SUBAQUEOUS VOLCANICLASTIC SUCCESSIONS IN THE MIDDLE TRIASSIC OF WESTERN HUNGARY

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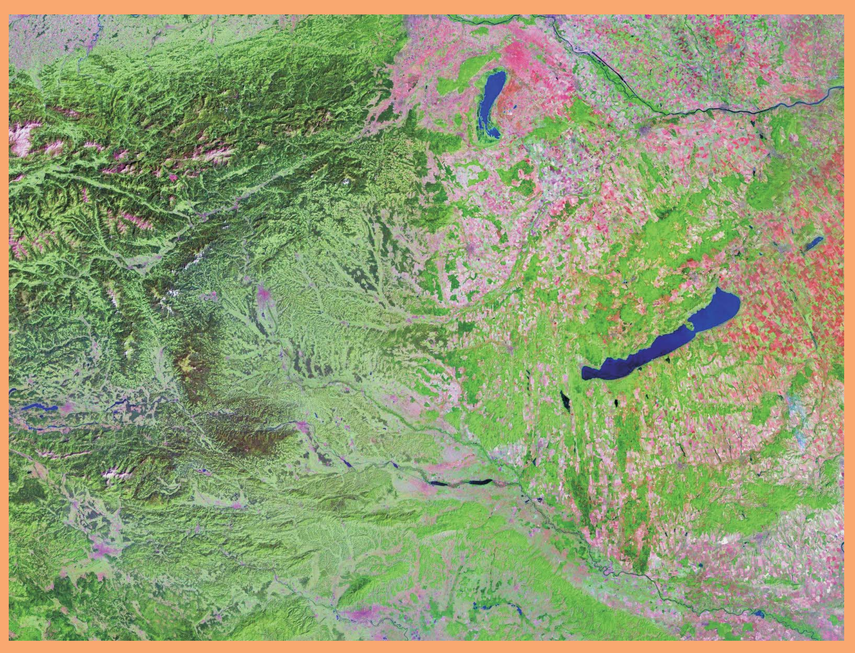


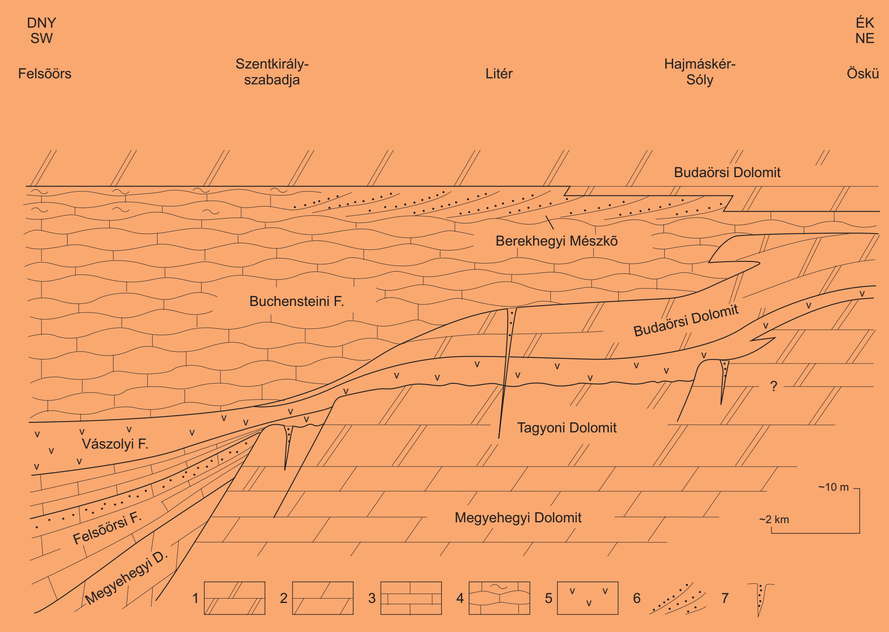
Abstract

In western Hungary Middle Triassic sedimentation was steady from the Permian/Triassic till the end of the Early Anisian that was followed by carbonate platform disruption. Alkaline acidic volcanism started due to Late Anisian tectonism. The Middle Anisian Lofer cyclic platform carbonates are sharply overlain by reddish, grey or greenish crinoidal volcaniclastic limestone with ammonites. This sequence is overlain by a few m thick altered calcareous tuff ("pietra verde"). These beds are montmorillonitised, bentonitic, with green, yellowish, red matrix hosting vitro-, litoclasts, and micro-holocrystalline crystals. The K-rich trachyte became rhyolitic upwards with increasing calc-alkalinity. These beds are thicker in the Anisian basins (18 m) than above the platforms (5-8 m).

