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The Volcanic Stratigraphy of Cappadocia, Central Anatolia

L. Viereck-Goette (1), P. Lepetit (1), G. Ganskow (1), A. Gurel (2)

(1) Institut für Geowissenschaften, Friedrich-Schiller-Universität Jena, Germany, (2) Institut für Geologie und Mineralogie, Nigde, Turkey (lothar.viereck-goette@uni-jena.de)

The landscape of Cappadocia, Central Anatolia, is characterized by scenic erosional structures in nine rhyolitic to dacitic ignimbrite compound cooling units, forming the Neogene Volcanic Plateau of Nevsehir, for which a late Miocene to lower Pliocene, mainly Turolian age is indicated by fossil vertebrates [1] as well as K/Ar ages of 11 to 3 Ma [2]. The ignimbrites are spread over some 1.000 km^2 and volumes of several 10 to some 100 km^3 are calculated for each. They were first mapped in the 1960s by Pasquarè [3] who also first described and named most of these volcaniclastic units as well as basaltic to dacitic lavas, epiclastic sediments and paleosols they are interlayered with. Extensive geophysical surveys resolved two large negative anomalies that were interpreted as source areas of the caldera-forming ultraplinian eruptions [4]. However, some interpretations are in conflict with stratigraphically deduced locations [5].

The stratigraphic column set up for the Nevsehir plateau is based on a number of selected exposed sections in erosional valleys in which the ignimbrites can be distinguished on base of their petrographic (phenocryst associations, clast morphology, type of xenoliths) and chemical characteristics [6]. However, the stratigraphic position of a few local ignimbrite units (e.g. Sofular Ignimbrite, Valibaba Ignimbrite) or their correlation with known units remained unresolved. Within recent field and laboratory studies we could prove mineralogically and geochemically that (a) the Valibaba Ignimbrite sensu [2] does not exist as separate unit, but is stratigraphically equivalent to the Kizilkaya Ignimbrite sensu [2]; we (b) also recognized the Sofular Ignimbrite to be misplaced by all previous investigators and wrongly correlated with the Gördeles Ignimbrite by [8]. The data indicate the Sofular Ignimbrite to be older than the Cemilköy Ignimbrite as well as lithologically and stratigraphically identical with the Sarimaden

Tepe Ignimbrite [9].

As an additional tool, the paleomagnetic characteristics of the ignimbrite units are used to control the stratigraphic succession proposed [10]. Based on the assumption of a quasi continuous rotation of the Central Anatolian Block during the Late Miocene, ages for undated ignimbrite units (e.g. Gördeles and Tahar) are calculated based on the correlation coefficients between declination and inclination with age derived from two reliable radiometric ages as calibration points (e.g. 4.3 Ma for Kizilkaya Ign. and 8.5 Ma for Sarimaden Ign.).

However, most of the stratigraphic time in the rock succession is represented by interlayered epiclastic sediments which were not addressed in any study except in [2]. These sediments include lacustrine diatomites, carbonates and marls as well as fluvial siliciclastics such as conglomerates, sands and minor clays. Additionally, we recognized a widespread gigantic mass flow that serves as marker horizon. Additionally, some ten contemporaneous paleosol successions developed on the lahars which represent allochthonous volcaniclastites, more rarely autochthonous tephra horizons show a pedogenic overprint [cf. 11].

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