Les contributions des SHS à
l'étude des questions environnementales
Bilan et perspectives de recherche
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Loss of Agricultural Soils to Urban & Suburban Development in France: 2000-2018

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**M.Sc. Environmental Hazards and Risks Management interns*

Introduction

- Save Our Soils (SOS), Académie-5
- UMR ESPACE CNRS & M.Sc. Environmental Hazards and Risks Management, Géographie
- L'artificialisation des sols impacte
  - la perte définitive des sols les plus fertiles
  - la biodiversité
  - l'imperméabilisation des surfaces
  - les inondations
  - les ilots de chaleur urbains…

Les constats

- Urban areas are expanding onto agricultural land at an unprecedented rate throughout the world.
- France's best soils and farmlands are being paved over by housing, roads, shopping centres, industrial complexes…
- The European Corine Land Cover (CLC) database can help track growth in artificial areas and losses in agricultural land between 2000-2018.

Les objectifs

1. Quantify rates of Artificial land cover growth and agricultural farmland loss for medium-sized cities in France.
   1.1 Relate agricultural & urban expansion to land cover change drivers.
   1.2 Relate agricultural loss rates to the ***Projets Alimentaires Territoriaux (PAT)***.
2. Demonstrate trends with case studies.

1. Trends for Medium-sized cities

- **42 cities** selected in France (mean population: 58 000; range 30 000 – 150 000); at least **25% of municipal area is agricultural**; **13 of 42 cities (31%)** have some form of PAT commitment.

- **In South-East France:** Avignon (84); Arles, Istres, Salon-de-Provence (13); Draguignan, Hyères (83).

2. Case studies

- **Large cities:** Bordeaux vs Montpellier ***(PAT-2014)***

- **Medium-to-large cities:** Orléans vs Tours (***PAT-year?***).

https://www.esa.int/Applications/Observing_the_Earth/Copernicus/Sentinel-2/Land-cover_maps_of_Europe_from_the_Cloud

Average growth in artificial area: 15 ha/yr (median 12 ha/yr; std. dev. 10 ha/yr)

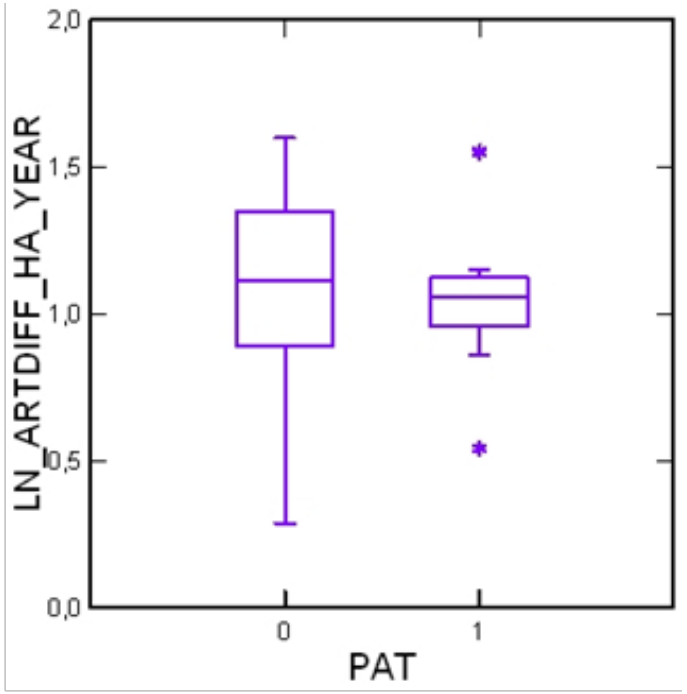
Average loss in agricultural land cover: -13 ha/yr (median -11 ha/yr; std. dev. 9 ha/yr)

89% of the loss in agricultural land is due to artificial land cover expansion

Artifical land cover growth is driven by:

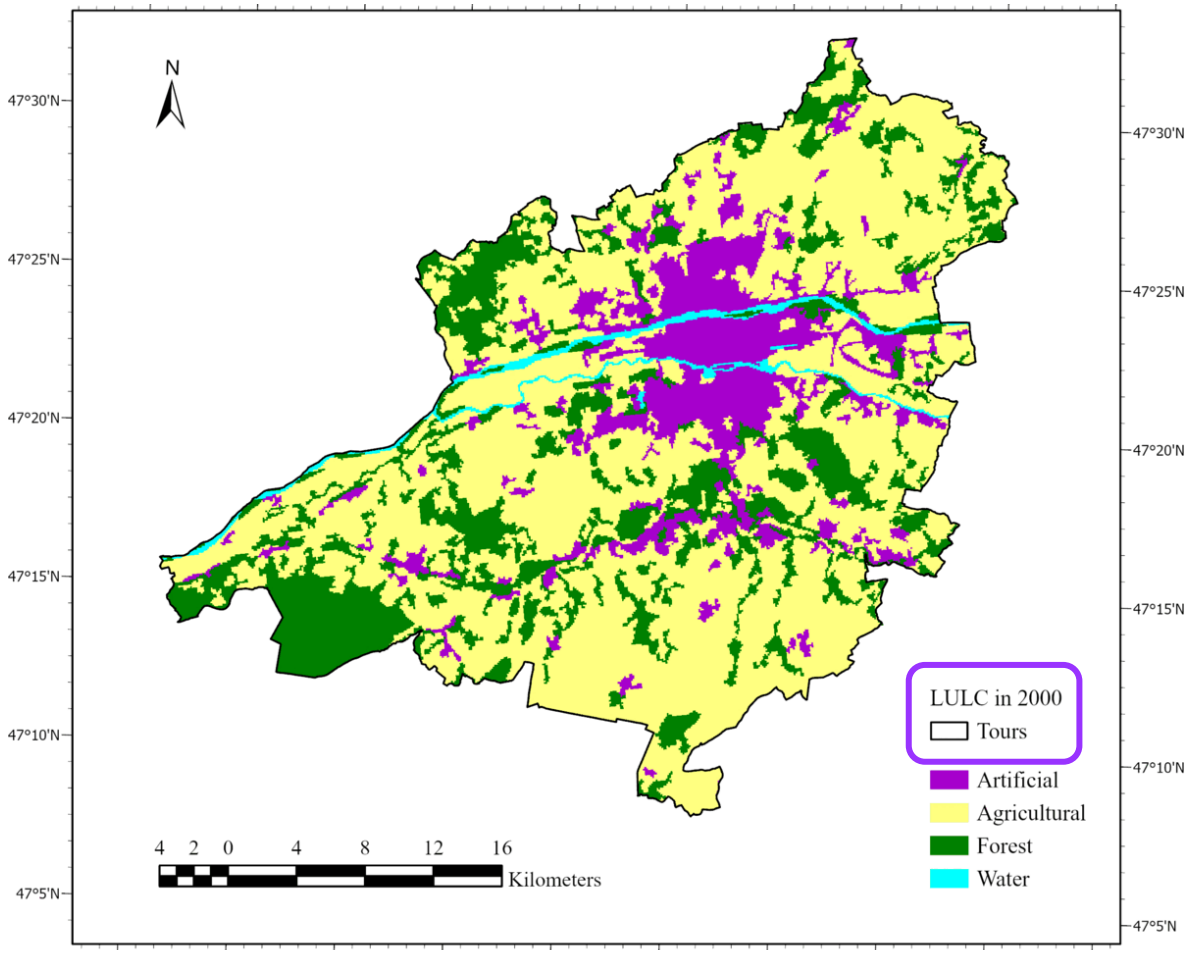
- **Agricultural area**
- **Forest area**
- **Population**
- **Average income**
- **Average property value**

