



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 îlots 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



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

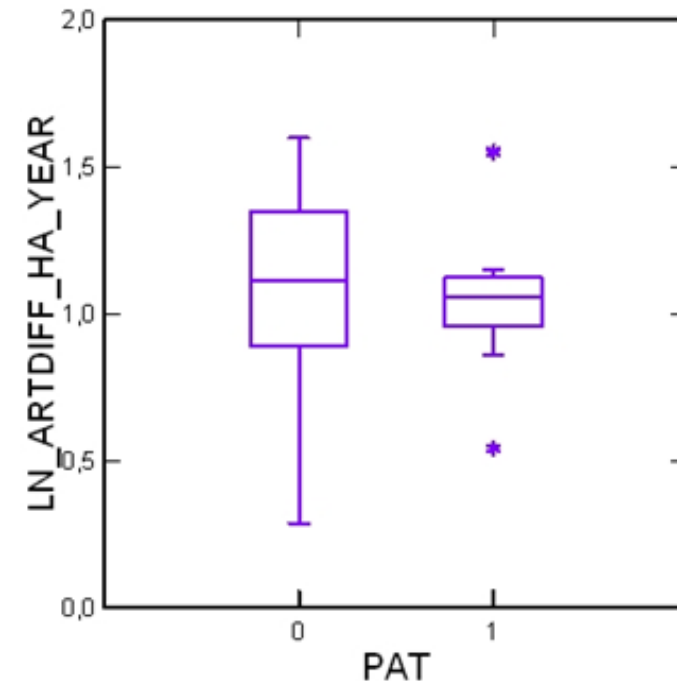
Average loss in agricultural land cover: -13 ha/yr (median -11 ha/yr; std. dev. 9 ha/yr)

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

Artificial 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

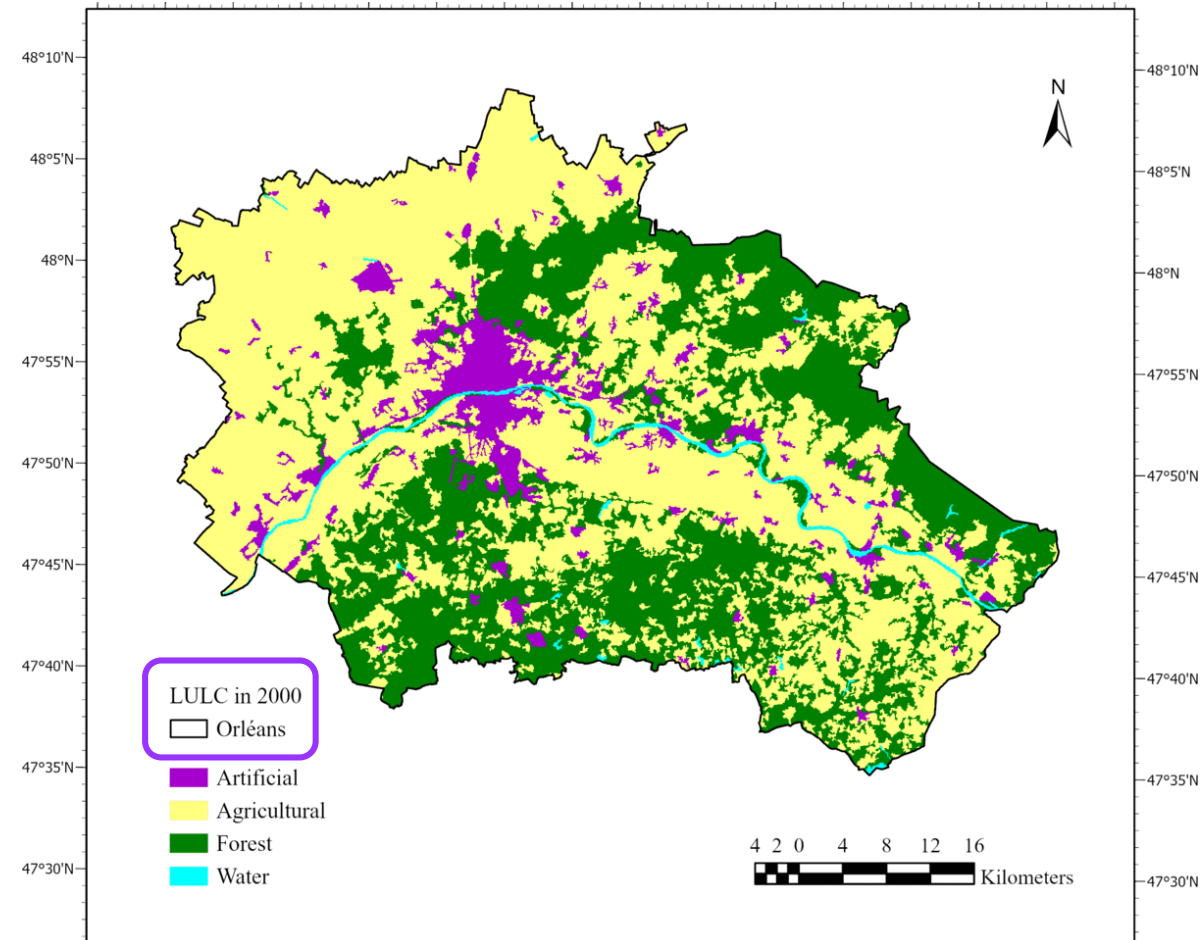
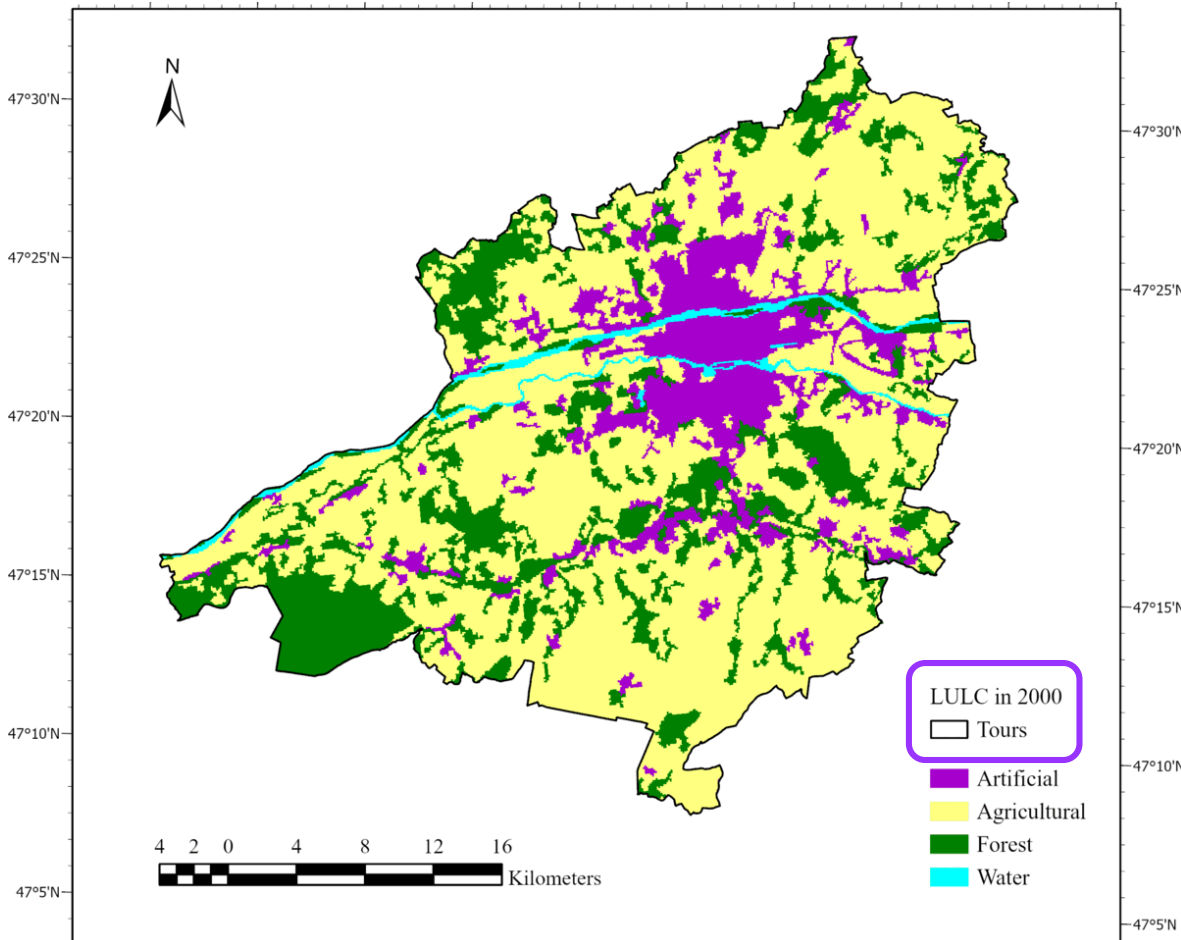