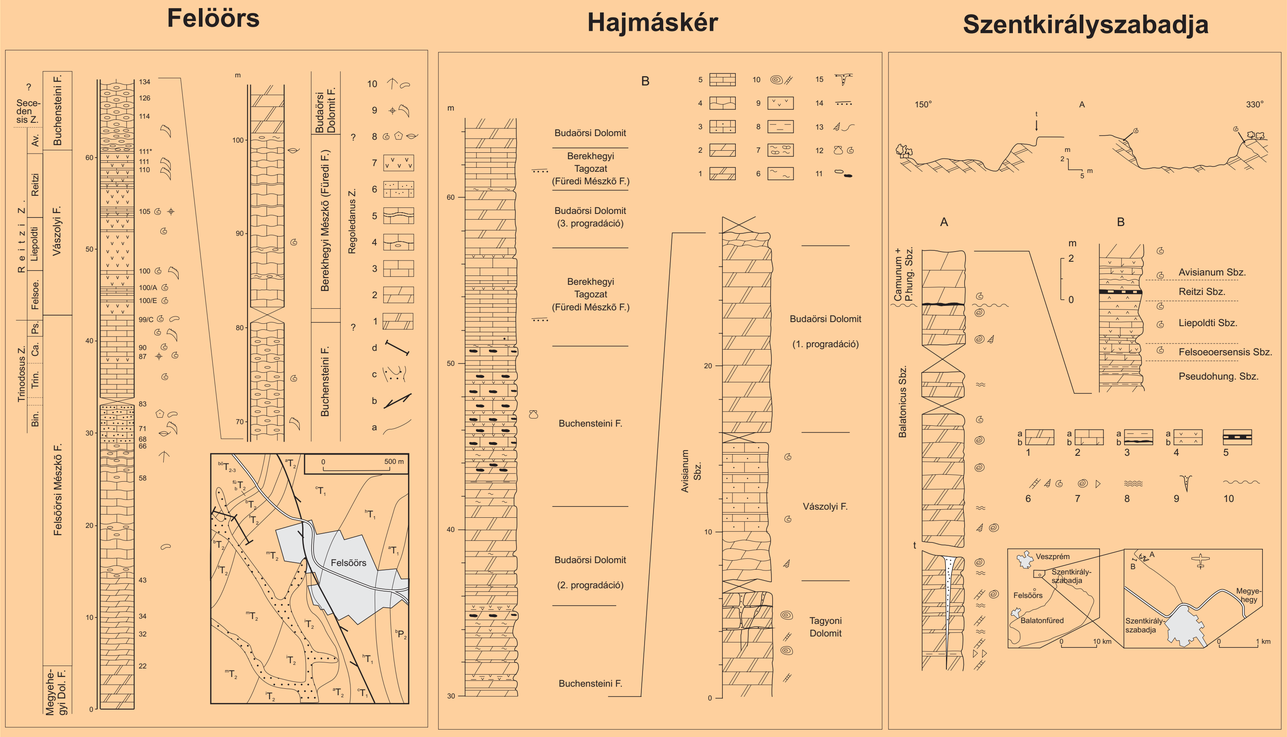
The Upper Ladinian sequence consists of silicified thickly bedded, red, grey, limestone with tuff layers, and with alternations of tuff, marl and thinly bedded limestone ("posidonia beds"). This sequence (as Buchenstein Formation) deposited in a pelagic basin, where carbonate deposition was ended by volcanism. The deposition of this sequence (30 m) occurred during the Longobardian substage in condensed sedimentation. In contrast in the Southern Alps the much thicker Upper Ladinian is represented by a volcaniclastic sandstone-silty-marl.

In western Hungary the Upper Anisian to Lower Ladinian volcanics are thick while they are of subordinate in the Upper Ladinian. Similarity does not exist in the thickness of the sequences between volcaniclastic rocks of the Lower Ladinian of western Hungary (tens of m) and the Livinallongo Formation (Dolomites, Italy) (180-200 m). The wide distribution of Lower Ladinian pyroclastics related to the higher explosivity of the magma and/or subaqueous reworking/redeposition.

The volcanism became basic and effusive during the Late Ladinian in the Southern Alps. In Hungary this sequence consists of volcaniclastic sandstones („wengen group", Southern Alps). With decrease of silica content of the magma, its viscosity and explosivity decreased resulting limited dispersal of the deposits.