(P-value < 0.05)

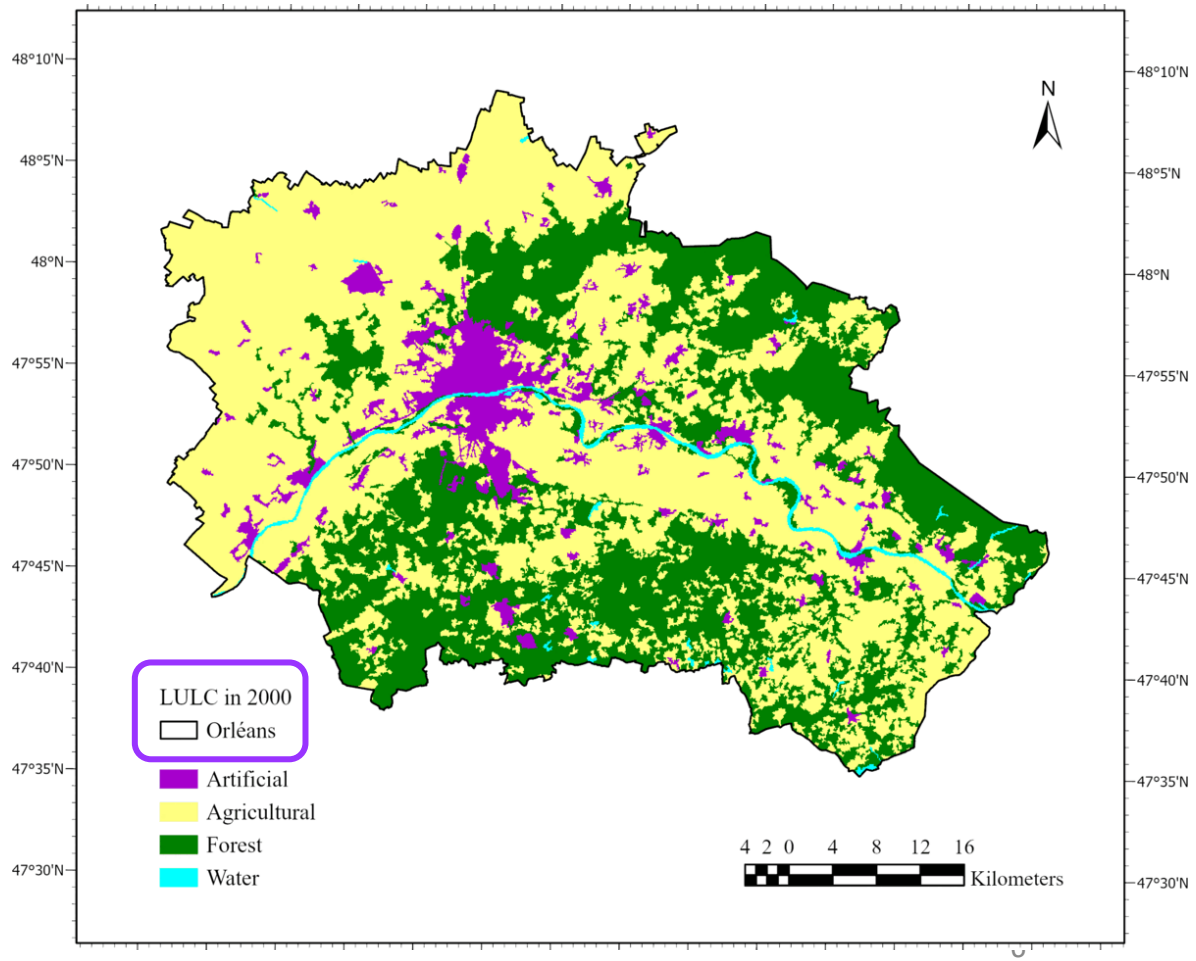


PAT policies do not yet affect the loss of agricultural land

Tours



Orléans



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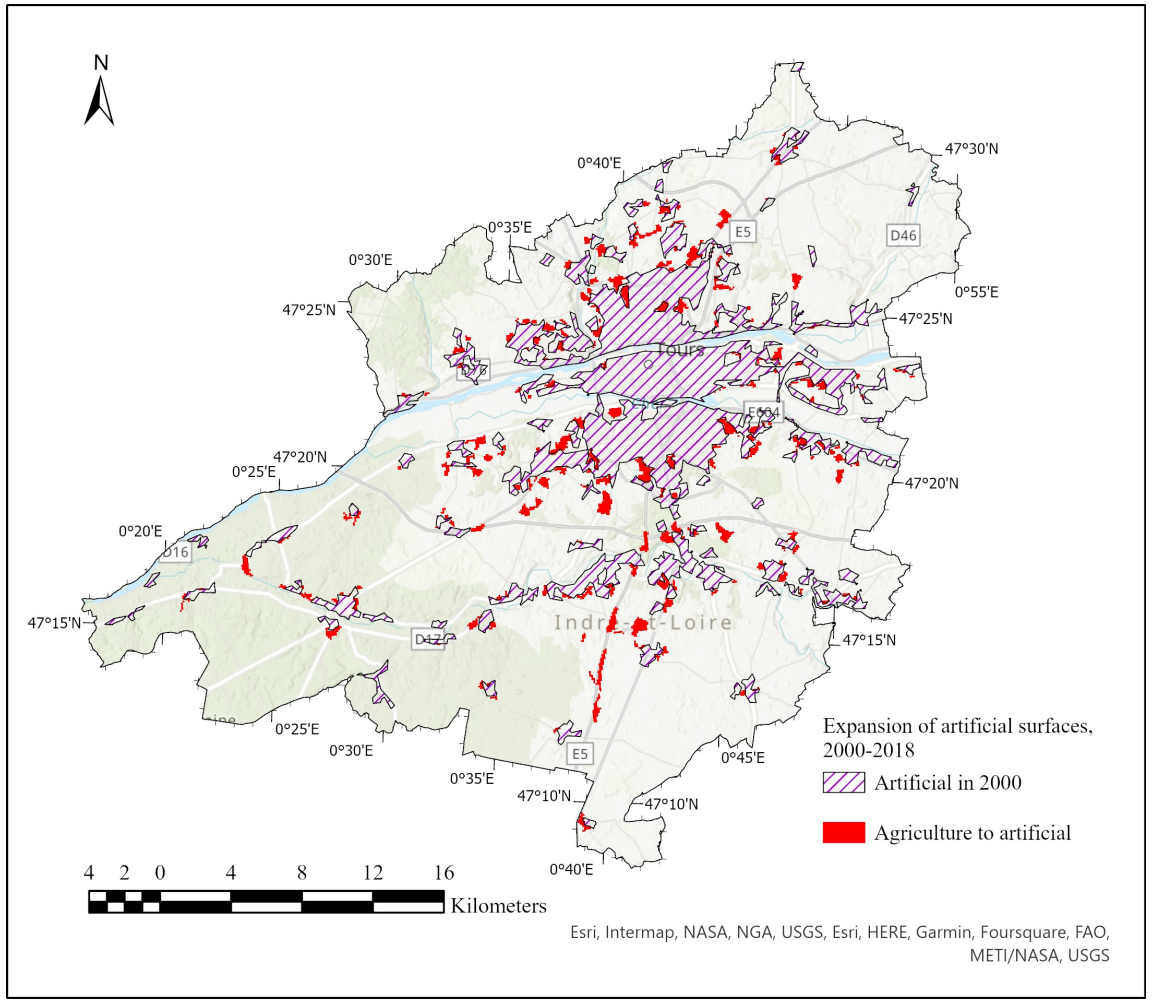

