

2. The 1984-1985 Antarctic Search for Meteorites (ANSMET) Field Program

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The purpose of the 1984-1985 ANSMET (Antarctic Search for Meteorites) expedition was to recover meteorites from the Main, Near Western, Middle Western, and Far Western icefields in the Allan Hills area and to carry out a reconnaissance of other nearby blue icefields. A brief summary of the locations visited is provided in Table 2-1. Figures 2-1 and 2-2 contain maps of these locations and the routes taken between them.

Expedition members included leader W.A. Cassidy (University of Pittsburgh, Pittsburgh, Pennsylvania), Catherine King-Frazier (James Madison University, Harrisonburg, Virginia), John Schutt (University of Pittsburgh, Pittsburgh, Pennsylvania), Roberta Score (National Aeronautics and Space Administration/Johnson Space Center, Houston, Texas), Carl Thompson (Canterbury, New Zealand), Robert Walker (Washington University, St. Louis, Missouri), and the author (then at Washington University, St. Louis, Missouri).

The expedition proper began in late November 1984 when all the members except for Cassidy gathered at McMurdo Station on Ross Island; Cassidy joined the party at a later date. The first week was spent at McMurdo Station, undergoing survival training (for two days, on the lower slopes of Mt. Erebus) and gathering and preparing the expedition's gear for transportation to the Allan Hills area.

During the 6 weeks of the expedition the party lived entirely in Scott tents, two persons to a tent. Typical "non-storm" day temperatures were in the -5° to -10° F range with windchill factors generally falling between -10° and -40° F. Since it was the austral summer, the sun never set during the entire expedition. As a result, work days tended to be long, weather permitting. The entire day was usually spent away from camp. Cooking was done over portable, single burner gas stoves.

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Water was obtained by melting snow and ice. Lunches were generally very simple affairs, because most food froze solid once it was taken from the tents (although the author did determine that thinly sliced pastrami, when put in a plastic bag and taped against the engine block of a snowmobile, would remain partially thawed until lunchtime). Typical lunches consisted of chocolate bars, raisins, and similar items.

After a delay of several days due to bad weather, the party was transported to the Allan Hills on December 8 using UH-1N Huey helicopters with an intermediate refueling stop at Marble Point on the Antarctic mainland (Figure 2-1). The group was accompanied by a two man photography team from public television station WQED (Pittsburgh) who were filming sequences for a documentary. Some of this footage was subsequently shown in the seven part film series PLANET EARTH. The film crew left on 10 December.

The first camp was made between the Allan Hills Main Icefield and the Near Western Icefield (Figure 2-2). The camp remained in its first location for 8 days, during which the two nearest icefields were searched for meteorites (Table 2-1, Figure 2-2). Approximately 80 meteorite fragments were found during this period. The collection procedure consisted of search, collection, and surveying. During the search phase the snowmobiles were driven en echelon (similar to the pattern used by the fighter plane squadrons of WWII) in order to cover the maximum possible area in each sweep. This line formation swept back and forth over the icefield until a meteorite was spotted. Once found, meteorites were photographed, assigned a sample number, and enclosed in several successive sample bags (Figure 2-3). The position of the meteorite was then determined relative to survey reference points. All the meteorites were kept frozen until they arrived at the curatorial facility at the Johnson Space Center in Houston.

On December 17 the camp was moved to a new site at the Middle Western Icefield (Figure 2-2). The Middle Western

