French-Lebanese Summer School on Remote Sensing

American University of Beirut
May 30th to June 3rd, 2022

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

Workshop & Summer School Program >> Detailed Outlines, Prerequisites & Lecturers' Profiles

American University of Beirut
Faculty of Agricultural and Food Sciences| Beirut, Lebanon

Sponsors

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DAY 1 | Monday, MAY 30TH, 2022 >>Workshop on 'Application of REMOTE Sensing for WATER, Environment and Land'

- 30 min for each presentation (20 min for presentation, 10 min questions)
- The program is scheduled as follows:

09:00-09:30	Registration
09:30-09:35	Welcome from AUB & FAFS by INTERIM DEAN Ammar OLABI
09:35-09:40	Welcome from THEIA by Dr. Nicolas BAGHDADI
09:40-09:45	Welcome from AgHive-Department of Agriculture by Dr. Hadi JAAFAR
09:45-10:10	Summer School: Information and Program by Rim HAZIMEH
10:10-10:30	Morning Break
10:30-11:00	HSEB & AgSAT for Global ET at sub-field scales - AgHive Dr. Hadi JAAFAR
11:00-11:30	Urban Heat Island Effect - LDEM, AUB Dr. Yaser AbunnASR
11:30-12:00	Disaster Rapid Mapping at ICube-SERTIT within the EMS Copernicus Service and the International Space and Major Disaster Charterframeworks Dr. Hervé YéSOU
12:00-12:30	Estimation of Soil Parameters in Agricultural Areas Dr. Nicolas BAGHDADI & Dr. Mehrez ZRIBI
12:30-13:30	Lunch
13:30-14:00	Drought Estimation and Mapping Dr. Mehrez ZRIBI & Dr. Michel LE PAGE
14:00-14:30	Landslides using remote sensing - CNRS Dr. Chadi ABDALLAH
14:30-14:45	Afternoon Break
14:45-15:15-	SEEDS for Recovery (CEDIL) – Deep learning for evaluating humanitarian interventions – Syria - AgHive Lara Sujud & Dr. Hadi JAAFAR
15:15	Closure of Workshop Day 1

Days 2, 3, & 4 | May 31th to June, 2nd, 2022 >> French-Lebanese Summer School on Remote-Sensing

Summer School General Schedule

- Each day, courses will start at 9:30 AM and finish at 16:30. Lunch breaks will be held from 12:30 to 14:00. All sessions will run in parall.
- An initiation to remote-sensing and Image processing open to any participant is proposed. A detailed program is to be found in the following pages.
- The other sessions are thematic and designed for participants already possessing basic understandings and practices in remote-sensing and imagery processing. Outlines and prerequisites for each tutorial session are detailed in the following pages.
- Each participant will select only one session among the followings:

Presenter	Parallel Tutorial Session
Dr. Mehrez Zribi, Dr.Hafsa Bouamri & Sami Najem	Initiation to Remote Sensing Image Processing
Dr. Nicolas Baghdadi & Núria Pantaleoni	Estimation of Soil Moisture in Agricultural Areas Using Sentinel-1/2 Images
Dr. Hervé Yésou	Disaster Rapid Mapping from Space
Dr. Michel Le Page & Dr. Mehrez Zribi	Drought Mapping

Day 5 | Friday, June 3rd, 2022 >> Cultural Tour

SUMMER SCHOOL SESSION >> INITIATION TO REMOTE-SENSING IMAGE PROCESSING

OUTLINE

- Physics of measurement, radiation, satellite imaging: optical remote sensing
- Physics of measurement, radiation, satellite imaging: Radar remote sensing
- Download and Preprocessing of Sentinel-2 and Sentinel-1 images
- Practical work on image processing using open access software (QGIS and OTB)

PREREQUISITE

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

Dr. HAFSA BOUAMRI has graduated to Ph.D. Degree in Hydrology and Remote Sensing from University Sultan Moulay Slimane in Morocco and University of Quebec in Trois-Rivieres (Canada) in 2021.

She is currently post-Doctoral research at the French Institute of Research for Development (IRD), in Montpellier, France.

Hafsa's research interest includes, hydrological modelling, snow modelling, remote sensing image processing, time series analysis.

DR. HAFSA BOUAMRI
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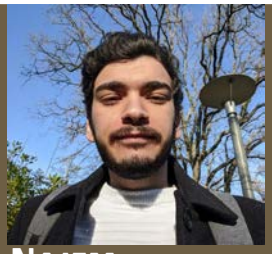
SAMI NAJEM completed his Bachelor's degree in Biology from the Lebanese university in Fanar, Lebanon. Then he earned his Master's degree in Biodiversity: Management and Conservation of Natural Resources from the Lebanese University.

His Master's thesis was centered around drought monitoring in the MENA region using micro-wave remote sensing data.

Sami is currently a Research Engineer at INRAE UMR-TETIS, Montpellier. His specialization is radar and optical remote sensing in the field of agricultural management.



