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Paleomagnetism of volcanics and sediments of the Saar-Nahe-Basin, southwest Germany - A contribution to earliest Permian paleogeography

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Reconstructing early Permian Pangea in a Wegenerian configuration using paleomagnetic data to constrain the paleolatitudes of continental margins facing each other results in a significant overlap between Laurasia and Gondwana. Alternative reconstructions (Pangea B) circumvent this problem but have not been widely accepted. Recently, it has been argued that the continental overlap is an artefact due to erroneous age assignments, poor quality of some of the pre-70s paleomagnetic data and/or unrecognized effects of inclination shallowing. Consequently, Domeier et al. (2012) in their recent compilation of global paleomagnetic data for the Paleozoic applied a blanket inclination shallowing correction factor of 0.6 to all data obtained from sediments and removed a substantial number of older paleomagnetic data from volcanic rocks from the data set arguing that these do not fulfill modern reliability criteria. Among these data are the paleomagnetic results for the so called Nahe and Saar-Nahe volcanics of southwest Germany, which have been studied in the late 50s to 70s of the last century yielding paleolatitudes for the region very close to the paleoequator. In order to check the quality of these results we studied 11 sites of rhyolites as well as basic volcanic rocks on the northern margin of the Saar-Nahe-Basin (SNB) and additional 35 sites consisting of reddish and brown sediments of various grain sizes (18 sites) and volcanic rocks (17 sites) on the southern edge of the SNB. All rocks sampled are well dated ranging from 288Ma to 297Ma in age. Great care has been taken to unequivocally determine the paleohorizontal of the volcanic rocks. All samples were subjected to detailed thermal demagnetization experiments. More than 70% of the samples studied yield interpretable results. After removal of a secondary overprint of variable dominance, directions of the Characteristic Remanent Magnetization could be determined reaching maximum unblocking temperatures of up to $680°$C (sediments) or $580°$C (volcanic rocks). Combining the results from both rock types yields a mean direction of $196°/-12.0°$ (declination/inclination) with α_{95} of $5°$ and a Fisherian *k* of 25.5 based on 36 site mean directions. Due to the rather small dip angles in the SNB, no fold test could be applied. However, *k* increases upon untilting, suggesting a primary character of the magnetization. The resulting paleo south pole position at $44.4°$S, $345.2°$E provides a new high quality contribution to the Apparent Polar Wander Path of Europe. In a paleogeographic context, our results are not compatible with a “Pangea A” reconstruction in the earliest Permian if the data for Gondwana is taken at face value.