



# Climate action- Take urgent action to combat climate change and its impacts.

Ambassador of SDG 13:  
 Pr. Noamen Rebai Professor at École Nationale d'Ingénieurs de Tunis, responsible for the Specialized Master's degree in Geomatics.



## PROJECTS

### 1. Greenhouse Gas emission Report

GHG Report of UTM of the year 2022 and Baseline year 2016

<http://www.utm.rnu.tn/utm/fr/politiques--utm-ghg-emission-report>

<http://www.utm.rnu.tn/utm/fr/politiques--emission-carbon>



Carbon Emission at the University of Tunis El Manar 2016-2022  
 Towards a Net Zero Target

### 2. Med-EcoSuRe project from 2019 to 2023



#### Partnership

Role	Name of the organisation	Country
Lead beneficiary	Mediterranean Renewable Energy Centre	Tunisia
Partner 1	University of Tunis El Manar	Tunisia
Partner 2	University of Florence – Department of Architecture	Italy
Partner 3	University of Seville - Thermoecncs Group at Thermal Energy Engineering Department	Spain
Partner 4	An-Najah National University - Energy Research Centre	Palestine
Partner 5	Naples Agency for Energy and Environment	Italy
Partner 6	Spanish association for the internationalization and innovation of solar companies	Spain

The Med-EcoSuRe project offers an innovative approach to the definition and diffusion of cost-effective energy renovation within university buildings, with the perspective of extending results to the whole public buildings sector in the long term. A Mediterranean cross-border living lab - bringing together researchers, building managers, companies, public organisations, and students - will be established to develop energy efficiency and renewable energy solutions as well as retrofitting schemes to be implemented in 9 university buildings. The final aim behind the project is to turn university managers into active players contributing to the co-creation and experimentation of

## MAR2PROTECT

The project aims to provide a holistic approach to prevent groundwater contamination from the impacts of climate change and global change.

The core of the innovative Managed Aquifer Recharge is the Decision Support System which incorporate technological and societal engagement information using an Artificial Intelligence-based evaluation to improve groundwater quality and quantity.

The Tunisian partner, ISSBAT (UTM), defines the objective of the project as to implement an effective tertiary treatment to minimize the introduction of pollutants in the aquifer. The aquifers studied located in the Cap Bon Peninsula in Tunisia.



**Demo site 2: Oued Souhil, Nabeul Modelling Activities (WP4) Nabeul-Hammamet coastal aquifer**

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No GA 101082048



### DEMOSITE 2 : Oued Souhil, Nabeul

- Location: Nabeul (36°27'43.1"N 10°42'20.9"E)
- **GW (Nabeul-Hammamet aquifer) Problems:**
  - > **level is declining:** increasing water demand and long period of drought
  - > **water quality is deteriorating:** High Salinity (sea water intrusion) and diffuse pollution from agriculture (excess of nitrate and phosphorus)

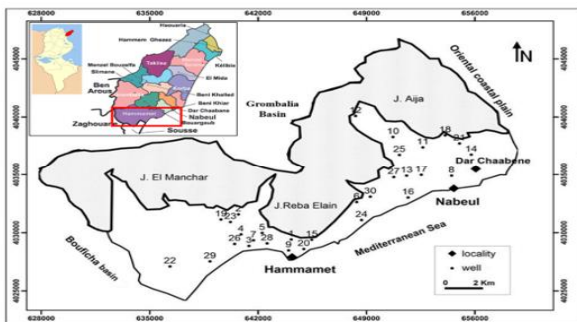


Figure 1. Location map of Hammamet-Nabeul shallow aquifer and groundwater sampling positions.

- **Recharge Water:**
  - Treated MWW from two WWTPs **SE3** (oxidation ditches) and **SE4** (activated sludge).
  - > **High salinity**
  - > **Pharmaceuticals** (Ofloxacin)
  - > **Endocrine Disrupting Chemicals** (Bisphenol A) .

