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Volcanic geology of the western Zacapu lacustrine basin (Michoacán, México) and its importance for archaeology

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The Zacapu lacustrine basin (1980 masl) is located in the central part of the Michoacán-Guanajuato Volcanic Field, which holds the largest concentration of monogenetic volcanoes in the Trans-Mexican Volcanic Belt. Volcanic structures in the western part of the basin are <2 Ma old and include thick lava flows, cinder cones, domes, and shields. Their composition is mainly calc-alkaline andesitic, but other rock-types (ranging from olivine basalts to rhyolites) do also occur. Here we focus on the malpaíses (=badlands in Spanish), a local term for young sparsely vegetated lava flows (mainly andesites), which are up to 100 m thick and have a rough blocky surface almost devoid of soil. Despite of their inhospitable appearance, several of these lava flows were densely inhabited in pre-Hispanic time (before AD 1521) as attested by numerous archaeological remains. This paradox has as of today not been solved satisfactorily, although several explanations have been proposed. In fact, the case of the Zacapu basin is not unique, since archaeological sites indicating large population centers on young lava flows at the margins of lakes do also occur elsewhere in the Trans-Mexican Volcanic Belt (e.g. Angamuco, Pátzcuaro basin and Cantona, Serdán-Oriental basin). In order to help solve this riddle, we provide a detailed geological map of the area and morphological and chemical analysis of the lava flows. Some of these lava flows are very young (<3,200 yr BP) and are either associated to a scoria cone or a buried vent underneath. Furthermore, we are trying to obtain radiometric dates of the eruptions, as well as estimates of the total erupted volumes and duration-times of lava flow emplacement. This data will help to provide a time frame for further discussing the pre-Hispanic demographic evolution of this area that culminated with the rise of the Tarascan empire (AD 1250-1521) in Michoacán.