

## PhD position in remote sensing

---

### ***Optical and microwave remote sensing-based flood extent mapping***

*The Luxembourg Institute of Science and Technology (LIST) is offering a fully paid PhD candidate position in the framework of a newly funded Doctoral Training Unit (DTU) in Water Sciences: Hydro-CSI.*

*The doctoral programme HYDRO-CSI is funded in the framework of the PRIDE scheme of the Luxembourg National Research Fund (FNR).*

*The main objective of the DTU is to train a new generation of highly skilled experts with a view to contribute to solving some of the most pressing challenges related to water resources research and management: hydrological system complexity, non-stationarity of boundary conditions, high-frequency monitoring of environmental processes, global change impact assessment. This position is envisaged to start between January 1<sup>st</sup> 2017 and 1<sup>st</sup> May 2017 and will extend over a maximum duration of 4 years.*

*The PhD candidate will be part of the Water Safety and Security Unit at the Department of Environmental Research and Innovation (ERIN) at LIST and will work in the Remote Sensing and Ecohydrological Modelling research group. Furthermore, the PhD candidate will be affiliated with the Technical University Vienna.*

*Central theme of the project: The most common approaches for using satellite Earth Observation data for flood mapping are based on Synthetic Aperture Radar (SAR) images. Working in the microwave range of the electromagnetic spectrum (1-10 GHz), SAR is characterized by a good sensitivity to the presence of water on the Earth's surface and is able to provide hydrology-related data day and night, regardless of cloud cover. Past studies demonstrated that SAR systems are suitable tools for flood monitoring so that the use of SAR data is presently well-established in operational disaster management.*

#### **Job description:**

*For the purpose of a timely and effective flood management, a number of algorithms published in the literature are available to produce flood maps in near real-time. In spite of this recent progress, the detection of floodwater under vegetated canopies and in built environments still represents a critical issue. This is due to the fact that radar signatures of floodwater in such target areas are often not clearly identifiable.*

*The enhanced observational capabilities, in terms of spatial (ranging between 1m and 20m) and temporal (few days) resolution of new SAR satellite constellations, such as TerraSAR-X, SENTINEL-1A/B and COSMO-SkyMed, set the scene for the development of improved flood mapping algorithms, especially for mapping water bodies in complex environments.*

*Therefore, during the PhD project the high sensitivity of the SAR Interferometric (InSAR) coherence for detecting small changes will be exploited in order to detect the presence of water in urban areas, but also to reduce possible false alarms caused, for example, by soil moisture effects in case of bare soils.*

*Polarimetric information, made available by these new sensors, will be exploited as well, enhancing the detection on floodwater in vegetated areas. All these different features will be integrated making use of statistic modelling-based change detection approaches.*

*Data from optical satellite data, such as Sentinel-2 or WorldView, will be also exploited in combination with SAR data in order to further improve the flood detection in such complex environments. Optical data provides information on the vegetation cover as well as on temporal and spatial variations of water bodies.*

*Breakthroughs are expected in urban and vegetated areas due to the full exploitation of the information content provided by the latest generation of SAR (Intensity, InSAR coherence and polarimetry) and optical (multispectral) sensors.*

*Moreover, the candidate will be in charge of:*

- *making a state-of-the-art analysis relative to the general objectives of the project and the elaboration of the working hypotheses,*
- *designing and implementing short- to long-term laboratory and field experiments in line with the formulated hypotheses,*
- *rigorously processing and analyzing collected data for publication in highly ranked international peer-reviewed journals.*

#### **Eligibility:**

- *No restrictions apply as to the nationality of the candidates*
- *Candidates may not have received a doctorate prior to their application to this position*
- *Candidates shall be available for starting their position no later than 1<sup>st</sup> May 2017*

#### **Qualifications:**

- *Applicants should have a MSc degree (or equivalent) in electronic or environmental engineering, remote sensing, mathematics/statistics*
- *Programming skills are essential (e.g. Matlab, Python, IDL)*
- *Show a strong interest in environmental processes, SAR and optical remote sensing.*
- *Experience with the processing of remote sensing imagery is considered an asset.*

#### **Place of employment and main place of work:**

- ***Primary supervisor at degree awarding institution at TU Vienna:*** Prof. Dr. W. Wagner
- ***Primary supervisor (at LIST):*** Dr. M. Chini
- ***Co-supervisors (at LIST):*** Dr. P. Matgen, Dr. R. Hostache
- ***Primary work location:*** Luxembourg Institute of Science and Technology (LIST)
- ***Duration and location of secondment/s:*** Regular stays at the TU Vienna will be mandatory (up to 50% of the total duration of the PhD project)

#### **Application procedure:**

*The application can be submitted via LIST's job portal: <http://www.list.lu/en/jobs/>. If there are any questions regarding the procedure please contact our HR office ([jobs.list.lu](mailto:jobs.list.lu)). The application must include:*

- *A motivation letter oriented towards the preferred position and experience*
- *A current CV, which includes full contact details*
- *Two reference letters or full contact details of the two referees*
- *A copy of master (or similar) degree that allows for the enrolment on a doctorate degree*

*Applications will be reviewed until all positions are filled, with the final date of submission being 31<sup>st</sup> October 2016. An assessment committee will be appointed to review the applications and candidates selected based on Network-wide guidelines, which aim to ensure equal opportunities. Shortlisted candidates will be invited to interview either in person or by Skype.*

*The main criterion for selection will be the existing skills, knowledge and research career potential of the applicant, match with the project, and fulfilment of the above mentioned qualifications. Candidates from all backgrounds are encouraged to apply.*

*The LIST is committed with equality of opportunities and gender balance.*

*All open positions are published and recruitment is performed according to international best practices. All PhD candidates are joining LIST under an employment contract for the full duration of their PhD project.*

*The HYDRO-CSI DTU subscribes to the principles of research integrity within the framework of the FNR funding scheme (FNR Research Integrity Guidelines). These rules rely on the European Code of Conduct for Research Integrity, the Singapore Statement on Research Integrity and the Montreal Statement on Research Integrity.*

*PhD candidate mobility will consist in secondments to partner universities, as well as private companies in case of potential for collaboration on applied aspects, technological developments or business opportunities (e.g. in the framework of a Private Public Partnership).*