Cl-36 flux variations in the Dome Fuji ice core, Antarctica: as a dating tool for deep ice cores

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The concentration of cosmogenic radioisotopes in the ice core provides useful information about the history of cosmic ray flux in the atmosphere that reflects the past solar activity and changes in the Earth's geomagnetic field. We present here the first results of cosmogenic radionuclide ^{36}Cl ($T_{1/2}$ = 301 kyr) measurements in the deep ice core retrieved from Dome Fuji, Antarctica. ^{36}Cl-AMS (Accelerator Mass Spectrometry) has been performed with 100 MeV energy by using a multi-nuclide AMS system at the University of Tsukuba.

The ^{36}Cl concentration records the values of about 1.7 $*10^4$ atoms g^{-1} during the last glacial maximum (LGM), and about 0.14 $*10^4$ atoms g^{-1} in the deepest part of the core at around 3,000 m. There are some correlations between the ^{36}Cl concentration and the paleoclimatic parameter Delta-^{18}O. We converted the ^{36}Cl concentration to ^{36}Cl flux by using the snow accumulation rate as a function of Delta-^{18}O. The ^{36}Cl flux in the deep ice core decreases with increasing age-parameter values calculated from a one dimensional ice-flow model. The whole tendency of the ^{36}Cl reduction agrees well with the theoretical radioactive decay. This result suggests that the ^{36}Cl analysis will provide age constraints for the deep ice core.