

## The World's First Volcanologists?

When did humans first create images of landscape and inanimate objects therein? This fundamental question may be intractable because Prehistoric rock paintings are scarce and interpreting an artist's mindset who lived hundreds of generations ago is exceedingly difficult. Nonetheless, it is plausible that awe-inspiring volcanic eruptions are likely candidates for such imagery. Among those few putative carvings or paintings of Prehistoric volcanic eruptions identified by archaeologists, there is the remarkable rock painting of Kanlitaş in the Kula UNESCO Geopark (Manisa Province, Turkey). Compared to other candidates, the Kanlitaş rock art is unique because of the presence of human footprints preserved in volcanic ash that have been discovered near a volcanic cone during the construction of Demirköprü dam in the 1960's. These ichnofossils, known as the Kula footprints, unequivocally demonstrate that humans eye-witnessed the formation of a volcanic cone named Çakallar.

However, exactly when this happened has long remained elusive. An international team of volcanologists, geographers and geochronologists have now reconstructed the minutiae of how and when the eruption unfolded. Research conducted by İnan Ulusoy and Erdal Şen from Hacettepe University, Mehmet Akif Sarıkaya from İstanbul Technical University, Axel K. Schmitt from Heidelberg University, Martin Danišik from Curtin University, and Erdal Gümüş from Manisa Celal Bayar University provided the first internally consistent ages for the footprints using two independent dating methods.

According to this research, the volcanic activity at Çakallar volcano started "wet", with a hydrovolcanic eruption triggered by ascending magma getting in contact with groundwater. This short-term violent eruption blanketed its surroundings with a few centimeters thick carpet of humid volcanic dust. Volcanic activity continued after the water was evaporated. This "dry" eruptive phase formed the nearly 100 m tall Çakallar scoria cone. Even later in the eruption, lava poured out of the crater and breached the loose scoria wall of the cone. Footprints in the wet volcanic ash show that in the short interval between the wet and dry eruption phase, humans along with dogs walked calmly towards the eruption center. Scoria, the product of the later eruption phase, buried and preserved the imprints. These traces reveal that humans observed the continuing low intensity eruption from a safe distance.

The Kanlitaş pictograph was painted on a rock shelter located in about 20 minutes walking distance from the fossil footprints. It may depict the erupting scoria cone and lava flow: there is a crater-like elliptical shape in the upper part of the pictograph which sits upon a conical structure. Red dots painted inside the crater-like shape resembles the multiple small vents inside the summit crater of modern Stromboli volcano in Italy. A line painted beneath the conical shape may represent lava flowing away from the volcano. The pictograph is also marked with three hand imprints without thumb and forefingers above the conical shape interpreted as the volcano.

Were these people the first "volcanologists", drawn to a natural spectacle, and did they depict this impression artistically? This remains speculation, but new radiometric age determinations firmly place the eruption into the Bronze Age,  $4.7 \pm 0.5$  thousand years before today. If the assumption that the Kanlitaş rock painting shows Çakallar volcano was correct, this would be the oldest portrayal of a volcanic eruption that has been eye-witnessed by humans, as demonstrated by the well-preserved human footprints in its ash. This research also underscores that the latest stage of Kula volcanism occurred in very recent Prehistoric times.

Full text is freely available at <https://authors.elsevier.com/a/1Yvb5-4PRq9rb> until 07.06.2019.

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