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SUMMER SCHOOL SESSION >> INITIATION TO REMOTE SENSING IMAGE PROCESSING DETAILED PROGRAM

DAY 2 | TUESDAY, MAY 31TH, 2022 >> PHYSICS OF MEASUREMENT, RADIATION, SATELLITE IMAGING

09:30–12:30 (with a morning break)	Physics of Measurement, Radiation, Satellite Imaging: Optical Remote-Sensing
14:00-16:30 (with an afternoon break)	Physics of Measurement, Radiation, Satellite Imaging: Radar Remote-Sensing

DAY 3 | WEDNESDAY, JUNE 1ST, 2022 >> DOWNLOAD AND PREPROCESSING OF SENTINEL IMAGES | PRACTICAL WORK ON IMAGE PROCESSING

09:30–12:30 (with a morning break)	Sentinel-2 (Optical): Download and preprocessing. Atmospheric correction Sentinel-1 (Radar): Download and preprocessing. Radiometric correction
14:00-16:30 (with an afternoon break)	Practical work on image processing using open access software such as QGIS and OTB » Import/Export, visualisation, contrast » Interpretation of Optical Images » Interpretation of Radar Images

DAY 4 | THURSDAY, JUNE 2ND, 2022 >> PRACTICAL WORK ON IMAGE PROCESSING USING OPEN ACCESS SOFTWARE SUCH AS QGIS AND OTB

09:30–12:30 (with a morning break)	» Creating Map Layout » Digitizing/vectorising » Mathematical operations
14:00-16:30 (with an afternoon break)	» Segmentation » Classification

SUMMERSCHOOLSESSION>> 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 S^2MP
- 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 postdoctoral 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).

DR. NICOLAS BAGHDADI
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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

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, etc.). From 2013 to 2022, Nicolas Baghdadi has been the Scientific Director of the French Land Data Center Theia https://www.theia-land.fr/en.

NÚRIA PANTALEONI graduated in Geology and Environmental Sciences at the Universiat Autonoma de Barcelona. Later, she decided to take up the challenge and obtained a Masters degree in Water and Agriculture from the Supagro Univesity (Montpellier, France).

Currently, curious about the analysis of the vegetative cycle of crops and aware of the stakes and increasing tensions on water resources, Nuria is working in the use of satellite data to monitor the vegetative state of agricultural plots, as well as the study of soil moisture and possible irrigation periods as a INRAE Research Engineer at UMR-TETIS (Montpellier, France).

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SUMMER SCHOOL SESSION >> 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 Lebanon 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 activities 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.

DR. HERVÉ YÉSOU
Research Engineer, ICube
SERTIT, Strasbourg University, France
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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.

SUMMER SCHOOL SESSION >> DROUGHT 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

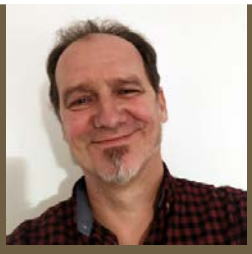
- Computers: PC Windows or Linux, 4Gb RAM and 20 Gb HD.
- Software: QGis Ideally, an internet connection. Excel or equivalent
- Ideally, an internet connection
- The lecturer will bring with him the necessary setups + data.

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, France, 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).

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.



DR. MICHEL LE PAGE
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MEHREZ ZRIBI is a Research Director with Centre National de Recherche Scientifique (CNRS). He received the B.E. degree in signal processing from the École 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 organism. Since October 2008, he has been with the Centre d'Etudes Spatiales de la Biosphère (CESBIO), Toulouse, France.

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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Sponsors

This event is supported by the European Union's **Caroline Herschel Framework Partnership Agreement on Copernicus User Uptake** under grant agreement N° FPA 275/G/GRO/COPE/17/10042, project FPCUP (Framework Partnership Agreement on Copernicus User Uptake), Action 2019-1-40 "Dissemination and capacity-building using Copernicus data and the algorithms and value-added products from the French Land data center Theia".

The **FPCUP European program** supports this initiative as pursuing the six following Copernicus objectives:

1. Increase socio-economic benefits by promoting the use of Earth observation in applications and services;
2. Foster the development of a competitive European space and services industry ;
3. Increase demand for Copernicus data and Copernicus information
4. Promote the use of Copernicus data and Copernicus information by institutions and bodies, international organisations and European, national, regional or local authorities,
5. Increase market penetration, including the expansion of the existing markets and creation of new markets and competitiveness of the European downstream operators;
6. Demonstrate European added value.

www.copernicus.eu

The American University of Beirut (AUB) is a top-ranked institution in the Middle East and North Africa (MENA) region that prides itself on cutting-edge research and interdisciplinary innovation to advance knowledge on a wide range of issues such as the development of renewable energy resources, strategies for a sustainable environment in arid climates, peace mediation and dialogue, and treatments for human diseases.

www.aub.edu.lb

The **Faculty of Agricultural and Food Science (FAFS)** at AUB is one of the oldest and most established faculties of agriculture in the MENA region. Through research, education, and community engagement, FAFS inspires minds, trains future leaders, and promotes sustainable environment, water, livelihoods, and food systems in Lebanon, the region, and beyond. The Department of Agriculture trains future agricultural engineers to optimize crop production only after securing the requirements of sound policy in terms of water, energy, and renewable resources. This summer school is co-organized by AgHive, the unit for the Remote Sensing and Geospatial Lab and the Smart Irrigation Lab at the Department of Agriculture at AUB.

sites.aub.edu.lb/aghive/

Created in 2012 and supported by 10 French research organizations, **Theia**, the French consortium for continental surfaces data, pursues four main objectives:

1. Promoting and facilitating access to spatial Earth observation data;
2. Developing value-added products for the scientific community and public stakeholders;
3. Networking scientists and users;
4. Promoting French research on a European and international scale.

www.theia-land.fr