O 55. GEOCHEMICAL PROPERTIES AND GEOLOGICAL SIGNIFICANCE OF KARASU SPRING WATER AND YERKÖPRÜ TUFAS (HADIM-YERKÖPRÜ KONYA)

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ABSTRACT: Karasu spring water is located in Yerköprü region, which is 100 km away from Konya. The Karasu spring coming out from a fault and water output from karstic network into the valley.
The Karasu spring which is enriched in carbonate discharges into valley as surface water, while the other spring discharges into the Göksu valley from a karstic void close to the Yerköprü waterfall. Water from both springs mixes at the waterfall and flow throgh Göksü valley.
Bicarbonate ions in Karasu spring water are deposited as tufa (terrestrial carbonate) in Yerköprü waterfall region.
In the past, Karasu spring water with bicarbonate has been used in water mills. Therefore, tufa deposition occurred in different areas. Changing the bed of the Karasu Spring causes the current precipitation to stop. This situation caused the pollution of the white tufas. Deposited tufas due to the change of the bed of the Karasu source on different parts of the waterfall cause slope collapse. The region, which is an important geosite area for Geotruzm, so, the Karasu source and the fascinating tufa structures should be protected. Thus, both the geological structures will be protected and the environmental pollution will be prevented.

Keywords: Karasu, Yerköprü, Tufa, Karstic spring water

1. INTRODUCTION

Tufa is common continental carbonate deposits in a wide range of environmental depositional, climatic, and tectonic settings throughout the World (Ford and Pedley, 1996; Guo and Riding, 1998; Hancock et al., 1999; Arenas et al., 2000; Glover and Robertson, 2003; Martín-Algarra et al., 2003; Andrews 2006).

The purpose of this paper is to describe and interpret geochemical characteristics of tufa facies in an active tufa deposition site in the Yerköprü area (South of Konya, Turkey) and Karasu spring Water.

2. MATERIAL AND METHOD

Samples were collected systematically in places where the tufa sequence is thick. Also, random sampling was realized from different lithologies. 15 water samples were collected in spring months. First the thin sections and acetate peels from samples were prepared for determining the petrographic and sedimentological characteristics of different facies. The mineralogical composition of the samples was determined by X-ray diffraction (XRD) and SEM method at ILTEK laboratory in Selçuk University.

3. GEOLOGICAL SETTING

The recent Yerköprü tufa sediment were deposited with angular unconformity on the Aladağ terrace tufa (~90-350 ka, Delikan et al., 2017; Fig. 1 and 2), the Permian carbonate rocks (Taşkent formation) and Triassic meta-olistostrome (Zindancık metaolistostrome).