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Tours

Orléans

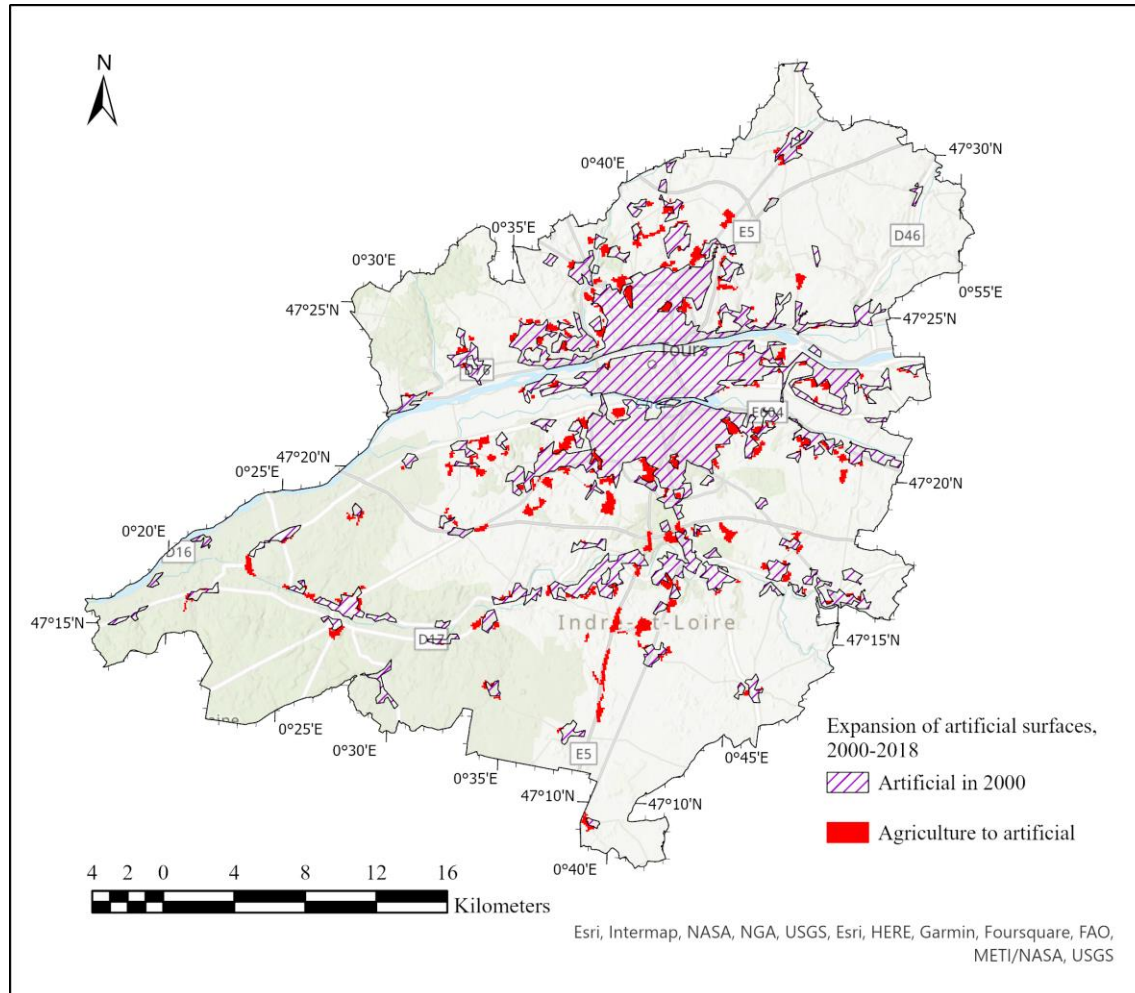




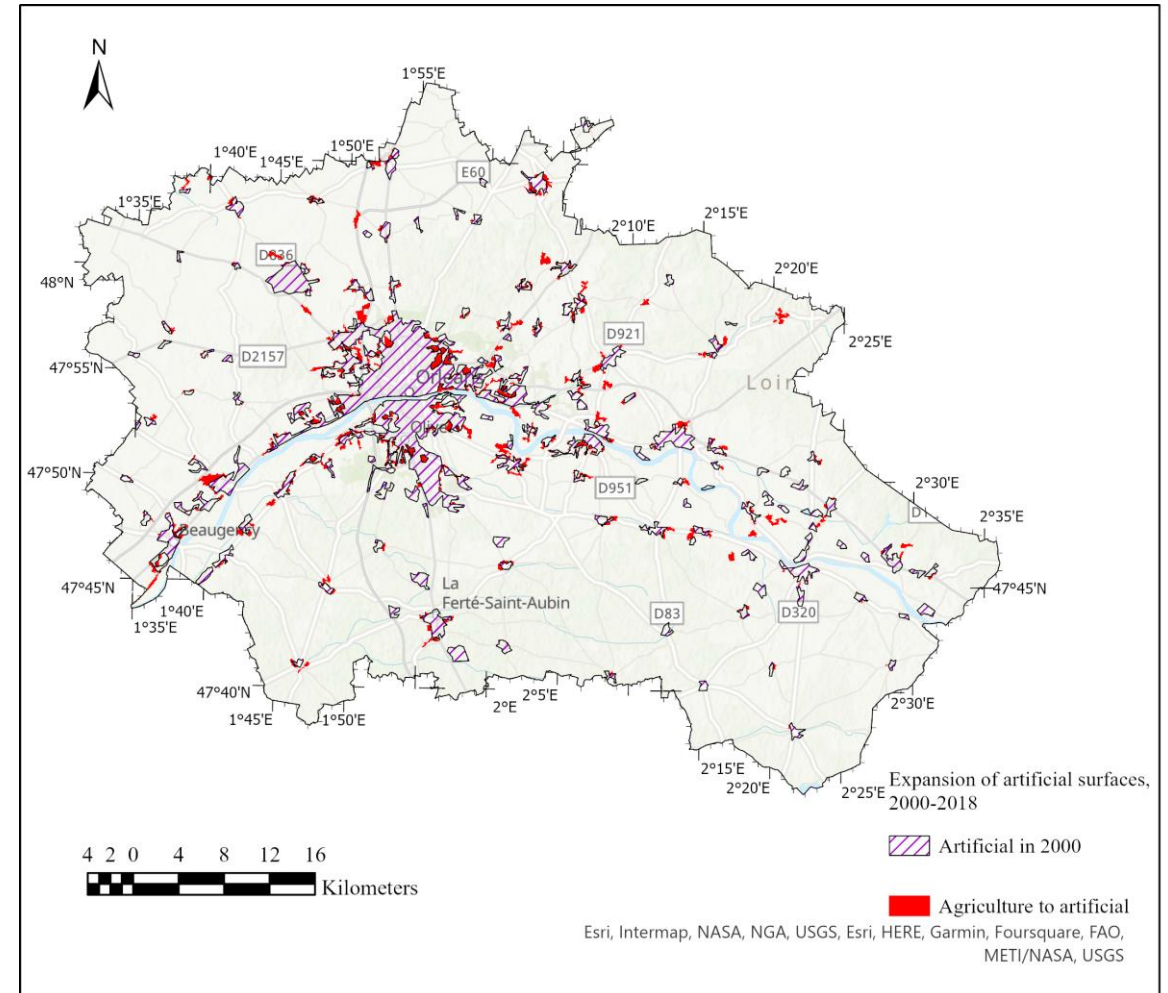
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Tours



