



Pole for Doctoral Studies  
Center for Doctoral Studies Sciences, Technologies, and Medical Sciences

## ANNOUNCEMENT OF DOCTORAL THESIS DEFENSE



**M. HADEK Ali**

Will present here research work with the aim of earning a  
**Doctorate**

**Doctoral program: Engineering Science and Technology**  
**Discipline: Geoinformatics**  
**Specialty: Applied Geosciences**

**On 07/11/2025 at 10H00 at the Conference Hall of the Faculty of  
Sciences and Techniques of Tangier, UAE  
Under the Theme**

**Synergy of Freely Accessible Optical and Radar Remote Sensing  
Imagery for Assessing and Monitoring Natural Ressources in a  
climate Change context through Land Use Mapping: Case of  
the North Atlantic Region of Morocco**

**Front of the jury composed of :**

| First Name & Last Name   | Establishment          | Designation |
|--------------------------|------------------------|-------------|
| Pr. MAATOUK Mustapha     | FST of Tangier, UAE    | President   |
| Pr. BOULAASSAL Hakim     | FST of Tangier, UAE    | Reviewer    |
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| Pr. ETEBAAI Issam        | FST of Al-Hoceima, UAE | Examiner    |
| Pr. WAHBI Miriam         | FST of Tangier, UAE    | Supervisor  |

*Host Research Structure:* RESEARCH AND DEVELOPMENT IN APPLIED SCIENCES

## Abstract



Tangier has experienced rapid urbanization and environmental change driven by demographic growth, economic development, and its strategic Atlantic–Mediterranean location. To assess these pressures, this study integrates Landsat-based Random Forest land-use mapping, DSAS shoreline-change analysis with DGPS validation, and PSInSAR monitoring of Sentinel-1 data to assess spatio-temporal dynamics and coastal stability from 2000 to 2023.

The Random Forest classification model achieved an accuracy of 96%, demonstrating a shift toward increased built-up and forested regions, which encroached into coastal ecosystems. Concurrently, the DSAS analysis reported an average shoreline erosion rate of –2.24 meters per year, with hotspots at Sidi Kacem and Houara beaches; and PSInSAR identified ground subsidence zones and potential landslides linked to local geology. Despite limitations in medium-resolution satellite imagery, this multi-method framework provides essential insights for risk mitigation and sustainable territorial planning; future integration of LiDAR is recommended to refine terrain and shoreline analyses.

The approach is readily transferable to other coastal cities facing similar challenges.

**Keywords:** Spatio-temporal analysis. subsidence. Coastal erosion. PSInSAR. Land-use planning.