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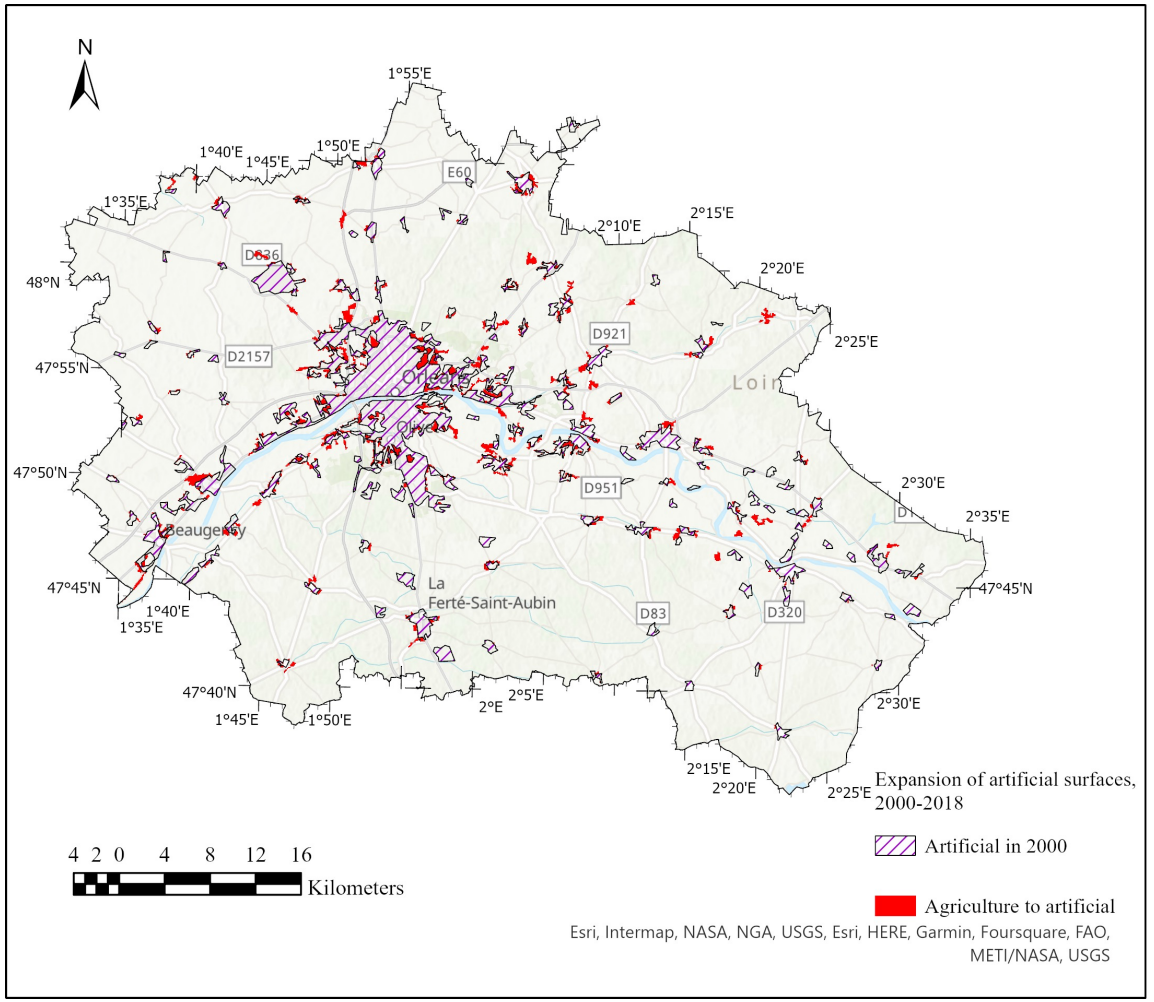

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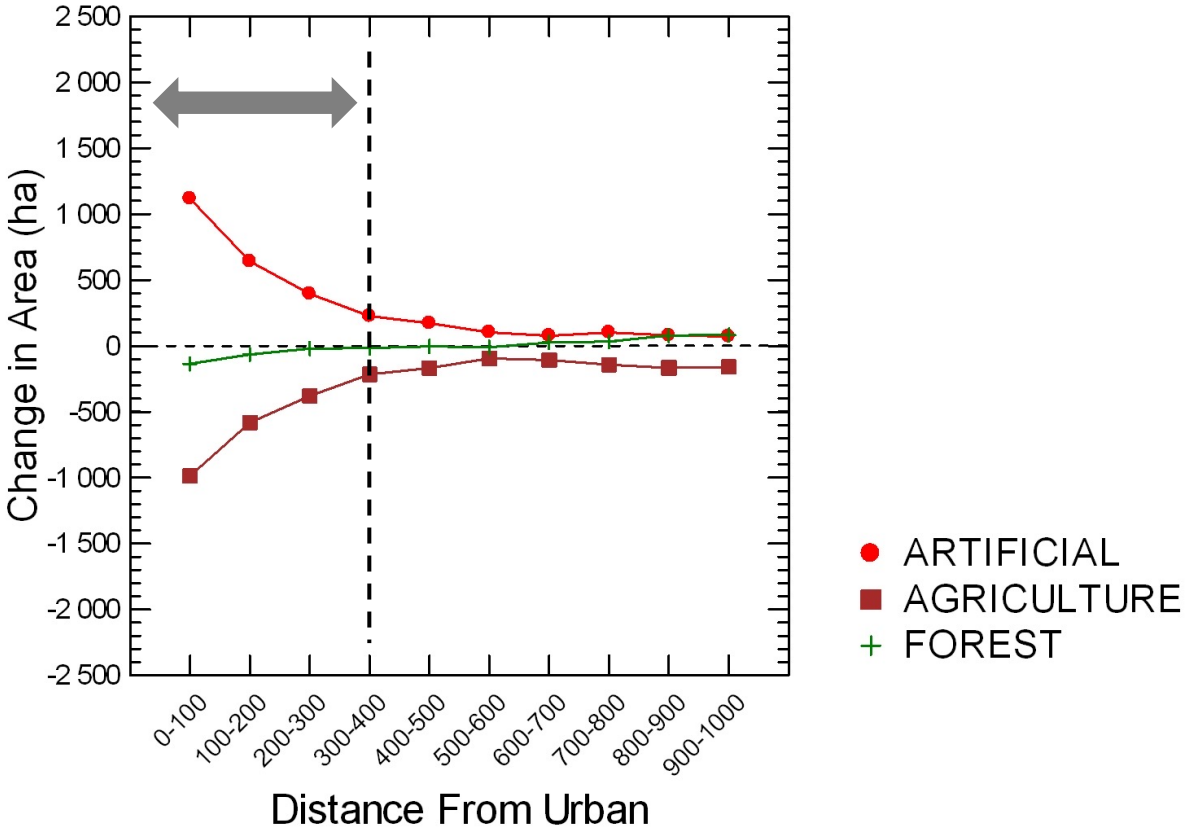

