



The COoL-AMmetropolis project

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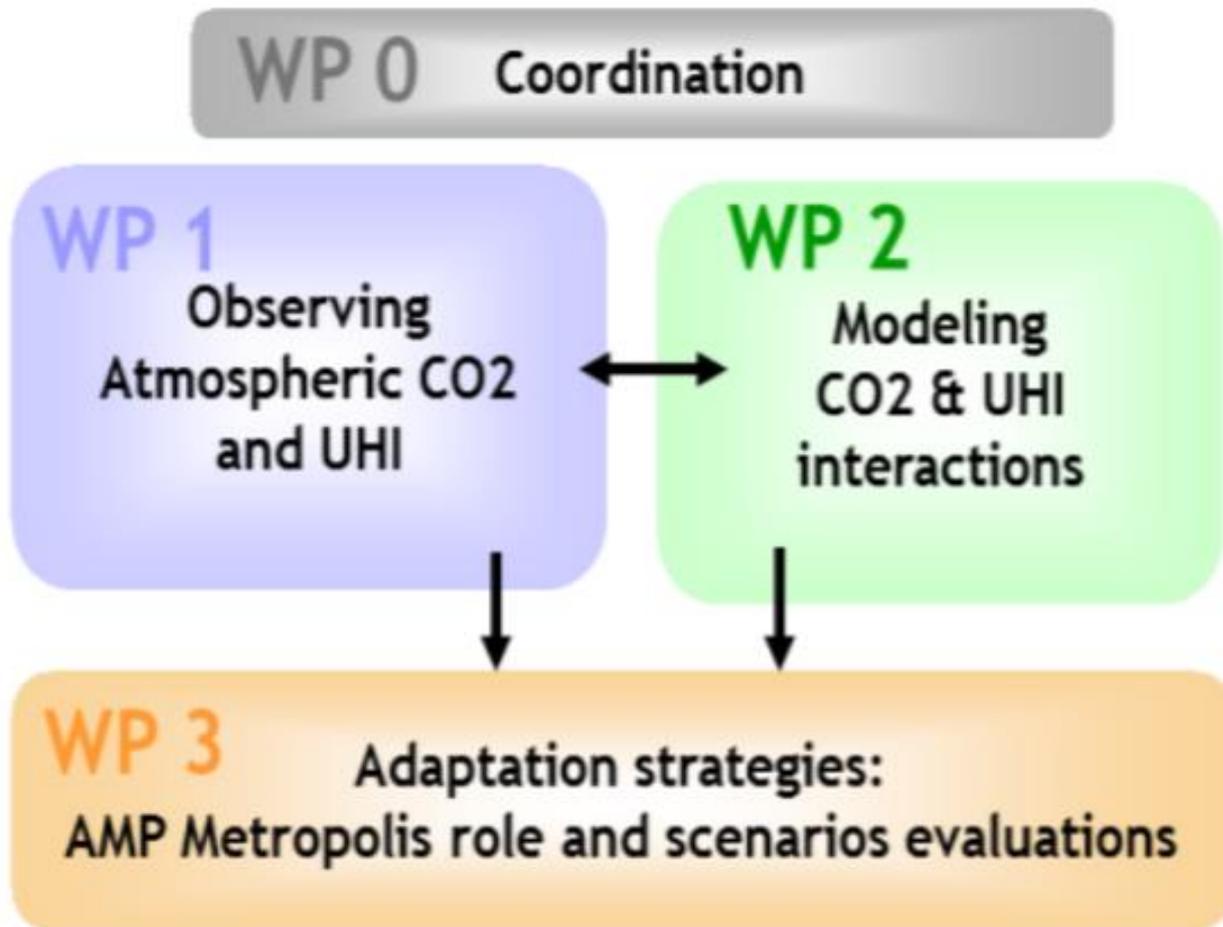
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- Name : **COoL-Ammetropolis**
- Coordination : **Prof. Irène Xueref-Remy (IMBE)**
- Title : **Towards the reduction of CO2 emissions and urban heat island in the Aix-Marseille metropolis area, France**
- Partners : **11**
 - 5 funded partners: IMBE, CNRM, LIEU, PYTHEAS, ATMOSUD
 - 6 non funded partner: LSCE, INRAE, GNS, ESPACE, MIO
 - 1 sub-contracter : GREC-SUD
- Starting date : **October 1st, 2019**
- Duration : **4 years**
- ANR dotation : **748 950,80 €**
- Total cost : **1 936 511,90 €**
- Labels : **National poles of Competitivity « CAPENERGIES » and « ADVANCITY »**

- ❑ Urbanized and industrialized areas are the main source of anthropogenic CO₂ (>70% of CO₂ from fossil fuel emissions)
- ❑ In these areas, the process of urban heat island (UHI) increases the local temperature that comes on top of global warming
- ❑ The main sources (and sinks) of urban CO₂ and UHI are common : buildings, thermal vehicles, vegetation
- ❑ **Acting on these common sources and sinks is a mean to develop sustainable cities.**
- ❑ **Our target : the Aix-Marseille metropolis area (AMm) – 1.8 M inhabitants and about 11% of French CO₂ emissions.**

We aim at acting for accelerating the environmental transition in an area where the environment is undergoing a huge pressure from Human beings and climate change, from a strong interaction between Environmental Sciences, Human and Social Sciences, stakeholders and policy makers.

