

FRENCH-UZBEKISTAN SUMMER SCHOOL on Remote Sensing

SAMARKAND STATE UNIVERSITY 6 & 12 JULY 2020

Dissemination and capacity-building
using Copernicus as well as Theia
data and value-added products

SUNDAY, 12TH JULY 2020 SIDE-EVENT
>> PARALLEL TUTORIAL SESSIONS

Samarkand State University
140104, University blv. 15,
Samarkand City, Samarkand region, Uzbekistan

Sponsors

FPCUP European program

**French National Research
Institute for Agriculture, Food
and Environment**

French Spatial Agency



THEME 1 >> LAND USE/LAND COVER MAPPING USING SENTINEL-1/2 IMAGES

OUTLINE

- » Introduction to land-cover and land-use mapping
- » Feature extraction (spectral indices, texture indices) of a single satellite image
- » Basics of supervised classification and introduction to Random Forest
- » Introduction to time series image analysis for land-cover mapping

PREREQUISITE

- » Basics in remote sensing
- » Basics in image analysis
- » If possible, basic in data processing/data mining
- » Installation of iota2 processing chain: <https://framagit.org/iota2-project/iota2> and documentation: <https://iota2.readthedocs.io/en/latest/index.html>
- » Knowledge in a programming language (python) would be great.
- » The lecturer will bring with him the necessary setups. Data will be provided.

LECTURER

Clément MALLET is a senior researcher of the French National Institute for Geographic and Forest Information (IGN).

He leads the research team on the analysis and modelling of geographic information for territory dynamics retrieval of the IGN-University Paris-Est GeoInformation laboratory. His research interests are related to geospatial computer vision and multi-modal remote sensing.

He is currently co-chairing the JURSE conference series on urban remote sensing and is program chair for the 2020 ISPRS Congress (Nice, France). He is also an associate editor of the *ISPRS Journal of Photogrammetry and Remote Sensing* and the *Photogrammetric Engineering & Remote Sensing*.



DR Clément MALLET

Senior Researcher,
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THEME 2 >> URBAN MAPPING

OUTLINE Methods and tools for built-up areas mapping from Copernicus data

MORNING SESSION (9.00 - 12.30 HRS.)

- » The Global Human Settlement Layer (GHSL) concept: data analytics, knowledge extraction and global products
- » The Symbolic Machine Learning (SML) classifier for mapping human settlements from remote sensing data
- » Built-up areas extraction from Sentinel-1 and Sentinel-2 data

AFTERNOON SESSION (13.30 - 17.00 HRS.)

- » Hands-on computer lab on Built-up extraction with the MASADA tool v.2

PREREQUISITE

- » Basic knowledge of GIS, remote sensing and data analysis
- » Software: Quantum GIS or ArcGIS, Matlab runtime 2016b
- » Minimum Hardware requirements for running MASADA: 16 GB of RAM - Any Intel or AMD x86-64 processor, 100 Mb (+ 700 Mb for Matlab Runtime) disk space for installation and the Matlab Runtime version 2016b. The supported OS are 64-bit Win7-Win10.

LECTURER

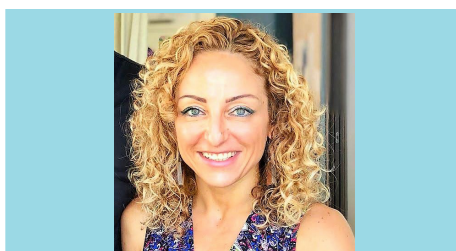
Christina CORBANE received her Ph.D. degree in remote sensing applied to Earth sciences and environmental sciences from the Université Montpellier II, Montpellier, France.

Her academic and professional background is in remote sensing and spatial analysis applied to the study of Earth's environment and to key disaster management and security issues. In particular, she worked on the development of a prototype for automatic ship detection from remote sensing imagery and on a rapid urban mapping model between 2007 and 2009 as part of her appointment at the Institut de Recherche pour le Développement (IRD).

From 2009 to 2012, she worked as a Scientific and Technical Officer with the Joint

Research Centre of the European Commission (JRC) and was responsible for the development of methodologies for the validation of rapid geo-information for disaster management. From 2012 to 2014, she joined the National Research Institute of Science and Technology for Environment and Agriculture (Irstea), Montpellier, France, to conduct research in mapping and monitoring of natural habitats with Earth observation data. Between 2014 and 2016, she was involved in research activities at the JRC related to disaster risk reduction and Pan-European risk assessment.

Her current responsibilities involve, artificial intelligence and big Earth data processing for assessing the fitness for purpose of Sentinel-1 and Sentinel-2 for global human settlement and land cover mapping.



DR Christina CORBANE

Scientific Officer, Senior Researcher, Joint Research Centre, European Commission

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THEME 3 >> ESTIMATION OF SOIL MOISTURE IN AGRICULTURAL AREAS USING SENTINEL-1/2 IMAGES

OUTLINE The following points will be approached:

- » Sensitivity of radar signal to soil parameters
- » Modeling of radar backscattering coefficient
- » Inversion of radar signal for mapping soil moisture in agricultural areas using the operational algorithm S²MP
- » Practical course for estimating soil moisture over agricultural areas using Sentinel-1 and Sentinel-2 data on free open access software

PREREQUISITE

- » Basic knowledge about radar and optical images
- » Basic knowledge about satellite image processing
- » Software: QGIS, OrfeoToolbox, Python and SNAP ESA
- » The lecturers will bring with them the necessary software setups and the database
- » A computer with at least 6 GB RAM is required

