THE UK FIREBALL ALLIANCE: LESSONS LEARNED FROM TWO METEORITE FIELD SEARCHES IN THE UK.

A. C. O'Brien[1], A. J. King[1], C. L. Bays[1], L. Daly[1], J. Rowe[1], K. Joy[1], W. Gater[1], P. Campbell-Burns[1], R. Kacerek[1], A. Christou[1], G. Collins[1], J. Horák[1], M. McIntyre[1], S. McMullan[1], A. Smedley[1]. [1]UK Fireball Alliance

Introduction: The UK currently has six meteor camera networks that are coordinated through the UK Fireball Alliance (UKFAll) [1]. Together, these networks currently image much of the UK's night sky. Since its formal establishment in 2020, the UKFAll has organised field searches following two detected fireball events that dropped meteorites in the UK: one at 21:54 (UTC) 28th February 2021 in Gloucestershire, England, and another at 23:45 (UTC) 14th April 2022 in Shropshire, England. The former fireball detection led to the recovery of the Winchcombe CM chondrite, the first UK meteorite in 30 years [2–4], whilst our search for the Shropshire meteorite have not yet located any stones. Here, we report some lessons learned as a citizen-science and academic collaboration, and from engaging with both local and national communities in searching for meteorites in Gloucestershire and Shropshire, UK.

Camera Networks: UKFAll includes the UK Meteor Network (UKMON), Network for Meteor Triangulation and Orbit Determination (NEMETODE), the UK Fireball Network (UKFN), the Fireball Recovery and InterPlanetary Observation Network (FRIPON), the Global Meteor Network (GMN), and the AllSky7 network. Orbital calculations and dark flight modelling are a collaborative effort by researchers from the Global Fireball Observatory based at Curtin University, Australia, as well as the University of Western Ontario, Canada, and FRIPON, France.

Winchcombe: Since the Winchcombe meteorite fell during a national lockdown, we issued a press release asking residents in Gloucestershire to report possible meteorite finds following the fireball, as opposed to sending a search party immediately. This approach was successful, with the Wilcock family waking to find a pile of dark rocks and powder on their driveway, and having seen the news, collecting the material and contacting the UKMON. Following verification of the meteorite fall, and additional refinement of the strewn field, a small (~15 scientists) search party assembled in Gloucestershire on 4th March 2021. This led to the recovery of the largest 152 g stone at Rushbury House farm on 6th March 2021.

Field Experience: Members of UKFAll with meteorite searching experience led small teams of 4 – 8 people. The search was conducted in a unique situation due to COVID. Care was taken to remain socially distanced at all times, which made coordination of the search efforts challenging. Positive engagement with the local community was prioritised from the outset, with team leaders contacting landowners for permission to search and emphasising our safety precautions and risk assessments. News of the meteorite fall spread quickly, and residents were very hospitable and enthusiastic about our activities. The UK countryside is full of "meteorwrongs", and the rural terrain was difficult to search due to long grass, bushes etc. A game was devised to help boost morale – and to see if a meteorite would be found in that field – where a convincing meteorwrong was thrown into each new area by one team member to be found by the search team. During the field search, we also received many enquiries. These were managed by dedicated UKFAll team members, who replied to emails and visited potential meteorite finds in the area.

The press interest in the story following the announcement that the meteorite had been found was significant, with journalists soon arriving in Winchcombe. This press release came after the main UKFAll search had ended, and there were many requests from the the media for interviews. Following several busy days, a key lesson learned was to the need to have a designated media liaison for any future press releases.

Shropshire: This meteorite search was carried out over six days by ~20 scientists in an agricultural area south of Shrewsbury that included grazing land for sheep, wheat and rapeseed fields, and woodland. Searching in mid-April proved more challenging due to the increased vegetation cover. In order to train more people in meteorite hunting strategy, search line leaders were alternated each day. An initial small team arrived for the first two days to engage with the community. This "recon" was used to assess the terrain, identify key areas, and obtain permissions, and to avoid inundating small communities with search teams without advance notice. Early on, we engaged with a business owner, who helped to spread the word using local social media groups. Within 24 hours, most residents in the strewn field were aware of the meteorite fall and our presence, with many families conducting their own searches of public land. On 18th April 2022, a press release with an approximate strewn field was issued to local journalists. As with Winchcombe, there was significant national media interest, despite no stone being found to date. This helped us to gain access to search areas, as several landowers were aware of the meteorite before we contacted them.

References: [1] https://www.ukfall.org.uk/ [2] Daly L. et al. (2021) *Elements* 17(5) [3] O'Brien A. C. et al. (2022) *Astr. & Geophys*. 63(1) [4] Rowe J et al., (2021) *BAA*, 131.