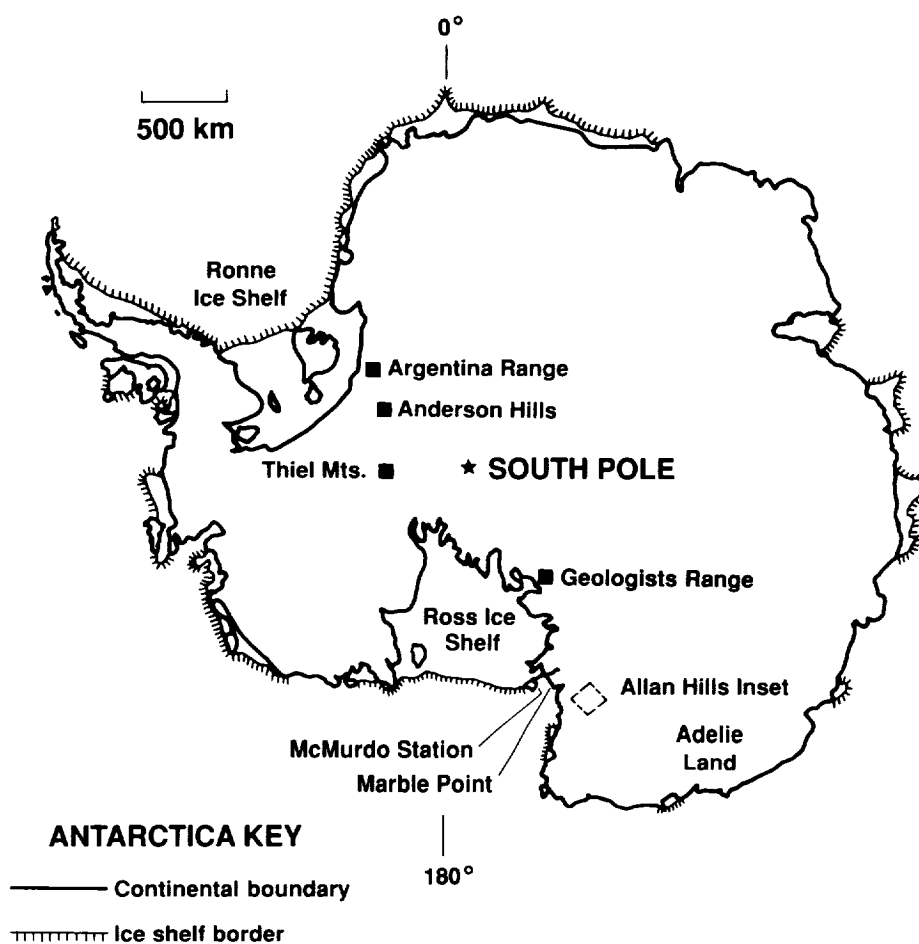


FIGURE 2-1.—A map of the continent of Antarctica. Major sites visited by expedition members during the 1984–1985 field season are marked on the map. The positions of many of these sites are also listed in Table 2-1. The boxed portion represents the extent of the area enclosed in the map in Figure 2-2.

TABLE 2-1.—Antarctic locations mentioned in the text.

Icefield	Location	Dates and camps
McMurdo Station	(77°30'S, 166°40'E)	
Near Western Icefield	(76°44'S, 158°49'E)	8–17 Dec 1984 (Camp 1)
Middle Western Icefield	(76°50'S, 158°26'E)	17–21 Dec 1984 (Camps 2 and 4)
Far Western Icefield	(76°54'S, 157°01'E)	21 Dec 1984–6 Jan 1985 (Camp 3)
Elephant Moraine	(76°11'S, 157°10'E)	8–10 Jan 1985
Allan Hills Main Icefield	(76°41'S, 159°17'E)	9–15 Jan 1985
Battlement Nunataks	(76°32'S, 159°21'E)	13 Jan 1985
Trinity Nunataks	(76°26'S, 160°38'E)	Not Reached
Odell Glacier Camp	(76°47'S, 159°35'E)	15–19 Jan 1985 (Camp 7)
Carapace Nunatak	(76°53'S, 159°24'E)	16 Jan 1985
Natural Rock Arch	(76°45.5'S, 159°57.7'E)	Discovered 17 Jan 1985
Geologists Range	(82°30'S, 155°30'E)	Aerial Recon 25 Jan 1985
Anderson Hills	(84°30'S, 84°00'W)	Aerial Recon 25 Jan 1985

Icefield was searched from December 18 to December 21 and approximately 30 additional meteorites were found. All traverses were made using snowmobiles to pull trains consisting of 1 to 3 Nansen or Knudsen sleds. Traverses at this location were made with the snowmobiles in single file to minimize risks associated with crevasses. On December 21, the camp was moved to the Far Western Icefield (Figure 2-2). The southeastern arm of the icefield was extensively searched and about 120 meteorites were found. The northwestern arm of the icefield was quickly surveyed but not thoroughly searched. Christmas Eve was celebrated by cramming 6 people in one Scott tent and sharing a meal of ham, lobster, shrimp, and yams.

