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New U-Pb zircon ages of the Upper Cretaceous volcano-sedimentary deposits from the Haţeg Basin (Southern Carpathians) and temporal intrabasinal correlation

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Volcano-sedimentary deposits crop out in relatively small patches in the northwestern part of the Haţeg Basin (South Carpathians, Romania), around the villages of Densuş and Răchitova. They belong to the partly volcaniclastic continental beds deposited here during the Late Cretaceous, and are grouped into the Densuş-Ciula Formation. These units comprise primary volcanic and secondary epiclastic rocks of andesitic-dacitic composition.

Here we report new laser ablation ICP-MS U-Pb zircon ages of three volcaniclasts (from distinct outcrops) of andesito-dacitic composition from the Densuş area. There are no previous absolute age constraints on these rocks although earlier mapping assigned a Maastrichtian age. Our samples were collected from the Lower Member of the Densuş-Ciula Formation and belong to a debris flow deposit. The U-Pb analyses yielded crystallization ages of about 80–82 Ma for all three samples (80.44 ± 0.14, 80.22 ± 0.25, and 81.88 ± 0.17). Some (lower resolution) whole rock K-Ar and zircon fission track datings on volcaniclasts from the Răchitova outcrops yielded ages of 82.7 ± 1.5 Ma and 80 ± 9 Ma, respectively, and are consistent with our data. Our new ages also fall within the well documented range of the ~72–82 Ma subduction-related magmatism (Neo-Tethyan) in Banat and the Apuseni Mts. and sediments dispersed from it. Volcanic rocks sourcing these deposits were indubitably a part of this regionally significant magmatic arc.

The Densuş-Ciula Formation unconformably overlies the Răchitova Formation – grouping the youngest marine beds in this area, divided into Upper and Lower members. The Upper Member was formerly attributed to the upper Campanian due to two identified nannofossil events, the FO (first occurrence) of *Uniplanarius sissinghii* and *Uniplanarius trifidus*, both considered late Campanian events. More recently, the age of the Upper Member was biostratigraphically restricted to early late Campanian.

These ages conflict with our U-Pb zircon data, which suggest that subaerial volcanic activity was already taking place in this area by the middle Campanian. Either biostratigraphic ages are imprecise or the volcano-sedimentary deposition of the Densuş-Ciula Formation took place significantly later than the actual volcanism. More complicated scenarios, such as tectonic juxtaposition of older volcano-sedimentary rocks over younger marine deposits, are plausible but less likely. Further investigations of the ages and tectonic evolution of the uppermost Cretaceous in the Haţeg Basin are needed.

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