Level: bachelor

Course title: Modelling of physical processes in the atmosphere I

Status: obligatory

ECTS: 6

Requirements:

Learning objectives

Students acquire knowledge about modelling and parameterization of surface processes. Main aim of this course is to inform students about the basic equations of atmospheric boundary layer, schemes for parameterization of surface processes, dry and wet convective adjustment and modelling of atmospheric radiation. After graduation, one is well educated and becomes an expert prepared for practical work, with high level of understanding the essentials of atmospheric physics and able understand the state-of-the-art developments.

Learning outcomes

One has the ability to understand and analyze processes in Earth-atmosphere system and competence for current problems in modelling atmospheric processes. In addition, one is prepared to use the known solutions in new problems, as well as to use atmospheric and climate change models. Furthermore, one is qualified to work in various scientific institutes, agricultural institutes and institutes for monitoring and environmental protection. One has the ability for independent work and further improvement.

Syllabus

Modelling of surface processes. Vertical transport of water in soil. Equation for Fick's diffusion. Darsy's law. Parameterization of water potential and water properties of soil in the scheme for the interaction of soil and atmosphere. Parameterization of the horizontal and surface outflow. Methods of treatment of moisture transport. Transport of water within the plant canopy. Resistance representation.

Parameterization schemes for surface processes. The basic classification. Parameterization of the processes within the vegetation and bare soil, and above the bare soil. Parameterization of hydrology in different schemes. Implementation of surface schemes in atmospheric, hydrological models and models for environmental protection.

The basic equations of atmospheric boundary layer. The coefficient of roughness. The surface fluxes based on the theory of similarity. Height of the atmospheric boundary layer in an unstable atmosphere. Height of boundary layer in a stable atmosphere.

Weekly teaching load				Other:
Lectures: 3	Exercises: 3	Other forms of teaching:	Student research:	