Middle Triassic Stratigraphy in Western Hungary

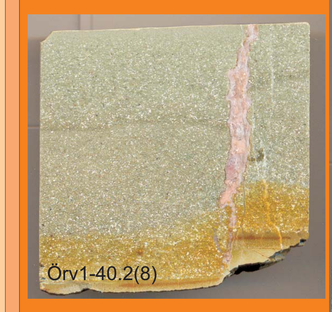


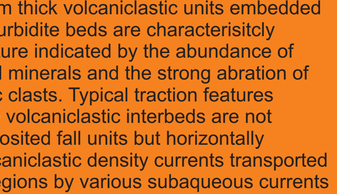
Middle Triassic Volcaniclastic Successions in Western Hungary

Middle Triassic volcaniclastic rocks from western Hungary are generally thin (dm-scale) units of inverse-to-normal graded tuff and lapilli tuff. The beds are altered by strong epidotisation and their colour reaches dark green with alternating pinkish fine tuff units. The volcaniclastic beds are intercalated with carbonate mudstone units and sandwiched between turbidite and debrite beds of carbonate rich clastic units. The volcaniclasts areinferred to have been transported by turbulent volcaniclastic gravity currents. The microtexture of the volcaniclastic rocks are generally well-packed with angular to subrounded glassy volcanic fragments.

Strong epidote alteration of juvenile volcanic material replace the original texture of the rock completelz in those locations where the volcaniclastic rocks reaches a total of few dm thickness.

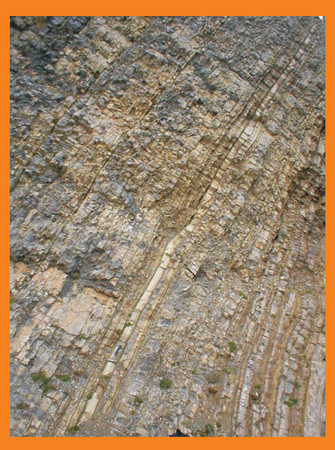
Themicrotexture of the volcaniclastic rocks show a gradual transition from a primary pyroclastic to a reworked volcaniclastic character. Rocks that have well-packed and glassy fragment rich texture inferred to have more prymary affinity.



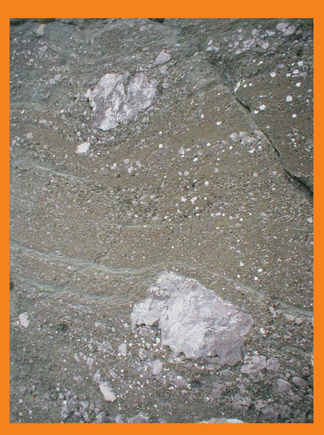


A few cm to a dm thick volcaniclastic units embedded in pelagic limy turbidite beds are characterisitcly reworked in texture indicated by the abundance of altered coloured minerals and the strong abration of the glassy mafic clasts. Typical traction features indicate that the volcaniclastic interbeds are not suspension deposited fall units but horizontally transported volcaniclastic density currents transported to the pelagic regions by various subaqueous currents and/or the mechanical energy dispersed by the eruption nearby.

Facies Relationship to Southern Alps / Latemar



Typical phreatomagmatic succession with alternation of tuff and lapilli tuff rich in angular carbonatic accidental lithic fragments, impact sags, antidunes, scour fillings and traction depositional features indicate that shallow subaqueous (Surtseyan) to sunaerial (maar/diatreme) volcanism may have been responsible for the generation of these units in the Southern Alps.