#### 4. Implementation of photovoltaic panels at ENIT, September 2023



#### 5. Tunisian-Bavarian Hub for Green Hydrogen

Implementation of Tunisian-Bavarian hub for green hydrogen in ENIT (UTM), as part of the project

## RESEARCH ACTIVITIES

**H2Vert.TUN**, May 2023

Green hydrogen is produced by electrolysis of water from renewable energy. Its main assets are zero greenhouse gas emissions, being a totally clean energy, which is an asset for the decarbonisation of industry in Tunisia, and its flexibility, as it can be stored and distributed on demand, which is an asset for the export market. <https://www.giz.de/en/worldwide/109268.html>

The hub, launched Wednesday, is a platform of exchange and training intended to promote research and develop top notch technologies in connection to green hydrogen. Scaled-up scientific and technological cooperation is an additional target along with the stepped-up exchange of experiences and partnerships. The hub also offers training and skill-building opportunities for professionals. <https://www.tap.info.tn/en/Portal-Economy/16307007-first>

# 1. International Congress « Artificial Intelligence Role & Climate Change Impact »,

3<sup>rd</sup> edition of the international congress “ISEE Geomatics” held October 30<sup>th</sup>, 2023, <https://2023.isee-geomatics.com/>

**TOPICS**

**GEOMATICS and AI.**

1. Smart solutions for sustainable water, soil and air management
2. Geospatial data for Sustainable Development of agricultural resources.
3. Assessment Approaches for land use, land cover (Agrogeomatic)
4. Monitoring environment and climate change indicators
5. Natural Resources and Environment management

**SPATIOTEMPORAL MONITORING AND 3D MAPPING**

1. Real Time monitoring and embedded system
2. 3D Survey and Mapping
3. Geodesign and Urban 3D
4. Solar land Modelling
5. Building Information Modelling for Sustainable Development

**HERITAGE AGAINST CLIMATE CHANGE**

1. Augmented reality for heritage simulation
2. Climate change impact on heritage
3. Digital photogrammetry and rebuilding the monument
4. Revisited Tourism
5. WEB-GIS applications

**KEYNOTES**

- Michel Kasser
  - Geomatic Industry Survey.
- Yacine Bouroubi
  - Artificial Intelligence and Big EO data applications: case studies
- Michel Boko
  - Contemporary Climate Change: factors and impacts
- Pierre Grussenmeyer
  - Architectural photogrammetry and applications of heritage documentation
- Faouzi Ghorbel
  - Geometric Statistic: Methods and applications

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- 2023.isee-geomatics.com
- contact@isee-geomatics.com
- Hammamet - TUNISIA




**3<sup>rd</sup> EDITION**

**TIMELINE GEOMATICS!  
ARTIFICIAL INTELLIGENCE  
ROLE & CLIMATE CHANGE  
IMPACT**

**CONGRESS CHAIRS:**

Noamen REBAI (ATG, ENIT/Université Tunis El Manar)  
Mohamed MASTER (Université Mohamed V de Rabat)



**CONFERENCE  
AIM AND OBJECTIVES**

I SEE GEOMATICS 2023 will bring together researchers, research scholars, experts, and policy makers to share their research, and experiences and discuss recent advances in Geomatics Methods and applications to social, cultural Heritage city, Georisk, Energy, Georesources, and new Geomatic Industry Surveys. The conference will cover many aspects related to Modeling with Intelligent Systems applications grouped into three main topics below. Indeed, the colloquium will provide a space to discuss the results of the digital Web mapping research thematic and fundamental applications. It will also offer the opportunity for a national and international debate of experts:

- To emphasize the Public, Private, and NGO Partnership and
- To develop new incoming works on AI methods and applications, with consideration of climate change impact, and broadcasting of the Copernicus Geospatial data for the wide public « OPEN DATA ».

