Eruptive history of the barombi mbo maar, southwest cameroon, central Africa: constraints from tephrostratigraphic analysis of phreatomagmatic deposits

Boris Chako Tchamabe[1], Takeshi Ohba[1], Issa Issa[1], Dieudonne Youmen[2], Sebastien Owona[2], Festus Tongwa Aka[3], Gregory Tanyileke[3], Joseph Victor Hell[3]

[1]Tokai University, Japan, [2]University of Douala, Cameroon, [3]IRGM, Cameroon

E-mail: boris.chako@yahoo.fr

The Barombi Mbo Maar (BMM), the largest maar in Cameroon, is located on the Cameroon Volcanic Line (CVL), 200Km SW of the Nyos Maar and 60Km NE of Mt Cameroon. It is surrounded by about 126m thick of pyroclastic materials on its eastern flank. For the first time, we have examined this thick pile of materials in detail. Three exposed tephra sections of the inner crater of the maar were inspected in order to reconstruct its eruptive evolution. Field studies regarding grain size, fabric, structures, clast morphology and abundance as well as transition style between different layers permitted to describe the layout of the deposits, discuss the depositional mechanism, the welding processes, and the main eruptive styles. Stratigraphically, three main depositional units subdivided into layers that we grouped into two cooling units are observed. From the bottom upwards, a thick unconsolidated to poorly consolidated series of thin lenticular and well stratified lapilli- and ash-beds is covered by a dry pyroclastic surge, loosely packed and very crumbly. This forms the most accessible part of the lower unit (U1). U1 is overlain by an explosive breccia and two dense and consolidated layers of lapillituff and lapillistone that constitute the second unit (U2). A thin (10cm) bed of paleosoil separates the first cooling unit (U1 + U2) from the second corresponding to the upper unit (U3). U3 consists of a complex and massive fallout deposits with 03 sub-units containing many explosive breccia layers full of basement rocks and mantle xenoliths. The sequence of eruptive activity corresponding to the stratigraphy of the deposits would be represented by: (1) phreatic and phreatomagmatic fragmentation that favoured the quarrying of the vent zone. This first volcanic episode would have been very explosive as suggested by the small sizes (2 to 10mm) of the clasts contained in U1 and the significant quantity (about 60 percent) of country rock fragments found in U2. Activities developed mostly in dry conditions as shown by the porous character of materials, and the absence of water evidence proof during transport as accretionary lapilli. At the end of this eruptive episode, a wet phreatomagmatic phase developed characterized by the welded and hardly consolidated upper part of U2, though temperature would have also played a significant role. (2) A series of hydromagmatic eruptions occurred to form U3 after a relatively long reposed period characterized by the presence of the paleosoil.