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Volcanic control on a marine sedimentary system proximal to a volcanic island: a case history from the Miocene Pannonian Basin (Mátra Volcanic Field – Northern Hungary)

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During the Mid-Miocene the northern part of the Pannonian basin was characterized by shallow- to deep-marine environments surrounding subaerial volcanoes. In the early stage of their activity (from about 18 Ma to 15-16 Ma), explosive eruptions of silicic magmas emplaced thick ignimbrite units party on land and partly underwater. After this first stage, magmatic activity became andesitic, giving raise to composite volcanoes as isolated islands (e.g., Visegrád Mts., Börzsöny, Cserhát and Mátra), like in the present Aeolian or Caribbean islands. The Mátra volcanic complex is one of the largest among them, built up following the major 14.9 Ma Demjén ignimbrite volcanic episode (Lukács et al. 2018). Although the building rocks of the volcanic edifice were studied in detail, less attention was given to the sedimentary sequences supplied at the periphery of the volcano, at the transition from subaerial to subaqueous environment.
This work shows the preliminary results of a stratigraphic, sedimentological and petrographic study carried out on the sedimentary formation, cropping out between the villages of Tar and Sámsonháza (NW part of the Mátra Volcanic Field - Northern Hungary). Ten logs have been measured and correlated together for a 3D reconstruction of the sedimentary system, which progrades northwestward onto a plurimetric-thick ignimbrite deposit (Demjén ignimbrite). Channel and lobe deposits are packaged together in a thinning-upward sequence. In the channels, massive deposits are alternated to bedforms, indicating that both instantaneous hyperpycnal flows and slower flow dynamics were involved in the channel filling process. Gravel-size clast counts in the field and sandy-size point-counts in thin sections have been used to identify the different contributions of the eruption events, their rapid reworking and the erosion of older volcanic units to the sedimentary system. The absence of rounded clasts might indicate that the volcaniclastic sediments suffered minimal transport before being supplied to the sedimentary systems. The absence of any other, non-volcanic lithotypes might indicate that the volcanic center was isolated and the only sediment supplier of the basin.
The gained results have a primary impact on the understanding of the complex dynamics that control the progradation of sedimentary sequences in shallow marine environment, proximal to composite volcanic centers.

Reference
Lukács R., Harangi Sz., Guillong M., Bachmann O., Fodor L., Buret Y., Dunkl I., Sliwinski J., von Quadt A., Peytcheva I., Zimmerer M.: Early to Mid-Miocene syn-extensional massive silicic volcanism in the Pannonian Basin (East-Central Europe): Eruption chronology, correlation potential and geodynamic implications EARTH-SCIENCE REVIEWS 179: pp. 1-19. (https://www.sciencedirect.com/science/article/pii/S0012825217303409) (2018)