

Understanding the evolution of maar craters

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Two innominate lakes located 12 km SEE of Laguna Potrok Aike at ~51° 59' 51"S; 70° 09' 18"W fill maar related tuff-ring interiors. The more western maar has an ellipsoidal shape, a size of 1.300 m × 700 m and the water level is 70 m below the surrounding topography. The eastern lake, of sub-circular shape is 650 m in diameter and its water level is 40 m below the average surface.

The interior tuff-ring cliffs show ca. 60 m thick succession of tephra bedded in 0,3 m thick beds inferred to have been deposited from high energy pyroclastic density currents. The beds contain predominately olivine crystals, ultramafic xenoliths, basanoid rock fragments, blocky non- to moderately vesicular volcanic glass shards and accretionary lapilli. Plastering of fine grained tephra over larger clasts is prominent. Accidental lithic clasts from deeper seated volcanic sequences as well as lacustrine sediments possible from maar lake(s) have also been recognized. The textural characteristics of the tephra beds and its fragments such as the shape, size, and distribution pattern of different fragments suggest inhomogeneous magma/water interaction events during the eruption.

We propose the detailed volcanological, sedimentary and paleomagnetic study of the pyroclastic succession of the tephra rings. Results should contribute to understand the evolution of maar craters, tephra deposition mechanisms, feeding systems and the palaeosecular variation of the Earth's magnetic field for the last several glacial to interglacial cycles. A potential drilling through the maar lacustrine beds of the maar lake would give a good base for correlation of events occurred after formation of these craters. Moreover, the detailed study at Potrok Aike and the two mentioned maars are closely spaced and presumably of similar age. These volcanic craters would give a good chance to identify distal pyroclastic fall events. Such tephra beds are likely to have been accumulated in these craters. Moreover, succeeding to drill a core reaching the diatreme below the lacustrine maar succession would give raw data to understand the eruptive history of maar volcanoes developed in a "soft sediment" filled basin. The evolution and the development of a maar in such a setting is not understood yet. Studies over this subject only have been done on old, commonly eroded maar volcanic structures. The proposed research site would be among the very few sites in the world, where during an interdisciplinary approach the evolution of such volcanoes could be well understood. Eventual correlations with the Laguna Potrok Aike sediment record will reinforce regional interpretations.