French-Egyptian Winter School on Remote Sensing

German University in Cairo
March 13th to 16th, 2023

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

Workshop & Winter School Program >>

Detailed Outlines,

Prerequisites

& Lecturers' Profiles

German University in Cairo| Egypt

Sponsors

DAY#1 | MONDAY, MARCH 13TH, 2023 >> WORKSHOP AND WINTER SCHOOL ON REMOTE SENSING AND ITS APPLICATIONS IN CLIMATE CHANGE'

09:00-09:30	Registration
09:30–09:40	Welcome from the GUC BY VICE PRESIDENT PROF. DR. EHAB KAMEL ABOU-ELKHEIER
09:40-09:45	Welcome speech by the Chief Representatives of JICA Egypt Office BY MR. KATO KEN
09:45-09:50	Welcome from THEIA BY DR. NICOLAS BAGHDADI
09:50-09:55	Welcome word by JICA-Egypt Alumni BY ENG. ADEL ABO ELNOUR, Chairman of JICA Alumni Association
9:55-10:15	Winter School Information and Program BY DR. HAYTHEM ISMAIL & DR. NICOLAS BAGHDADI
10:15-10:45	MORNING COFFEE BREAK

INVITED TALKS SESSION#1 — MODERATOR: PROF. DR. MOHAMMED ABDEL-MEGEED SALEM

10:45-11:15	Space Technology and Earth Observation Applications as Potential Collaboration to Achieve SDGs and Climate Actions in the Arab and Africa Regions PROF ISLAM ABOU EL-MAGD, Counselor for the Minister for African Affairs and Space Technology, Ministry of Higher Education and Scientific Research
11:15-11:40	Estimation of Soil Parameters in Agricultural Areas DR. NICOLAS BAGHDADI, INRAE
11:40-12:05	Disaster Rapid Mapping at ICube-SERTIT within the EMS Copernicus Service and the International-al Space and Major Disaster Charter frameworks DR. HERVÉ YÉSOU, SERTIT
12:05-12:30	Sentinel-2 Satellite Image Time-Series Analysis for Land Use and Land Cover DR. VINCENT THIERION, INRAE
12:30-12:55	Smart Agriculture, Irrigation and Water Management Systems based on AI and IoT for Climate Change Adaptation PROF. MOHAMED ZAHRAN, Prof. at Electronics Researcher Institute, Former Chairman of National Authority for Remote Sensing & Space Sciences
12:55-14:15	LUNCH break

INVITED TALKS SESSION#2 — MODERATOR: DR. MOHAMED ABDEL-KADER

14:15-14:45	Drought Estimation and Mapping DR. MICHEL LE PAGE, IRD
14:45-15:15	The Role of NRIAG in Sustainable Development and Risk Reduction in Africa PROF GAD EL-QADY, Director of National Research Institute of Astronomy & Geophysics
15:15-15:45	AFTERNOON BREAK

INVITED TALKS SESSION#3 — Moderator: DR. HISHAM OTHMAN

15:45-16:15	Advances in GNSS Data Collection Methods PROF. GOMAA DAWOD, Survey Research Institute, National Water Research Center
16:15-16:45	EO for Flood Detection in Nile Basin "Online Presentation" DR. WAFA ABOUL HOSN & ENG. MOHAMED HOSSARY, UN-ESCWA, Lebanon
16:45-17:00	Closure of Workshop Day#1

Days #2, #3, & #4 | March 14TH to 16TH, 2023 >> French-Egyptian Winter School on Remote-Sensing

Winter 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. Michel Le Page & Kamel Lahsini	Initiation to Remote Sensing Image Processing
Dr. Vincent Thierion	Mapping Landuse & Landcover using Sentinel images
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	Drought Mapping

Day#5 | March 17TH 2023 >> Scientific Visit: Astronomy Museum, National Research Institute of Astronomy & Geophysics

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
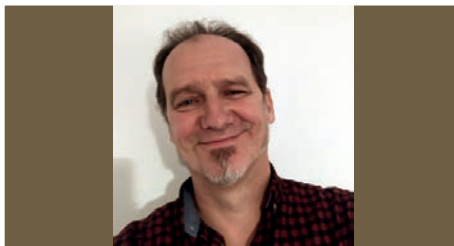» Practical work on image processing using open access software (QGIS and OTB)

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.

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

DR. MICHEL LE PAGE
Engineer, French Institute of Research for Development (IRD), France

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(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.

