Volcaniclastic rocks in the geological record of the Oaş and Gutâi Mts., Eastern Carpathian: fragmental and reworking processes

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Oaş and Gutâi Mts. are part of the inner volcanic arc of the Eastern Carpathians built up during complex Miocene subduction processes. The suite of different extrusive and intrusive deposits attributed to the felsic, extensional-type volcanism and the intermediate, arc-type volcanism, respectively, comprises abundant volcaniclastic deposits often in connection with coeval sedimentary deposits. Fragmental processes, both explosive and non-explosive, provided the volcanic debris consolidated partially as primary volcaniclastics such as pyroclastic, hyaloclastic and talus breccia deposits.

The pyroclastic deposits identified in Oaş and Gutâi Mts. belong to both felsic and intermediate magmatic suites. The rhyolitic ignimbrites from Gutâi Mts are the exponents of the felsic, caldera-related volcanism. Andesitic block and ash flow deposits occur in Gutâi Mts. and dacitic pyroclastic surge deposits in Oaş Mts. All of them accounting for both magmatic and phreatomagmatic explosions are related to the collapse of growing volcanic structures. The hyaloclastic deposits developed extensively in both Oaş and Gutâi Mts., by the quench fragmentation undergone by andesitic and dacitic lavas emplaced under water. The talus breccias formed on the steep slopes of the volcanic forms in Gutâi Mts., involving the unstable part of the lava pile prone to gravitational collapse.

Most of these primary volcaniclastic deposits are spatially connected with secondary volcaniclastic deposits involving the same loose volcanic debris emplaced by subsequent reworking. Commonly they are interbedded with sedimentary deposits. The felsic volcanism from Gutâi Mts. provided abundant rhyolitic, ignimbrite-related pyroclastics which underwent repeated reworking mostly by mass flow processes, slides/slumps before emplacing in submarine, deep water setting. A similar succession was identified in drill cores in Oaş Mts., but lacking the primary pyroclastics.

The hyaloclastic deposits are usually passing to resedimented hyaloclastites and frequently they suggest reworking altogether with the pyroclastics provided by phreatomagmatic rootless explosions, mostly by mass movements. Thick debris flow deposits and slides or slumps involving the volcanic debris are very common in the geological record of Oaş and Gutâi Mts. The identification and proper classification of these deposits play a major role in understanding the evolution of the volcanic phases, usually followed by subsequent, sometimes dramatic reworking processes. These processes developed in a syn-eruptive stage seem to contribute much more to the actual volcanic morphology of Oaş and Gutâi Mts than the long lasting post-volcanic erosion.

Fragmental processes, whether explosive or non-explosive, followed by reworking episodes contributed essentially to the build up of the Oaş and Gutâi Mts. They were triggered and controlled by the active tectonics and subsidence as well as by the submarine setting, predominant throughout the volcanic area and the time span of the volcanism.

Besides the geotectonic setting controlling the evolution of the volcanism and the style of eruption, the submarine setting had a major input in some of the fragmental processes and in the emplacement of the volcaniclastic deposits. Considering the processes controlled by the submarine, mostly deep water setting, may be useful when reconstructing the volcanic forms of the Oaş and Gutâi Mts. which is a real challenge as far as most of the volcanic morphology was substantially altered by syn-eruptive subsequent processes followed by post-volcanic erosion.