ALMAHATA SITTA NEWS: WELL-KNOWN VARIETIES AND NEW SPECIES IN THE ZOO.

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Introduction: After asteroid 2008 TC_3 impacted Earth in 2008, a highly diverse range of meteorite types was identified among the numerous meteorite fragments collected in the Almahata Sitta strewn field, including various types of ureilitic rocks and chondrites (e.g. [1-10]). Here, mineralogical characteristics of 18 new samples (MS-MU-021 – MS-MU-038) are presented, complemented with the oxygen isotope signature of MS-MU-021..

Results: The samples represent (like earlier studied fragments) one single lithology weighing between 7.4 (MS-MU-028) and 221.5 g (MS-MU-034). Together with MS-MU-034 some other large samples of the strewn field are characterized: MS-MU-036 (177.1 g), -037 (149.2 g), and -038 (148.2 g). Among the samples are 5 E chondrites, 12 samples of ureilitic origin (including a trachyandesite (MS-MU-035)), and an enstatite- and metal-rich achondrite.

E-chondrites: Based on the low Si-concentration in metal (0.8-1.3 wt%) all five enstatite chondrites are from the EL-subgroup (2 EL3, 1 EL4, 2 EL6 (MS-MU-024, -026)). The EL3 chondrites (MS-MU-023, -031) can be characterized by their well-preserved chondritic texture and the occurrence of olivine. Especially in MS-MU-031 abundant Fa-poor olivine was found within the porphyritic chondrules. Olivine is lacking in MS-MU-029 (EL4).

Ureilites: MS-MU-022, -034, -037, and -038 are coarse-grained ureilites. Within MS-MU-022 olivine has cores of Fa_{11-13}, whereas the Fa-contents of olivine cores from MS-MU-034 and -038 are much higher and very similar (23-24 mol%). Olivine within MS-MU-034 contains abundant tiny Cr-rich inclusions (exsolved chromites; <<1 µm). MS-MU-037 has abundant pyroxene (~$Fs_{18}Wo_5$) and broad reduction rims around the olivine (Fa_{19-21}). Two ureilitic fragments have complex textures with highly variable grain sizes (MS-MU-021 (Fig. 1), -028). The composition of the olivine cores in MS-MU-028 is Fa_{15-17}, whereas Fa-contents of up to 26 mol% were analyzed in olivines from MS-MU-021. In this sample a small number of large olivine grains are embedded in a fine-grained groundmass (Fig. 1). The bulk sample has $\delta^{17}O$ = 3.98‰ and $\delta^{18}O$ = 8.29‰, which is consistent with an ureilitic origin.

MS-MU-025, -027, -030, -032, and -033 are heavily-shocked, fine-grained ureilites. MS-MU-027 shows a high abundance of C-phase(s) and typical olivine has very low Fa contents (<3 mol%). The samples MS-MU-030 and MS-MU-032 contain abundant metal and sulfide and their core olivines have about 10 and 9-12 mol% Fa, respectively. MS-MU-033 is a typical fine-grained ureilite with olivine cores of Fa_{19-21}.

Ureilitic trachyandesite: The thin section inspection revealed that this sample (MS-MU-035) is similar to MS-MU-011 (ALM-A [9]) having abundant (~65 vol%) subhedral, zoned anorthoclase and/or plagioclase (typically ~An_{9-25}) embedding Cr-bearing Ca-pyroxene (~$Fs_{20}Wo_{38}$) and Ca-poor pyroxene (~$Fs_{35.5}Wo_8$) (Fig. 2).

Enstatite- and metal-rich achondrite: MS-MU-036 is an unusual enstatite- and metal-rich achondrite with three coexisting pyroxenes (~$En_{98.5}Wo_{1.3}$, ~$En_{96.5}Wo_{3.2}$, and~$En_{60}Wo_{40}$). The silicates are embedded within a Si-bearing metal matrix (Fig. 3). Additional phases include oldhamite, alabandite, and daubréelite. Based on texture and mineralogy, it might represent a unique type of meteorite, however, similarities exist to MS-MU-019 and Itqiy [11].

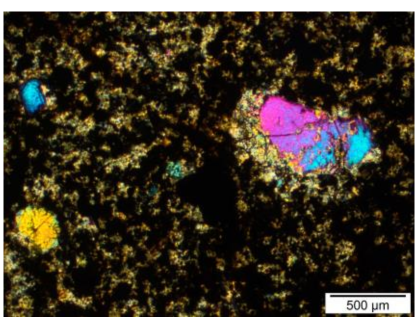

Fig. 1: MS-MU-021

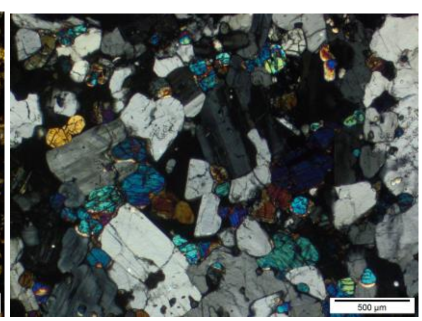

Fig. 2: MS-MU-035

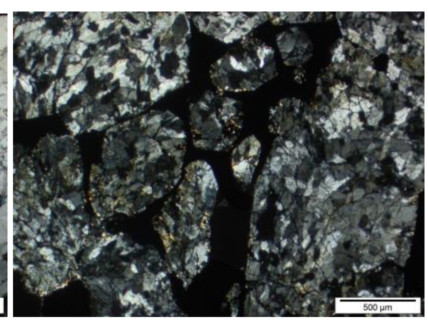

Fig. 3: MS-MU-036 (metal: black)

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