Orléans

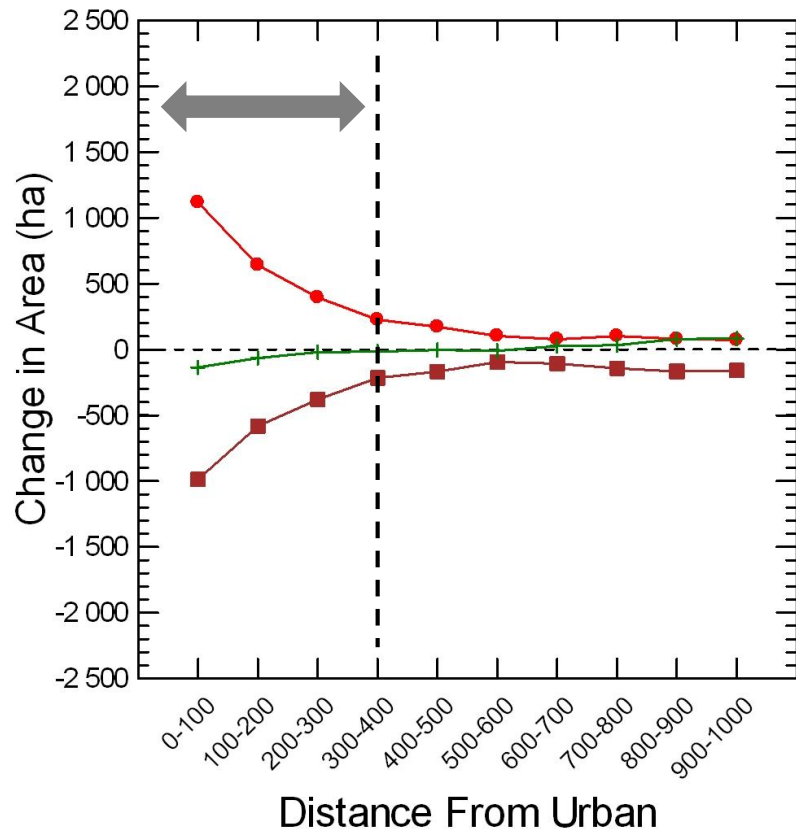




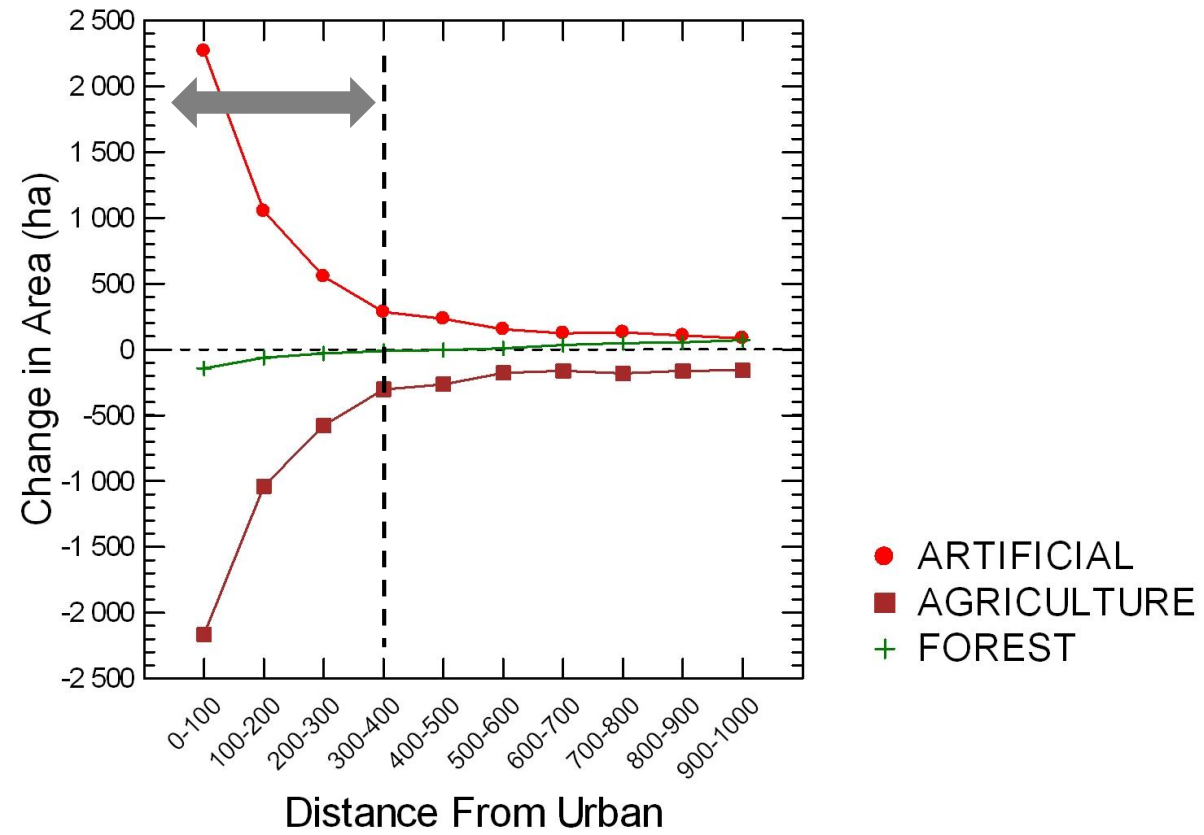
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Tours



