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Comparing search techniques and terrain types on the rates of meteorite cold finds: analysing the close line and petal search techniques on the Nullarbor Plain, South Australia.

Searching for meteorites in the Australian deserts has increased in the past 10 years with the inception of both the Desert Fireball Network (DFN) and Monash Meteorite Collection Teams (MMCT). These groups have different methodologies derived from the primary objective. Notably, the DFN search technique relies more on close line search techniques similar to that employed in evidence searches at crime scenes. Given the target of these searches are single stones tracked to a fall line by cameras, this search technique makes sense. A single target stone will often be missed if there are large gaps in search paths, and therefore it is important to cover as much of the target area as possible. By contrast, the MMCT have developed a search technique more related to trail searches for missing persons. This technique, termed 'petal search', allows searchers to spread out across a much larger area. As there is no defined search line, searchers are free to pick the best terrain to search.

In addition, petal searches more easily identify meteorite strewn fields; groupings of related meteorites from a single fall breaking up during atmospheric entry in a broader area. This effectively makes these meteorites a much larger target for searchers. Hence, searchers who are more widely spaced are more likely to find individual stones belonging to a strewn field, and therefore more likely to find more stones from the same fall.

Here we present data from the past two years of collection trips to the Nullarbor Plain by the MMCT using petal search technique and compare this to the line search in the recent Hughes fall target area. In 2019, the MMCT search area amounted to 4.07 km^2 , in which 46 meteorites were found, at a rate of 11.3 cold find meteorites per km^2 . By comparison, the DFN Hughes fall search, covering approximately 1 km^2 found only a single cold find. This would indicate that meteorite searches for cold finds should only utilise the petal technique, however terrain conditions require investigation due to the difference in these sites. The 2018 MMCT collection expedition covered a similar area to the 2019 area, collecting 23 meteorites, reducing the rate to 5.8 meteorites per km^2 . Notably, the region searched in 2018 consisted of more wet erosion features in comparison to the 2019 area. By comparison, the Hughes search area lacked oases and consisted mostly of hummock sands and low xeric scrubland. Terrain factors are little understood, but it is likely that they have a significant impact on find rates. Petal searches allow searchers to select the most open terrain, and therefore allow for more effective searching than intensive close line searches.

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