

Announcement of the Sodankylä summer school
“PBLs over complex and vegetated land surfaces”
in the framework of
Marie-Curie Excellence Chair project PBL-TMRES (Planetary Boundary Layers - Theory, Modelling and Role in Earth System) of Prof. S. Zilitinkevich
and
Nordic Network on Fine Scale Atmospheric Modelling (NetFAM)

Date: June 4-14, 2005

Location: Sodankylä Observatory (Northern Finland, **67.37°N, 26.63°E**)

Observatory activities: Pallas-Sodankylä GAW station, Sodankylä Meteorological Observatory, Micrometeorological mast, Finland UV International Research Infrastructure, Sodankylä Satellite Data Centre. (http://www.fmi.fi/view/research_polar/polar_2.html)

Micrometeorological mast (48 m): close to the observatory situated in a Scots pine forest. The measurements at the mast include eddy-covariance fluxes of CO₂, latent and sensible heat and momentum, radiation components, and gradients of the CO₂ concentration, temperature and wind. Ambient air ozone concentrations and also gradients in the mast are measured continuously and the number concentration of condensation nuclei is measured on a campaign basis. Soil measurements include temperature and volumetric moisture gradients, heat flux and soil CO₂ efflux by an automated chamber.

Facilities: Guest rooms for visitors, local secretary....

Attraction: remote and pristine atmosphere of Lapland (<http://www.sodankyla.fi/english.php>), Midnight sun period (non-nocturnal stable PBL), (<http://tourism.rovaniemi.fi/?depid=6335>), boreal and tundra ecosystems, the Midnight Sun Film festival (<http://www.msfilmfestival.fi/>), Santa Claus village close-by.

Scope and purpose of the Summer school:

The importance of the accurate and full description of Planetary Boundary layers (PBL) processes in a vast variety of numerical models (NWP, GCM, air pollution transport and dispersion) is increasing constantly as the resolution of models increases and the needs of various holders widen and deepen. This also imposes to cope with the actual complexity of natural surfaces (heterogeneity, high surface elements, time- and space variability of surface characteristics on various scales). This requires new theoretical developments and paradigms as well as new and more representative data tailored for the various needs of models. It is thus important that the new generation of students and young scientists involved with these issues get an up-to-data training on recent developments in connection with various applications.

The purpose of the summer school is to present in an integrated way the various aspects and challenges of PBL modelling, theory, empirical description and measurements for describing and simulating PBL over complex surfaces such as natural vegetated landscape and cities. International experts will deliver comprehensive lectures on these various theoretical and practical aspects of the PBL problematic in the field and models. Practical works will be also organised using the micrometeorological mast data and instruments. Students will have the possibility to present their work on PBL for exchange of experience and views.

Preliminary programme:

1. General lectures (17 hours):

- 1.1 The PBL over complex surface: background, challenges and gaps (6 hours):
Sergej Zilitinkevich (Univ. of Helsinki, Finnish Meteorological Inst.)
- 1.2 The urban PBL: structure and modelling (3 hours):
Alexander Baklanov (Danish Meteorological Inst.)
- 1.3 Aggregating fluxes and surface characteristics of heterogeneous surface (3 hours)
Niels-Otto Jensen (Risø National Laboratory, DK)
- 1.5 Exchange of momentum, heat and mass by forest canopies (3 hours)
Timo Vesala (Univ. of Helsinki)
- 1.6 Mesoscale effects and PBL (2 hours)
Hannu Savijärvi (Univ. of Helsinki)

2. Research application lectures (15 hours):

- 2.1 Modelling transient surface characteristics such as snow cover and wetted vegetation (2+1 hours):
Timo Vihma (FMI) & Patrick Samuelsson (SMHI)
- 2.2 LES simulations of stable PBL (2 hours)
Igor Esau (NERSC, Bergen, NO)
- 2.3 High-resolution simulation of interactions in the urban canopy and boundary layer (2 hrs)
Alberto Martilli (CEAM, Spain)
- 2.4 The ISBA scheme, related surface data assimilation and surface description (ECOCLIMAP)
(2 hrs) Ernesto Rodriguez (INM, Spain)
- 2.5 Momentum fluxes in HIRLAM (1 hr)
Niels Woetman Nielsen (DMI, DK)
- 2.6 Modelling of fluxes in models: comparisons vs. field data (1 hr)
Hannu Savijärvi (Univ. of Helsinki)
- 2.7 Mesoscale processes and modelling of the urban PBL (2 hours)
Robert Bornstein (California State Univ. San Jose)
- 2.8 Radiation and stable PBL (2 hours)
Hannu Savijärvi (Univ. of Helsinki)

3. Practical sessions (15 hours):

- 3.1 Sodankylä micrometeorological mast instrumentation, data logging & gathering, data analysis
Markku Kangas & Mika Aurela (FMI)
- 3.2 Working sessions
 - Working session on Northern Temperature Problems in HIRLAM – ARPEGE
 - Working session on urban meteorology (incl. FUMAPEX): linkages between NWP-air quality models, e.g.: treatment of cities in NWPs, met data for urban areas
- 3.3 Seminars and exercises
 - Scientific presentations by students/young researchers for discussing specific problems
 - Practical exercises