Interplay of Volcanism and Submarine Environment at the Beginning of the Volcanic Activity in Gutai Mts., Romanian Eastern Carpathians

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Gutai Mts. have been formed at the jonction of two microplates involved in the complex subduction processes which generated the inner Carpathians volcanic arc.

In Middle Miocene, this area was part of the Pannonian Basin containing small islands of Paleogene flysch deposits. A calc-alkaline rhyolitic volcanism had started 15.4 Ma ago, emplacing subaerial caldera related ignimbrites in the south-western part of the mountains. Ongoing explosive volcanism related to one or two unknown sources had developed in connection with two subsiding areas which accumulated volcaniclastics of pyroclastic origin.

The first explosive event had been responsible for a pyroclastic mass emplaced inside sea water flooded caldera, by different mechanisms: water-settling from suspension and submarine gravity flows are suggested using facies analysis. A thick sequence of volcaniclastics of pyroclastic origin, encapsulated by claystones, suggests the deep water, below wave base submarine environment, maintained by caldera subsidence.

The second explosive event developed much later in the eastern part of the ignimbrite outflow, coincident with another subsiding block flooded by sea water. Sediment gravity flows of pyroclastic origin are the only suggested transport mechanisms. Resulted volcaniclastics are interlayered within claystones. The deep water style of sedimentation was maintained by subsidence as in the western part.

Well-sorted, massive pumice lapillistones suggesting fallout deposits (Allen and McPhie, 2000) appear locally, in the western part. Besides them, the whole range of mass flow volcaniclastics has been identified. Tuffaceous conglomerates containing alluvial debris and grading into pumice rich layers are emplaced from the dense underflow of original subaerial pyroclastic flows surpassing the shoreline (Cas and Wright, 1991) and travelling as debris flows and hyperconcentrated flows. Thinning and fining upwards sequences of doubly graded pumice and ash units are deposited from distal dilute flows (Yamada, 1984), after the separation of the underflow. Emplacement processes suggest progressive aggradation or "en masse freezing". Slides and slumps are also obvious.

Resedimented mass flow volcaniclastics (McPhie et al, 1993) resulted from progressive dilution and fluidization through water ingestion of pyroclastic flows triggered by eruptive momentum or by subsequent slump on the subaqueous slope after the cease of eruption. The flow separation (Fisher, 1983) developed strongly by water entrainment into the flow head, decceleration of the flow front and the proceeding ahead of the underflow (Kano, 1996). The subaqueous/ subaerial evolution of the explosive volcanism is difficult to assess. Both subaerial pyroclastic flows and submarine pyroclastic flows related to subaqueous explosions are suggested (Fiske and Matsuda, 1964 in Yamada, 1984). The impact of the submarine environment on both the pyroclastic flows triggered by the eruptive momentum and the pyroclastic mass emplaced by the cease of the eruption consists in the syn-eruptive resedimentation and the emplacement in deep water, below wave base environment.

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