Urban climate services from the URCLIM project

Valéry Masson (MeteoFrance)
Bénédicte Bucher (IGN)
Adriaan Perrels (FMI)
Bert van Schaeybroeck / Rafiq Hamdi (KMI)
Zenaida Chitu (Meteo Romania)
URCLIM OBJECTIVES

1) A methodology for the creation of High resolution urban maps for climate studies

2) Downscaling methods from regional climate models to city scale & assessment of uncertainties

3) multi-criteria impacts and evaluation of adaptation strategies (Urban Heat Island & heat waves, precipitation, snow cover, economy,...)

4) Urban Climate Services (defined with stakeholders) & co-visualization of urban/climatic data
Urban case studies

5 case studies:
- Involvement of urban users
- Case study selection
- Repository
- Collection of high resolution datasets
- Data fusion

Topics:
- Extreme downpours
- Urban heat island & heat stress
- Air quality
- Winter road conditions
- Effectiveness of adaptation

Example of data:
https://weathermap.netatmo.com/

Project URCLIM is part of ERA4CS, an ERA-NET initiated by JPI Climate with co-funding of the European Union (Grant n° 690462)
Urban mapping - open source

A methodology for High resolution urban maps for climate studies

- Analysis of available data
- Creation of urban maps
- Extraction of data from hyperspectral images
- From maps to model
- Climate indicators demo chain in the cloud

Example of open urban data: www.openstreetmap.org
Urban mapping → climate service integration

Helsinki metropolitan region
- Insert results into existing urban GIS for planners
- 2 options considered: kartta.hsy.fi (more data layers) or Seutuatlasi.fi (more user friendly)

France: http://mapuce.orbisgis.org/
Downscaling of Urban Heat Island

Reference: 18 years climate simulations at 1km scale

a. Dynamical downscaling to city scale with CNRM-AROME: application and evaluation for past period

- **ALADIN noCITY**
  - 12 km
  - FRANCE
  - Eval period

- **AROME CITY**
  - 2.5 km
  - North of FRANCE
  - Eval period

- **AROME CITY**
  - 1.3 km / 500 m
  - Paris area
  - Eval period

- **SURFEX offline CITY**
  - 250 m
  - PARIS area
  - Eval period

b. Statistical-dynamic downscaling to city scale: application and evaluation for past period

- **Meso-NH CITY**
  - 250 m
  - PARIS area
  - Weather Types

- **Meso-NH noCITY**
  - 250 m
  - PARIS area
  - Weather Types

- **ALADIN noCITY**
  - 12 km
  - Paris area
  - Eval period

- **AROME CITY**
  - 2.5 km
  - North of PARIS
  - Eval period

- **AROME CITY**
  - 1.3 km / 500 m
  - Paris area
  - Eval period

- **SURFEX offline CITY**
  - 250 m
  - PARIS area
  - Eval period

c. Statistical-dynamic downscaling to city scale: application to RCP scenarios and city scenarios

- **EuroCORDEX noCITY**
  - 12 km
  - Paris area
  - Future / Scenarios

- **AROME CITY**
  - 2.5 km
  - North of FRANCE
  - Eval period

- **AROME CITY**
  - 1.3 km / 500 m
  - Paris area
  - Eval period

- **SURFEX offline CITY**
  - 250 m
  - PARIS area
  - City scenarios
Heat wave risks indicator

**Impact**
- Very high
- High
- Medium
- Low
- Very low

**Combined hazard and impact values**

**Meteo-Romania**
## Trends in Extreme Daily Precipitation Indices

<table>
<thead>
<tr>
<th>City</th>
<th>RCP2.6 Trend in R95PTOT (mm/yr)</th>
<th>RCP2.6 Trend in r20mm (days/yr)</th>
<th>RCP4.5 Trend in R95PTOT (mm/yr)</th>
<th>RCP4.5 Trend in r20mm (days/yr)</th>
<th>RCP8.5 Trend in R95PTOT (mm/yr)</th>
<th>RCP8.5 Trend in r20mm (days/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brussels</td>
<td>-</td>
<td>-</td>
<td>0.3</td>
<td>0.01</td>
<td>0.9</td>
<td>0.02</td>
</tr>
<tr>
<td>Bucharest</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.3</td>
<td>0.01</td>
</tr>
<tr>
<td>Helsinki</td>
<td>-</td>
<td>-</td>
<td>0.5</td>
<td>0.01</td>
<td>0.9</td>
<td>0.02</td>
</tr>
<tr>
<td>Paris</td>
<td>-</td>
<td>-</td>
<td>0.3</td>
<td>0.01</td>
<td>0.7</td>
<td>0.03</td>
</tr>
<tr>
<td>Randstad</td>
<td>-</td>
<td>-</td>
<td>0.3</td>
<td>0.01</td>
<td>0.9</td>
<td>0.02</td>
</tr>
<tr>
<td>Toulouse</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Note: Values are for RCP2.6, RCP4.5, and RCP8.5 scenarios.*

Meteo-Romania
Climate change and slipperiness
Pedestrian conditions in Helsinki recent climate - 2055

recent climate
~2055

FMI
Thank you for your attention!