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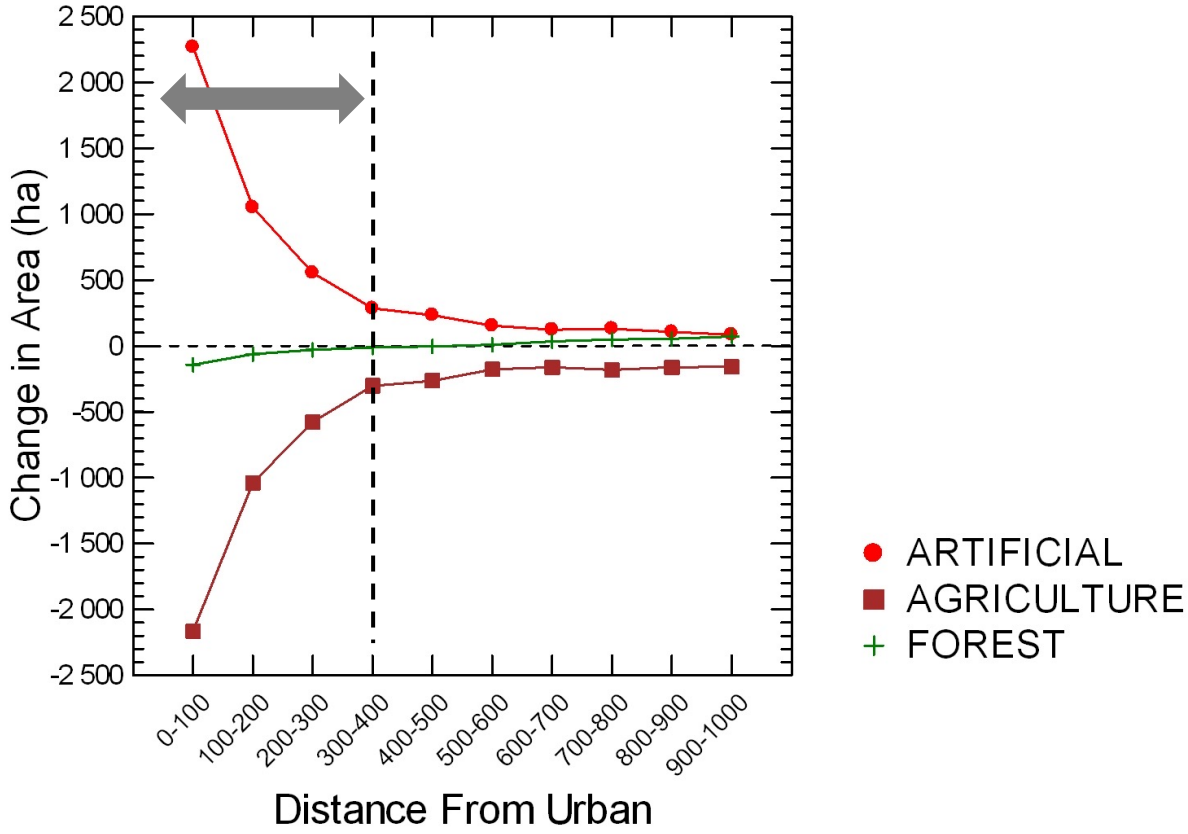