**ORGANIZER**



**PROMOTE PARTNERS:**



**CONFERENCE VENUE**

The I SEE GEOMATICS 2023 will take place in Hammamet, a coastal city located in the Northeast of Tunisia. The town is very famous for its fordless white sandy beach and tourist resort. At the city center stand the old Medina and the historic fort of Hammamet

**ABOUT THE ORGANIZERS**

The Tunisian Association of Geomatic (ATG) is in partnership with the Research Laboratories of Engineering Geotechnics and Georisk (LRIGG) in ENIT. In addition, the University of Tunis El Manar (UTM), and High school of Engineering of Tunis (ENIT) are pleased to organize the third International Congress of I SEE GEOMATICS 2023, from 30th October to 1st November 2023 in Hammamet-Tunisia



**KEY DATES**

July 15th, 2023 : Deadline for Abstract submission  
July 31st, 2023: Acceptance notification  
Sept 15th, 2023: Deadline for registration & 2nd circular  
October 1st 2023: Scientific program & 3rd circular



## 2. Conference « New data for the management of our resources »

National conference held at ENIT in November 2023. The theme of the first session is the management of energy resources.

11-11-2023  
10:30AM  
ENIT-AMPHI LATIRI

Cycle de rencontres réseau  
« Nouvelles donnes pour la gestion de nos ressources »  
Donne #1 : Energies

Mr Belhassen Chiboub  
Chef de programme énergie ou Ministère de l'industrie, des mines et de l'énergie

Mr Chihab Bouden  
Professeur à l'Ecole Nationale d'ingénieurs de Tunis, ancien ministre de l'Enseignement supérieur et de la recherche scientifique

Mme Afef Chachi  
Directrice de l'Observatoire National de l'énergie et des mines

ADENIT  
Association des Diplômés de l'Ecole Nationale d'Ingénieurs de Tunis

### 3. PhD & Master Research

Climate Impact on Marine Intrusion

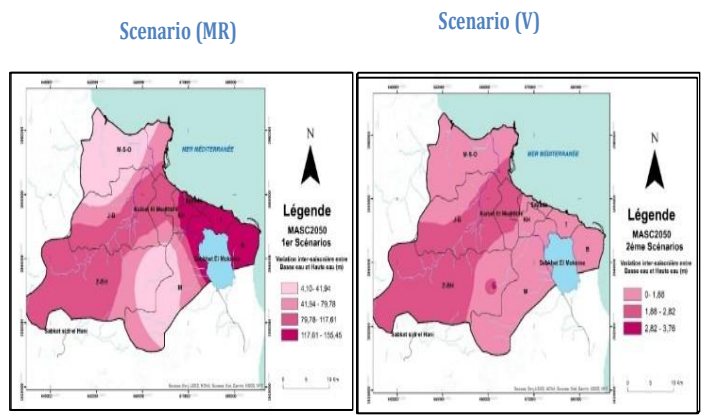


PREDICTING SEAWATER INTRUSION USING ARTIFICIAL INTELLIGENCE -BASED MODELS FOR THE OPTIMAL AND SUSTAINABLE USE OF GROUNDWATER IN COASTAL AQUIFER: Case study of Monastir, Tunisia.

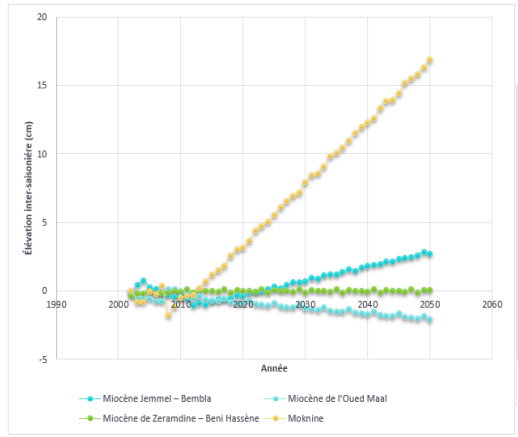
Noamen Rebai, Rihem Majdoub Fehri,  
noamen.rebai@enit.utm.tn



MAS 2050 Prediction Model:



Confirm results of global climate model established by IPCC (IPCC 2021).



## 4. Assessing the impact of climate change on Lake of Ichkel, a natural reserve



**ISEE**  
GEOMATICS 2023

ISEE 23 International Conference on Artificial Intelligence role and Climate Change Impact Oct 30<sup>th</sup>-Nov 1<sup>st</sup>, 2023. Hammamet Tunisia.

