GENETICAL RELATIONSHIP BETWEEN IGNIMBRITES AND SUEVITES? – IMPLICATIONS FROM THE SUEVITIC RIES/STEINHEIM IMPACT LITHOLOGIES

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Introduction: Ignimbrites are deposits of pyroclastic density currents (pyroclastic flows), a hot suspension of particles and gas driven by the collaps of an eruptive column. The deposits are composed of a poorly-sorted mixture of volcanic ash and pumice, commonly with scattered lithic fragments; various stages of welding and reomorphic flow structures can be observed [1]. They usually exhibit a fine-grained, often non-erosive, basis (surge), followed by ash layers that contain inversely graded rock fragments. Bottom-up, ignimbrites are dominated by pumice-rich ash layers, overlain by very fine-grained fall-back ashes [2]; elutriation (degassing) pipes are frequently developed at the top.

Discussion and Results: Recently reinvestigated suevitic impact breccias from the Steinheim Basin and the well-studied Nördlinger Ries suevite exhibit some of the characteristic structural properties of volcanic ignimbrites. The ~50 m thick suevitic Steinheim impact breccia is overlain by a thin (~5-10 cm) finer-grained 'top layer' that we interpret as fall-back material. The layer displays conspicuous flow banding with sheared domains of flattened and elongated sandstones (ss in Fig. 1), limestone clasts with pale (devolatilized) rims, and fluidally textured lithic veinlets (v). As the top layer seems to be 'welded', the structural features all point to a highly dynamic deposition from a hot collapsing 'eruptive' column (impact vapor plume).

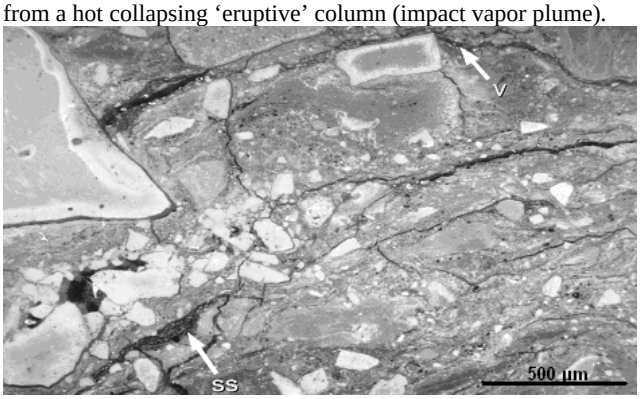

Fig. 1: 'Ignimbrite-like' top layer of the Steinheim suevite impact breccia.

Impactoclastic fall-back top layers on suevites have been described from various impact sites (e.g., [3]). In addition to this potential ignimbrite analogon, degassing pipes occur in the Ries suevite [4]. Inversely graded rock fragments and the non-erosional suevite basis at the Ries may be regarded as further similarities between Ries suevite and ignimbrites. Apart from this marked analogy, ignimbrites can be easily discriminated from suevites for the lack of shock metamorphism in minerals and aerodynamic melt particles ('flädle'). Due to their volcanic origin, the groundmass of ignimbrites is dominated by volcanic ash with crystal fragments and pumice, whereas impact-crushed rock fragments prevail in the suevite matrix.

References: [1] Freund A. 1998. *Bulletin of Volcanology* 60: 545–567. [2] Schmincke H.-U. 2004. Volcanism. 324 p. (Springer). [3] Köberl C. et al. 2007. *Meteoritics & Planetary Science* 42:709-729. [4] Newsom et al. 1986. *Journal of Geophysical Research* 91:239-251.