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Detecting new particle formation in Antarctica

Airmodus A11 nCNC system was one of the research instruments used during the FINNARP2014 Antarctic expedition. The goal of the aerosol scientists participating the expedition was to determine the processes leading to new particle formation in the extremely clean air of the Antarctica.

To understand how new particles are formed in the atmosphere, i.e. why the gas-to-particle transformation events occur, it is important to monitor both the gas phase precursors and the aerosol population very carefully. The Finnish expedition was well equipped to do this: never before has such a wide range of extremely sensitive instruments been used in Antarctica *(e.g. DMPS, NAIS, APi-TOF, CI-APi-TOF and two Airmodus A11 nCNC systems. A11 nCNC provides the activation size distribution of 1 -3 nm aerosol particles).*

Researcher Tuija Jokinen from the University of Helsinki was one of the 13 people on the expedition. She spent almost three months in the Finnish Antarctic research station Aboa. Aboa, built in 1988, is located on Basen Nunantak in Queen Maud's land, Antarctica, about 15 000 km from Finland. "Despite the long storage time, transportation by boats, airplanes and snowmobiles and harsh weather conditions, all instruments worked perfectly after setting up. Only a few short power cuts occurred during the whole campaign. Other than that we did not have to worry about the measurements", she says. There were some exiting moments though, since the nature can be as harsh as it is beautiful. "During the 'white outs' the only way to find our way to the instrument container and back to the station which were only 200 m apart, was to follow the power cables. You really could not see anything!"

The measurements continued for 11 weeks. For approximately three weeks the winds were circulating the research station bringing exhaust fumes from the generator to the measurement station. "This was a good check to see that all instruments react to anthropogenic emissions the way they should" Tuija states, and continues "The rest of the campaign was devoted to studying the particle precursors and nanoparticle formation at Antarctica." Data measured on one of the days when the wind was from the research station is shown in the figure on the right.

"Now I have visited every continent, which is a great achievement considering my previous fear of flying" says Tuija.

Next Tuija Jokinen will head to Station Nord in northern Greenland, where she will also be using the A11 nCNC system among other exiting aerosol instruments.

Photographs on the right:

"Flying in the ski plane was a great experience" – Tuija Jokinen.

Photo of MSc Tuija Jokinen.

The instruments waiting in transport boxes for the researchers outside the measurement container, and installed in the container. In the photos also PhD Mikko Sipilä, University of Helsinki.

Photographs and the data figure courtesy of Tuija Jokinen.

Read more on Aboa and the FINNARP 2014 expedition on www.antarctica.fi.

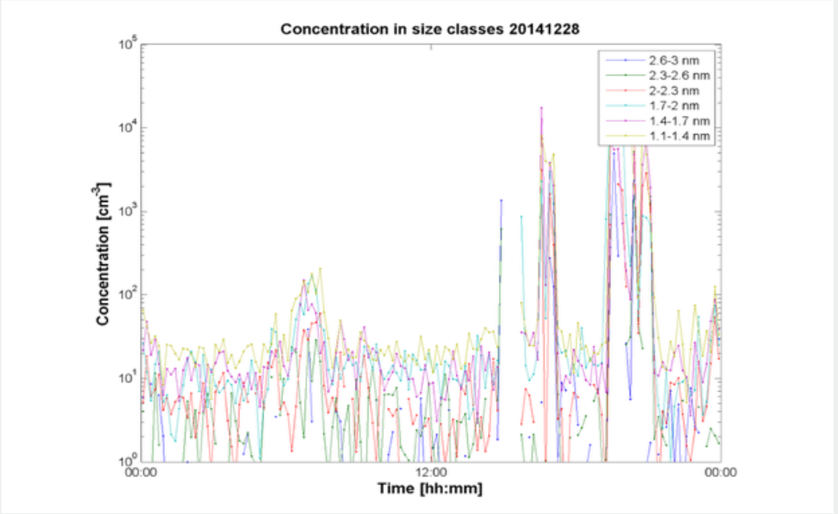

Figure above: one day of nCNC data: in the morning there was a minor new particle formation event, in the afternoon the wind was from the research station and the small particles emitted by the diesel generator are clearly visible.