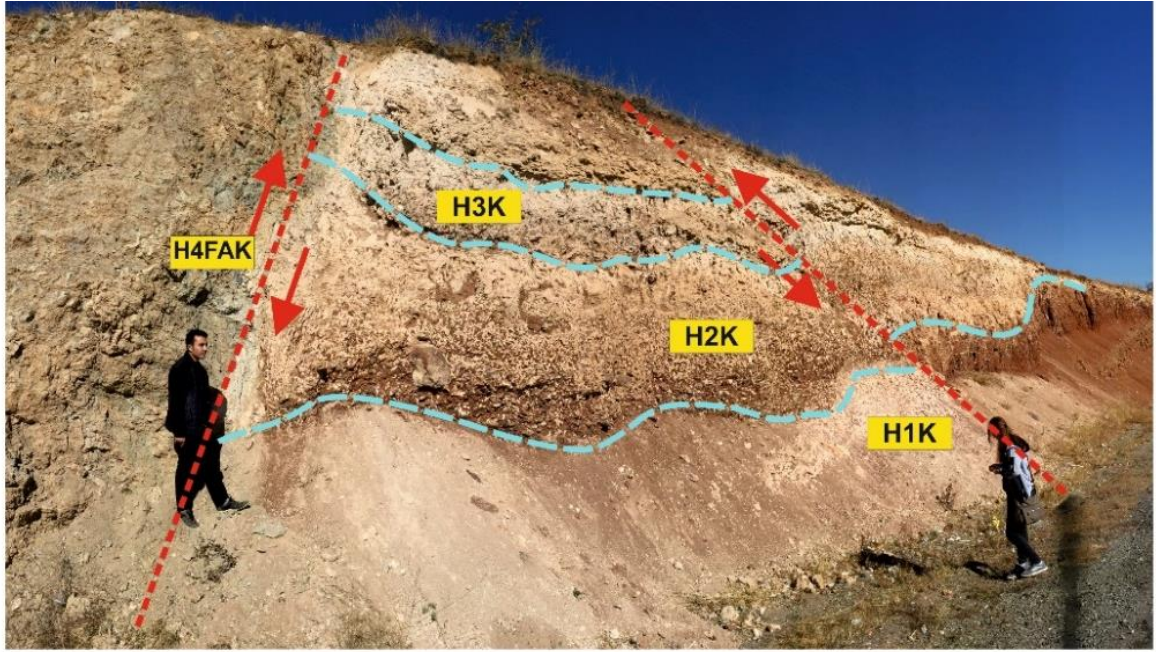


Figure 3. Konya Fault Zone observed in the road cut on the Konya-Antalya Road in Hatip district (samples: H1N, H2N, H3N, H4FAK, H5N and H6N).

CONCLUSION

1. For the first time, the existing caliches in the Konya region were named in this study.
2. For the first time, the caliche here was dated using the ESR method.
3. Hatip location, the age of the caliche sample (H4FAK) taken from the fault was found to be 292.86 K years and since the caliche here were observed in the field study where they settled here after the fault, the normal fault age here is thought to be older than the probable relative age of 292.86 K years.

ACKNOWLEDGEMENTS

I would like to express my endless thanks to Prof. Dr. Ülkü SAYIN and Prof. Dr. Ayhan ÖZMEN who made ESR analysis, and Prof. Dr. Hükmü ORHAN who helped in geological studies. I would also like to thank the scientific Research Projects Coordinatorship of Selçuk University for their support of the project.

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