DISCOVERY AND TERRESTRIAL AGE OF FRO 01149, AN EXTREMELY SMALL, WEATHERED AND OLD H-CHONDRITE FOUND ON TOP OF FRONTIER MOUNTAIN, ANTARCTICA. L. Folco[1*], K. C. Welten[2*], K. Nishiizumi[2] and D. J. Hillegonds[3]. [1]Museo Nazionale dell'Antartide, 53100 Siena, Italy (*e-mail: folco@unisi.it) [2]Space Sciences Laboratory, University of California, Berkeley, CA 94720, USA, (*e-mail: kcwelten@uclink4.berkeley.edu); [3]CAMS, Lawrence Livermore National Laboratory, Livermore, CA 94550, USA.

Introduction: In December 2001, a small (1.5 g) chondrite was found on top of Frontier Mountain (northern Victoria Land) by a PNRA team during a geomorphological survey. The meteorite was sitting on glacially eroded bedrock surfaces at an altitude of 2775 m (i.e., ~600 m above present day ice level), recording a past, yet undated, ice sheet overriding of Frontier Mountain. The meteorite, named Frontier Mountain (FRO) 01149, was classified as an H4 chondrite [1], and shows almost complete oxidation of the metal and sulfides, corresponding to weathering degree W4 on the scale of Wlotzka [2]. A second search effort on top of FRO in 2003 did not yield additional specimens.

Analytical Methods and Results: Due to the high degree of oxidation, an attempt to separate clean metal from ~1 g of this meteorite was unsuccessful. We thus dissolved ~95 mg of the bulk sample for measurements of cosmogenic ^{10}Be, ^{26}Al, ^{36}Cl and ^{41}Ca. In addition, we separated a grain-size fraction of >250 µm and leached this fraction with dilute HCl to remove weathering products and obtain clean silicate grains. We dissolved ~31 mg of this fraction for measurements of cosmogenic ^{10}Be and ^{26}Al. Concentrations of ^{10}Be, ^{26}Al, ^{36}Cl and ^{41}Ca were measured by accelerator mass spectrometry at the CAMS facility at LLNL.

For ^{41}Ca in the bulk sample, we only obtained an upper limit of <0.4 dpm/kg. Since most (if not all) of the metal and troilite in this meteorite was converted to Fe-hydroxides, we assume that the measured value represents ^{41}Ca produced from Fe and Ca in the silicates, whereas ^{41}Ca produced in metal and troilite was lost upon oxidation [3]. This upper limit of 0.4 dpm/kg thus corresponds to <2.4 dpm/kg(Fe+5*Ca). Based on a saturation value of 24 dpm/kg, this value indicates a terrestrial age >300 kyr. The ^{10}Be concentrations of 7.3±0.1 dpm/kg corresponds to a terrestrial age of 1.6-2.2 Myr if we assume a ^{10}Be production rate of 15-20 dpm/kg and an exposure age long enough (>5 Myr) to saturate ^{10}Be. Measurements of ^{26}Al and ^{36}Cl (in progress) are necessary to further constrain the terrestrial age and exposure history of FRO 01149.

Conclusions. If the terrestrial age of ~2 Myr is confirmed by additional radionuclide measurements, FRO 01149 will be the third chondrite from Antarctica with such a high terrestrial age [4,5]. The difference is that the first two, Allan Hills (ALH) 88019 and Lewis Cliff (LEW) 86360 were found on the ice surface and were relatively fresh compared to FRO 01149. The relative freshness of the two old ALH and LEW meteorites led to the conclusion that these two meteorites spent most of their terrestrial residence time traveling within the ice. However, the high degree of weathering and the find location strongly suggest that FRO 01149 fell where it was found and spent most of its terrestrial residence time exposed on bedrock. The terrestrial age of FRO 01149 can thus constrain the last glacial overriding of Frontier Mountain and provide information on the glacial history of northern Victoria Land.

References: [1] Russell S. et al. (2002) MAPS 37, A157-A182. [2] Wlotzka F. (1993) Meteoritics 28, 460. [3] Welten K. et al. (2004) MAPS 39, 481-498. [4] Scherer P. et al. (1997) MAPS 32, 769-773. [5] Welten K. et al. (1997) MAPS 32, 775-780.