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Study of pyroclastic lithofacies and related eruption type in the Aran area (central Iran zone)

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The study area is located in 40 Km west of Kashan and belongs to Orumieh - Dokhtar volcanic belt that is a part of Central Iran tectonic zone. The Eocene volcanism in Aran area is related to middle alpine orogenic event. Eocene rock units consist mainly of lavas and a variation of tuffs & tuffites & other volcaniclastic rocks (equivalent to Karaj Fm. in Central Alborz). Tuffs have a dominant importance in this area. Field and microscopy petrography shows that tuffs are acid - median and in some parts of area graded to basic in Composition.
In a SW - NE trend, the basin has been changed from shallow marine to terrestrial environment. Vertical changes in lithofacies are a reaction of different conditions in paleogeography which can be a proof for volcanic uplift. Also, in these environments, changes in pyroclastic facies which related to type of eruption (submarine and subaerial) reflected in flow, fallout and surge eruptional mechanisms. Some of main volcanic and especially pyroclastic lithofacies evidences of the subaqueous eruption in this area are: locally horizon of andesitic pillow lava, fluidal shape andesitic-basaltic lavas in lower horizons lava breccia layer, several layers of andesitic-basaltic hyaloclastic tuff & lapilli-tuff breccia, rhyolitic-dacitic subaqueous dense pyroclastic flows, different sizes of accretionary lapilli, vesiculated tuff & tuff layers with cross st. due to surge mechanism. With respect to these pyroclastic facies plus notable and thick mass flow layers, also slumping and current soft sediment deformation st. in upper parts of shallow water sequences may be related to subaqueous to subaerial eruption in a hydroclastic volcano structure.
The evidences for subaerial (terrestrial) volcanism in continental parts are including: cross lamination in pyroclastic surge tuffs in base of a ignimbrite sequence, welding of pumice shards with fiamme st. and spherical (snow flake) texture from devitrification of fluidal vitric shards in ground mass and degassing micropipes in this ignimbrite unit, vesicular tuff as a result of surge mechanism and block and ash flow tuffs in red-violet thick brecciated lava layers.
On the basis of existence cuspate and lapilli pumice shards contents with slightly vesicular blocky glass shards that contain in some cases curved fractures and jig-saw margins; it is purposed that magmatic fluids exsolution may be accompany magma prior to interactions between water and magma in phreatomagmatic explosions.
Species of hydrothermal (chloritic, epidotic, calcitic, sericitic, argillitic and hematitic) alteration and Qz-Fld devitrification processes that related to volcanism caused to mineralogical, chemical and textural changes in volcanic rocks.