Department of Physical Geography and Geoecology

Academic year 2017/2018

Head of department

Doc. Mgr. Václav Treml, Ph.D.
E-mail: vaclav.treml@natur.cuni.cz; Phone: (+420) 221 951 985
Albertov 6, 128 43 Praha 2, Czechia

The department of Physical Geography and Geoecology is the largest department teaching physical geography in the Czech Republic and provides all levels of tertiary education (Bachelor's, Master's, Ph.D.). Teaching And research cover all the main branches of physical geography: Biogeography, Climatology, Geomorphology, Hydrology and Soil science. Four full professors and five associated professors are currently affiliated with the department. The department has active collaboration with numerous institutions over the world and hosts foreign students within the Erasmus and other programs.

TEACHING

Bachelor's programs: Geography and Cartography, Physical Geography and Geoinformatics, Surface water and groundwater, Geosciences
Master's programs: Physical geography and geoecology, Hydrology and hydrogeology, Landscape and society
Ph.D. program: Physical geography

Courses at Bachelor's level are mostly taught in Czech, lectures at Master's level are provided either in Czech or on a bilingual basis. Courses provided exclusively in English are: Selected chapters in Physical Geography of Czechia, Hot topics in Physical Geography, Hydrological modelling, Geographical colloquium. For a full list of courses please see:
https://www.natur.cuni.cz/geography/physgeo/study.

MAIN RESEARCH DIRECTIONS

Natural hazards
Floods, droughts, storms, mass movements, glacial lake outbursts and their impacts on the landscape and society
Glacial and periglacial geomorphology, Quaternary science
Deglaciation and its impact on landscape evolution, climate system and biotic migrations

Hydrology
Landscape changes and rainfall-runoff processes, snow accumulation and snowmelt, water quality

Climatology
Large-scale circulation patterns, statistical climatology

Landscape evolution and palaeoenvironment
Palaeoenvironmental reconstructions, soil erosion and accumulation events, tectonics and landscape evolution

Advanced technology in geographical research
Applications of unmanned aerial vehicles (UAV), advanced geophysical methods in geomorphology and soil science

Biogeography and landscape ecology
Response of forest ecosystems to climate change, landscape structure and animal migrations

Department of Physical Geography and Geoecology

Academic year 2017/2018

REGIONS OF INTEREST

Central Europe
High mountains (Andes, Tian-Shan, Western Carpathians)
High latitude and polar regions (Svalbard, Antarctic peninsula, Scandinavia, Canada)

RESEARCH FACILITIES

- Laboratory of physical geography (equipment for sediment and soil analysis)
- Dendrochronological laboratory (fully equipped lab for standard and wood-anatomical methods)
- EcoHydro Lab (basic hydrochemical analyses)
- Monitoring networks of rainfall-runoff and climatologic processes (several catchments in the Czech Republic, Peruvian Andes, Tian-Shan)
- UAV with multiple sensors
- Ground penetrating radar and other geophysical devices

RECENT RESEARCH HIGHLIGHTS

Biogeography

Hulva, P., et al. incl. Zýka, V., Romportl, D. (2017). Wolves at the crossroad: fission-fusion range biogeography in the Western Carpathians and Central Europe. *Diversity and Distributions* 24, 179-192

Treml, V., Veblen, T.T. (2017). Does tree growth sensitivity to warming trends vary according to treeline form? *Journal of Biogeography* 44, 1469-1480.

Cuny, H., et al. incl. Treml, V., (2015). Woody biomass production lags stem-girth increase by over one month in coniferous forests. *Nature Plants* 15160, DOI: 10.1038/NPLANTS.2015.160.

Climatology

Stryhal, J., Huth, R. (2018). Trends in winter circulation over the British Isles and central Europe in twenty-first century projections by 25 CMIP5 GCMs. *Climate Dynamics*, doi: 10.1007/s00382-018-4178-3

Stryhal, J., Huth, R. (2017). Classifications of Winter Euro-Atlantic Circulation Patterns: An Intercomparison of Five Atmospheric Reanalyses. *Journal of Climate* 30, 7847-7861

Geomorphology

Menounos, B., Goehring, B.M., Osborn, G., Margold, M., et al. (2017). Cordilleran Ice Sheet mass loss preceded climate reversals near the Pleistocene Termination. *Science* 358, 781-784.