Lecturers

Nicolas BAGHDADI received his Ph.D. degree from the University of Toulon, France in 1994. From 1995 to 1997, he was a post-doctoral researcher at INRS Ete – Water Earth Environment Research Centre, Quebec University, Canada. From 1998 to 2008, he was with the French geological Survey (BRGM), Orleans, France. Since 2008, he is a Research Director at the French Research Institute of Science and Technology for Environment and Agriculture (IRSTEA, now INRAE). He is the editor of two series of

books: *Land Surface Remote Sensing* set and *QGIS in remote sensing* set

<http://www.iste.co.uk/subject.php?id=NJNK>



DR Nicolas BAGHDADI

Research Director,
INRAE, France

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His main field of interest is the analysis of remote sensing data (mainly radar and lidar) and the retrieval of environmental parameters (e.g. soil moisture content, soil roughness, canopy height, forest biomass...). Since 2013, Nicolas Baghdadi is the Scientific Director of the French Land Data Center Theia

<https://www.theia-land.fr/en>

Hassan BAZZI received the Bachelor's degree in Geomatics Engineering from Lebanon in 2017 and the master's degree in Information System for Land Management from AgroParisTech, France in 2018.

He is currently working toward the Ph.D. degree at the University of AgroParisTech (INRAE-TETIS research unit) focusing on radar and optical techniques for water resource management in agricultural area.



DR Hassan BAZZI

Research Engineer,
INRAE, France

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THEME 4 >> DISASTER MAPPING FROM SPACE

OUTLINE

- » Copernicus Emergency Service at Global scale (Forest fire and flood monitoring with EFFIS EFFAS)
- » Copernicus Emergency at local/regional level (Rapid mapping, Risk and Recovery) and Charter International Space and major Disaster
- » Practical cases on forest fire and flood in Ouzbekistan exploiting Sentinel imagery

PREREQUISITE

- » Basic knowledge about remote sensing is necessary
- » Software: SNAP ESA version 7 and QGIS
- » The lecturer will bring with him the necessary setups + data

Lecturer

Hervé YÉSOU received his PH.D. Degree from the University of Strasbourg in 1993. Since he is a core member of the SERTIT Unit, a specialized lab in remote sensing operational applications in the field of Environment (natural resources and territories monitoring, disaster rapid mapping).

Since more than 20 years he is involved in rapid mapping activities, mainly within the framework of the International Charter "Space and Major Disasters" and since December 2015 within the Emergency- Mapping Service of Copernicus. In this Copernicus service, he acts as Officer on Duty (ODO), taking in charge answer to the request of activation, ordering adequate images and monitoring the ac-

tivities between different production centres being in contact with Authorized Users all the time during the activation. Another main field of interest is wetland and water bodies' characterization and monitoring, he is member the Science Team of the future Altimetric mission, SWOT. Since 2000 he has been

an external expert for CNES on the definition of VHR future sensors, participating to the ORFEO thematic groups, as well as to the definition of potential new missions, 3S2, Pleiades HR, GEO HR, Arctos and their validation for the risk and environmental domains. Since 2016 he is member of the MENFIS think tank, working on the definition of USERS requirement for the new coming CO3D project.



Dr Hervé YÉSOU

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THEME 3 >> DROUGHT ESTIMATION AND MAPPING

OUTLINE

- » The process of evapotranspiration and its estimation from Earth observations
- » Practical exercises on the estimation of evapotranspiration and irrigation management
- » Basis of drought analysis
- » Estimation and mapping of drought indices from Earth observations

PREREQUISITE

- » Computers: PC Windows or Linux, 4Gb RAM and 20 Gb HD.
- » Software: QGIS Ideally, an internet connection. Excel or equivalent
- » Ideally, an internet connection
- » The lecturer will bring with him the necessary setups + data.

LECTURERS

Michel LE PAGE received a technical degree in computing (1986) and a master degree in Urban Geography (1998). He is currently an engineer at CESBIO, Toulouse working on the development of tools based on remote-sensing imagery for the end user.

He has 25 years of experience in GIS and remote-sensing research in developing countries, particularly in the field of integrated water management at

the watershed scale (Mexico, Tunisia and Morocco).



DR Michel LE PAGE

Engineer, French Institute of Research for Development (IRD), France

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In recent years, he has devoted to the development of tools based on optical remote sensing for estimating evapotranspiration on irrigated land in semi-arid areas. His current interests are in the way to transfer those decision making tools to farmers and managers of irrigation systems.

Mehrez ZRIBI is a Research Director with Centre National de Recherche Scientifique (CNRS). He received the B.E. degree in signal processing from the Ecole Nationale Supérieure d'Ingénieurs en Constructions Aéronautiques, Toulouse, France, and the Ph.D. degree from the Université Paul Sabatier, Toulouse. In 1995, he joined the Centre d'Etude des Environnements Terrestre et Planétaires Laboratory/Institut Pierre Simon Laplace, Vélizy, France.

In 2001, he joined CNRS organ-

ism. Since October 2008, he has been with the Centre d'Etudes Spatiales de la Biosphère (CESBIO), Toulouse. He is responsible of the team of observation systems in CESBIO. His research interests include microwave remote sensing applied to hydrology, microwave modelling for land surface parameters estimations and finally airborne microwave instrumentation. He has published more than 100 articles in refereed journals. He is editor of twenty books about remote sensing theory and applications.



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