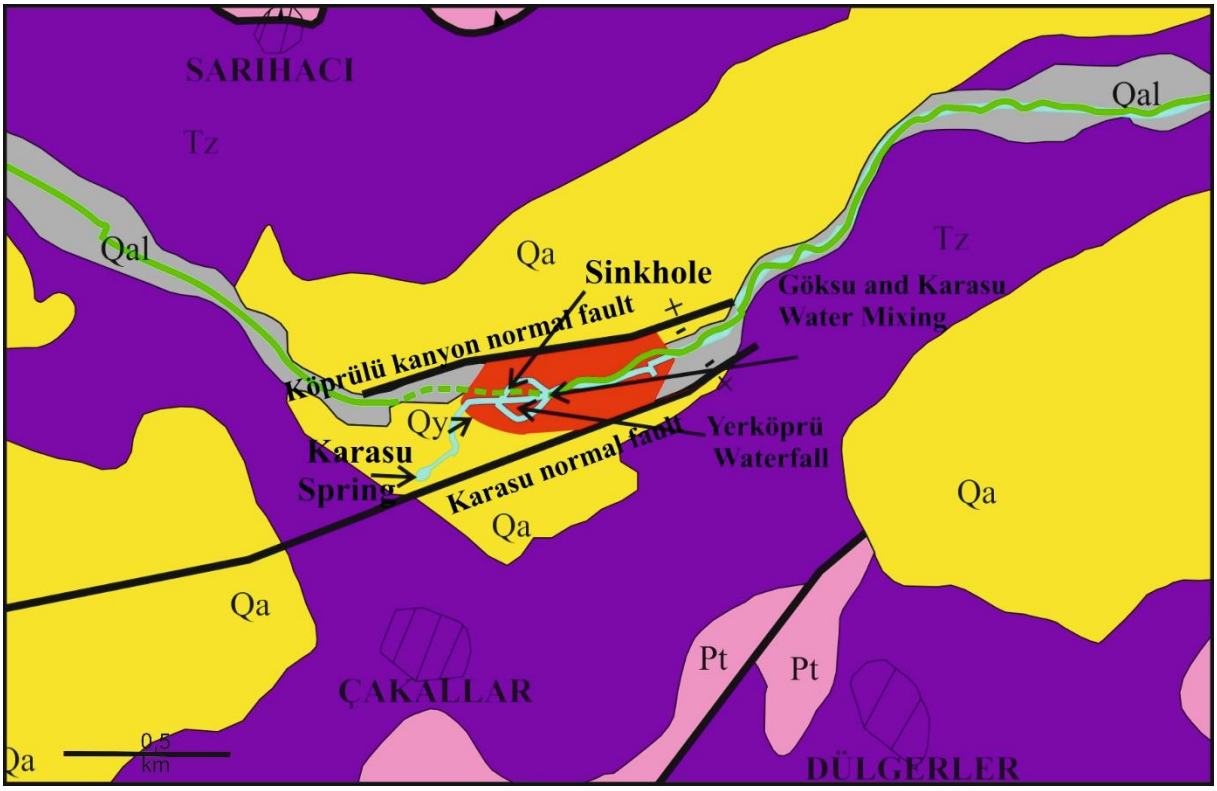

Figure 1. Geological map of the study area (Mert and Delikan, 2014)

4. RESULT

4.1. Lithologic classification

In the study area, four different tufa facies have been differentiated using the classification of Pedley (1990)

Autochthonous facies

- Phytoherm framestone facies
- Phytoherm boundstone facies

Allochthonous Facies

- Brecciated Tufas facies
- Micritic tufa facies

4.2. Karasu Spring

The field observation and chemical analysis of waters from Karasu spring and Göksu river showed clearly that the tufa deposition is resulted only from the carbonate rich water of the Karasu spring (Table 1). The water from Karasu spring flow on the natural bridge where the Göksu river flow beneath. The distance from the source of Karasu spring and the waterfall is 700 meters, but the tufa formation took place only on and around the waterfall where the water flow fast and turbulent (Jet flow) causing aeration and low pressure on the carbonate rich Karasu water. This increases the rate of degassing of CO2 (Figure 3 and 4). Tufa deposition in the waterfall area is resulted from degassing of CO2 due to sudden hydrological changes rather than due to the effects of organisms, evaporation and sediment water interaction. This cause the water reach to the oversaturation and accelerate the tufa deposition. This fast deposition of tufa on the water fall is known as waterfall effect (aeration effect, low pressure effect and jet-flow effect; Figüre 5) (Zhang et al., 2001; Cheng, 2004).

5. CONCLUSIONS AND DISCUSSION

1. All tufa in the study area were deposited in Fluvial environment.
2. Water chemistry points that tufa formation was mainly deposited in relation to the Karasu spring in the area . Field Observation also support this.

3. The deposition rate of tufa is very low in places where Karasu flow laminarly, but is high in places where the water flow turbulently such as at waterfall.
4. In the study area, the deposition site of the facies was mainly controlled by faults and recently by human who cahanges the water ways for different purposes.
5. The Yerköprü tufa deposits, which at an altitude above 800 m., correspond to 'the high mountain tufa' on the Andrew's (2006) classification
6. The study area is a candidate for being a geosite bacause of actual tufa formation and magnificiant waterfall.

