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Dating the gone Badenian stratotype (Middle Miocene, Paratethys, Vienna Basin, Austria)

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Calcium carbonate, organic carbon together with stable oxygen and carbon isotopes were investigated in a 9 m sampled section from the lost Badenian stratotype at Baden/Sooss (Lower Austria). Comparing courses of geochemical parameters between the stratotype and a nearby drilled 102 m scientific core resulted in continuation of the core section into the stratotype. Cross correlation between anisotropic magnetic susceptibility (AMS) combined with the negatively correlated calcium carbonate content of the drilled section on the one side and solar insolation at 65° northern latitude on the other resulted in an extremely significant correlation between -14.221 Ma and -13.982 Ma. This is younger than the before estimated time frame (-14.379 to -14.142 Ma) based on cross correlation between AMS and the orbital 100 kyr eccentricity and 41 kyr obliquity cycles. The direct continuation of the drilled section by the stratotype covering a time span of 17.7 kyr consequently dates the Badenian stratotype between -13.982 Ma and -13.964 Ma. Therefore, the upper limit of the stratotype, assigned to the Early Badenian, puts it close to the Langhian/Seravallian boundary at -13.82 Ma, demonstrating the need for revising the Badenian stratigraphic subdivision based on orbital cycles, especially the middle Badenian Wielician substage.