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SEDIMENT-MAGMA INTERACTION DURING SHALLOW LEVEL (FERRAR-)SILL EMPLACEMENT, VICTORIA LAND, ANTARCTICA

L. Viereck-Götte, R. Schöner, B. Bomfleur, J. Schneider, H. Kerp, R. Hanemann

[1]Institut für Geowissenschaften, Friedrich-Schiller-Universität, Jena, Germany, [2]Geologisch-Paläontologisches Institut, Westfälische Wilhelms-Universität, Münster, Germany, [3]Institut für Geologie, TU Bergakademie, Freiberg, Germany

Recent field investigations in North Victoria Land, Antarctica, which were carried out during the 9th German North Victoria Land Expedition (GANOVEX IX, 2005/2006), provide evidence for magma-sediment interactions during shallow level sill emplacement. The Triassic-Jurassic sedimentary sequence comprises dominantly medium to coarse grained quartzose/arkosic sandstones of the Section Peak Formation (SPF) in the lower part, and ripple cross-bedded, fine grained tuffaceous sandstones in the upper part (informally called here Shafer Peak Formation, SHF). The sediments occur in between the crystalline basement and the base of the Kirkpatrick plateau forming lava flows, and are intruded by massive sills of the Ferrar Group. Contacts of the magma with the quartzose sandstones (SPF) are sharp and show contacts of fused sediment and chilled magma on cm-scale. On the contrary, contact zones of the magma with fine grained tuffaceous sandstones of the SHF are often represented by peperitic products derived from fragmentation, often also vesiculation, of magma and fluidization of SHF sediments: tuffaceous sandstone layering enclosing basaltic lapilli and blocks grading into breccias of sill magma, that may intrude into sediment piles and sills as clastic dikes. The most striking observation is that these tuffaceous sediments contain the same igneous clast association, from vitric to medium grained crystallinity, as the basaltic, mainly hydroclastic sediments of Exposure Hill Type (EHT) events, that are interlayered with the sediments of the SHF. We suggest that EHT events originated from these shallow sill intrusions into the wet sediments of the SHF – and thus predate the eruptions of the plateau-forming Kirkpatrick effusive event. Our observations indicate that all transitions exist from (1) apophyses of sills on dm-scale over (2) plugs, partially brecciated, extending several meters upward from sills to (3) diatremes several 10 m in exposed height. As clasts of the underlying crystalline basement occur neither in the fluidized sediments nor in the subaerial sediments of the EHF, hydroclastic fragmentation and peperite formation are restricted to the less than 200 m thick sediments of the Beacon Supergroup.