PSEUDOTACHYLITE BRECCIA VEINS FROM DHALA IMPACT STRUCTURE, NORTH CENTRAL INDIA: TEXTURE, MINERALOGY AND GEOCHEMICAL CHARACTERIZATION. J.K. Pati[1], W.U. Reimold[2,3], A. Greshake[2], C.K. Koeberl[4], and P. Pati[1], [1]Department of Earth and Planetary Sciences, Nehru Science Centre, University of Allahabad, Allahabad-211 002, India(jkpati@yahoo.co.in); [2]Museum für Naturkunde Berlin, Invalidenstrasse 43, 10115 Berlin, Germany (uwe.reimold@museum.hu-berlin.de), [3]Humboldt-Universität zu Berlin, Unter den Linden 6, 10099 Berlin; [4]Department of Lithospheric Research, University of Vienna, Althanstrasse 14, A-1090 Vienna, Austria (christian.koeberl@univie.ac.at).

Introduction: Pseudotachylitic breccia veins and larger occurrences are known from large impact structures (Vredefort, Sudbury, Manicouagan, Araguainha) as well as from relatively smaller structures (Rochechouart, Slate Islands). This is the first report of pseudotachylitic breccia veins in basement granitoids from the Dhala structure, north central India [1]. They occur in vertical borehole MCB-10 at N25°17'59.7" and E78°8'31".

Results: The Dhala structure was drilled by the Atomic Minerals Directorate for Research and Exploration (AMDRE), Department of Atomic Energy, of the Government of India in about 60 locations up to depths of nearly 600 m, in a regional search for uranium. The mesoscopic pseudotachylitic breccia occurs in MCB-10 at 348.15, 384.90, 389.90, 401.85, 452.75, 484 and 502.55m depths as veins, pods, networks of or single anastomozing veinlets with thickness ranging from less than a mm to about 5 cm. In the core samples, multiple crosscutting PTB veins with sharp boundaries with the host granite are noted, and in places clastic debris off the wall (rip-off clasts) are observed within the vein. In thin section, these bluish grey to dark grey veins have sharp but irregular contacts with the host granitoids and are generally highly altered. The extensively iron-stained granitic host rock shows sericitization and the mafic phases are mostly chloritized. Locally cataclastic granite is cut by post-cataclasis carbonate veinlets. Two types of PTB veins are observed: 1. Distinct vein type cataclastic breccias at the microscopic scale with minor amounts of actual groundmass showing locally heavily altered domains, possibly representing comminuted clastic debris. 2. Extremely altered dark grey PTB veins (chloritized groundmass, saussuritized feldspar, heavily iron-stained matrix, and chloritization of biotite ± hornblende). There are distinct and euhedral phenocrysts obviously grown from a melt phase in larger (> several mm in width) occurrences. The groundmass is fine-grained similar to the texture of a crystallized melt phase, but is always extensively altered.

Eighteen samples comprising host rock and PTB vein material were sliced from drill core from various depths and analyzed for their major, minor (incl. REE) elemental compositions by XRF and INAA. The average LOI value in PTB samples is 5.8 wt.%) and is distinctly higher than that of the host rocks (1.9 wt.%). The SiO_2 content of the host rocks ranges between 60.4 to 77.7 wt.%, and the Na_2O+K_2O values vary from 7.02 to 10.75 wt.% indicating the general granitic composition. Their modal mineralogy (quartz + alkali feldspar ± plagioclase ± biotite ± hornblende) and texture also classify the host rocks as granitoids. The PTB veins have relatively low average SiO_2 content (40.0 wt.%) with high MgO values (average: 12.3 wt.%), and they are similar to silica-undersaturated mafic rocks in their Ni/Cr ratio <1. Possibly the preferential dissolution of hydrous phases into the melt, breakdown of biotite±hornblende, and alteration by Fe-rich solutions may have lead to the formation of magnetite and could be responsible for the change in major element chemistry from the granitoid to PTB vein compositions. Interestingly the granitoids and the PTB samples, in general, show identical REE patterns with average total REE < 260 ppm, LREE enrichment, HREE depletion and negative Eu anomaly (Eu/Eu*=0.38-0.73).

Conclusions: These highly altered PTB veins and the granitoid hosts with contrasting major element chemistry but identical REE pattern possibly formed as fracture fillings during the modification stage. They could have also been locally generated due to frictional melting, or some of the thin veinlets might be shock veins.

References: [1] Pati J.K. et al. (2009) *Meteoritics & Planet. Sci., 44*, A121.

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