



Integrating age information from different localities for stratigraphic marker beds: discussion of the Eltville Tephra age (Western Europe)

Christian Zeeden, Joerg Zens, and Frank Lehmkuhl

Chair of Physical Geography and Geoecology, RWTH Aachen University, Aachen, Germany

Stratigraphic marker beds are often used in geosciences for regional and global correlation. For various reasons dating those layers directly proves to be difficult sometimes. In such cases ages from above and below such a horizon represent minimum- and maximum-ages. If these ages are determined from more than one location, it is possible to combine these ages, test their consistency and finally derive an age in agreement with the findings from most localities. Several approaches to integrate the age information from different localities are discussed, resulting in combined ages consistent with both stratigraphy and most of the dating results. All approach rely on assumptions, most importantly the correctness of ages and their reported uncertainty.

The Eltville Tephra originates from an unknown eruption in the Eifel volcanic field is an important marker bed in Rhine-Meuse Area nearby the boundary between the deposition of reworked and primary loess during the LGM (ca. 20 ka). The Eltville Tephra is usually imbedded in loess; dates from directly above and below come almost exclusively from luminescence dating. As different luminescence dating techniques were applied to samples over- and underlying the Eltville Tephra a systematic bias of the sum of these techniques seems unlikely, but may be present due to the fact that most ages are feldspar ages uncorrected for fading.

The results of several statistical approaches to deal with ages from various localities are compared, and their chances and shortcomings using well understood artificial data are discussed. These are also used to obtain an integrated datum for the Eltville Tephra including a reproducible uncertainty. This has the potential to improve on existing dates for various other stratigraphic marker beds especially in the terrestrial realm, where often dates for (or around) correlative sediments are obtained from various localities.