

COSMOGENIC RADIONUCLIDES IN BUNBURRA ROCKHOLE ACHONDRITE FALL. K. C. Welten¹, K. Niishiizumi¹, M. W. Caffee², M. M. M. Meier³, P. A. Bland⁴, P. Spurny⁵, ¹Space Sciences Laboratory, Univ. of California, Berkeley, CA 94720-7450, USA. ²PRIME Laboratory, Purdue Univ., West Lafayette, IN 47907, USA. ³Isotope Geology, ETH Zürich, CH-8092 Zürich, Switzerland. ⁴IARC, Dept. of Earth Science & Engineering, Imperial College, London, SW7 2AZ, UK, ⁵Astronomical Institute of the Academy of Sciences, Fričova 298, CA-251 65 Ondřejov Observatory, Czech Republic.

Introduction: In October, 2008, the Bunburra Rockhole (BBR) achondrite fall was recovered in the Nullarbor region of Australia based on fireball data from the Desert Fireball Network [1,2]. It is the first achondrite with an accurately known orbit, which is characterized as an Aten-type orbit. While the mineralogy and bulk composition suggested that BBR is a eucrite, oxygen isotope analysis have indicated it is an ungrouped achondrite [1]. We received a chip of BBR for cosmogenic nuclide analyses. Here we report the cosmogenic radionuclide concentrations, while the noble gas concentrations are reported in [3].

Experimental methods. We dissolved 61.5 mg of BBR along with Be and Cl carriers in HF/HNO₃. After dissolution, we separated Be, Al, Cl, and Ca. An aliquot was taken for chemical analysis. AMS measurements of ¹⁰Be, ²⁶Al and ³⁶Cl were performed at PRIME lab, Purdue University. We report ³⁶Cl, while ¹⁰Be and ²⁶Al results will be reported at the meeting.

Results and discussion. The bulk composition of BBR, including a Fe/Mn ratio of ~32, is consistent with HED meteorites, but does not rule out a distinct ungrouped achondrite. Figure 1 shows that the cosmogenic ³⁶Cl concentration of 16.8±0.8 dpm/kg is consistent with a small pre-atmospheric mass of ~50 kg (R=15 cm), as derived from the fireball data, and thus indicate a minimum CRE age of ~1 Myr. The ¹⁰Be and ²⁶Al data will further constrain the pre-atmospheric size as well as the CRE age of BBR.

References: [1] Bland P. et al. (2009) *Lunar Planet. Sci. Conf.*, 40, #1664. [2] Spurny P. et al. (2009) *Lunar Planet. Sci. Conf.*, 40, #1489. [3] Meier M. et al. (2009) *Meteorit. Planet. Sci.*, (this volume).

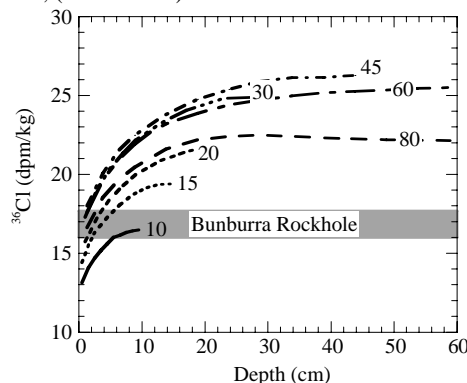


Fig. 1. ³⁶Cl concentration in BBR vs. calculated depth profiles. Table 1. Concentrations of major elements (in wt%) and cosmogenic ³⁶Cl (in dpm/kg) in Bunburra Rockhole.

	Mg	Al	Ca	Mn	Fe	³⁶ Cl	³⁶ Cl*
BBR	3.7	6.2	6.9	0.43	14.0	16.8±0.8	24±1

*normalized to Fe+8Ca