

CURRENT LIST OF TOPICS IN 2017, DOCTORAL SCHOOL OF ENVIRONMENTAL SCIENCES

<i>supervisor</i>	<i>supervisor's e-mail address</i>	<i>topic</i>	<i>description</i>	<i>place of research</i>	<i>knowledge of English required</i>	<i>knowledge of other language appreciated</i>	<i>professional requirements</i>
Péter Csontos	cspeter@caesar.elte.hu	Weed ecology with special attention to soil seed banks	Weeding is one of the major problems in agriculture worldwide. Their major harmful effect is expressed via yield loss of the cultivated plants, although some weeds also responsible for human health damage via allergenic pollens. Most of the weeds are annual species with high rate of seed production, and they maintain their presence in crop fields using two main modes, that are: (1) maintaining autochthonous soil seed banks, and (2) establishing themselves from allochthonous seed rain. Within the PhD research some selected weed species will be studied from seed ecological points of view. A successful candidate will be experienced with field study design and subsequent collection and analysis of seed and soil samples as well as biomass allocation measurements on weeds under various ecological conditions. Travel to field sites is required. Successful applicants will have ample opportunity to learn a large scale of methods and data analyses in seed ecology and will be introduced to scientific paper writings.	Institute for Soil Science and Agricultural Chemistry, Centre for Agricultural Research, Hungarian Academy of Sciences	at least B2 level		Applicants must possess a high degree of motivation and self-reliance. MSc in agriculture, biology, horticulture or a related field and an outstanding work ethic is required. Experience of working with data sets would be an advantage.
Tamás Turányi	turanyi@chem.elte.hu	Reaction kinetics of nitrogen compounds in combustion systems	NO emitted to the atmosphere causes photochemical smog and acid rain, while N ₂ O is a greenhouse gas, which is 300 times more effective than CO ₂ . The most significant source of NO in the atmosphere is combustion, mainly furnaces and internal combustion engines. A great part of N ₂ O is also produced during combustion. The aim of the research project is the elaboration of a detailed chemical kinetic model that quantitatively describes the formation of NO and N ₂ O in combustion systems from the nitrogen content of the air and the fuel, and also the conversion of the nitrogen compounds formed back to N ₂ .	Chemical Kinetics Laboratory, Institute of Chemistry, ELTE H-1117 Budapest Pázmány Péter sétány 1/A Hungary	at least B2 level		
Tamás Turányi	turanyi@chem.elte.hu	Modelling of the combustion of butanol	Butanol and ABE (mixture of acetone, butanol and ethanol) are new generation biofuels. The task is the development of a new detailed reaction mechanism for the description of the combustion of butanol and ABE; testing this mechanism against literature experimental data and reduction of the mechanism for CFD calculations.	Chemical Kinetics Laboratory, Institute of Chemistry, ELTE H-1117 Budapest Pázmány Péter sétány 1/A Hungary	at least B2 level		
Tamás Weidinger	weidi@caesar.elte.hu	Applied micrometeorology	Measurement and modelling of the surface-biosphere-atmosphere interactions and planetary boundary layer (PBL) processes are important topics. In the past few years we took part in several national and international research programs. Modelling (SVAT, 1D PBL, WRF), measurement (radiation budget, eddy covariance, UAV instruments) and method-developments are also performed within our team. The concrete topics will be selected after discussion with the candidate. Few suggested themes: (i) development of reference surface energy budget and PBL datasets and application in optimization of NWP turbulence parametrizations; (ii) development of UAV and quadrocopter based measuring system for PBL measurements; (iii) optimization of wind- and solar energy forecast based on numerical model results, micrometeorological measurements, wind turbine and solar power plant production datasets.	Department of Meteorology ELTE	Excellent command of English	German, Spain	taking part in field measurements, knowledge of programming languages (FOTRTRAN, Basic, etc.), skills in database-management systems