Margold, M., Jansen, J.D., Codilean, A.T., Preusser, F., Gurinov, A.L., Fujioka, T., Fink, D. (2018). Repeated megafloods from glacial Lake Vitim, Siberia, to the Arctic Ocean over the past 60,000 years. *Quaternary Science Reviews* 187, 41-61.

Engel, Z., Mentlík, P., Braucher, R., Minár, J., Laetitia, L., AsterTeam. (2015). Geomorphological evidence and ^{10}Be exposure ages for the Last Glacial Maximum and deglaciation of the Velká and Malá Studená dolina valleys in the High Tatra Mountains, central Europe. *Quaternary Science Reviews* 124, 106-123

Hydrology

Jenicek, M., Seibert, J., Staudinger, M. (2018). Modeling of future changes in seasonal snowpack and impacts on summer low flows in Alpine catchments. *Water Resources Research* 54, 538-556.

Su, Y., Langhammer, J., Jarsjo, J. (2017). Geochemical responses of forested catchments to bark beetle infestation: Evidence from high frequency in-stream electrical conductivity monitoring. *Journal of Hydrology* 550, 635–649.

Vlček, L., K. Falátková, P. Schneider (2017). Identification of runoff formation with two dyes in a mid-latitude mountain headwater. *Hydrology and Earth System Sciences*, 21: 3025–3040.

Department of Physical Geography and Geoecology

Academic year 2017/2018

RESEARCH GROUPS

Climatology and meteorology research group

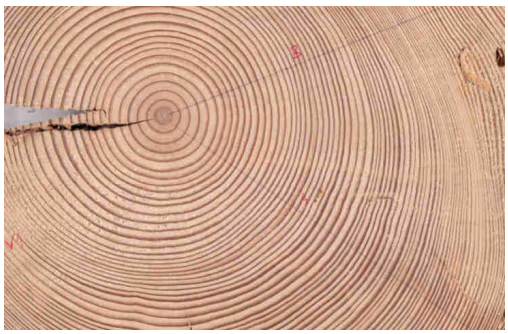
Climatology and meteorology group deals with the climate-change dynamics, circulation patterns and meteorological hazards. The basic and applied research is focused on the following topics:

- Climate change detection
- Statistical modelling of climate
- Variability in circulation patterns
- The influence of solar activity on the troposphere
- Meteorological extremes and their causes, climatology
- Relations between meteorological, hydrological and geomorphological extremes

GeoBio (Landscape ecology, Biogeography, Soil science)

GeoBio focuses on natural processes at the landscape level with emphasis on the human impact on these processes. The basic and applied research is focused on the following topics:

- Monitoring and modelling of the impact of land cover changes on landscape functions
- Dendrochronology – response of forests to climate change
- Influence of landscape structure on biotic migrations
- Assessment of the relationship between geodiversity and biodiversity at the landscape level
- Landscape classification and typology
- Dynamics of land cover in extreme conditions (alpine timberline, former mining areas)
- Long-term evolution of selected characteristics of soils and vegetation in relation to the human impact



Department of Physical Geography and Geoecology

Academic year 2017/2018

RESEARCH GROUPS

Geomorphology and Geodynamics research group

The Research Group of Geomorphology and Geodynamics focuses on the Quaternary landscape evolution and on geomorphological and geodynamical processes related to natural hazards. The basic and applied research is focused on the following topics:

- Regional deglaciation history (Central Europe, Peruvian Andes, northern North America)
- Glacial mass balance in polar regions
- Palaeoenvironmental significance of patterned ground Mass movements
- Interplay between neotectonic and climatic processes
- Palaeoelevation histories investigated by radiometric dating, thermochronology and geochemical exhumation methods

Hydrology research group

Research group of hydrology is studying hydrological and hydrometeorological processes. The main research topics solved within the framework of domestic and international projects are:

- Impact of landscape changes on rainfall-runoff processes and flood risk
- Retention potential of headwater areas and flood plains
- Dynamics of snow cover accumulation and melting processes in mountain areas
- Natural hazards and risk in alpine regions, including glacial lake outburst floods
- Erosion and transport of material through river catchment
- Hydromorphological monitoring of streams and restoration of fluvial ecosystems
- Water quality changes in surface waters

Department of Physical Geography and Geoecology
Charles University, Faculty of Science
Albertov 6, 128 43 Praha 2, Czech Republic

Phone.: (+420) 221 951 366; (+420) 221 951 367
e-mail: kfgg@natur.cuni.cz

http://www.natur.cuni.cz/geography/physgeo