Orléans

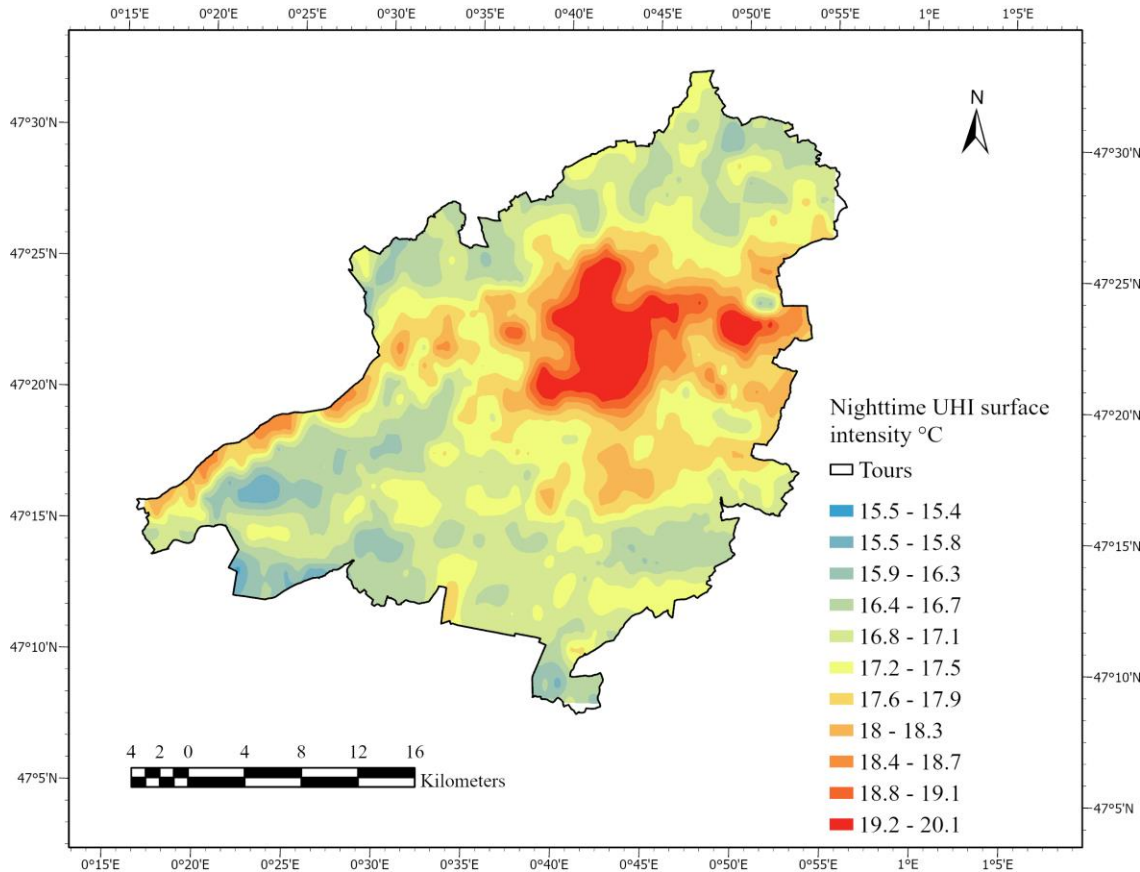




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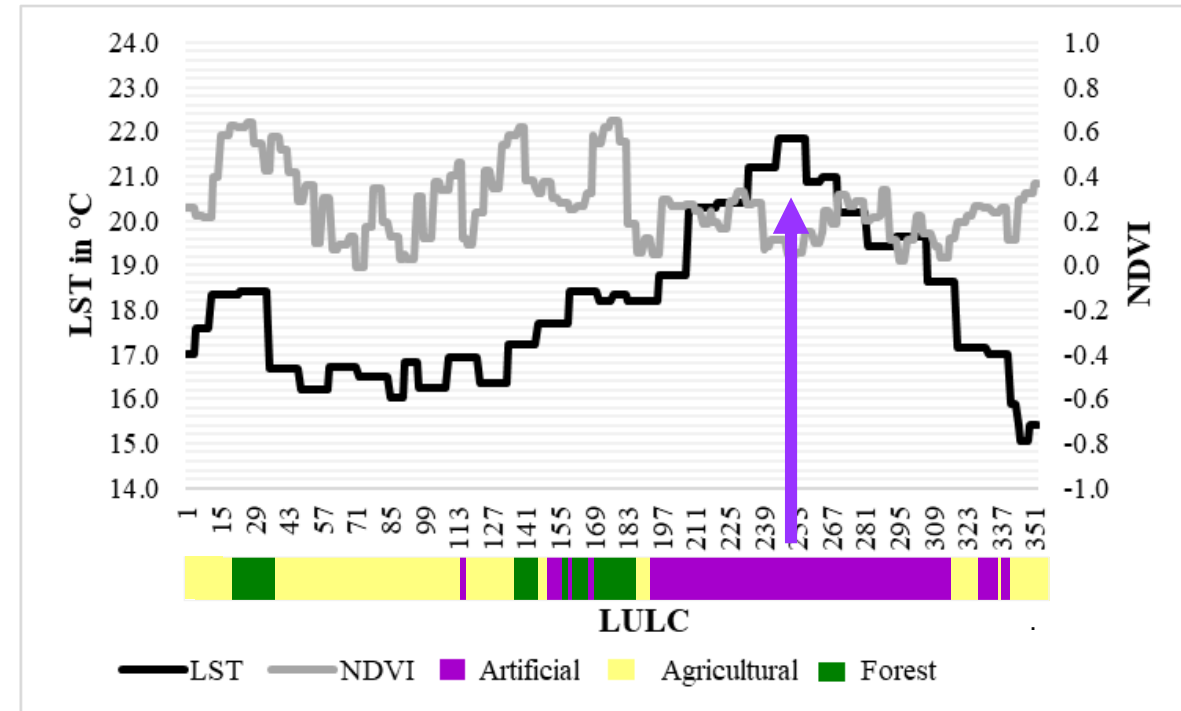
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Tours