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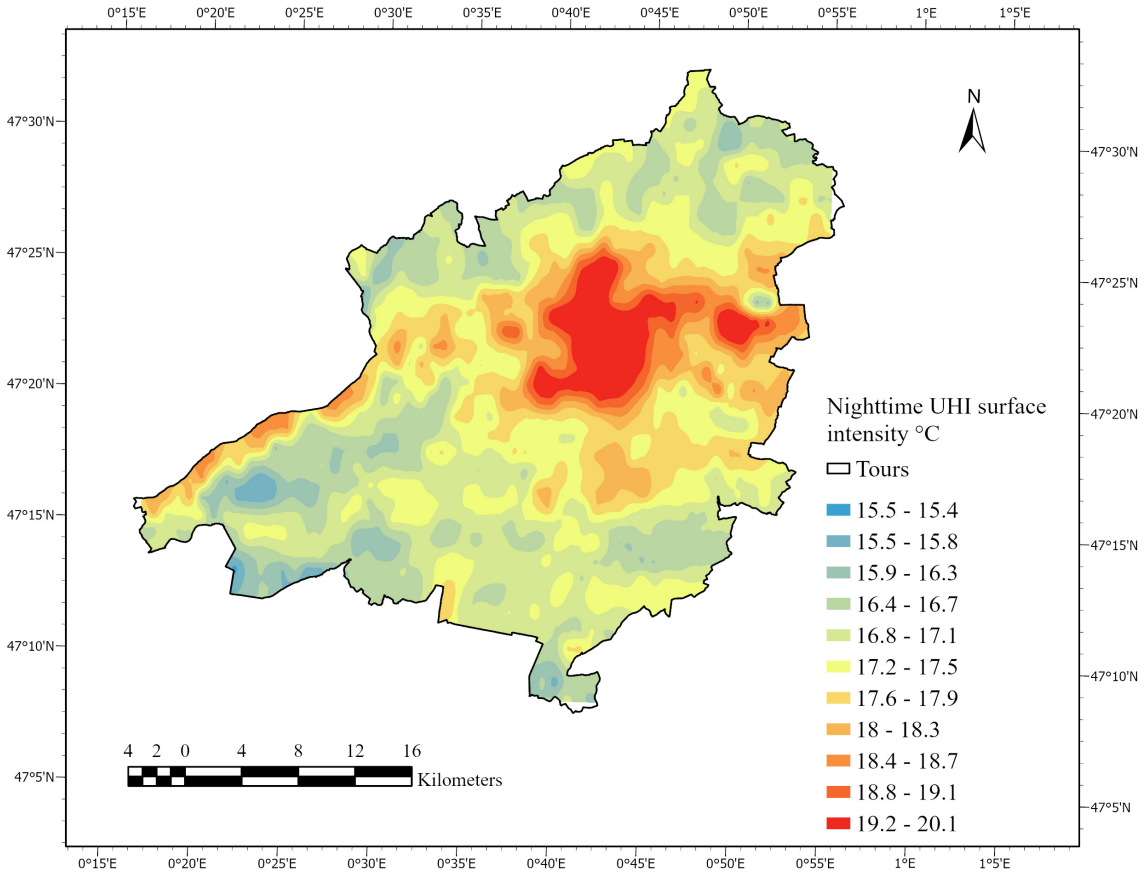
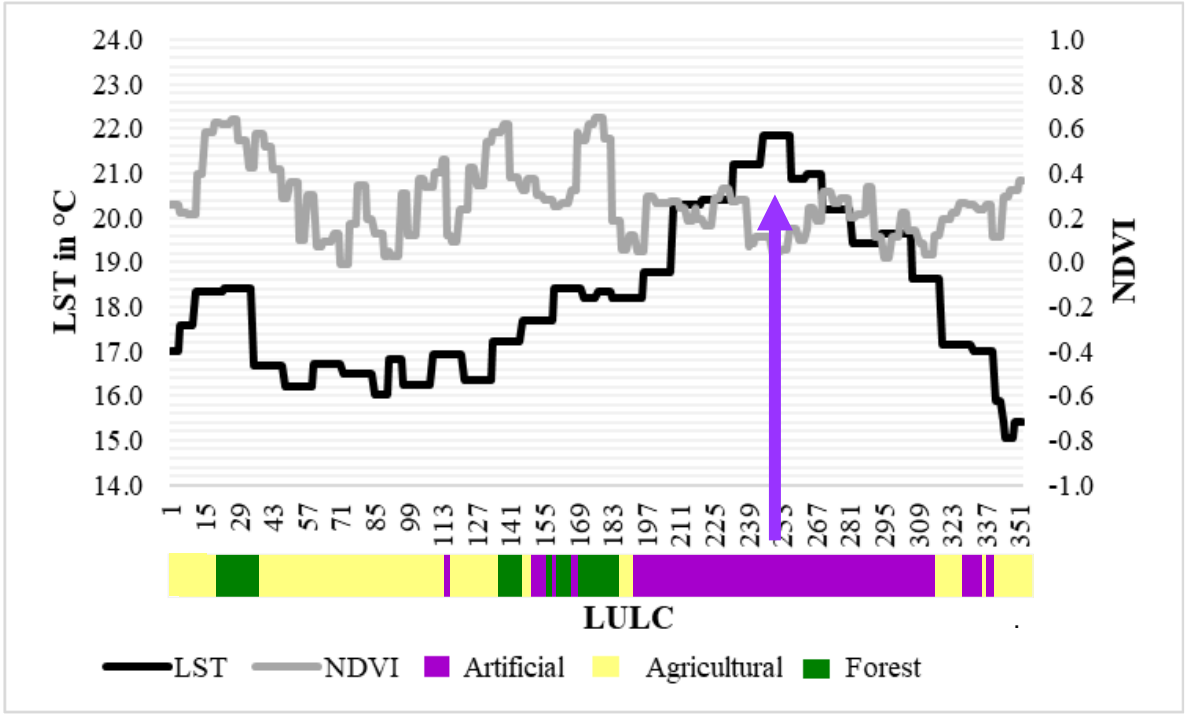


