

Reconstruction and fluctuation mechanism of past aerosols preserved in ice cores

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Ice cores can reconstruct past atmospheric environment. One of advantages for ice core archive is to reconstruct past gas and aerosols, which are important factors for evaluation of global warming. Antarctica and Greenland ice sheets have some ice domes (summit), where are useful sites for ice core drilling due to high elevation. Highland in the ice sheets can reconstruct wider emission area around the drilling sites.

At first, we will review some famous papers how reconstruct past aerosols from Antarctic dome ice cores. Antarctic dome cores can reconstruct recent 800 kyr BP, and aerosol fluctuation preserves in the cores along eight glacial-interglacial periods. Ice core community turns for obtain old ice archive in inland Antarctica (oldest ice project), so that Antarctic deep ice cores are one of topics for the ice core community.

Then, we will talk about our present project of Greenland SouthEastern Dome shallow ice core project (SE-Dome project). The SE-Dome has a huge accumulation rate (about 1.0 m water equivalent per year), where is about 4 time compared to ordinal Greenlandic dome ice cores, and 30 times to Antarctic ice cores. High accumulation dome has an advantage to reconstruct high-time resolution (e.g. seasonal scale) of recent epoch such as Anthropocene (AD 1750 to present). We obtained a 90 m ice core from the SE-Dome site in 2015, and then reconstructed aerosol fluctuations with seasonal scale from 1960 to 2014. As a result, sulfate flux responds to the decreasing trend of SO_x emissions, but the nitrate flux does not follow the decrease in NO_x. We have a plan in 2020 for next drilling of about 300 m ice core to reconstruct aerosol fluctuation with seasonal scale over the Anthropocene. We are looking for new joint studies using the ice core with members in the community of atmospheric chemistry.

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