ARPU KUILPU, AN ORDINARY CHONDRITE ON A JUPITER FAMILY COMETARY ORBIT.

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Introduction: The Desert Fireball Network is a camera network in Australia covering approx. 2.5M sq. km, focused on meteorite recovery with associated orbits. It has been successful, with 6 recoveries to date [1]. The most recent meteorite to be officially named and confirmed is Arpu Kuilpu (AK), seen by the DFN as fireball DN190601_01. Here we describe the details of the fall, and the orbit observed. The meteorite has been classified and registered as Meteorite Bulletin ID 74013.

Recovery: DN190601_01 was seen to fall at 09:53 UT on 1st June 2019, and searching was carried out about six weeks later. The fall was less than 15 km from the closest DFN camera near Hughes Airport on the Nullarbor, South Australia, so triangulation uncertainties were excellent. The 31 g mass of AK was recovered at 20.6181°S, 129.5662°E, and was found half-embedded in the local clay terrain. It was recovered by searching on foot, on the 2nd day of the 10 day expedition. The meteorite exhibits a matt fusion crust, with a small broken corner showing evidence of sub-mm chondules.

Sample and orbit: AK was classified as an H5 chondrite, based on the backscattered electron image of a polished section. Figure 1 gives details of minerals seen in polished section. However, most notable is that the orbit for AK would normally be classed as Jupiter family comet, as shown in Figure 2a. This slightly confounds expectations, as one would not initially expect an H5 ordinary chondrite on such an orbit. This provides some initial evidence of the evolution of this orbit, and may result from terrestrial planet scattering as detailed in [2] and as such we shall discuss the minerology and this hypothesis in more detail.

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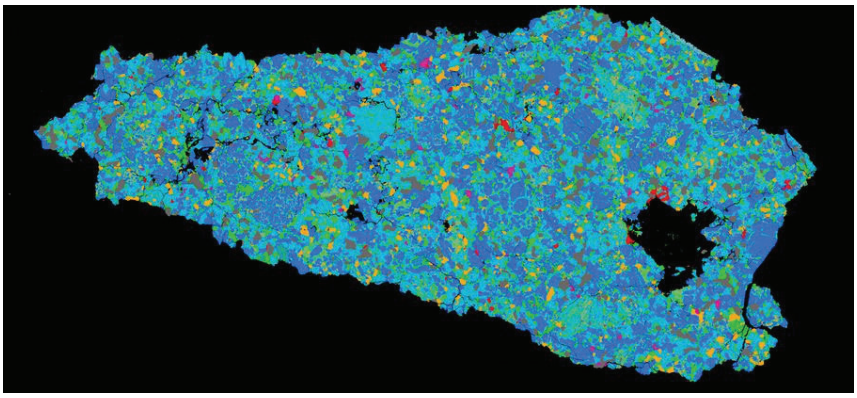

Figure 1 Mineral Map of AK, showing Pink – Chromite, Red – Phosphates, Orange-Troilite (sulfides), blue-olivine, teal-enstatite(orthopyroxene), Y/G-Plagioclase, Beige-Clinopyroxene

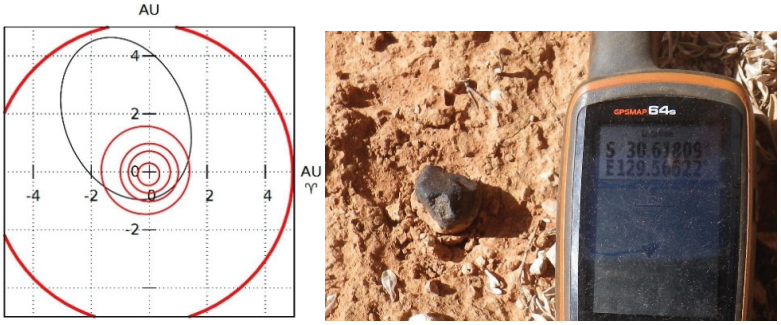

Figure 2 (a) Orbit of AK, showing terrestrial planets and Jupiter, and (b) on discovery in the Nullarbor.

References: [1] Devillepoix, H.A.R. et al (2020), *Planetary and Space Science*, 191: 105036 [2] Shober, P.M. et al (2021) Planetary Science Journal 2:98