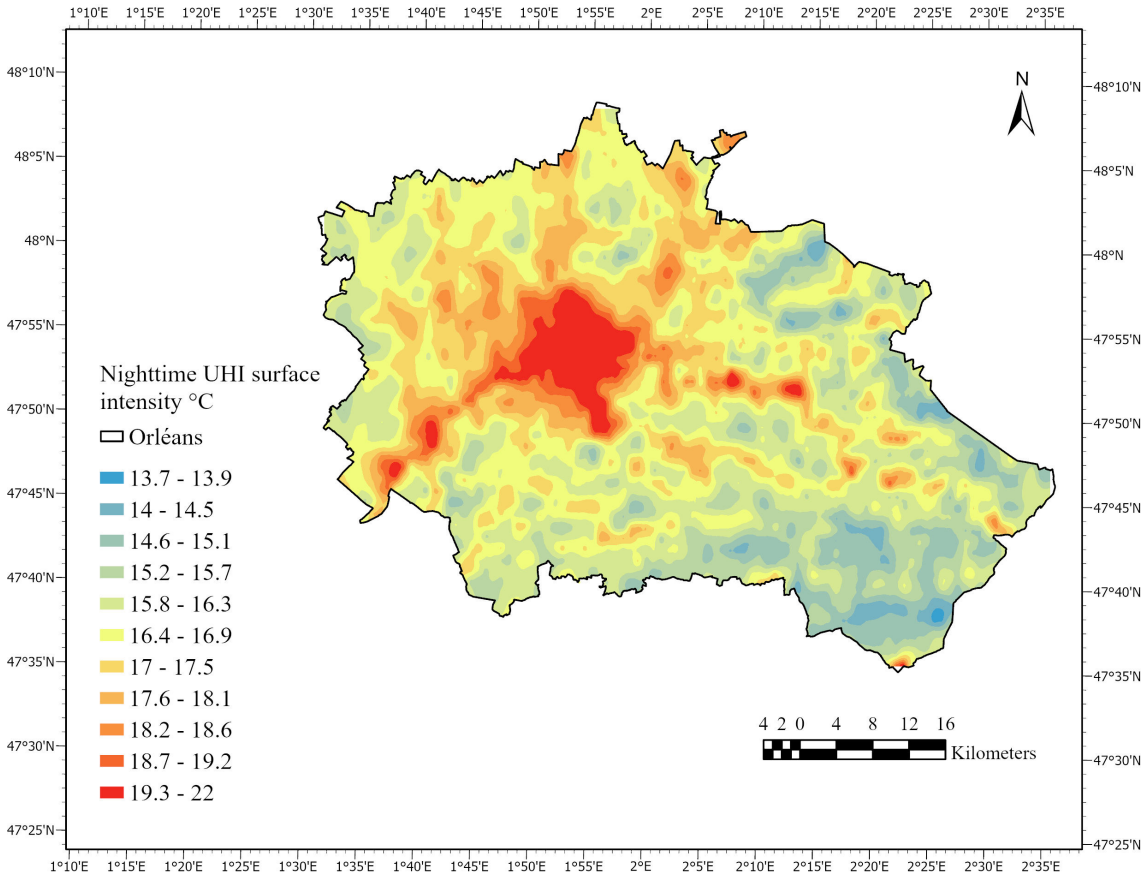
Nighttime Urban Heat Island Effect



Interpolated Land Surface Temperature (LST) map

Interpolated Land Surface Temperature (LST) profile

Orléans



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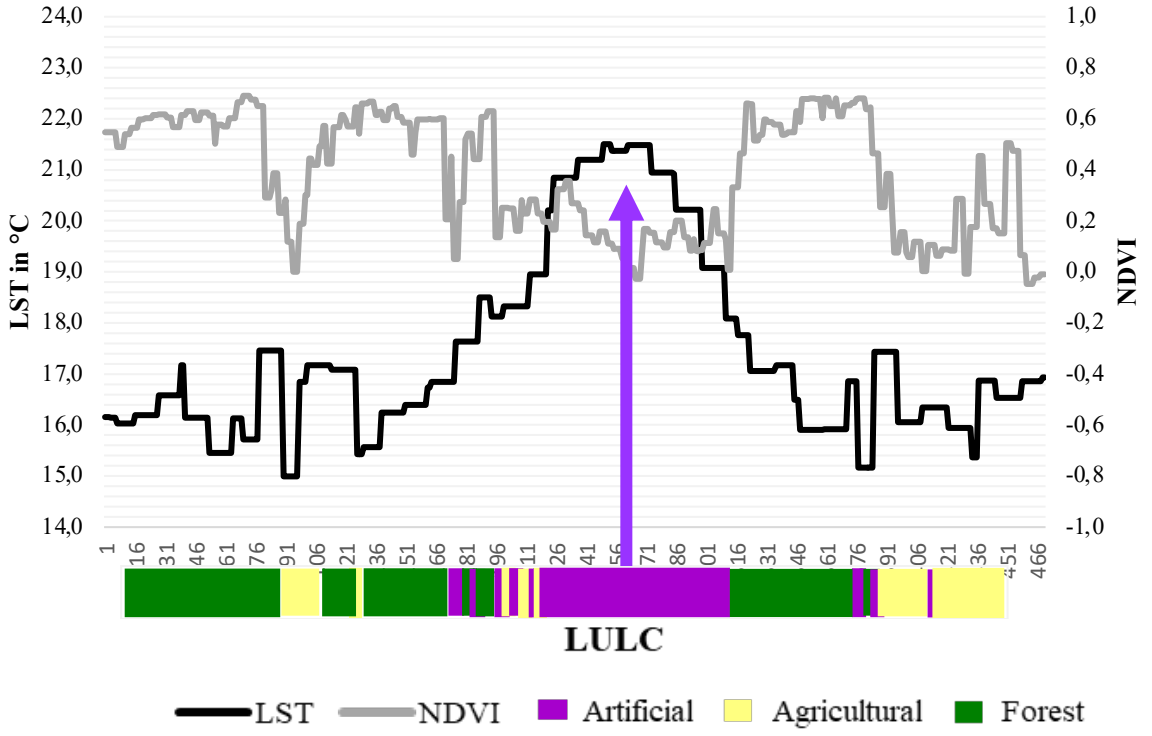
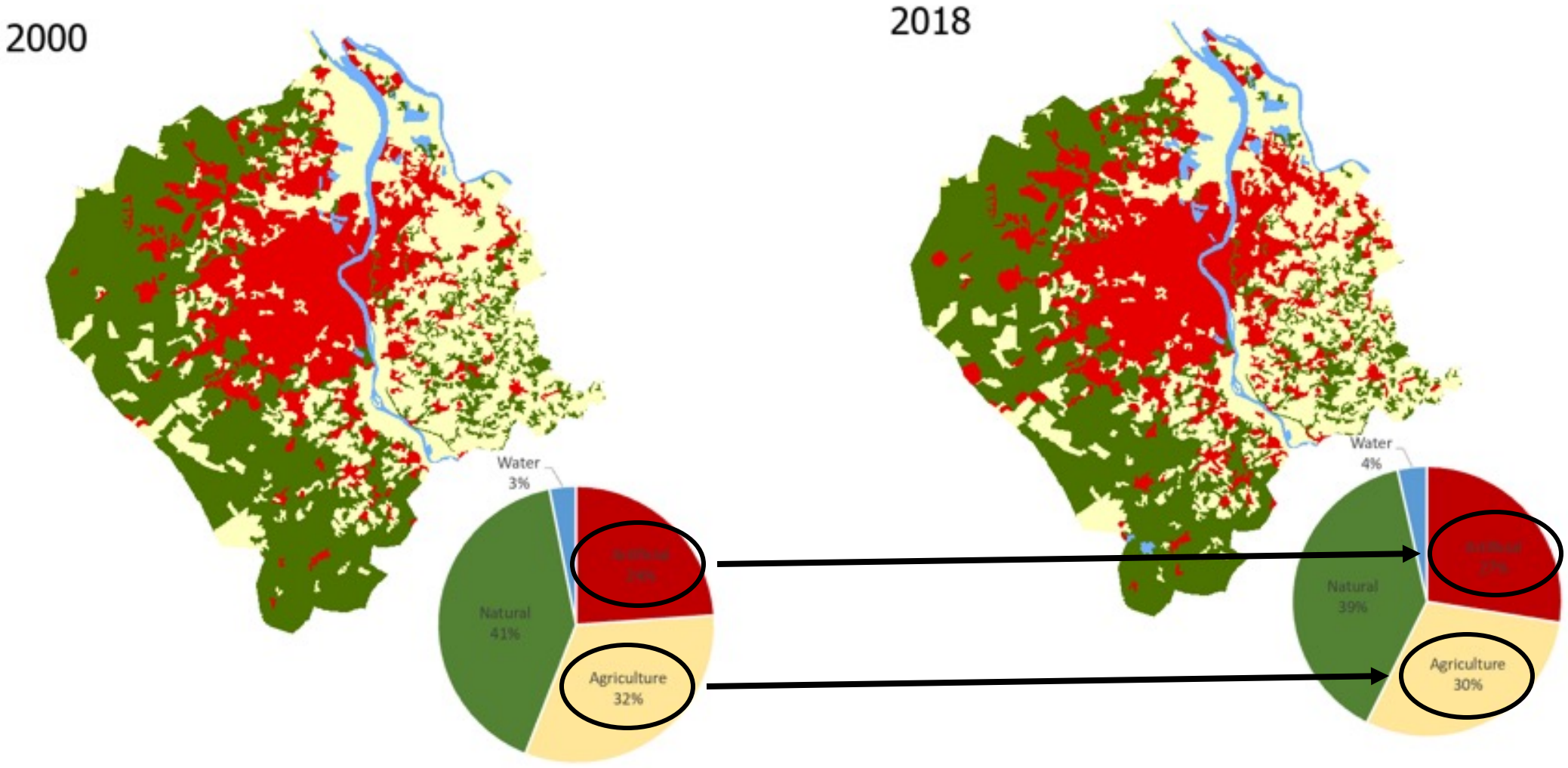


