

SEARCH FOR METEORITES IN THE PATRIOT HILLS AREA, ELLSWORTH MOUNTAINS, WEST ANTARCTICA. P. Lee¹, W. A. Cassidy², D. Apostolopoulos³, M. Deans³, A. Foessel³, C. Krause⁴, J. Parra⁵, L. Pedersen³, K. Schwehr¹, and W. L. Whittaker³, ¹NASA Ames Research Center, MS 245-3, Moffett Field CA 94035-1000, USA, ²Department of Geology and Planetary Science, University of Pittsburgh, Pittsburgh PA 15260, USA, ³The Robotics Institute, Carnegie Mellon University, Pittsburgh PA 15213, ⁴Fuerza Aerea de Chile, ⁵Museo Nacional de Historia Natural, Santiago, Chile.

Introduction: Between Dec. 30, 1997, and Jan. 25, 1998, a human search for meteorites was conducted at Patriot Hills (80°20'S, 81°20'W), Ellsworth Mountains, West Antarctica, as part of a site characterization study for the Robotic Antarctic Meteorite Search (RAMS) Project. The goal of the RAMS Project of the Robotics Institute of Carnegie Mellon University is to develop a robotic vehicle, using the NOMAD rover, capable of searching for meteorites in Antarctica autonomously. The Patriot Hills site was chosen because of its relative ease of access and because a wide variety of terrestrial rock types was known to be present [1]. A program of field tests of components and instruments to be integrated onto NOMAD in late 1998 was carried out at Patriot Hills during the 97–98 field season in conjunction with the search for meteorites reported here.

Meteorite Search: The areas searched include both blue ice fields and moraines. The blue ice fields of Patriot Hills and nearby Independence Hills, Morris Cliff, Marble Hills, and Minaret Bowl were traversed and searched for meteorites by snowmobile and on foot. Two additional blue ice fields above Morris Cliff and between Mt. Simmons and Mt. Geissel (Independence Hills) were accessed by light aircraft and searched on foot. A total blue ice area of approximately 60 km² was covered, representing the bulk of the blue ice area available between Mt. Shattuck, Patriot Hills, and Minaret Peak. The polymict, allochthonous portions of the moraines associated with Patriot Hills, Independence Hills, Morris Cliff, Marble Hills, and Minaret Bowl were also searched. The total linear distance of moraine walked was approximately 35 km.

Result: No meteorite was found. Two explanations for this outcome are possible: (1) The

relatively low altitude of the blue ice fields at Patriot Hills (800–1100 m vs >2000 m for typical meteorite concentration sites [2]) make for relatively warm summer peak temperatures leading to seasonal melting of surface ice. Meteorites exposed at Patriot Hills would likely be subject to rapid weathering and/or would not be able to be exposed at the surface without sinking deeper into the ice by melting the ice radiatively; cryoconite holes, melt ponds, and refrozen ice are pervasive and attest to the significance of this temperature effect. (2) The history and sources of ice in the Patriot Hills area are unknown and might have been inadequate for concentrating meteorites. The blue ice fields might have been exposed as potential meteorite stranding surfaces only recently, and/or the upstream gathering area might not be extensive. None of the above explanations can be ruled out at present. However, regardless of the explanation, it can be safely concluded that the Patriot Hills site is not a productive search area for meteorites.

References: [1] Craddock C. et al. (1986) *Geologic Map of the Ellsworth Mountains*, GSA. [2] Cassidy W. A. (1991) in *The Geology of Antarctica*, pp. 652–666, Oxford Univ.

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