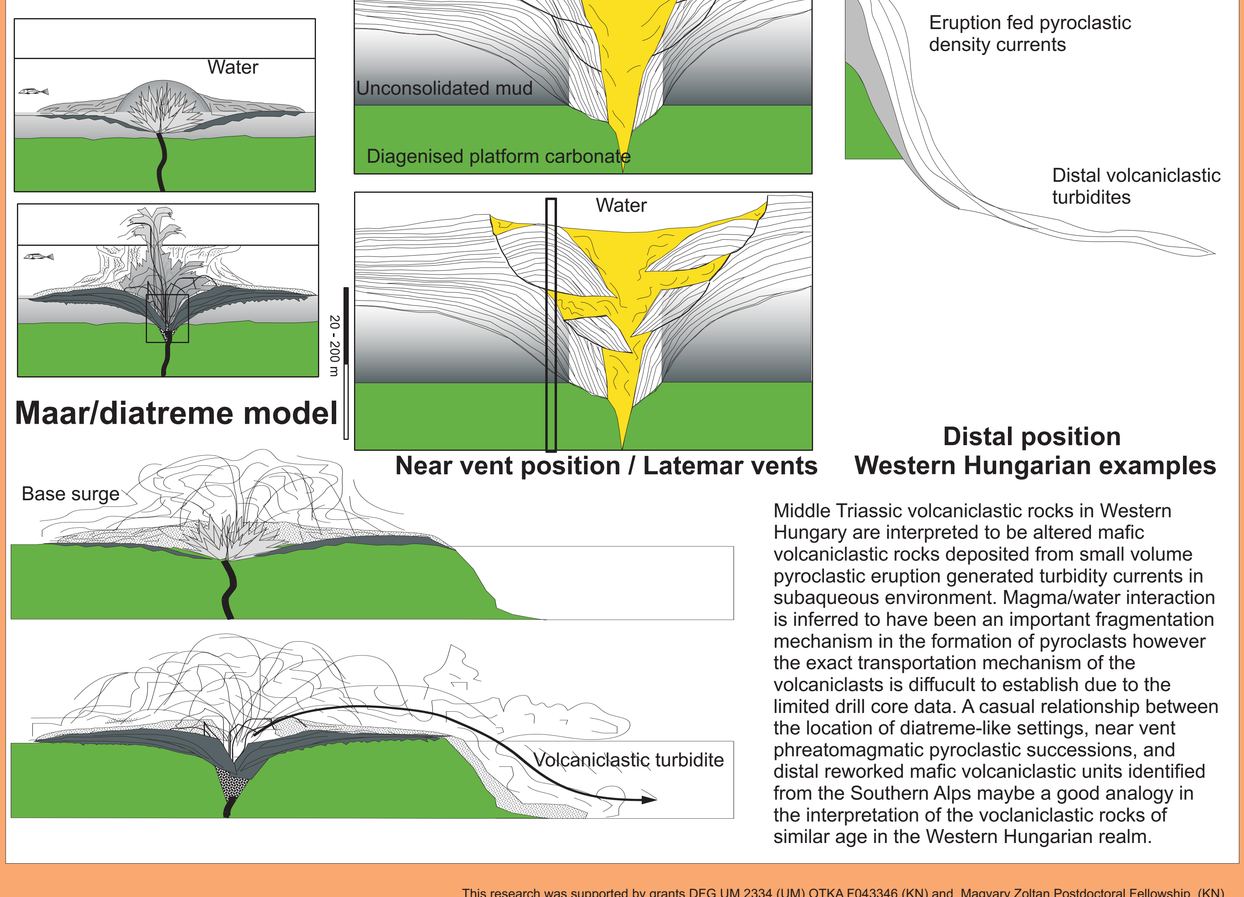


A classic volcaniclastic bed called Tc interbedded in a pelagic carbonate mud rich siliciclastic turbidite unit (XXXXX). The volocaniclastic units bears textural characterisitics indicating that it has been deposited in a similar way from physical point of view to those beds that are under- and overlain it. This bed documents a phase when more volcanic detritus got introduced to the pelagic depositional system due to adistal volcanic eruption.

Inverse-to-normal graded volcaniclastic beds represent the classic pietre verde in the Southern Alps.

In the centre of the Latemar (Southern Alps, Italy) 4 massive volcaniclastic breccia zones, with fluidisation channels, collapsed wall rock blocks, entrapped fine tuff units and semicircular geometry have been identified recently and interpreted to be diatremes of phreatomagmatic voclanoes. The link between the dital "pietre verde" and such diatreme pipes is not established yet, however a casual link is seemengly obvious.

Eruptive Mechanism



Distal position Western Hungarian examples

Middle Triassic volcaniclastic rocks in Western Hungary are interpreted to be altered mafic volcaniclastic rocks deposited from small volume pyroclastic eruption generated turbidity currents in subaqueous environment. Magma/water interaction is inferred to have been an important fragmentation mechanism in the formation of pyroclasts however the exact transportation mechanism of the volcaniclasts is diffucult to establish due to the limited drill core data. A casual relationship between the location of diatreme-like settings, near vent phreatomagmatic pyroclastic successions, and distal reworked mafic volcaniclastic units identified from the Southern Alps maybe a good analogy in the interpretation of the voclaniclastic rocks of similar age in the Western Hungarian realm.

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