FALL AND RECOVERY OF THE DINGLE DELL METEORITE

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Introduction: The Desert Fireball Network (DFN) is a continental scale facility optimised to recover meteorites and calculate their pre-entry orbits. It is built following the idea that an efficient fireball network must cover large areas of easily searchable terrain. The DFN currently operates 50 high resolution fireball observatories across 2.5 million km^2 of outback Australia. The observatories are fully autonomous, intelligent imaging systems, capable of operating for 18 months in a harsh environment without maintenance [1]. While most of the Australian DFN is set up in remote desert areas, some roof-top systems have been installed on schools and farm buildings across the Western Australian Wheat Belt. Not only does this help with public engagement, but these farm areas also provide excellent searching conditions for most of the year (8 months): eased logistics to organise field searches, and large open featureless fields facilitating meteorite recovery. We report here the latest find from the DFN: the Dingle Dell meteorite.

Fall of the Dingle Dell meteorite: On Halloween night shortly after 8 PM local time, several reports of a large bolide were made on the *Fireballs in the Sky* smart-phone app [2] from the Western Australian Wheat Belt area. Six nearby DFN observatories imaged a 6.2 second fireball starting at 12:03:46 UTC on 31st October 2016 and immediately reported to the central server. The closest camera, Perenjori (Fig. 1), was located almost directly under the fireball and was the only one to image the end of the luminous trajectory. Other nearby camera sites were overcast and therefore quite distant stations had to be used, all more than 200 km away from the event, to triangulate the trajectory. Additionally, patches of thick cloud made the data analysis harder because of considerable light scattering from the bright fireball. Notwithstanding these observational difficulties, the DFN automated data reduction pipeline allowed us to rapidly determine that a sizeable meteorite had likely made it to the ground, and we were able to constrain the fall position and orbit. The object entered our atmosphere at 15.43 km/s, and was observable for 78 km through the atmosphere. The object stopped ablating at an altitude of 19.52 km, when it was traveling at 3.54 km/s. The dark flight was simulated through the atmosphere to the ground, using a weather model.

Recovery of the Dingle Dell meteorite: Within two days, two team members visited the predicted fall area, about 4 hours' drive from Perth, Western Australia, to canvass local farmers for access and information. Having gained landowner permission to search, a team of 4 people was sent to the area 3 days later. Searching was carried out mostly on foot and with some use of mountain biking in open fields. After 8 hours of searching, just 6 days and 16 hours after the fall, a 1.150 kg, meteorite was found close to the farm boundary, approximately 230 m from the predicted fall line. The very hard ground showed no evident trace of the impact. Weather history shows that no rain had fallen between the fall and the recovery 6 days later. The meteorite was collected and stored using a Teflon bag, and local soil samples were collected in the same manner for comparison. A detailed description of the petrology and mineralogy will be presented in [3]. Some fine red dust was seen on surface, most probably aeolian in nature.

Fig 1. : Dingle Dell fireball captured from the Perenjori camera system (crop of all-sky image)

Summary: Dingle Dell is the fourth meteorite with an orbit recovered by the DFN in Australia. It is however the first one that was recovered within 1 week of its fall, without any precipitation contaminating the rock, confirming that the DFN as a proficient sample recovery tool for planetary science.

References: [1] Howie R. M. et al. (in press) *Experimental Astronomy*. [2] Sansom E. K. et al. (2016) *International Meteor Conference, Egmond, the Netherlands*. [3] Benedix, G. K. et al. (2017) *this conference*.