Paper ref:  
T1\_4\_0523

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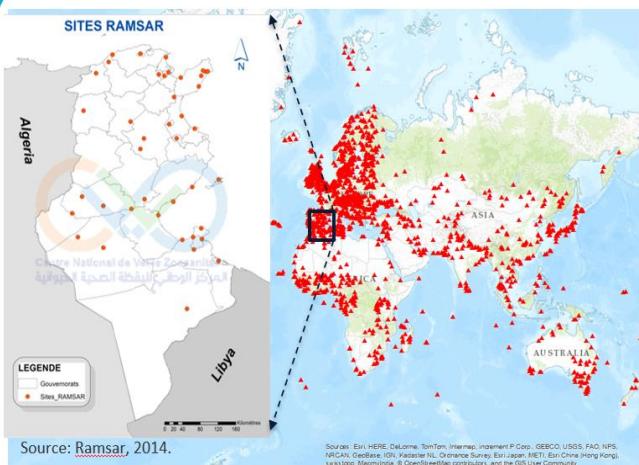
### *Assessing the Impact of Climate Change on Lake Ichkeul Functioning A 1D hydrodynamic model-based quantitative analysis*

**Belhadj Cyrine<sup>1</sup>, Noamen rebaï<sup>1</sup>, Béchir Bejaoui<sup>2</sup>**

1. Geotechnical and Geohazards Engineering Laboratory, National Engineering School of Tunis (ENIT)
2. Marine Ecosystems Modelling Laboratory, National Institute of Marine Sciences and Technologies (INSTM)

Topic: Geomatics and AI : Monitoring Environment & Climate change indicators

### Ramsar sites



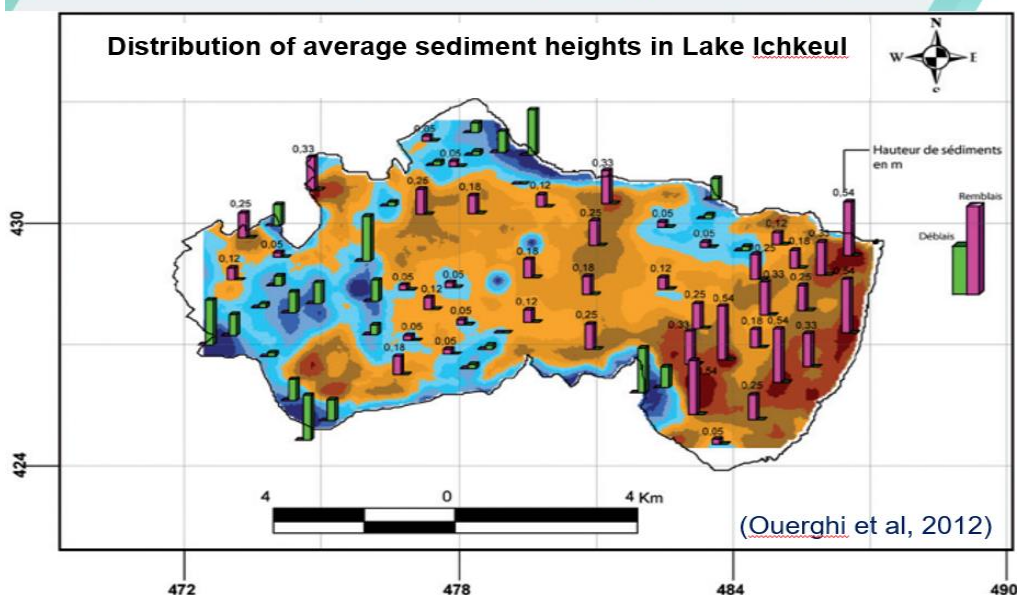
- 2185 sites around the world considered by the Ramsar Convention to be wetlands of international importance (208,597,750 hectares).

- Tunisia has 35 Ramsar sites covering an area of 821,009 hectares.

