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Pyroclastic flows and associated sediments, Tláloc-Telapón, piedmont fringe of the eastern basin of Mexico

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Tláloc and Telapón Volcanoes were always considered Tertiary in age (Mooser, 1975), although the dacitic lavas and pyroclastics that together form the Tláloc Formation were thought by Vázquez-Sánchez and Jaimes-Palomera (1989) to be probably between 0.6 to 0.7 Ma. The piedmont fringe below these two volcanoes has resulted from deposition of pyroclastic deposits, interbedded with lava flows, fluvial-lacustrine sediments and lahars but no dates are available. These sediments have been mapped as the Tarango Formation, with a tentative Pliocene age (Mooser, 1975).

However in a stratigraphic study of these deposits (Mooser et al., 1976), they were considered to be mainly of Pleistocene age. No part of the sequence has been dated before, except a pyroclastic flow from the Río Frio Pass, derived from Telapón, at > 35,000 and > 40,000 years BP (Cornwall, 1971).

Here we report new work on the stratigraphy, sedimentology, dating and origin of pyroclastic deposits from Tláloc. The stratigraphy is complex, with several generations of thick pyroclastic flows, block and ash flows, ash falls, lahars, organic paleosoils and fluvial-lacustrine sediments.

A radiocarbon date of 37,220 ± 890 BP in incorporated carbonised wood gives an age for the youngest pyroclastic flow at La Joya site. Farther up the valley, there are older pyroclastic flows with organic paleosoils between the flows, although these have not yet been dated. A second radiocarbon date from La Joya is from charcoal in a stratigraphically younger rhyolitic volcanic ash/fluvial-lacustrian sequence which is lateral to the main pyroclastic flow succession (34,380 ± 500 BP). The third new date comes from a high lake stand of Lake Texcoco, at approximately 2,240 m at San Vicente Chicholpan in a delta-near shore sequence. Here charcoal in lake sediments below a lahar has been dated at 34,000 ± 340 BP providing an approximate age for an associated mammoth found above the lahar, as the sequence must have been deposited fairly rapidly, for there are no breaks in deposition and the sequence was capped by the Great Basaltic Ash (GBA) around 30,000 BP.

The rhyolitic pyroclastic flows are found as sheets or wide channel fills, which fine upwards in individual units. They are dominated by pumice up to cobble-gravel in size, in a fine sand matrix. The incorporated lithics are dominated by porphyritic andesites. The clasts concentrations are variable within the flows which have a characteristic fabric and many gas escape structures. Overall there appears to be a marked long continued middle to upper Pleistocene sequence of Plinian eruptive phases from the Tláloc-Telapón in association with rhyolitic domes, with intervening periods of environmental stability, although all these phases are much younger than previously considered. The eruptions created pyroclastic flows, ash falls and post-eruptive lahars.