Interpolated Land Surface Temperature (LST) map

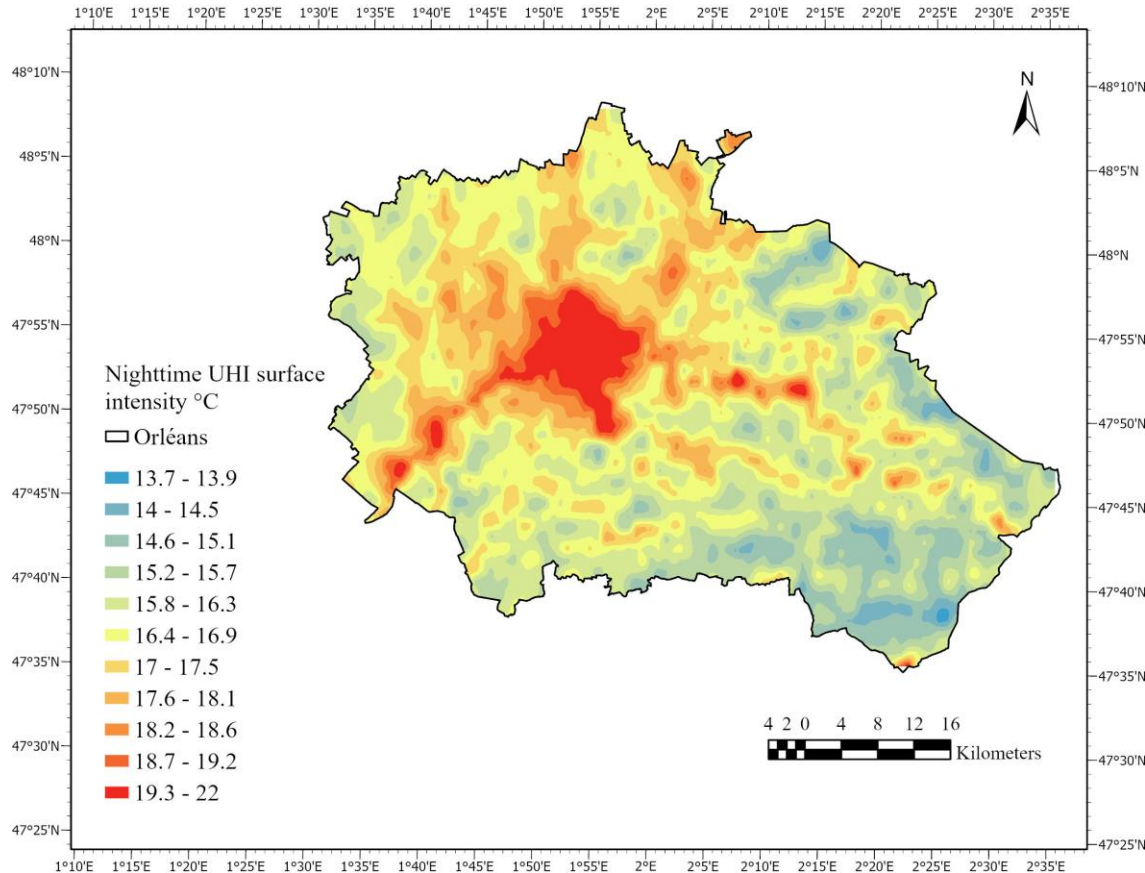
Nighttime Urban Heat Island Effect



Interpolated Land Surface Temperature (LST) profile