On January 6 the party returned to the Middle Western Icefield and made an additional search for meteorites. On the 8th, Schutt and Sandford made a trip to Elephant Moraine (Figure 2-2) in order to meet with two geologists (Gunther Faure and Karen Taylor of Ohio State University, Columbus, Ohio) and to escort them back to the Allan Hills area. The rest of the party proceeded on to the Allan Hills Main Icefield.

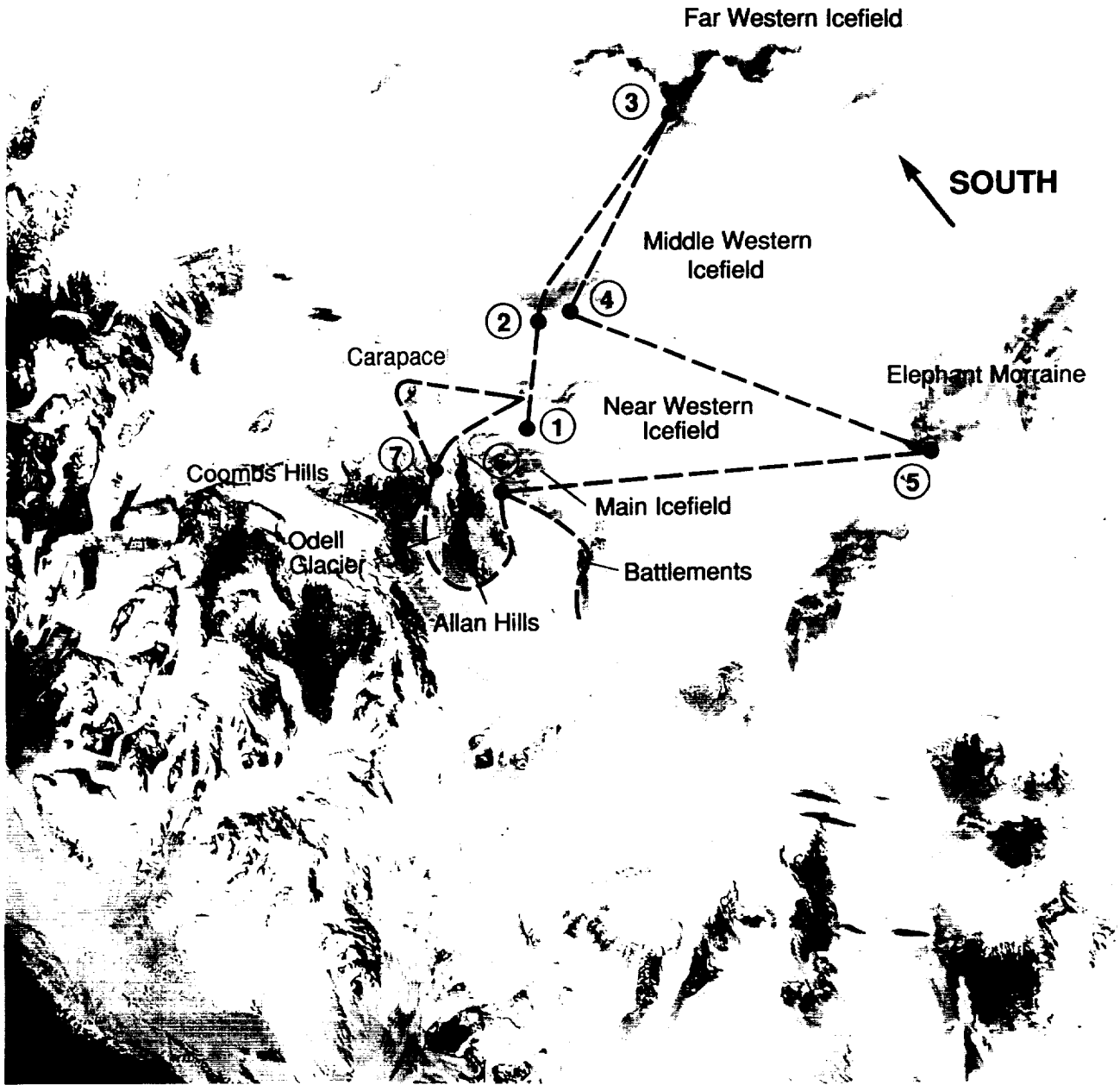


FIGURE 2-2.—A map of the Allan Hills area. Major traverses made during the 1984-1985 field season are shown as dashed lines and the camp sites are given as numbered dots. The positions of many of the features on the map can be found in Table 2-1.

