Atmospheric planetary boundary layers: physics, modelling and role in Earth system

Fact Sheet

Project Information

PBL-PMES

Grant agreement ID: 227915

Project closed

Start date
1 January 2009

End date
31 December 2013

Funded under
Specific programme: "Ideas" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

Total cost
€ 2 390 000,00

EU contribution
€ 2 390 000,00

Coordinated by
ILMATIETEEN LAITOS
Finland

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Objective

This project aims to systematically revise the planetary-boundary-layer (PBL) physics accounting for the non-local effects of coherent structures (long-lived large eddies especially pronounced in convective PBLs and internal waves in stable PBLs). It focuses on the key physical problems related to the role of PBLs in the Earth system as the atmosphere-land/ocean/biosphere coupling modules: the resistance and heat/mass transfer laws determining the near-surface turbulent fluxes, the entrainment laws determining the fluxes at the PBL outer boundary, the PBL depth equations, and turbulence closures. In this project the first round of revision will be completed, the advanced concepts/models will be empirically validated and employed to develop new PBL parameterization for use in meteorological modelling and analyses of the climate and Earth systems. The new parameterizations and closures will be implemented in state-of-the-art numerical weather prediction, climate, meso-scale and air-pollution models; evaluated through case studies and statistical analyses of the quality of forecasts/simulations; and applied to a range of environmental problems. By this means the project will contribute to better modelling of extreme weather events, heavy air pollution episodes, and fine features of climate change. The new physical concepts and models will be included in the university course and new textbook on PBL physics. This project summarises and further extends our last-decade works in the PBL physics: discovery and the theory of the new PBL types of essentially non-local nature: long-lived stable and conventionally neutral ; quantification of the basic effects of coherent eddies in the shear-free convective PBLs including the non-local heat-transfer law; physical solution to the turbulence cut off problem in the closure models for stable stratification; and discovery of the stability dependences of the roughness length and displacement height.

Fields of science (EuroSciVoc)

natural sciences > earth and related environmental sciences > atmospheric sciences > meteorology > **biosphera**

engineering and technology > environmental engineering > **air pollution engineering**

natural sciences > earth and related environmental sciences > environmental sciences > **pollution**

natural sciences > earth and related environmental sciences > atmospheric sciences > climatology > **climatic changes**

social sciences > **law**

Keywords

boundary layer | eddies | forecasting | meteorological modeling | mixing height | pollution episodes | simulations | stable | turbulence

Programme(s)

FP7-IDEAS-ERC - Specific programme: "Ideas" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

Topic(s)

ERC-AG-ID1 - ERC Advanced Grant Interdisciplinary Panel

Call for proposal

ERC-2008-AdG
See other projects for this call

Funding Scheme

ERC-AG - ERC Advanced Grant

Host institution

ILMATIETEEN LAITOS

EU contribution

€ 2 390 000,00

Total cost

No data

Address

Erik Palmenin aukio 1
00560 Helsinki
Finland

Region

Manner-Suomi > Helsinki-Uusimaa > Helsinki-Uusimaa

Activity type

Research Organisations

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Beneficiaries (1)

ILMATIETEEN LAITOS

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