



Pôle des Etudes Doctorales  
Centre des Etudes Doctorales  
Sciences et Techniques et Sciences Médicales

## AVIS DE SOUTENANCE DE THESE DE DOCTORAT

**Madame AHSISSENE Safae**  
Présentera ses travaux de recherche en vue de l'obtention du  
Doctorat



**Formation Doctorale : Mathématiques, Physique et Nouvelles  
Technologies**  
**Discipline : Nouvelles Technologies**  
**Spécialité : Télédétection Spatiale Et Confort Thermique Urbain-  
Humain**

**Le 25/07/2025 à 10H00 à la salle des soutenances de la Faculté  
des Sciences de Tétouan, UAE**

### Sous le thème

**Nouvelle approche typologique pour le calcul et l'amélioration du confort thermique  
urbain-humain dans des contextes bioclimatiques méditerranéens contrastés (Tétouan,  
Séville et Barcelone) : mesures in-situ et imagerie infrarouge-thermique satellitaire**

**Devant le jury composé de :**

Nom et Prénom	Etablissement	Qualité
Pr. BEN ACHHAB Nizar	ENSA de Tanger, UAE	Président
Pr. TABII Youness	ENSIAS de Rabat, UM5	Rapporteur
Pr. BOLAJRAF Mohamed	ENSA de Tétouan, UAE	Rapporteur
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*Structure de recherche : Télédétection, Systèmes et Télécommunications (23/009 UAE/ENSATe)*

## Résumé



Thermal comfort is a fundamental indicator of human well-being, particularly in urban environments where climatic conditions and spatial configurations vary rapidly. Traditional indices often fall short in capturing spatial heterogeneity and evolving microclimates, especially in hot or data-scarce regions. This thesis proposes a new typological approach to studying thermal comfort in Mediterranean cities, grounded in a multidisciplinary framework that draws from medical physiology, human thermoregulation, and environmental physics.

These foundational concepts offer critical insight into how the human body exchanges heat with its surroundings and how this balance is affected by complex urban microclimates. To address methodological limitations, a novel comfort assessment method is introduced, integrating satellite-derived Land Surface Temperature (LST) with in-situ field measurements. Seasonal surveys were conducted year-round in Tetuan and during summer in Seville and Barcelona. A strong correlation between LST and thermal sensation vote (TSV) validates the use of satellite thermal-infrared imagery in outdoor comfort analysis.

Spatial discomfort maps and season-specific comfort indices were generated to visualize urban heat exposure. As part of future research, atmospheric variables from reanalysis datasets such as ERA5 — including solar radiation, humidity, and 2-meter air temperature — are proposed for integration to enhance model accuracy, especially in regions lacking high-resolution meteorological data. This typological framework offers a scalable method for evaluating and improving urban-human thermal comfort in diverse Mediterranean bioclimatic contexts.

**Mots clés:** Remote Sensing, LST, Urban Climate, Thermal Comfort, Thermal Sensation Vote, Thermoregulation