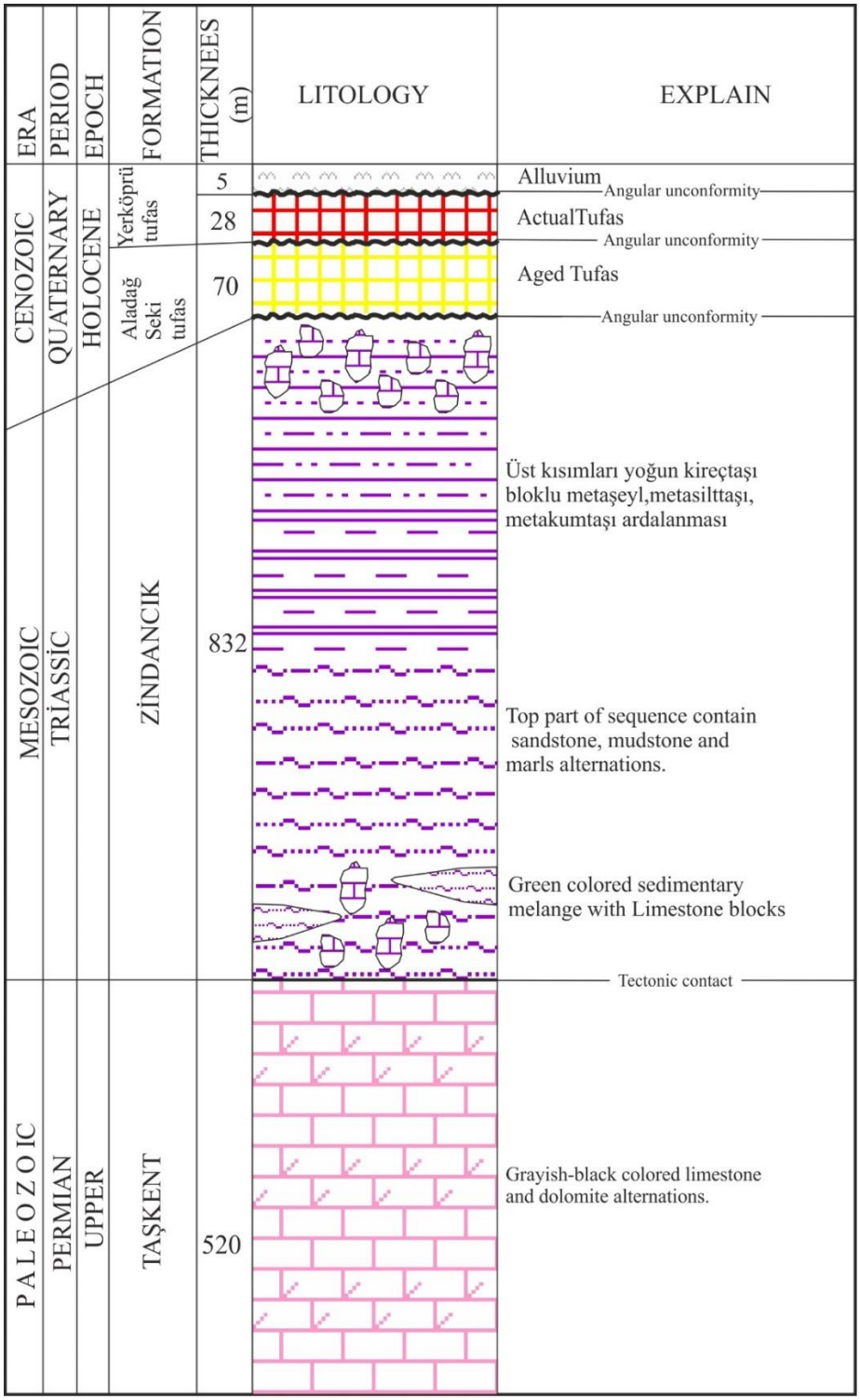

Figure 2. generalized column section of the study area (Mert and Delikan, 2014; unscaled)

Figure 3. Karasu spring water and carbon dioxide gas discharge outlet

Figure 4. After flowed a few hundred meters of Karasu spring water reaches to Waterfall