KAMEL LAHSSINI graduated from SUPAERO (Aerospace Engineering, Toulouse - France) in 2015 with a specialization in Signal and Image Processing.

He worked for Total as a remote sensing engineer and for Safran as a UAV system engineer.

He joined INRAE in 2020 and
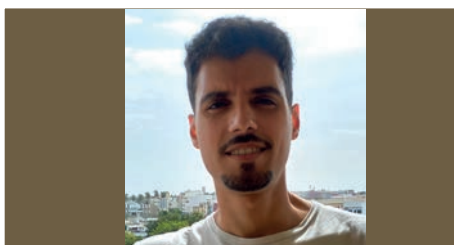
KAMEL LAHSSINI
PHD candidate, INRAE, France

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earned a Specialized Master in Geomatics and Remote Sensing from AgroParisTech (Montpellier - France).

He is currently pursuing a PhD on the use of multi-sensors satellite data to estimate biomass in tropical forest biomass.

DAY 2 | TUESDAY, MARCH 14TH, 2023 >> 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, MARCH 15TH, 2023 >> 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, MARCH 16TH, 2023 >> 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

Winter school session >> Mapping Landuse & Landcover using Sentinel images

Outline

The tutorial concerns the use of Sentinel-2 (optical time series) and Sentinel-1 (radar time series) images for mapping surface cover over large geographical areas (regional and national scales). In order to demonstrate the usefulness of these time series for mapping land cover and land use, the open-source processing chain Iota² will be presented in a theoretical manner and then during practical exercises.

During this tutorial, we will discuss:

» the theoretical and practical aspects of supervised classification (pixel, object and contextual) of Sentinel satellite image time series

» the generation of spatio-temporal variables

» the use of the iota² API with python to extract spectral variables at the scale of point surveys

Prerequisite

The prerequisites to follow this tutorial are the following:

» working with a Linux operating system

» basic knowledge of remote sensing and Sentinel imagery

» basic knowledge of the Linux environment, bash command lines

» language and QGIS

» some knowledge of Python is a plus

Lecturers

Vincent Thierion works as a Research Engineer with the French National research Institute for Agriculture, Food and Environment, INRAE, in Toulouse, France.

His work focuses on the use of satellite imagery and the development of software

Dr. Vincent Thierion
Research Director,
CESBIO INRAE, France

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solutions for the mapping of agricultural land cover and semi-natural environments.

He is an active member of the THEIA Data and Services Center as co-leader of the OSO Scientific Expertise Centre dedicated to land cover mapping by remote sensing.

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^{2}MP
» 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
Research Director,
INRAE, France

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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 cy-

NÚRIA PANTALEONI RELUY
Research Engineer,
INRAE, France

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cle 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).

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 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.

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
Research Engineer, ICube SERTIT, Strasbourg University, France
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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

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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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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

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

German university in Cairo has been established in 2002 in co-operation with many universities and institutes in Germany.

It is an independent, non-profit oriented Egyptian private institution, managed by a consortium of Germans and Egyptians with the vision of building a leading center of excellence in teaching and research that will effectively contribute to the general welfare nationally and internationally and endeavour the scientific, technical, economic and cultural cooperation between Egypt and Germany.

www.guc.edu.eg

JICA Alumni Association Egypt (JAA-E) Japan International Cooperation Agency (JICA) in Egypt Established officially in 1977, after long bilateral relationship returning to 19th century, Japan's cooperation in Egypt began with technical cooperation in 1954, followed by grant aid in 1973, and ODA loan in 1974. Along this period strong ties grow rapidly in all sectors. In collaboration with the Ministry of Higher Education and Scientific Research, JICA is supporting the development of the human resources of the Egyptian youth through provision of ODA loan in order to support dispatching Egyptian students, researchers and trainees to Japan, to acquire Japanese knowledge in various fields, in order to contribute to Egypt's economic and social development on the long term.

JAA-E is one of the result of long Japanese cooperation in Egypt, it is an Egyptian NGO, established in 1989. The association's board and members are the Ex-participants of JICA Egypt training programs (Short-Term Courses), who are working in different ministries and organizations in Egypt. The association's main mission is sharing experiences gained between its members with potential Egyptian society to support development in various fields through social, cultural and scientific activities.

www.jica.go.jp/egypt/english
jicaalumni-eg.com

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mohammed.salem@guc.edu.eg

» Registration Link:
https://forms.gle/6h6QuHLL7nBCCAG58