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A FUTURE PLAN FOR ATMOSPHERIC OBSERVATIONS USING UMMANNED AIRCRAFT (ABSTRACT)

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Atmospheric observations using unmanned aircraft have been planned for the polar atmospheric sciences, firstly in the Arctic under the "International Cooperative Research on Arctic Environment Observations". The plan is to obtain the three-dimensional distribution of atmospheric parameters such as concentration of greenhouse gases, aerosols, water vapor and radiation. In the Arctic, we have been observing CO₂ and CH₄ concentration by air sampling, continuous measurement of surface ozone, measurements of cloud, aerosols and radiation at the surface of Ny-Ålesund, Svalbard. In addition, it is indispensable to have the vertical and horizontal distribution of these parameters in order to know the transportation process or material cycle. The observation flights are to be made from the northern coast of Norway passing over the Greenland Sea and Svalbard to the Arctic Ocean. The higher priorities are the sinks and sources of CO₂, spring depletion of surface ozone, mechanism of stratospheric ozone hole and dynamics of Arctic haze. The aircraft to be used is "Perseus B" of Aurora Flight Sciences (Manassas, Virginia, U.S.A.), developed at the beginning of the 1990s, aiming to reach higher than 20 km in the stratosphere with low-cost by a remotely piloted system. This aircraft will have a long flight duration, about 40 hours, and range of about 10000 km at an altitude of 15 km with a payload of 150 kg. However, the payload section is limited to only about 0.2 m³. A new compact air sampling system with a cryogenic pump using the Joule-Thomson effect of highly pressurized neon is also under development at NIPR.

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