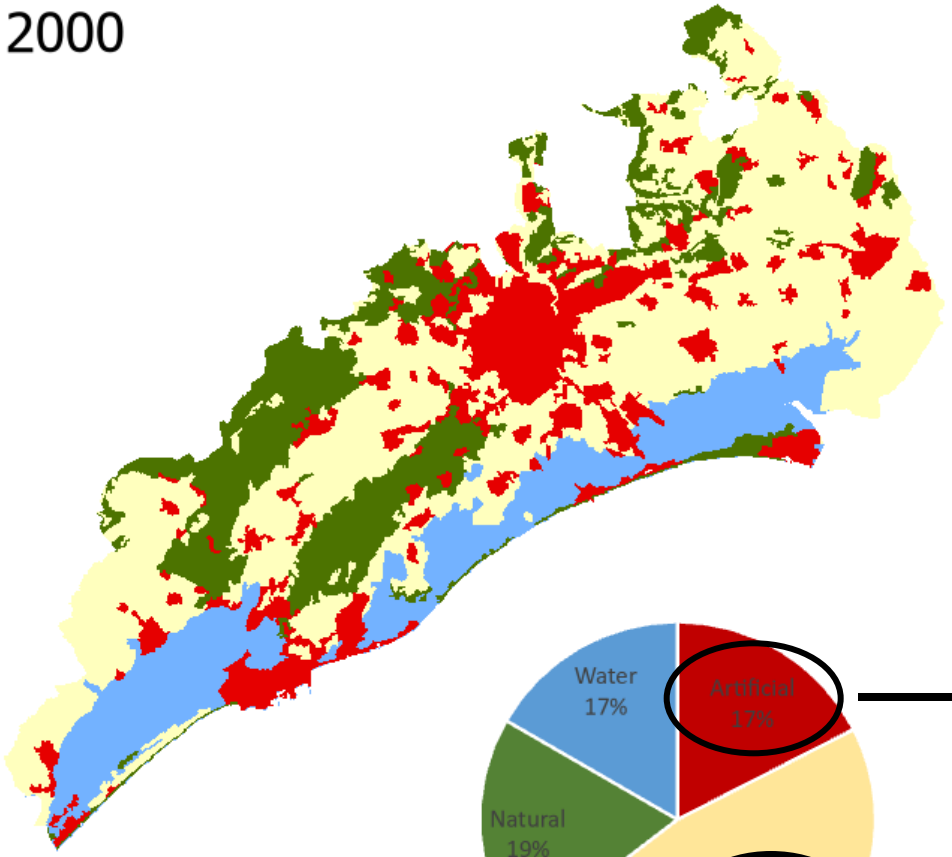
Interpolated Land Surface Temperature (LST) profile

