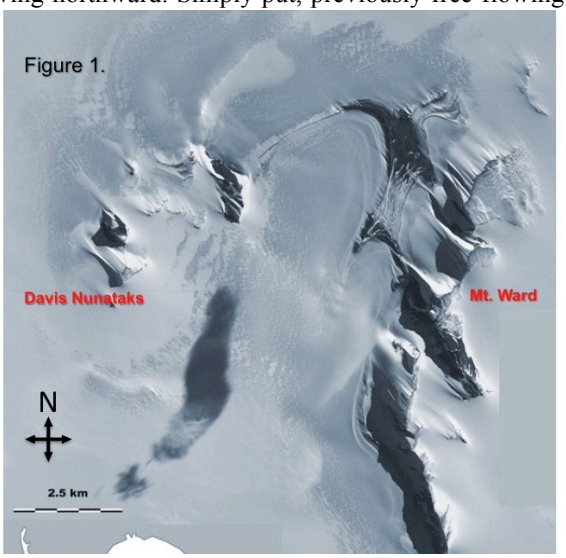
METEORITE SEARCH AND RECOVERY EFFORTS AT DAVIS NUNATAKS - MT. WARD, ANTARCTICA.

J. M. Karner[1], R. P. Harvey[2], J.S. Schutt[2], and B. Rougeux[2] [1]University of Utah, 201 Presidents Circle, Salt Lake City, UT, 84112. j.karner@utah.edu. [2]Case Western Reserve University, 10900 Euclid Ave., Cleveland, OH, 44106.

Introduction: The US Antarctic Search for Meteorites (ANSMET) has recovered 3,281 meteorites from the icefields surrounding the Davis Nunataks and Mt. Ward (DW) in Antarctica. The area has been visited in seven different field seasons starting with reconnaissance searches in 1985 and 2003, followed by systematic searches in 2008, '10, '14, '18 and '19. This abstract highlights the geographical setting of the area, the variety of physical settings of meteorite concentrations and search techniques, and the statistics of recovered meteorites from DW.

Geographic setting of DW: The Davis Nunataks and Mt. Ward lie about 70 km south of where the Mill Glacier flows into the Beardmore Glacier, at 85° 40' S, and 166° 50' E. Mt. Ward runs roughly north-south, and the peaks that make up the Davis Nunataks cluster in an area about 4 km to the northwest (Figure 1). Blue icefields (med. grey color in Fig. 1) fill the area between Mt. Ward and the Davis Nunataks and also extend outward several kilometers to the north of exposed peaks. In total there are about 50 square kilometers of bare blue ice at DW. Presently, the ice level is at an elevation of 2415 m; the tops nunataks are 50 to 100 m higher, while the top of Mt. Ward is about 300 m higher than the icefields. In the past, ice from the East Antarctic plateau most likely flowed over the peaks at DW, but gradual ice sheet thinning since glacial maximums and the topography of DW have now cut off this ice from flowing northward. Simply put, previously free-flowing ice at DW has now been pinched off, slowed, and is ablating away- allowing for deep blue ice to be exposed and meteorites trapped in that blue ice to be exhumed at the surface to accumulate like a lag deposit.



Physical settings of meteorite concentrations and search techniques: The majority of meteorite finds at DW have been on blue ice, and these large areas are searched in overlapping transects while on snowmobile. Certain parts of icefields at DW contain a large amount of terrestrial rocks; in these areas ANSMET team members have to hop off their vehicle in order to better search for meteorites, or even resort to foot-searching blue ice.

Moraines surround the main icefields at DW and have proved a lucrative setting for meteorite finds. In its last two field seasons at DW, ~760 meteorites were found in moraines. Moraine searching amongst thousands of terrestrial rocks is decidedly more challenging than spotting meteorites on blue ice, but the potential payoff in extraterrestrial samples makes it worth the effort.

Lastly, the downwind border of the major DW icefield (aka, the downwind ice edge) is often characterized by blue ice that gives way to a compact snow called firn. The strong katabatic winds in the area blow rocks (and meteorites) to these areas, and the firn essentially traps them. Meteorites found on firn are typically cm-size and weigh less than ten grams, but ANSMET policy is to collect all meteorites, regardless of size or class in order to obtain the best representation of the flux of extraterrestrial material to Earth.

Meteorite statistics from DW: Of the 3,281 meteorites that have been recovered from DW, about 2,110 have been officially classified [1]. Of the 2,110 an overwhelming majority, about 98%, are classified as ordinary chondrites. The remaining three percent of samples are split between achondrites (1.1%), carbonaceous chondrites (0.8%), and irons (0.2 %). This breakdown of meteorite classes is quite different than the All ANSMET meteorites breakdown [2] which shows 93% ordinary chondrites, 3% achondrites, 4% carbonaceous chondrites, and 1% irons.

References: [1] Todd, N. S. (2021) Complete Listing of Antarctic Meteorites in the U.S. Collection: https://curator.jsc.nasa.gov/antmet/us_clctn.cfm. [2] Scholar, P. (2019) Case Western Reserve University. (Electronic MSc. Thesis), http://etd.ohiolink.edu/

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