CATS-BL

CATS – Boundary Layer Measurements in the High Arctic

Principal investigator

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Areas of contribution

Polar atmospheric processes

Summary

The goal is the generation of a new data set of in-situ observations in the high Arctic for the verification of regional climate models and process studies. We plan measurements of the atmospheric boundary layer (ABL) structure for one year (Sept. 2017–Sept. 2018) at the Russian station Cape Baranov, which is one of the northernmost observatories in the Arctic. The measurements are part of the project CATS (Changing Arctic Transpolar System) as a joint effort of AARI, Russia, and the University of Trier, Germany.

Description

The representation of the atmospheric boundary layer (ABL) in the Arctic is a major challenge for numerical weather forecast models and regional climate models. Reference data sets with high temporal and spatial resolution for the ABL in the high Arctic are rare. Standard measurements using radiosondes yield typically one or two profiles per day.
We plan measurements of the atmospheric boundary layer (ABL) structure for one year (2017–2018) at the Russian station Cape Baranov by using a SODAR (Sound Detection And Ranging), a RASS (Radio Acoustic Sounding System) and large-aperture boundary layer scintillometer (BLS). The research station Cape Baranov is located on Bolshevik Island (Severnaya Zemlya) in the western Laptev Sea and is one of the northernmost observatories in the Arctic (79°18’N, 101°48’E).

A SODAR is a ground-based remote sensing instrument which measures the Doppler signal of sound returns, which are used to derive vertical profiles of the wind speed, wind direction and the turbulence characteristics with a vertical resolution of 10 m. The RASS extension allows for the determination of the temperature profile with the same resolution. The time resolution for RASS and SODAR profiles will be 15-20 minutes. The height range is typically around 500 m. In addition, the BLS will be used to measure line-averaged sensible heat fluxes. These measurements will be complemented with operational observations during 2017–2019 at the observatory Cape Baranov. The SODAR/RASS and the BLS will be installed end of September 2017 and will be operated for one year. The data will be used for the verification of simulations using a high-resolution regional climate model and for process studies. The measurements will cover the YOPP Special Observing Periods (SOPs) in the Arctic (Feb-Mar 2018 and Jul-Sep 2018).

**Timeline**

2017-09-25 - 2018-09-29

**Regional emphasis**

Northern hemisphere: Yes

Southern hemisphere: No

**Further specification**

Laptev Sea

**Key project deliverables**

Profiles of wind speed, wind direction, turbulence and temperature in the atmospheric boundary layer with high spatial (10 m) and temporal resolution (15-20 min). Line-integrated sensible heat flux.
Data management

PANGAEA
All data will be stored at data servers of AARI and at the University of Trier. After a thorough quality control, processing and publication in a peer reviewed journal, the processed data will be stored and made publically available in the PANGAEA data base.

Is data provided to WMO Global Telecommunication System
No

Real-time provision
No