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Climate Change and Landscape Development in Central Mexico Based on the Investigation of Paleosols.

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Central America has a special significance, since it is the terrestrial link between North and South America, providing a complete terrestrial record from the Arctic to near the Antarctic. Therefore a profile in the Transmexican Volcanic Belt (TMVB) was chosen to investigate climate change and the paleo-landscape. The semiarid area is built up of volcanic ashes, and deep gullies (barrancas) expose at least seven phases of stable land surface in which soil formation took place. Each paleosol complex is situated on a duripan (tepetate). The studied sequence is subdivided into three main units marked by their prevailing colour (Red Unit, Brown Unit, Grey Unit). The age of the paleosols can be determined as being between 1500 a BP due to the abundance of ceramics on top of the youngest soil in the Grey Unit and 900 ka BP due to K/Ar dating from the lowest paleosol. The end of the soil forming process of the Brown Unit has a 14C age of 42 ka BP. Compared with longer time ranges the three paleosol complexes were correlated with OIS stages. According to this, the oldest soil complex coincides with OIS 22 to OIS 12 shown by its oxidation features, caused by longer periods of warm climate. The Grey Unit shows only few sequioxides, which implies colder conditions and fits (according to the datings) into the period after the LGM. The Brown Unit is relatively correlated to OIS 12 to 6, which shows a moderate temperature. The poster presents results of field survey and mapping of paleo-surfaces in two barrancas. Furthermore, thin sections exemplify a characteristic vertical profile in detail. The horizontal profiles show the existence of paleo-barrancas in pre-hispanic time. Intensive

erosional processes in the paleo-barrancas cut through soil and tepetate equally. Afterwards they were refilled with sediment in a relatively short time, since no evidence of soil formation can be seen in the basal sediment which fills the paleo-barrancas. Altogether, there is evidence of at least five phases of erosion and sedimentation, partly recorded along the transitions of the Red Unit and Brown Unit. Layers with abundance of phytoliths and the results from the TOC agree to at least two former land surfaces, with grassland as the main vegetation cover, during which pedogenesis and sedimentation took place alternately. Predominantly the paleosols are duripans (tepetate) and luvisols. Micromorphology reveals clay coatings, which show alternating layers of different grain sizes (from clay to silt) and different colours as a result of Fe oxidation. Furthermore, sharp vertical boundaries between fresh and weathered soil are very common and clearly seen in thin sections. Hornblende (Amphiboles) was chosen as an indicator mineral for weathering - it was abundant in all horizons but showed very different degrees of weathering. Plagioclase minerals have etching properties, partly replaced by haematite. The results of the field survey and micromorphological investigation are able to demonstrate a rapid change in the water regime and significant changes of wet and dry periods throughout the studied sequence. In general, the horizons characterised by intense chemical weathering imply pedogenesis under tropic conditions while the horizons with unweathered volcanic glass indicate that soil formation was absent under cool conditions.