The research focuses on quantitatively assessing the impact of climate change on the functioning of Lake Ichkeul, an 8500-hectare (85 km<sup>2</sup>) ecosystem in northern Tunisia. Utilizing the MOHYB hydrodynamic model, a 1D numerical approach, the study investigates the role of lagoon exchange through the Tinja river, including the influence of tides, in controlling salinity and preventing drought occurrences in the Ichkeul lagoon. The model incorporates relevant environmental parameters, such as water inflow, wind stress, evaporation rates, precipitation, river inputs, water temperature, air temperature, and tidal variations, to simulate the hydrodynamic behavior of the lagoon. The hydrodynamics of Lake Ichkeul are influenced by the inflow of fresh continental water during winter and saltwater inflow from the Bizerte Lake during summer. Additionally, the model considers the impact of tides on controlling the flow of salt into the lagoon. By incorporating these dynamics, the study accurately captures the complex behavior of the lagoon and its response to changing environmental conditions.



### Ramsar site N° 203 : Ichkeul lake (12 600 ha,1980)



# INNOVATION COMPETITION

## 1. Shell eco-Marathon

ENIT ECOCAR participation in the international competition “Shell eco-Marathon” on June 30th 2022, and ranked as 18th Worldwide with score of 222KM/L.



## 2. National Competition INJAZ Tunisia 14<sup>th</sup> edition «The Entrepreneurs of the Future».

The team Supclay won the Best Young Company Award for their product Clay-based cement an environmentally friendly alternative to Portland-cement. They will be representing Tunisia at the regional competition in November in Qatar.





**SUPCLAY**

NATIONAL  
ENGINEERING SCHOOL  
OF TUNIS



CEO  
Molka Ghali

The volunteer  
Ms Imene Gabtni

**The product**  
We offer a clay-based cement, a more environmentally friendly alternative to Portland cement, while maintaining its essential characteristics.



**SUPCLAY**

**DID YOU KNOW?**

**CLAY CEMENT HAS THERMAL INSULATION AND THERMAL RESISTANCE PROPERTIES, WITHSTANDING UP TO 600°C, TWICE AS STRONG AS PORTLAND CEMENT.**

#BUILDING\_BEYOND\_EXPECTATIONS

**SUPCLAY**

**DID YOU KNOW?**

**CLAY-BASED CONCRETE CAN ALSO BE RECYCLED AND REUSED MULTIPLE TIMES, OFFERING A SUSTAINABLE ALTERNATIVE TO PORTLAND CEMENT.**

#BUILDING\_BEYOND\_EXPECTATIONS

# TRAINING

## Training IA, Climate change & Geomatics

Training for application of IA in studying Climate change & Geomatics, held November 2<sup>nd</sup>, 2023, in the context of the international congress of the same thematic.



# WORKSHOPS

## 1. Workshop GREECON

“GREECON” workshop for ecological construction, organized in ENIT (UTM) by Civil engineering club, 3Zeros club, and IEEE ENIT branch, February 2<sup>nd</sup> 2023.

<https://www.facebook.com/ENITunis/posts/pfbid0x4t3aZNPC7Zqtp34vgmEg5Uafpc9wxQgAp6rjK3fHukgosaGoBRneLzC5JEBkmZml>



## 2. Workshop IA, Climate Change & Geomatics

As part of the international congress “ISEE Geomatics” held October 30<sup>th</sup>, 2023. Professionals and Researchers animated different workshops in the theme of Geomatics and Climate Change.

<https://2023.isee-geomatics.com/preprogram/>

# Workshops: 30th October

Monday, 30 October workshops related to the themes of the Congress are organized on a half-day.

**WS 1:** Artificial Intelligence role in Geomatics

**WS 2:** Climate change between science and politic

**WS 3:** Local Climate Modelling (LCM)

**WS 4:** Geospatial data for Sustainable Development

**WS 5:** LiDAR 3D mapping and survey

**WS 6:** Copernicus and RS data

**WS 7:** Geomatic and Entrepreneurship: AI & OD for sustainable development

## FIELD WORK

**Field visits for students of Civil Engineering department of ENIT (UTM) to Korba, Nabeul.**

Observation of “Ganivelle” situated in the beach of Korba, Nabeul.



Ganivelle: wooden fences set up to preserve the dunes.



The Ganivelles is a research project, which aims to prevent the dispersal of the beach sand.

The Ganivelles preserve the dune ridge by forming embryonic dunes that won't be dispersed by storms or other environmental phenomena due to climate change.

