Preliminary thermochronological data on the tectonic evolution of the Bulgarian Rhodope.

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The Rhodope Massif of southern Bulgaria–northern Greece is part of the Alpine–Himalayan orogenic system to the north of the Aegean Sea. Geographically it pertains to the southern margin of the European continent. It lies on the upper plate of the Aegean subduction zone. Geologically it is separated from the Moesian platform in the north by the Sredna Gora volcanic arc and the Balkan Mountains. To the southwest it is bounded by the Serbomacedonian Massif. The Aegean Sea, a Miocene to recent back-arc basin, forms the southern limit while to the east the Rhodope disappears below the Neogene sedimentary cover of the Thracian Basin (Ricou et al., 1998).

In the past, the Rhodope massif has been interpreted as a stable Precambrian to Variscan continental block surrounded by two branches of Alpine–Himalayan collisional system; the Balkan belt to the north and the Dinarides–Hellenides belt to the south (e.g. Kober, 1928). Remapping of the thrust contacts and associated kinematic structures revealed the existence of Alpine low-angle faults and synmetamorphic structures which brought about a re-interpretation of the Rhodope Massif (Burg et al., 1990). It is today regarded as a complex of Mesozoic synmetamorphic nappes stacked in an Alpine active margin environment.

The nappe stack with its large scale south-vergent thrusts was formed during the Cretaceous due to collision of the Drama continental fragment to the south (belonging to the African continent) with the Moesian continent to the north (Burg et al., 1996; Ricou et al., 1998).

Following this convergence, Oligocene–Miocene extension took place. Extensional movements are clearly indicated by low-angle detachment faults and syntectonic, asymmetric graben depressions filled with Paleogene (Eocene–Oligocene) continental sediments.

The major goal of this project is to unravel the low temperature thermal history of the Rhodope mountain region. Abundant data are now available regarding the tectonothermal events that have shaped the Rhodope at temperatures above ca. 300°C, i.e. to within 10-15km below the surface (Rohrmeier, 2005) but the thermal evolution below this temperature is virtually unknown. The chronometers we employ are fission-track analyses on both zircon and apatite minerals (ZFT and AFT) as well as the (U-Th)/He method on apatite (AHe). The resulting data sets yield cooling ages below 300°C to about 45°C.

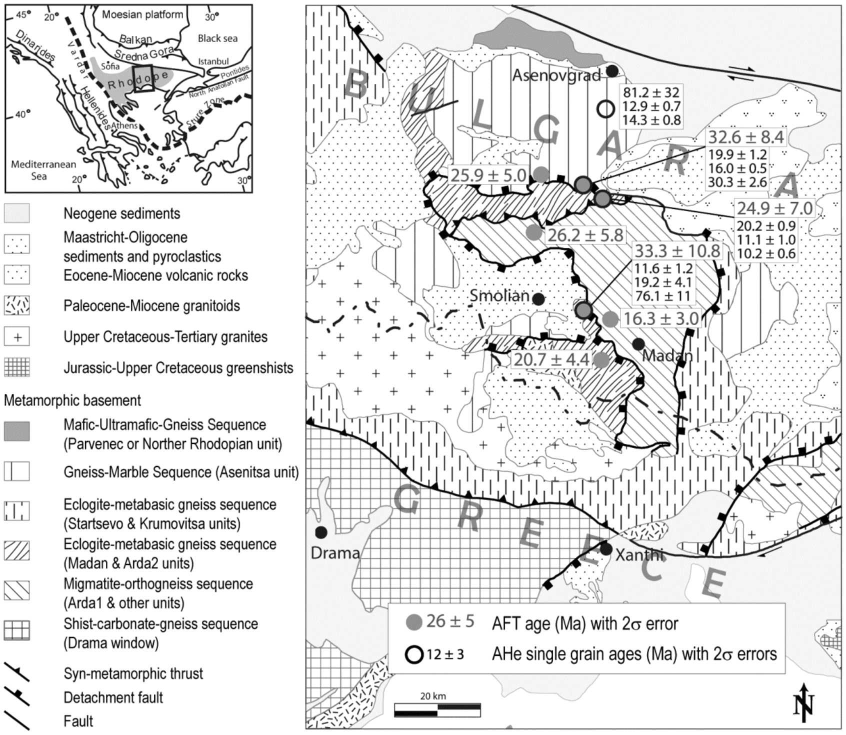

Fig. 1: Geological map of the Central Rhodope (after Kaiser Rohrmeier (2005) and others) with locations of analysed samples and results.

Six samples have been analysed for AFT so far. The apparent AFT ages range from 16.3 ± 3.0 to 33.3 ± 10.8 Ma (Fig. 1). The samples originate from different basement units of the Central Rhodope (Fig. 1). The AFT ages reveal that all units have been cooled to less than 110°C between 35 and 15 Ma. All ages are younger than 36 Ma which is in accordance with published Ar-Ar ages by Kaiser Rohrmeier (2005).

Up to now four samples have been analysed for AHe. Each sample has been dated by measuring He and U-Th on three single grains. The single crystal ages range from 81.2 ± 15.9 to 10.2 ± 0.3 Ma (Fig. 1). Some of these grain ages are clear outliers, as they are much older than the associated AFT age and/or much older than the other dated grains of a sample. The outliers might be a consequence of low U-Th concentrations in the grains and comparatively high U-Th blanks. With only four samples interpretations are not yet made.

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