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Simultaneous profiling of the Arctic Atmospheric Boundary Layer

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The structure of the Arctic atmospheric boundary layer (AABL) and the heat and moisture fluxes between relatively warm water and cold air above non-sea-ice-covered water (such as fjords, leads and polynyas) are of great importance for the sensitive Arctic climate system. So far, such processes are not sufficiently resolved in numerical weather prediction (NWP) and climate models. Especially for regions with complex topography as the Svalbard mountains and fjords the state and diurnal evolution of the AABL is not well known yet.
Knowledge can be gained by novel and flexible measurement techniques such as the use of an unmanned aerial vehicle (UAV). An UAV can perform vertical profiles as well as horizontal surveys of the mean meteorological parameters: temperature, relative humidity, pressure and wind.
A corresponding UAV called Small Unmanned Meteorological Observer (SUMO) has been developed at the Geophysical Institute at the University of Bergen in cooperation with Müller Engineering (www.pfump.org) and the Paparazzi Project (http://paparazzi.enac.fr).
SUMO will be used under Arctic conditions in March/April 2009. This time the special purpose will be to send two SUMOs simultaneously on mission; one over the ice and snow-covered land surface and the other one above the open water of Isfjorden. This will be the first step of future multiple UAV operations in so called “swarms” or “flocks”. With this, corresponding measurements of the diurnal evolution of the AABL can be achieved with minimum technical efforts and costs.