

ASPIRE

Antarctic Meteorology and Snow Research: from Process Understanding to Improved Predictions

<http://polar-meteorology.fmi.fi/>



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Areas of contribution

User-aspects and verification

Polar atmospheric processes

Modelling and forecasting

Polar-lower latitude linkages

Education

Observations

Land processes

Data assimilation

Data archiving

Outreach

Summary

ASPIRE will address the Antarctic atmosphere and snow. The work will result in better understanding of

physical processes as well as in parameterizations and post-processing methods applicable in weather prediction.

Description

The objectives of ASPIRE are (i) to obtain better knowledge on physical processes of Antarctic snow, atmospheric boundary layer (ABL), clouds, as well as atmospheric dynamics and transports, and (ii) to use this knowledge in improving weather and climate predictions.

To meet these objectives, we will have the following Work Packages (WP):

WP1. Microphysics and albedo of Antarctic snow

- processes controlling snow metamorphism and temporal evolution of snow albedo
- contribution to construction of an open-access pan-Antarctic database of co-located snow albedo and snow microphysical measurements

WP2. ABL

- processes in stably-stratified ABL, including interaction of gravity waves and turbulence, and decoupling of air and snow surface under very stable stratification
- interaction of ABL structure, turbulence, radiative transfer and clouds

WP3. Atmospheric dynamics and transports

- moisture transport from southern mid-latitudes to Antarctic; magnitude, variability, vertical profile, and impacts on Antarctic clouds and precipitation
- effects of Antarctic on weather and climate in southern mid-latitudes

WP4. Improved weather predictions

- evaluation of numerical weather prediction (NWP) models
- improvement of parameterization schemes for snow, surface albedo, and ABL
- post-processing of model output; downscaling and correction for systematic errors.

These activities contribute to the objectives of YOPP (as defined in the YOPP Implementation Plan).

ASPIRE will be carried out in extensive international collaboration, among others with three SCAR Action/Expert Groups: Snow in Antarctica, Antarctic Clouds, and Operational Meteorology in the Antarctic, utilizing observations from Finnish, British, French/Italian, Belgian, German, U.S., Japanese, and Chinese Antarctic stations. ASPIRE will focus on the Southern Hemisphere, but the research will strongly benefit from the team's analogous activities in the Arctic, and yield results applicable also for Northern Hemisphere weather prediction.

Timeline

2017-01-01 - 2020-12-25

Regional emphasis

Northern hemisphere: No

Southern hemisphere: Yes

Key project deliverables

1. Contribution to construction of an open-access pan-Antarctic database of co-located snow albedo and snow microphysical measurements
2. Data from field campaigns at the Finnish Antarctic station Aboa in Dronning Maud Land: snow microstructure and spectral albedo (at Aboa and along a 400-km-long transect), radiative and turbulent surface fluxes, vertical profiles of air temperature, humidity and wind (based on weather mast, sodar, and UAVs), cloud base height, gravity waves (as observed by a group of sodars).
3. Improved snow albedo and atmospheric boundary layer parameterization schemes applicable in NWP models
4. Improved schemes for post-processing of NWP model results

Data management

Finnish Meteorological Institute

Is data provided to WMO Global Telecommunication System

No