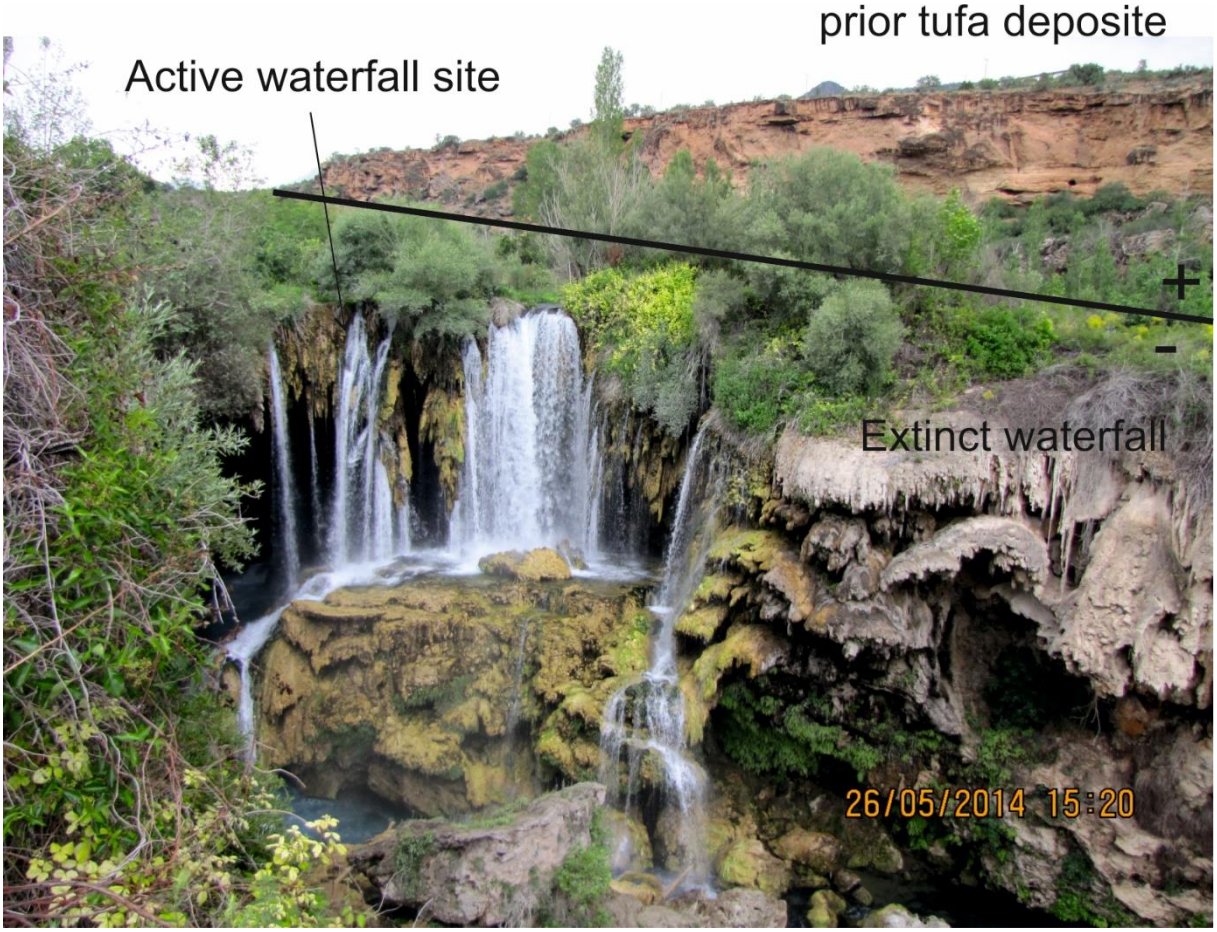

Figure 5 . Yerköprü waterfall and active tufa deposition

Table 1. The results of the chemical analysis of the Karasu spring water (spring and summer months)

	Sampling Seasons							
	Spring				**Summer**			
	Karsu spring	Waterfall top	Waterfall bottom	Waterfall downstream	Karsu spring	Waterfall top	Waterfall bottom	Waterfall downstream
Measurement Temperature °C	16,5	16,2	17,3	16,8	25,4	25,4	25,3	25,3
pH	6,98	7,38	7,67	7,79	7,15	7,46	7,19	7,45
Bicarbonate mg/lt	506,3	549	231,8	244	555,1	555,1	512,4	518,5
Calcium mg/lt	142,6	138,4	69	69,8	144	144	135	130
Total Alcalinite ($CaCO_3$) mg/lt	415	450	90	200	455	455	420	425

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