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First Geologic map of a key paleoelevation site in the northern Andes

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Study of the rise of the northern Andes has been generally hampered by the complete absense of suitable rock record. In the Eastern cordillera of Colombia, where most effort has been placed in the northern Andes, this gap encompasses the Oligocene to perhaps the latest Miocene times, suggesting a period of exhumation and erosion. No lower or middle Miocene strata have been reported in the Eastern cordillera. A classic locality studied by the Dutch group several decades ago in the Tequendama region of Colombia (Tilata Formation) contains the fossil record of latest Miocene-Pliocene (?) low-elevation (less than 500m) floras. These fossils are now found at ∼2500m a.s.l. leading to the inference that late Miocene-Pliocene was a time of surface uplift. New geologic mapping of this region reveals that this classic locality formed as a flat-lying fluvial/lake deposit that infilled an older, ocassionally steep, and already tectonically inactive landscape. This deposit consists of muddy and sandy strata with pebble conglomerates in the central and distal parts of the deposit, and very large boulders and breccias near the edges of the deposit that interfinger with finer-grained deposits. Despite intense paleontological surveying, only fossil floras (pollen, seeds and leafs), and diatoms (suggesting lake sedimentation) have been recovered, but no vertebrates. Ash beds, often 2m-thick have been reworked and give the this ∼35-40m thick deposit a characteristically white color. The age of these ash beds is unknown, but may record vulcanism in the nearby Central cordillera volcanoes (less than 2 Ma old), and also the more distant (∼300 km) volcanoes of the Paipa region (less than 7 to 8 Ma). If indeed deposited at low elevation, correlation would necessarily bring these deposits next to very coarse-grained vulcanoclastic deposits of the Mesa Formation in the lowland Magdalena valley to the west. Both the Mesa and Tilata formations are undeformed, and deeply incised. Dissection of the Tequendama deposit took place as the waterfalls of Bogota river (∼130m high) receded and cut through a thick and resistant Cretaceous and Paleocene quartz-arenite sequence. Once the resistant rock was cut, the unconsolidated deposit easily eroded and now is found as hanging terraces on both sides of the Bogota river. Although an argument can be made to rise the Tequendama deposit from 500 to 2500m elevation without structural deformation, its current geomorphologic setting suggests deposition and dissection ocurred at its current elevation.