FIRST LIGHT FOR THE DESERT FIREBALL NETWORK.

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Introduction: There are over 30,000 meteorites in collections world-wide. However, although we can analyse these samples to gain clues to the origins of our Solar System, we only have an approximate knowledge of where they come from. Camera networks, designed to observe fireballs, calculate orbits, triangulate fall positions, and recover meteorites, have been set up in several nations at various times in the past e.g. [1]. Although a primary motive behind most of these projects was the recovery of meteorites with orbital information, only 4 samples have been obtained. The reason is related to the chosen field areas: any vegetation makes looking for small meteorites extremely difficult. We are building a network in a desert that has proved eminently suitable for locating meteorites. The aim is to deliver numbers of samples with accurate orbits, providing a spatial context to aid in interpreting meteorite composition.

The Project: Our preliminary autonomous fireball camera network has now been established in the Nullarbor region of Western Australia. Three cameras designed to operate in deserts have been developed, and were deployed in late 2005. First light for our first camera was on 3rd December 2005. Operations are monitored via a satellite link. Orbits are calculated from observed fireballs, and meteorite fall positions will be determined for later recovery by field parties. The network will detect meteorites falling over an area of approximately 0.3-0.4 x 10⁶ km².

Results: The first fireball for which we were able to derive an orbit occurred on December 7th 2005, during the initial deployment of the cameras. The object may have been a small comet fragment. The fireball started at 103.92km, and terminated very high at 72.76km. It traveled 60.29km along its luminous trajectory in 1.8 seconds, with an initial velocity of 35.31 km/s. Its heliocentric orbit is typical for short period comets: semimajor axis 24.4AU, eccentricity 0.960, perihelion distance 0.97801AU, argument of perihelion 350.14 degrees, ascending node 75.41934 degrees, and inclination 51.74 degrees. Radiant position: right ascension 111.02 degrees, declination -68.75 degrees.

Future Work: A number of technical issues have been overcome, and testing (and observing) continues. Routine operations are scheduled from September 2006. Based on estimated fall rates [1,2] we hope to observe at least one meteorite fall by the end of the year. Recovery of meteorites during the grant period would prove our concept, and open the way for funding of a full network. Our current detection area is approximately 25% that of previous networks. The final Desert Fireball Network will have an area of 1.5 x 10⁶ km², and will be capable of recovering significant numbers of meteorites per year.