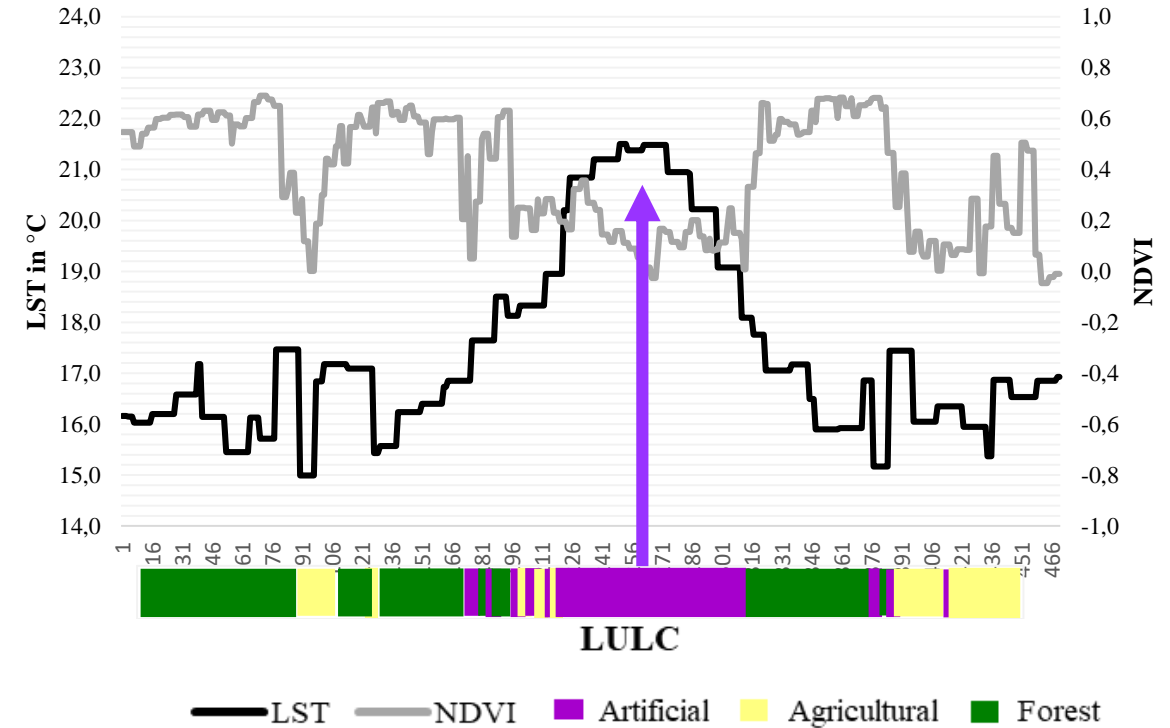


Orléans



Interpolated Land Surface Temperature (LST) map

Nighttime Urban Heat Island Effect

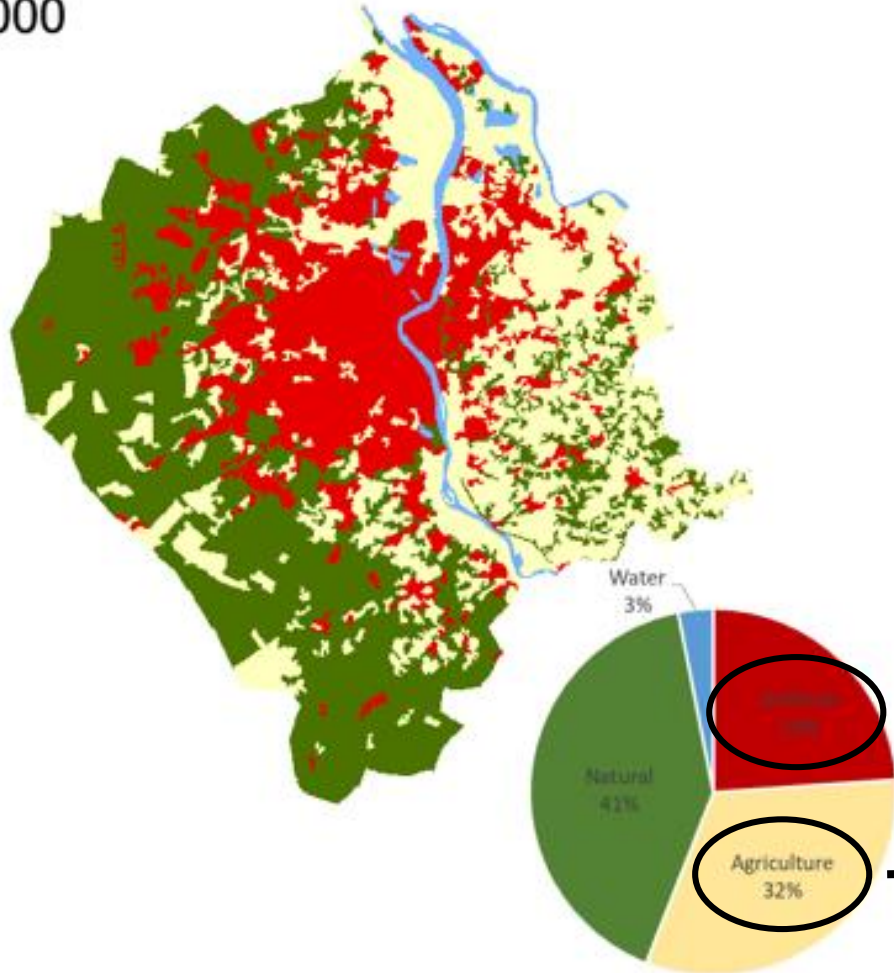


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