TERRESTRIAL AGES OF METEORITES FROM MILLER RANGE, ANTARCTICA

K. C. Welten[1], K. Nishiizumi[1] and M. W. Caffee[2], [1]Space Sciences Laboratory, University of California, Berkeley, CA 94720-7450, USA. [2]PRIME Laboratory, Purdue University, West Lafayette, IN 47907, USA.

Introduction: The ANSMET program has recovered more than 15,000 meteorites from a variety of blue ice fields along the Transantarctic Mountains. It is believed that many of these meteorite-rich blue ice fields are temporary features that formed when the East Antarctic Ice Sheet thinned since the last Glacial Maximum. During several ANSMET search campaigns, almost 700 meteorites have been recovered from the blue ice fields near Miller Range, in the central Transantarctic Mountains. Recent studies of the surface exposure ages of bedrock surfaces above the Miller Range blue ice fields indicate that the surfaces have been ice-free for >1 Myr, suggesting that the East Antarctic Ice Sheet surface elevation has been relatively stable in the last 1-2 Myr, and that the local meteorite stranding surfaces near Miller Range are likely to have been stable for ~1 Myr [1]. To test the hypothesis of the long-term stability of the Miller Range meteorite stranding surfaces, we are determining the terrestrial ages of ordinary chondrites from the Miller Range icefields, by measuring the concentrations of the cosmogenic radionuclides ^{10}Be (half-life =1.36 Myr) and ^{36}Cl (0.301 Myr) in the metal fraction.

Experimental methods: We selected 57 ordinary chondrites >200 g from different parts of the Miller Range stranding area. The meteorites include 27 H, 24 L and 6 LL chondrites. We crushed bulk samples of 2-3 g and separated and purified the metal fraction. We dissolved 50-100 mg of purified metal along with Be, Al and Cl carriers in HNO_3. After dissolution, we separated Cl, and measured ^{36}Cl by AMS at PRIME lab, Purdue University. We report the ^{36}Cl concentrations, while ^{10}Be in selected samples will be measured in the future.

Results and discussion: The ^{36}Cl concentrations in 57 samples range from 8 to 25 dpm/kg[metal], relative to an average saturation value of 22.1 ± 2.8 dpm/kg (2σ). Assuming average shielding conditions and minimum cosmic-ray exposure ages of ~1 Myr, the ^{36}Cl concentrations yield terrestrial ages up to ~420 kyr, while two-thirds of the meteorites are younger than 100 kyr. We will measure the ^{10}Be concentrations in samples with ^{36}Cl concentrations <15 dpm/kg to determine shielding-corrected $^{36}Cl/^{10}Be$-^{10}Be terrestrial ages [2,3], which will be reported at the meeting, and to verify if the Miller Range meteorite collection includes any large chondrite showers [3].

Conclusion: Although the surface exposure ages of some of the surrounding bedrock surfaces near Miller Range suggest that the ice elevation in this area has been relatively stable for the past 1-2 Myr, the terrestrial ages of the Miller Range meteorites are all younger than 450 kyr. Although our sample size of 57 meteorites is rather limited, the terrestrial ages do not provide evidence that the blue ice field has been stable for up to ~1 Myr, but do suggest that the stranding area has been stable for ~0.4 Myr. This is still an upper limit, since some of the older meteorites may have spent a significant part of their terrestrial residence within the ice, traveling from their fall site to the meteorite stranding area.

References: [1] Tan D. et al. 2010. Abstract #2416. 41st Lunar & Planetary Science Conference. [2] Lavielle B. et al. 1999. *Earth and Planetary Science Letters* 107:93-104. [3] Welten K. C. et al. 2006. *Meteoritics & Planetary Science* 41:1081-1094.