

Spatial and temporal variability of snow accumulation rate and snow chemistry at East Antarctic ice sheet

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Snow stakes along the traverse routes have been observed for long term monitoring program 'the variation of ice sheet surface mass balance' from the 1960's by the Japanese Antarctic Research Expedition in Shirase glacier drainage basin, East Antarctica. During the traverse route between coastal S16 point (69°02'S, 40°03'E, 580m a.s.l.) to inland Dome Fuji (77°22'S, 39°42'E, 3,810m a.s.l.), the snow stake observations every 2 km have been carried out from 1993. Latest stake heights were measured in January 2011 and February 2011. Yearly net snow accumulations from S16 to Dome Fuji were calculated. Heavy snow events were shown in 1998, 2004, 2005, 2008-2009 and 2010. Otherwise, in 1994, 1996, 1999, 2000, 2001, 2002 and 2006, light snow events were observed. They were different in way accumulating spatial pattern depending on places. The yearly accumulation rates were compared with seasonal change of AAO-index (SAM). As a result, yearly accumulation rate and AAO-index showed the positive correlation.

We would indicate the spatial distributions of air parcel origins. So we calculate air transport by using the NITRAM trajectory model (Tomikawa and Sato, 2005) and ERA-Interim meteorological data set in 1990-2009. The time duration is 5 days and we suppose the origin of air parcel is the point of trajectory at 5 days ago. The starting points are distributed on 1 deg. x 1 deg. grids over Antarctica and its altitude is 1,300m above the surface. We indicate the spatial distributions of air parcel origins to Antarctica. If there were high ratios of sea origin atmosphere in the inland, there was much snow. It is indicated that the humid air from the sea is the main origin of snowfall. But such relations were not seen on the coast.

We try to understand the cause of heavy snow and light snow event with snow chemistry.

Keywords: Antarctic ice sheet, snow accumulation rate, snow chemistry, spatial and temporal variability