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Unravelling a high-altitude Antarctic meteorite trap and implications for past conditions

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These zones are furthermore of large interest, as they can potentially contain old ice, which is easily accessible and available in large quantities. Despite this, these meteorite traps remain relatively poorly understood. Here, we propose an interdisciplinary approach to improve our understanding of a meteorite trap in Dronning Maud Land (East Antarctica) on the Nansen blue ice field (2600-3100 m above sea level).

From 185 collected surface blue ice samples, one of the largest observed spatial patterns in oxygen isotopic variation to date is found. Relying on meteorites for which the terrestrial ages are determined using 14C and 36Cl, this surface ice is interpreted to date from the previous interglacial up to the present-day. Based on satellite derived surface velocities, we estimate that more than 90% of the meteorites are supplied by ice flow by accumulating in a collection area of a few thousand square kilometres located south of the ice field. Less than 0.4 new meteorites per year are supplied to the ice field, suggesting that the hundreds of meteorites found 25 years after the first visit to this ice field mostly represent meteorites that were previously not found, rather than newly supplied meteorites. The source area is found to be relatively small, which, combined with indications of local shallow ice depths, implies that the Sør Rondane Mountains do not act as a barrier. By comparing the oxygen isotopic variation of the surface blue ice to that of the European Project for Ice Coring in Antarctica (EPICA), Dronning Maud Land (EDML) ice core (located 750 km to the west, at the same elevation), it is inferred that the regional changes in topography must have been relatively limited since the Last Interglacial.