

ERUPTION SEQUENCES AND MAGMA CHAMBER ZONATION OF THE DEJ TUFF COMPLEX (TRANSYLVANIAN BASIN, ROMANIA) AS INFERRED FROM MINERAL CHEMISTRY

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The rhyolitic Lower Badenian Dej Tuff Complex (DTC), consisting of volcanoclastic sand, sandstone or conglomerate, medium to fine-grained zeolitized tuffs, thin alternating layers of tuffs, tuffites and tuffaceous marls, records the inception of Neogene volcanic activity in Romania. A ca. 35m thick sequence of the DTC at Cepari (Transylvanian Basin) records a sequence of 4 principal pulses of tephra deposition via rare debris flows and frequent low-density turbidity currents. Compositions of plagioclase, biotite, Fe-Ti oxides, amphibole, pyroxene and allanite have been determined by quantitative microprobe analyses. Two significant compositional breaks have been pointed out across the succession, which separate three compositional sequences displaying systematic variations of mineral compositions and formation temperatures: decreasing An content of plagioclase, increasing TiO₂ and decreasing MgO and FeO/MnO ratio in ilmenite, decreasing formation temperatures of the Fe-Ti oxide pairs. These variations show that volcanoclasts supplied to the DTC shift to more basic compositions and higher formation temperatures at each compositional break, then gradually resume to progressively more acidic compositions and lower formation temperatures upward within each of the three compositional sequences. The most likely explanation of the presence of compositional sequences is that they record different eruptive events. The systematic internal suggests that during each eruption a compositionally and thermally zoned magma chamber has been tapped. Since the DTC is a re-deposited tuff sequence, the compositional zoning of the three sequences mimics the original order of compositional zones within the magma chamber.