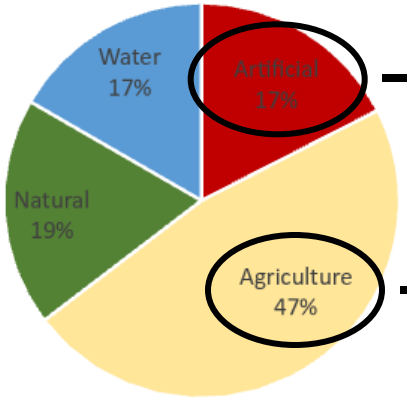
Bordeaux


2000
Water
3%
Natural
41%
Agriculture
32%
2018
Water
4%
Natural
39%
Agriculture
30%

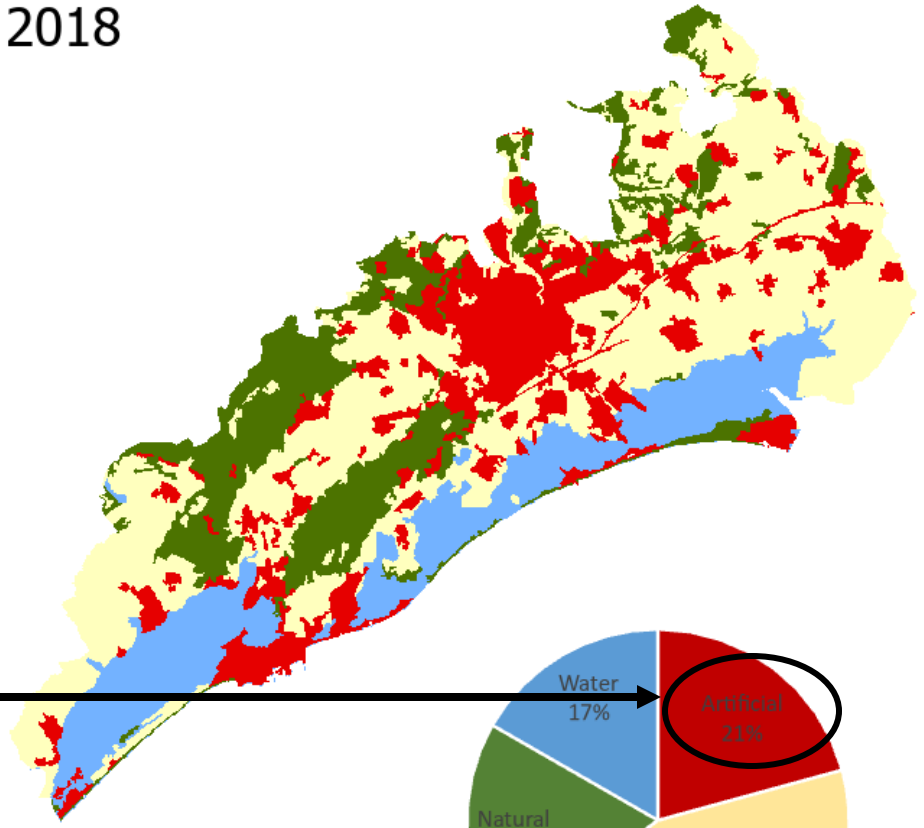
Montpellier

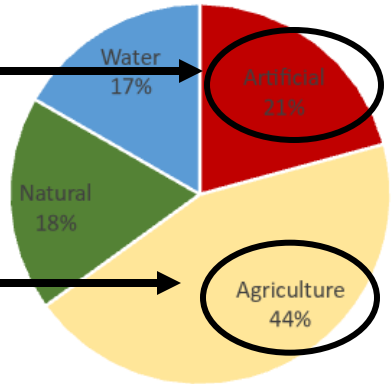
2000



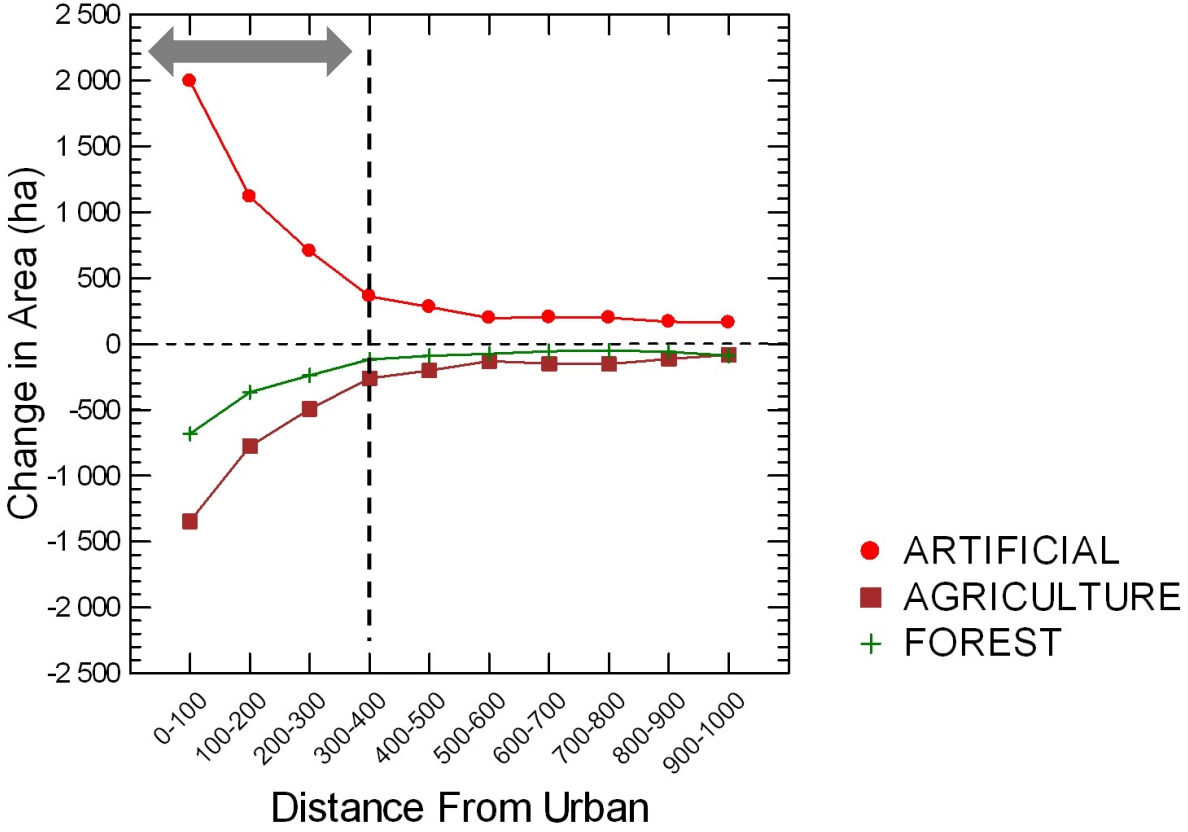


2018

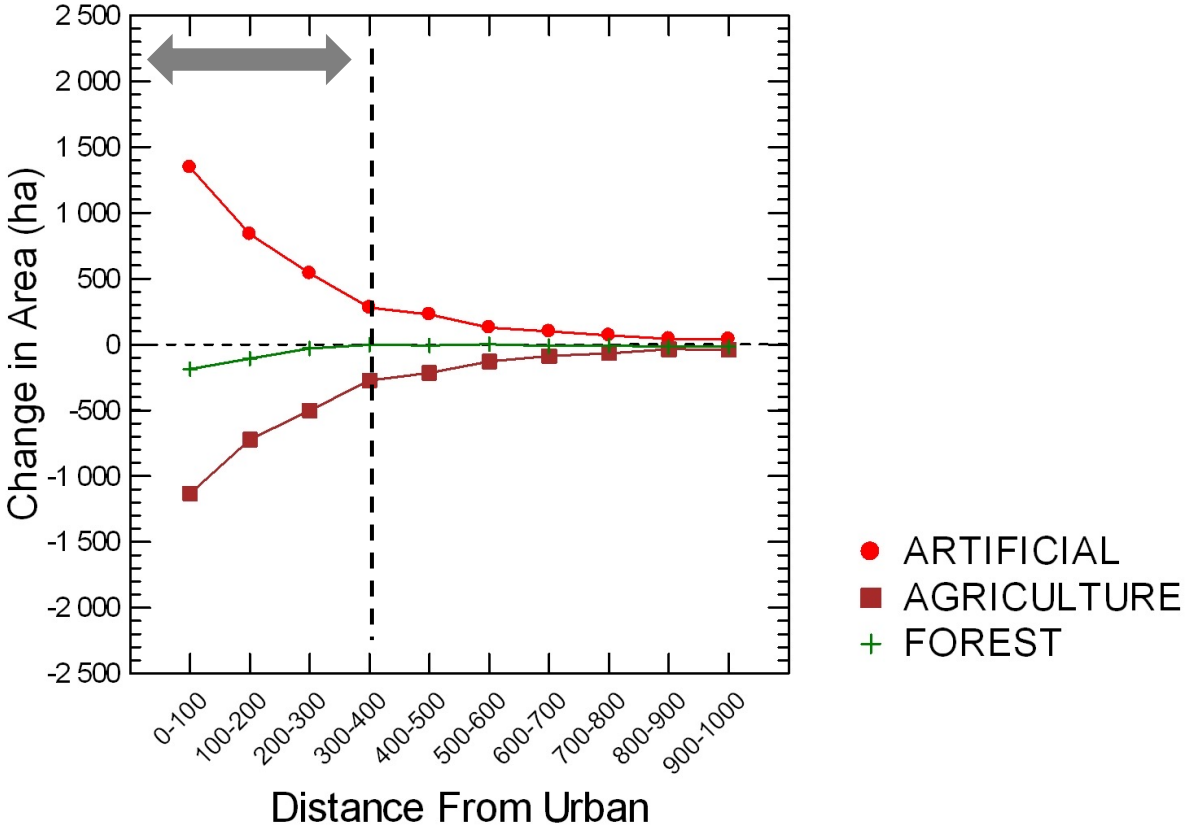




Bordeaux



Montpellier



- Urban and suburban expansion of medium to large cities in France is sacrificing our best agricultural soils.

- What soils are we protecting in our PLU? Are we protecting agricultural soils that are not at risk?

- How to optimize contradictory solutions?
  - Limiting expansion by densifying cities decreases intra-urban green space; this increases urban heat island effects and flooding risks.
  - Expanding further from the city onto less fertile soils increases travel time and air pollution.

Apports de l'interdisciplinarité

- **Sous-disciplines de la Géographie:** hydrologie, pédologie, politique urbaine, télédétection, pollution de l'air, transport & mobilité…
- **Sociologie:** quelles populations sont exposées à quels risques?
- **Economie:** que sont les coûts et bénéfices de différents scenarios d'aménagement?

Merci de votre attention

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