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Investigation on the Manengouba Volcano's geomorphosites (Cameroon): case of holo-magmatic and hydro-holomagmatic cones

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The Manengouba Volcano (MV) is one of the voluminous apparatus that composes the Cameroon Volcanic Line. It is located between Mounts Cameroon and Bambouto. It has been built between 1.55 Ma to Recent years through relevant progressive tectonic and volcanic phenomena. These events characterize the first sequence volcanism of the MV's history. They were responsible of the building up of two fitted caldera volcanoes (Elengoum and Eboga) that compose MV. The second sequence volcanism occurred following the collapse of the Eboga caldera. It was animated by several explosive and fissural eruptions that established along the MV numerous adventive landforms. A study of the latter is of paramount importance in understanding of deposits that constitute the geomorphosites and the evolution of the geomorphology of MV. It appears from the field and laboratory investigations that the MV includes around 70 holomagmatic and hydro-holomagmatic cones. Holomagmatic cones have basal diameters between 400 and 1000 m, heights less than 100 m relative to the surrounding terrain, and external slopes greater than 50°. The majority of these cones have three main directions namely N20-N40, N60-N70 and N120-N130. These cones are composed of pyroclastic projections, in particular lapilli, bombs, blocks and scoria. These projections are of various sizes and form more or less thick layers, defining a more or less clear stratification from the base to the top, with or without granoclassing. These pyroclastites are often associated with cone bottom flows that are either compact and prismatic in structure, or compact at the base and overlain by 30-60 cm layers of scoriaceous lava. Pyroclastites are the last lava flows and are at the origin of the partial or total breaking of several cones in the MV. The hydro-holomagmatic cones are the result of phreatomagmatic explosion processes and include the Manengouba Twin Lakes (Male and Female) and a Bassin (Djeu-Seh). Their heights vary from 10 to 30 m above the surrounding terrain. The external slopes are weak (10 to 15°) contrary to the internal slopes which are abrupt (more than 60°). These cones are of major orientation SW-NE and are also composed of pyroclastic projections but with fine and coarse ashes. These cones make MV one of the most complex volcanoes of the LVC. The high number of these cones reflects the high degree of fracturing of this volcano. The stratification of different deposits provides information on the rhythm of explosions that governed the history of each cone. These cones are geomorphosites whose scientific value makes them a natural laboratory for geoeducation and research.