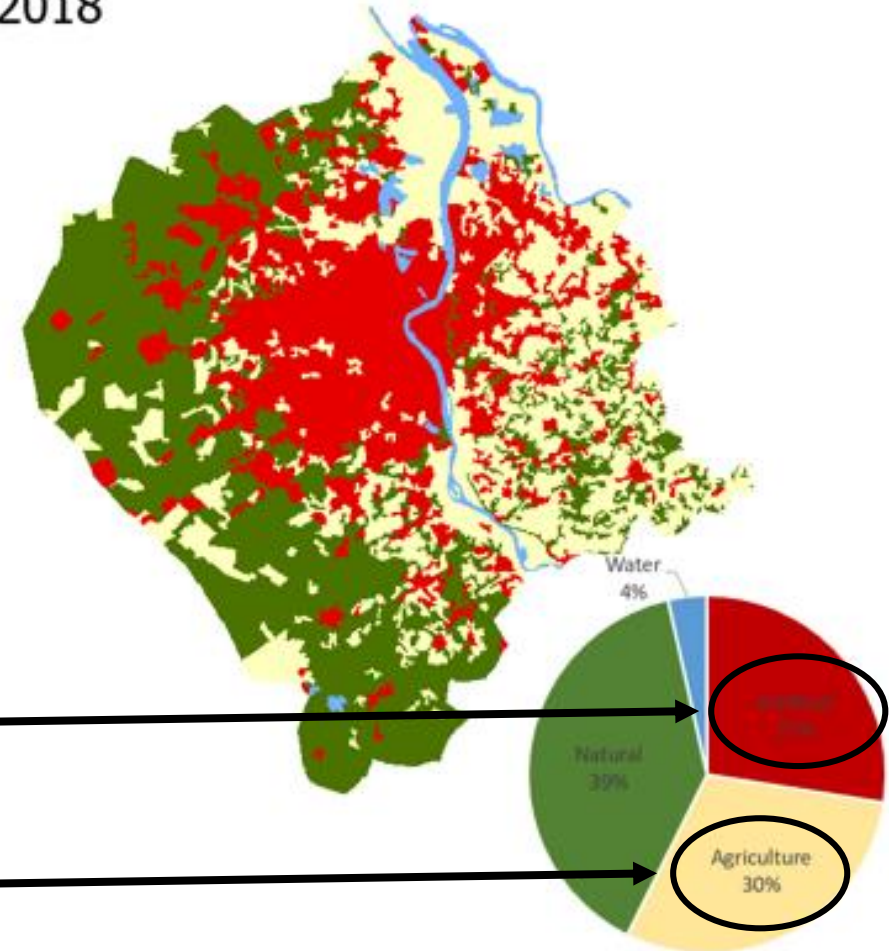


Bordeaux

2000



2018





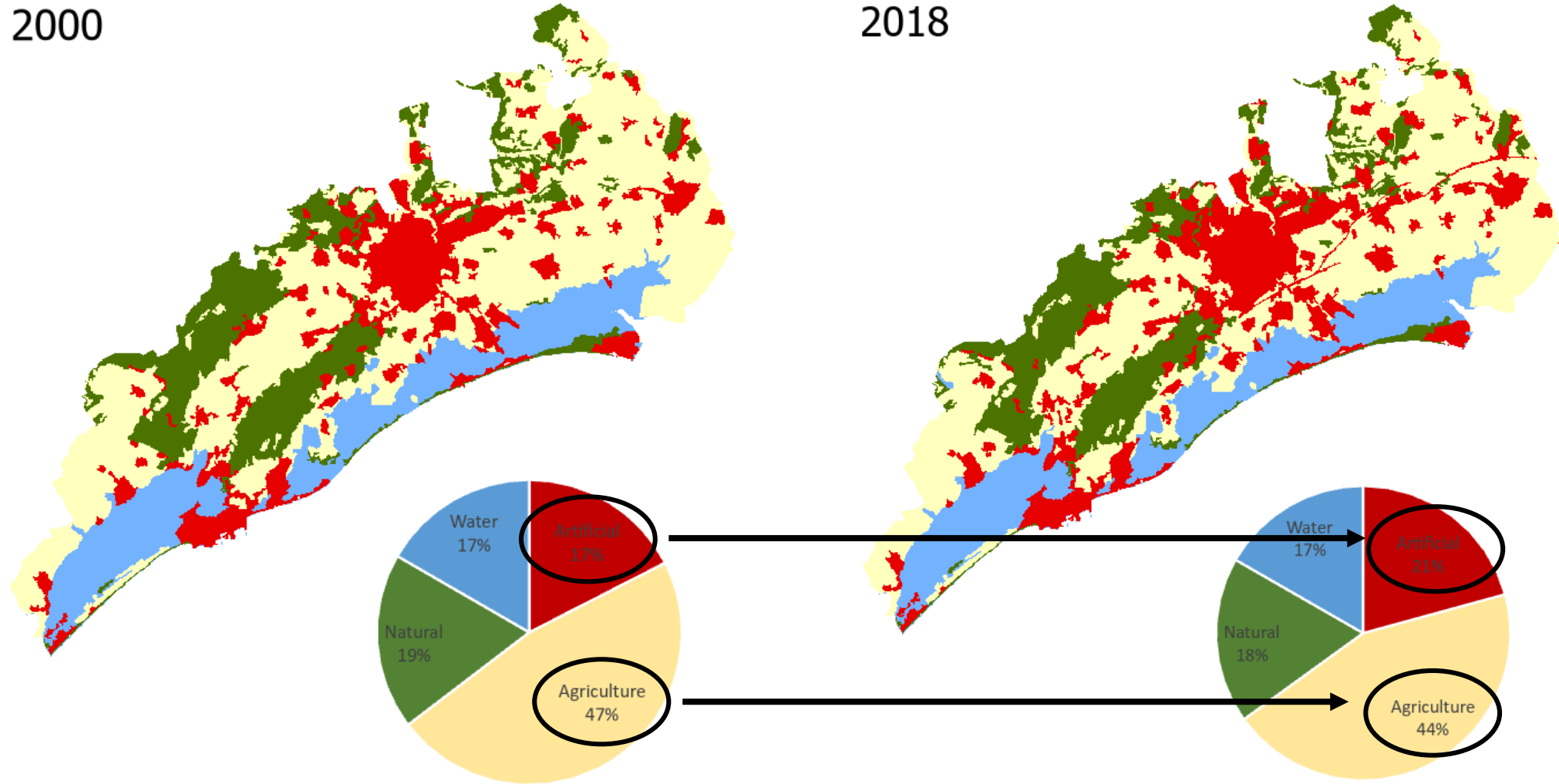
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Montpellier