Csaba Szabó	cszabo@elte.hu	Urban geochemical studies in polluted cities	The main aim of this project is to study urban soils and dusts in highly industrialized cities in the past, and figure out connection between industrial activities and spatial and temporal distribution of potentially toxic elements. A further objective of the study is to distinguish anthropogenic and natural sources of these elements using chemical (major and trace element composition of bulk samples and phases), physical (grain size and shape of particles) and statistical (univariate summary statistics, correlation and multivariate analysis, mapping) analyses.	Lithosphere Fluid Research Lab, Institute of Geography and Earth Science, Eötvös Loránd University	at least B2 level		MSc thesis in geology or environmental science or chemistry, previous experience in field work, sampling, stereo microscopy or analytical lab
Assoc. Professor Erika Tóth PhD.	totherika@caesar.elte.hu	Microbiological investigations in oligotrophic environments	Microbiological studies in different aquatic habitats: cultivation and cultivation independent methods. Evaluation of microbial biomass in low nutrient concentration aquatic environments. Isolation of bacteria, identification based on their 16S rRNA gene sequences. Comparative studies of different natural waters.	ELTE Mikrobiológiai Tanszék/Department of Microbiology	Medium (at least B2) level English language knowledge		
Imre M. Jánosi	imre.janosi@ttk.elte.hu	Climatological analysis of environmental data banks	There is a huge mass of atmospheric and oceanic parameters available for research, however it is not easy to extract useful information. Climatological methods of data evaluation provide not only simple descriptions, but permit to reveal physical mechanisms and causal relationships. A few current questions we are interesting in: Do lonely, isolated lightnings exist? Are there any unknown teleconnections between the stratosphere and troposphere? How to quantify the terms in the energy balance equation of ocean currents? Etc....	Eötvös Loránd University, Faculty of Science	fluent English		Background in geophysical fluid dynamics, programming experience
Balázs Székely	balazs.szekely@ttk.elte.hu	Development of feature extraction techniques from large point clouds, hyperspectral imagery and their data fusion	In the last years large datasets have been acquired by various remote sensing campaigns including airborne and terrestrial laser scanning (ALS and TLS, resp.), airborne and satellite hyperspectral (HS) remote sensing, photorobots scanning (PhRS) in man-made tunnels, etc. often financed by public resources, including governmental grants, EU research funding and alike. The projects were successfully completed, the data have been evaluated for a specific purpose, but, as a by-product, many other features, including geological, geomorphological, agricultural, biological, ecological features or built-up structures are also mapped, surveyed, scanned in the data, that are usually not evaluated. The current trend of data processing, the (semi)automated feature extraction allows processing of large data volumes; smart technologies pave the way for extraction, classification and categorization of features if ground truth data are available for a small portion of features. Our department and our cooperating international research partner institutes have access to large georeferenced datasets and ground truth data (often collected in extensive field work campaigns). The successful candidate (m/f) will develop effective computer codes and working computer applications processing large point clouds, HS data (a.k.a. "data cubes") and their georeferenced data fusion. The focus is on the processing of data fusion of data of various scales, e.g. ALS+HS+ground truth data of forests, scrub, wetlands, ALS or TLS or PhRS data of geological and geomorphological features. Various methods will be tested (e.g. agent-based methods, random forest, etc.) in order to achieve an effective feature extraction and high-quality, practically applicable classification. The research question also includes applicability and performance tests on various types of erroneous data, including misaligned georeference, effects of downscaling and differences in the measuring instruments of the fused data. The research is aimed at portability of the solution, whether the methods are applicable for data measured in different regions (flatland, hilly area), and under varying illumination conditions, and target-sensor angle configurations.	Department of Geophysics and Space Science, Eötvös Loránd University, Budapest	at least B2 level		Good command of at least one high-level software development tool in scientific domain, ability to use broad spectrum of existing scientific algorithms (e.g., optimization, multi-dimensional data processing, feature extraction, classification and quality evaluation), experience in geoinformatics, willingness to develop computer code in various environments are required. Experience in processing large (TB) data volumes, ability to write low-level data processing code to enable fast data processing utilizing capabilities and properties of modern computer hardware, including distributed processing on clusters, understanding of needs and typical workflows of typical users of remote sensing data and understanding of currently available remote sensing software would be a benefit are considered as desired skills.
Ákos Horváth	akos@elte.hu	Investigation of enhanced natural radioactivity in hydrogeological systems	The research topic is to investigate the origin of enhanced radon activity in subsurface waters (thermal waters, karst waters). Especially the investigation of biologically active radium accumulation is one aim in the Budai thermal karst system. The research includes to separate different parts of samples with different radium content and radon exhalation properties and the mechanism of the accumulation will be studied.	Eötvös Loránd University Faculty of Science	intermediate level		physics or environmental physics background is required

Judit Bartholy and Rita Pongrácz	bartholy@caesar.elte.hu , prita@nimbus.elte.hu	Impact of Climate Change and Land Use On Water Balance at Brantas Watershed East Java Indonesia	Population growth and development result in important consequences in land use, which evidently affects hydrological processes, and thus, the regional/local water resources. To predict the magnitude of the impact of climate change and land-use needs computer-based analytical models. The research aims to estimate the future hydrological parameters of an Indonesian specific region, i.e. Brantas Watershed, for which global climate models are used as an input, and various statistical tools are used in the methodology. After evaluating the water balance of Brantas Watershed area today, an assessment is prepared to predict the changes of water balance at river basin area and upstream Brantas watershed. The expected results of this research can be used by decision makers for watershed management efforts to adapt to regional climate change and land-use changes.	Eötvös Loránd University, Department of Meteorology	intermediate		MSc in a related field
László Kollár	kl@inf.elte.hu	Inverse design of wind turbine blades for extreme weather applications	The project aims to develop an inverse design methodology for wind turbine blade shapes incorporating performance under icing conditions. The process determines a required blade shape if an initial blade shape and the required pressure or velocity distribution around the blade are known. Then, the air velocity field in the proximity of the blade has to be determined; the trajectories of water droplets are simulated, which provides the local ratio of droplets that hit the blade surface; finally the local ratio of droplets that freeze to the blade surface is calculated from the heat balance. As a result, the local rate of accreted ice mass and the shape of the iced blade are obtained. If resistance to ice accretion can be specified as an input parameter, it would be possible to develop blade shapes that will enable wind turbines to operate under wider operating conditions.	ELTE SEK, Savaria Institute of Technology	medium level conversation, ability to read scientific literature		MSc in mechanical engineering, physics or meteorology
Miklós Kázmér	mkazmer@gmail.com	Fossil forests	Taxonomy of buried trees; tree ring studies, forest structure, taphonomy. Reconstruction of local and regional environment based on coexistent flora and fauna.	Department of Palaeontology, Eötvös University plus field work as necessary	at least B2 level		MSc. In geology or biology