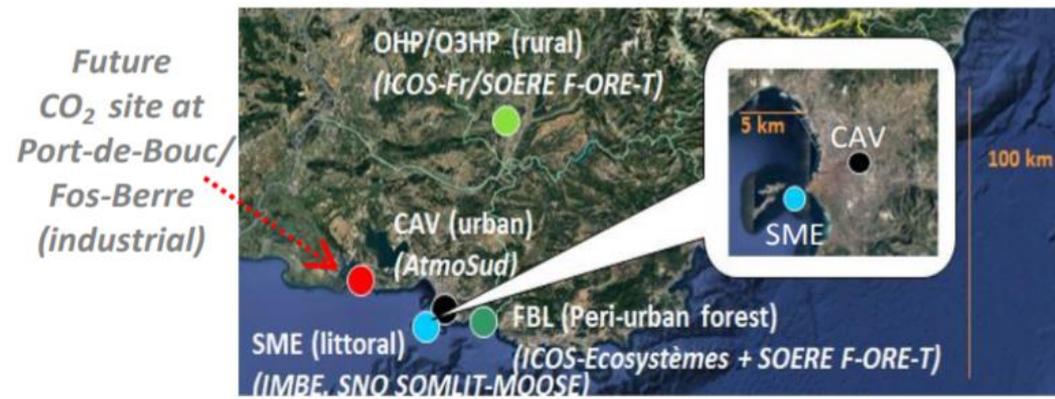


IMBE- PYTHEAS

Relies partly on existing ICOS network and ATMOSUD air quality agency facilities)

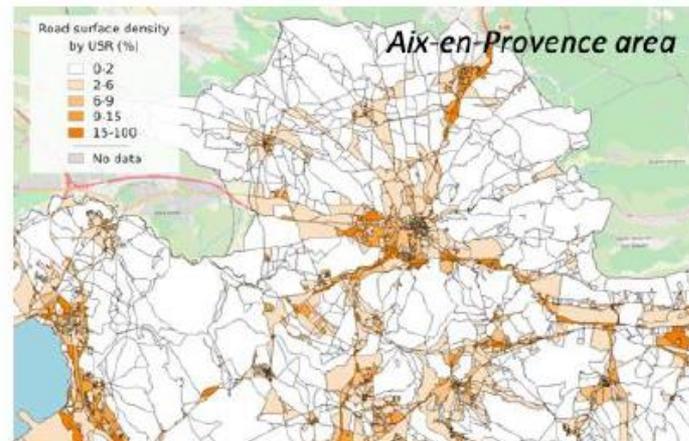
UHI quantification/variability and assessment of its impact on the atmospheric layer height
=> **Meteo and LIDARs sensors**

Rural – Urban –Coastal CO₂ gradient assesement => **CRDS analyzers**
+ Emissions inventory assessment
=> **Carbon isotopes, VOCs, NOx, black carbon, potassium...**



phD programs of Aurélie Riandet (ANR, 2019-2022) & Ludovic Lelandais (Région, 2019-2022)

- **CNRM / MESO-NH mesoscale modelling framework** (up to 250m on AM metropolis):
 - ✓ Fossil fuel CO₂ emissions: ATMOSUD high resolved inventory (1x1 km², 1h)
 - ✓ Vegetation heat and CO₂ fluxes : ISBA-AgS (Calvet et al 2008)
 - ✓ Building heat and CO₂ fluxes : TEB coupled to BEM (Schoetter et al 2017)
 - ✓ Vehicles heat and CO₂ fluxes : TEB (Masson et al, 2000)
 - ✓ IPCC projections meteorological fields



Exemple of the fine scale information available for our framework : road density in each urban block (ANR MApPuce)

- First step : model implementation and performances assesment against observation
- Second step: 2035 scenarios run for mitigating CO₂ and UHI (district to metropolis scales)

=> Postdoctoral position available in 2021 for 2 years (send us an email if interested 😊!)

Metropolis official objective : carbon neutrality in 2050 – can we go faster?

This task relies on a strong collaboration between all parties:

- ATMOSUD (high resolved inventory per emission sector, 1x1 km², 1h)
- LIEU (environmental layers and jurists)
- GREC-SUD: organizer of annual meetings with local-regional stakeholders / policy makers / associations
- IMBE / CNRM/ PYTHEAS: integration of scenarii in the modeling framework
- Participation to environmental agencies and all other partners to the discussion.

- ❑ Reducing the uncertainties on current bottom-up CO₂ emissions assessments at the district to the city level.
- ❑ Improving our knowledge UHI variability and its impact on the atmospheric boundary layer in the AMm area.
- ❑ Fostering the rapid setting-up of actions for mitigating CO₂ emissions and the UHI by local-regional stakeholders / policy makers.
- ❑ Demonstrating the faisability (and limits) of this approach for other metropolis / megacities.

