

ACFER 370: AN ANOMALOUS CHONDRITE RELATED TO THE CUMBERLAND FALLS BRECCIA. V.Moggi-Cecchi¹, G.Pratesi², I.A.Franchi³, R.C.Greenwood³, ¹Museo di Scienze Planetarie, Provincia di Prato, e-mail: v.moggi@pratoricerche.it, Via Galcianese, 20/h, I-59100 Prato, Italy, ²Dipartimento di Scienze della Terra, Università di Firenze, Via La Pira, 4, I-50121, Florence, Italy, ³PSSRI, The Open University, Milton Keynes, MK7 6AA United Kingdom.

Introduction: Acfer 370 is a small meteorite, weighing 129g, lacking fusion crust, recovered in November 2002 in Algeria (Acfer area) by Filiberto Ercolani, an Italian meteorite "hunter" who was tragically killed in a car accident. After splitting the sample into two end cuts (67 and 62 g respectively) both the cut surfaces showed the presence of two areas with different weathering grades. Both specimens and a PTS are on deposit at the Museo di Scienze Planetarie (inv. MSP 2277).

Description: The thin section displays a chondritic texture, with several chondrules and chondrule fragments (rather common), set in a very fine-grained interchondrule matrix. Chondrules range in size from 150 to >2000 μm (mean = 460 μm) and account for more than 80 % of the total volume. Chondrule types are various: PO, POP, PP, GOP-pk [1], RP, BO and C. A compound BO chondrule is also present. Mineral fragments (mainly large orthopyroxene crystals) are rare. Opaque phases are clearly distinguishable in the less weathered area as distinct large (100-300 μm) aggregates of both kamacite and taenite associated with troilite and Fe,Ni phosphides, with minor weathering products. In the more weathered area remains of Fe,Ni alloys are visible as extremely fine-grained spots inside PP chondrules. EMPA analyses performed on olivine (inside and outside chondrules) and low-Ca pyroxene provided the following results: $\text{Fa}_{5.65}$ (mean on 20 analyses, PMD = 3.82%), $\text{Fs}_{6.94-22.63}$ (mean = 15.64 on 20 analyses). Clinopyroxenes display an augitic composition ($\text{Fs}_{11.5}\text{En}_{48.9}\text{Wo}_{32.6}$). Metal is kamacite ($\text{Fe}_{93}\text{Ni}_7$), while Cr content of troilite is 0.3 wt. %. Phosphides are both melliniite ($\text{Ni,Fe}_4\text{P}$ [2]) and a probable new phase ($\text{Fe,Ni}_4\text{P}$, the Fe-rich equivalent of melliniite. Weathering grade changes in the two areas from W1 to W3. Oxygen isotope analyses performed at the OU on a bulk sample from the less weathered area gave the following results: $\delta^{17}\text{O} = 2.67\text{‰}$; $\delta^{18}\text{O} = 4.17\text{‰}$; $\Delta^{17}\text{O} = 0.50\text{‰}$.

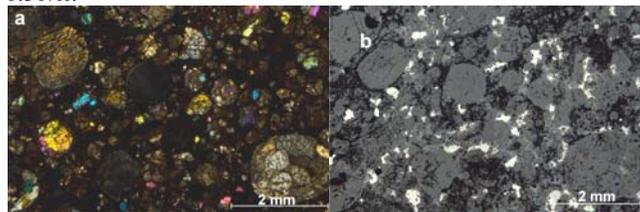


FIG. 1: photomicrographs of a thin section of MSP 2277 showing the chondritic texture: (a) transmitted light, crossed polars; (b) reflected light, plane polars

Conclusions: Although texturally similar to UOCs, olivine in Acfer 370 is homogeneous, with Fa contents similar to the chondritic portion of Cumberland Falls (CF) [3]. The variable opx composition and Cr content of troilite also confirm these similarities to CF, although no daubreelite has been detected in this meteorite. Oxygen isotope data also suggest affinities with CF [4,5].

References: [1] Moggi Cecchi et al. (2006) *Per. Min.*, **75**, 217 [2] Pratesi et al. (2006) *Am.Min.*, **91**, 451 [3] Neal & Lipschutz (1981), *GCA*, **45**, 2091 [4] Verkoouteren & Lipschutz, (1983), *GCA*, **47**, 1625, [5] Newton et al. (2000) *M&PS*, **35**, 689.