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Cosmogenic $^{36}Cl/^{10}Be$ ratio in the Antarctic ice core during the last deglaciation and early Holocene

SASA, Kimikazu[1*] ; KUROSUMI, Kazuna[1] ; SUEKI, Keisuke[1] ; TAKAHASHI, Tsutomu[1] ; MATSUSHI, Yuki[2] ; TOSAKI, Yuki[3] ; HORIUCHI, Kazuho[4] ; UCHIDA, Tomoko[5] ; MATSUZAKI, Hiroyuki[6] ; MOTOYAMA, Hideaki[7]

[1]University of Tsukuba, [2]Kyoto University, [3]National Institute of Advanced Industrial Science and Technology, [4]Hirosaki University, [5]Tohoku University, [6]The University of Tokyo, [7]National Institute of Polar Research

^{36}Cl is cosmogenic nuclide (half-life:301 kyr) produced mainly by a reaction of $^{40}Ar(p, n\alpha)^{36}Cl$ in the upper atmosphere. Cosmogenic nuclides fall on the Earth's surface at a rate depending on the nuclide production rates and hence reflecting the cosmic ray intensity. Therefore we can reconstruct fluctuations of cosmic ray intensity, by determining the past ^{36}Cl depositional flux. Such fluctuations of cosmic ray intensity may indicate paleo solar activity and/or variations in the Earth's geomagnetic field.

In this presentation, we report the results of cosmogenic ^{36}Cl measurements during 10.55 - 18.42 kyr b2k in the ice core drilled at the Dome Fuji station, Antarctica (Motoyama et al., 2007). ^{36}Cl in the ice was measured with the accelerator mass spectrometry (AMS) system at the University of Tsukuba (Sasa et al., 2010). The results show that ^{36}Cl conc. is 0.21 - 1.80 $\times$ 10^4 atoms g^{-1} and ^{36}Cl flux is 0.54 - 3.25 $\times$ 10^4 atoms cm^{-2} yr^{-1}. The variation of ^{36}Cl flux in early Holocene shows similar fluctuations of ^{10}Be flux in the same ice core. $^{36}Cl/^{10}Be$ is constant at 0.10 $\pm$ 0.01 in early Holocene. This means that this value can be used for radioactive age dating of the old ice core. $^{36}Cl/^{10}Be$ varies in the last deglaciation. It suggests that the decrease in $^{36}Cl/^{10}Be$ ratio is linked to climate change.

Keywords: $^{36}Cl/^{10}Be$, Cosmogenic nuclide, Accelerator Mass Spectrometry, Radiometric age determination, Ice core