2000

2018

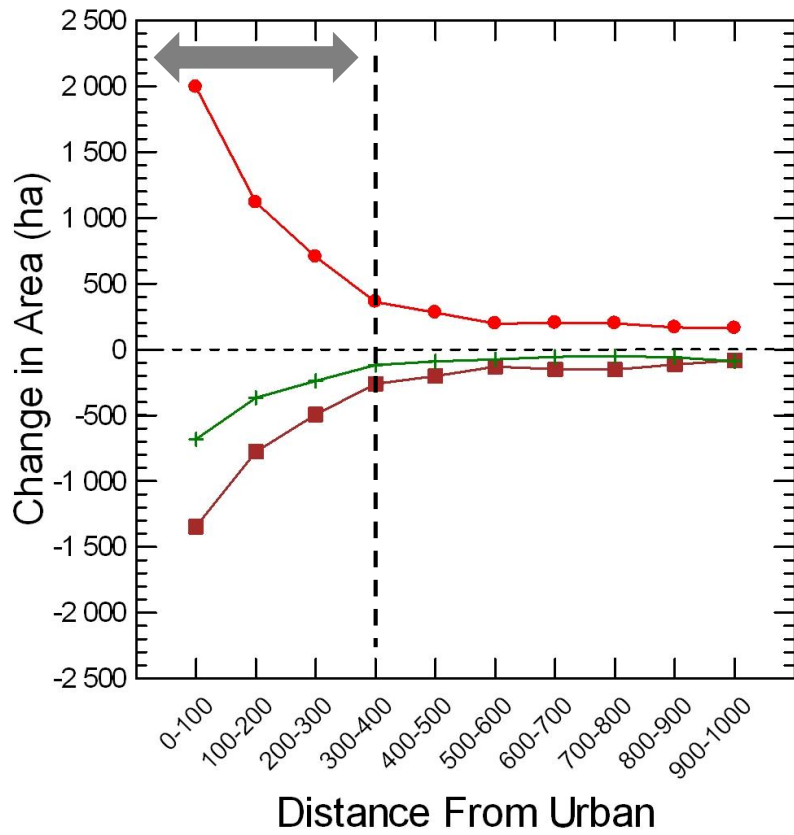




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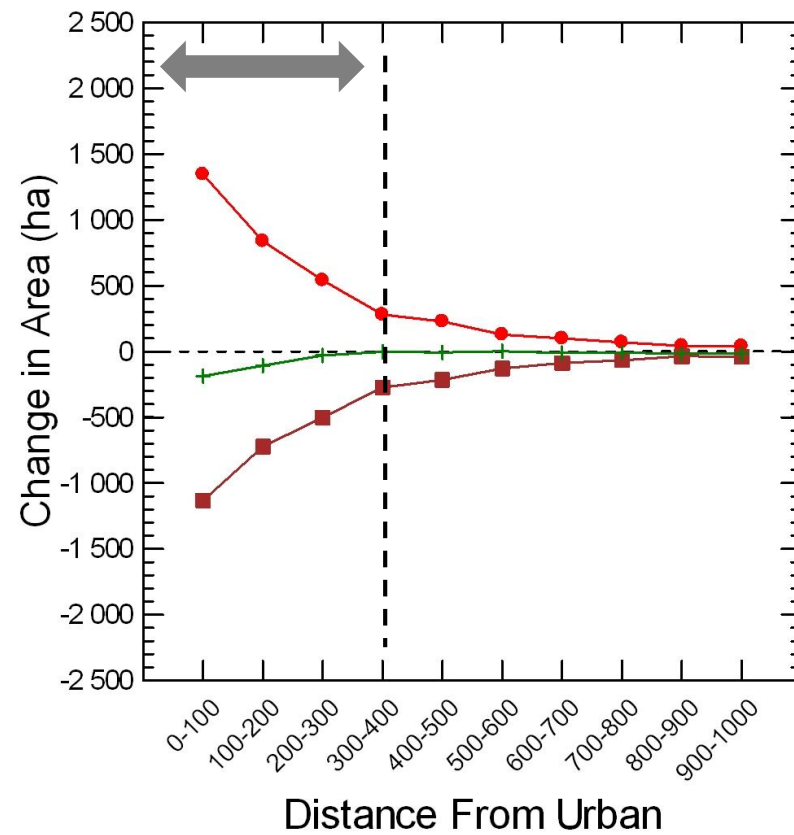
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Bordeaux



- ARTIFICIAL
- AGRICULTURE
- + FOREST

Montpellier



- ARTIFICIAL
- AGRICULTURE
- + FOREST



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- ❖ 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.



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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 scénarios d'aménagement?



Merci de votre attention
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