NORTHWEST AFRICA 11483 AND 11486: TWO NEW ACHONDRITES FROM SAHARA.

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Introduction: Two meteorites were found by an anonymous finder in Western Sahara and purchased in 2016 at the Erfoud market by Lucian Cojocaru. The main masses, weighing 15.9 and 7.2 g, respectively, are markedly different since only the second one is partially covered by black fusion crust. The sawn surface of the first one shows a coarse grained magmatic texture, with large black-green crystals. In contrast the second one displays a brecciated texture with white clasts set in a fine grained matrix. Both meteorites have been approved by the Nomenclature Committee of the Meteoritical Society with the names NWA 11483 and 11486, respectively [1]. Lucian Cojocaru owns both the main masses. The type specimens, weighing 4.2 and 2.2 g, respectively, and two thin sections are on deposit at the Museo di Storia Naturale dell'Università di Firenze.

Instruments and methods: Optical microscopy was undertaken at the laboratories of the Dipartimento di Scienze della Terra, Università di Firenze, Italy, using an Axioplan-2 polarizing optical microscope equipped with Axiocam-HR camera. SEM-SE images have been performed at the MEMA center of the Università degli Studi di Firenze laboratories by means of a ZEISS EVO MA 15 SEM. EMPA-WDS analyses have been performed at the Firenze laboratories of the IGG – CNR (National Council of Research) with a Jeol Microbeam microprobe. Oxygen isotope analysis was undertaken at the Open University.

Experimental results: Both meteorites were investigated by means of optical microscopy, SEM and EMPA techniques. A thin section of each sample was analyzed. The thin section of the first one (NWA 11483) shows a protogranular aggregate of olivine and pigeonite, with olivine grains ranging in dimensions from 100 to 500 μm displaying compositional zoning from core to rim. Blebs of Fe-Ni alloys metal are scattered thorough the section and carbonaceous material is visible at grain boundaries. The thin secton of the second meteorite (NWA 11486) shows a brecciated texture composed of lithic eucrite clasts in a finer grained matrix. Clasts consist of exsolved orthopyroxene crystals with fine pigeonite exsolution lamellae, 5-7 μm in width, augite, calcic plagioclase, ilmenite, chromite, troilite and FeNi metal. This meteorite shows a moderate degree of weathering and a medium shock stage.

EMPA analyses of selected grains were performed in order to determine the general minerochemical features of the matrix and of single crystals for classification purposes. Olivine grains in NWA 11483 display fayalitic cores ($Fa_{21.5\pm0.2}$, Cr_2O_3 = 0.71±0.02 wt%, CaO = 0.34±0.02 wt%, N=10), and more magnesian rims ($Fa_{10.8\pm0.1}$, N=7); pigeonite grains are Mg-rich ($Fs_{12.9\pm0.3}En_{81.2\pm1.1}Wo_{5.8\pm0.2}$, N=11). NWA 11486 displays a calcic plagioclase ($An_{86.3\pm1.4}Or_{0.7\pm0.1}$), an orthopyroxene host ($Fs_{54.9\pm1.1}En_{42.6\pm1.4}Wo_{2.6\pm0.3}$, FeO/MnO = 26.3±0.2, n=4) displaying pigeonite exsolution lamellae ($Fs_{62.6\pm1.3}$,$En_{29.8\pm1.2}Wo_{7.6\pm0.4}$; n=7; Fe/Mn = 24.7±0.2); augite ($Fs_{30.1\pm1.2}En_{25.8\pm1.2}Wo_{44.2\pm1.5}$; n=7; Fe/Mn=22.9±0.2);

Oxygen isotope analyses performed on both samples provided the following results: $\delta^{17}O$ = 3.58 ‰, $\delta^{18}O$ = 8.45 ‰, $\Delta^{17}O$ = -0.81 ‰ for NWA 11483 and $\delta^{17}O$ = 1.83 ‰, $\delta^{18}O$ = 3.93 ‰, $\Delta^{17}O$ = -0.22 ‰ for NWA 11486.

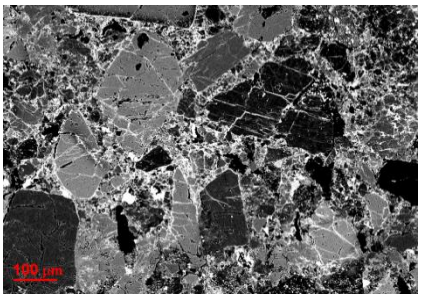

Figure 1: SEM-BSE image of NWA 11483; large euhedral grains are olivine; white spots are Fe,Ni metal

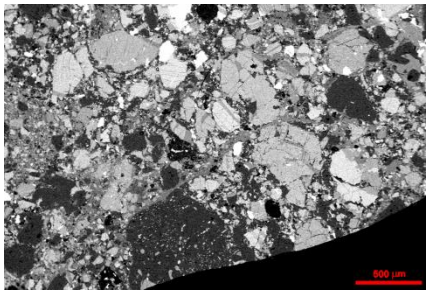

Figure 2: : SEM-BSE image of NWA 11486; white clasts are low-Ca pyroxene with pigenite lamellae;

Discussion and conclusions:

The textural and minerochemical data are distinctive and point to a classification as ureilite for NWA 11483 and as monomict eucrite for NWA 11486 [1,2]. Oxygen isotope data confirm this hypothesis [3].

References: [1] Bouvier, A. et al. (2018) *MAPS*, in press; [2] Grady M. et al. (2014), *Atlas of Meteorites*, 1st ed., CUP, Cambridge, pp.350; [3] Scott, E.R.D. et al. (2009), GCA, 73, 5835-5853.