While at Elephant Moraine, Sandford and Schutt found an additional 9 meteorites, including one of the season's few iron meteorites.

The Elephant Moraine party then proceeded to the Allan Hills Main Icefield where the entire expedition was reunited on January 10. Bill Cassidy joined the party on January 12. The Main Icefield camp was maintained until January 15. During

this time the party searched the nearby icefield and visited the blue icefield associated with the Battlement Nunataks; no meteorites were found there.

While at the Allan Hills Main Icefield, an experiment was set up to determine the extent to which wind moves rocks and meteorites on the ice. Rocks spanning a range of sizes (about 1 to 10 cm in diameter) were placed on the icefield in two lines



FIGURE 2-3.—The author with the largest meteorite found during the 1984–1985 field season. This meteorite is an ordinary chondrite.

perpendicular to the prevailing wind direction. One line of rocks was placed directly on the ice while the other line of rocks was buried just below the surface of the ice. Both lines were examined during the next year to see how various sized rocks were excavated and moved by the wind. After one year the buried rocks were found to have been entirely exposed by wind ablation of the ice. While the larger rocks had been moved very little, some of the middle-sized rocks had moved downwind by distances in excess of 100 meters. Many of the smaller rocks were never found again.

On the 15th, camp was broken and a traverse to the Trinity Nunatak area was begun. Unfortunately, this traverse had to be abandoned since a recent snowfall had covered up many of the crevasses along the way and travelling conditions were hazardous. The party therefore proceeded instead up the Odell Glacier and established camp at its head. Additional reconnaissance trips from this camp were made to the Odell Glacier and the blue ice near the Carapace Nunatak (see Figure 2-2). It was during one of these day trips that the author discovered the natural rock arch shown in Figure 2-4. As far as the author has been able to ascertain, this is the only known rock arch in Antarctica.

TABLE 2-2.—Summary of identified meteorites found.

Meteorite class	Number found
Ordinary Chondrites	
H	112
L	63
LL	15
Enstatite Chondrites	
E3	1
E4	7
Carbonaceous Chondrites	
C2	24
C3V	2
C4	2
Irons	3
Ureilites	1
Diogenites	1
Aubrites	18
Unique Achondrites	3

The entire party was airlifted out of the field and returned to McMurdo Station on January 19. Overall, the expedition enjoyed generally good weather, and most of the time was spent successfully hunting for meteorites. A total of 274



FIGURE 2-4.—This natural rock arch lies on the western slopes of the Coombs Hills overlooking the Odell Glacier in southern Victoria Land. The arch is at approximately $76^{\circ}45.5'S$, $159^{\circ}57.7'E$ and is the only formation of its type known to exist on the southern continent. The arch is estimated to be about 15 meters in height and width.

meteorite fragments were found, ranging in size from about $0.5 \times 0.5 \times 0.1$ cm (0.4 g) to one stone measuring $32 \times 22 \times 18$ cm (16,000 g) (see Figure 2-3). Most of these samples have now been examined and a summary of the breakdown by type is given in Table 2-2. Of special interest are a $17 \times 9.5 \times 6.5$ cm diogenite and 3 unique achondrites.

At this point, most of the expedition personnel returned to the United States. Three of the party members (Cassidy, Score, and Sandford) remained and on January 25 participated in an airborne reconnaissance (using a C-130 Hercules aircraft) of potential meteorite-bearing icefields near the Geologists Range and the Anderson Hills in the Patuxent Range (see Figure 2-1). The latter site looks promising and future expeditions to this area are being planned. Additional reconnaissance of icefields near the Argentina Range had to be cancelled when an

exploratory "ski-drag" landing in the Anderson Hills damaged the landing gear of the aircraft and it was forced to return to McMurdo Station.

On January 28 an additional flight was made to the Amundsen-Scott Station at the south pole. This trip was made in order to change the sample surface of an electrostatic dust collector which is in continuous operation at the pole. The collection surface was returned to the University of Pittsburgh for examination for extraterrestrial dust particles.

ACKNOWLEDGMENTS.—I would like to thank co-expedition member Robbie Score for providing the latest summary of the meteorite types found in the 1984–1985 field season, and for spurring my memory concerning various details of the trip. My thanks go also to Mike Zolensky for updating me on the status of the rock movement experiment at the Alan Hills Main Icefield.

