Geophysical Research Abstracts, Vol. 8, 05868, 2006 SRef-ID: 1607-7962/gra/EGU06-A-05868 © European Geosciences Union 2006



Optical Scattering Analysis of Dome Fuji Ice Core, Antarctica

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At Dome Fuji, deep ice core was first recovered a 2503m deep during 1994-1996. This core records past 340kyr climate history of the earth. We carried out optical scattering analysis of this ice core using the line scanner developed us which records images of two-dimensional scattering intensity of ice samples. Ice cores used for the measurements were preserved for about 7 years in cold room at -50 degree. In this study we analyzed the core samples of about 50 cm length at an interval of 2m within at depth range from 1690 to 1890 m. Age of the depth range covers from the middle of MIS (Marine Isotope Stage) 5.5, inertglacial stage, to end of the MIS 6, glacial stage. Fine structures were found in the MIS 6 ice samples on the images and faint structure were also found in MIS 5.5 ice samples. Average scattering intensity of the each sample fluctuates with large value in MIS 6 and decreases a stable value toward to MIS 5.5. The general trend of the average scattering intensity profile is similar to the delta 18O and chemical constituent profiles however the average scattering intensity profile shows the decreasing with two drastic fluctuations. In the depth range, scattering sources are considered to correspond microparticles and micro-bubbles, which form around micro-particles. So that scattering intensity depends on distribution and refractive index of the scattering sources however further study will be required to explain this two drastic fluctuations. We also carried out cloudy-clear layer thickness determination using a technique based on image analysis and signal process.