Fe-Ni-Co SULFIDES FROM THE STEINHEIM BASIN, SW GERMANY: POSSIBLE IMPACTOR TRACES. M. Schmieder and E. Buchner, Institut für Planetologie, Universität Stuttgart, D-70174 Stuttgart, Germany. Email: martin.schmieder@geologie.uni-stuttgart.de

Introduction: The 3.8 km in diameter Steinheim Basin (Baden-Württemberg, SW Germany) is a small, complex impact structure hosted by a sequence of Triassic to Upper Jurassic sandstones, marls, and limestones that build up the Swabian Alb plateau [1]. The specific alignment of the Steinheim Basin, the 24 km in diameter and 14.4 Ma Ries crater, and the Central European tektite strewn field led [2] to propose that both impact structures formed simultaneously during the 'Ries-Steinheim event'. In this volume, [3] newly report suevitic (i.e., impact melt-bearing) portions of the predominantly lithic Steinheim impact breccia lens ('Primäre Beckenbrekzie'). Fluidally-shaped altered impact glass particles mainly composed of hydrous phyllosilicates and some incorporated target rock clasts and droplets (mainly calcite and silica; among the latter is shocked quartz), and Fe-sulfide particles provide new insights into the Steinheim impact melt petrology and allow a first approach towards the identification of the Steinheim impactor.

Samples and analysis: Impact breccia samples were recovered from the B-26 drill core (core depth 76-77 m) stored at the Meteorkratermuseum, Steinheim. Analysis of altered melt particles was done using a CAMECA SX 100 electron microprobe.

Fe-Ni-Co sulfides: Among a notable amount of Fe-sulfide particles (commonly framboidal to spherule-shaped pyrite) within the altered melt particles, the majority is apparently free of Ni and Co. Microprobe analyses of spinifex-textured Fe-Ni-Co sulfides up to ~100 µm in crystal length yielded Ni contents of up to 1.17 wt% and Co contents of up to 0.1 wt% at a Ni/Co ratio of ~10 (1.6-14.55). Fe-Ni-Co sulfides also contain minor amounts of Al, Si, Ca, and Ti (<1 wt% in total) but are free of Cr.

Results and discussion: In contrast to essentially pure Fe-sulfides, Fe-Ni-Co sulfides in altered glass particles within a suevitic domain of the Steinheim Basin breccia are unlikely to originate from the sedimentary target rocks but suggest that these phases represent remnants of the Steinheim projectile. Our preliminary geochemical data point to an iron or stony iron meteorite as the Steinheim impactor. PGE and Ge/Ga analyses are planned in order to further characterize the Fe-Ni-Co sulfides as a possible meteoritic component in the altered impact melt particles.

Implications for the Ries-Steinheim event: Given that no extraterrestrial component has so far been detected in the Ries impact melt (thus, an achondritic body was proposed) [4], the new finding of Fe-Ni-Co-sulfides associated with the Steinheim impact structure still appears to be compatible with the formerly proposed Ries-Steinheim impact event [2]. The model still works if we consider two compositionally different bodies that might have been involved in a binary asteroid impact scenario.

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References: [1] Heizmann E. P. J. and Reiff W. 2002. *Der Steinheimer Meteorkrater*. Pfeil, Munich, 160 p. [2] Stöffler D. et al. 2002. *Meteoritics & Planetary Science* 37:1893-1907. [3] Buchner E. and Schmieder M. 2009. This volume. [4] Schmidt G. and Pernicka E. 1991. *Meteoritics* 26:392.