

CLIMRISK19



7th Annual Conference

Trento, 23-25 October 2019

Climate Risk: Implications for Ecosystem Services and Society, Challenges, Solutions

Wed
23
Oct

11:30 - 13:00 – Room “Sala Stampa”

S.03 - Urban areas: assessing, predicting and managing the current and future risk

Chair: P. MERCOGLIANO

Adaptation to climate change in urban areas: The use of specific climatology by professionals and local stakeholders involved in urban planning and management

C. LAVECCHIA, G. Frustaci, S. Pilati, E. Montoli, M. Pregnotato, M. Lapi, A. De Carli, B. Costa

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CLIMATOLOGY FOR PROFESSIONAL ACTIVITIES AND ADAPTATION TO URBAN CLIMATE CHANGE IN THE MILANO AREA

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DELLA PROVINCIA DI MILANO



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CLIMATOLOGY FOR PROFESSIONAL ACTIVITIES AND ADAPTATION TO URBAN CLIMATE CHANGE IN THE MILANO AREA

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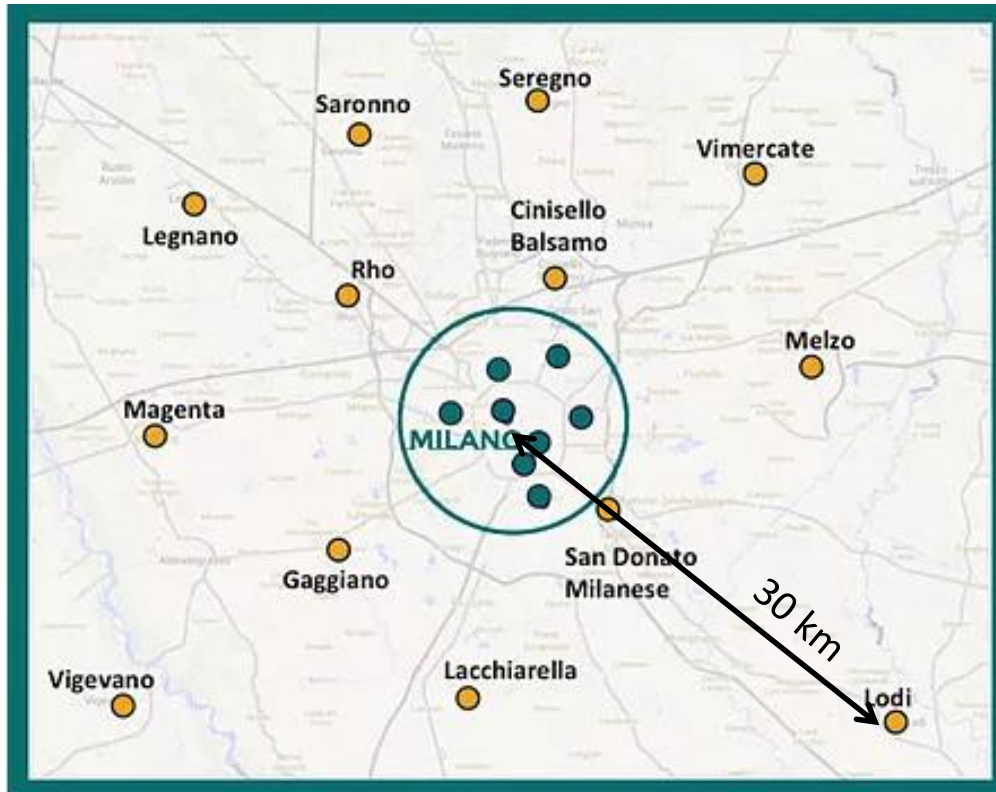
TARGET

- The **designers** - engineers, architects, urban planners, industrial experts, surveyors, ...
- The **professionals** who carry out urban land management activities
- The **technicians and administrators of local public bodies**
- The **scientific community**
- **INDIRECT: the community** (end-user citizens, media) **economic operators** (producers of goods & services)

AIMS

- The increase in **Knowledge** and **Awareness** of climate and its dynamics in an urban environment
- The implementation of an **updated Urban Climatology**
- Considering the **Local Climate and its change** as a **priority issue** in daily both public and private professional activities
- Significant **impact on** the effectiveness, in climatic terms, of interventions on **residential buildings**

Area of the project: MILANO AND SURROUNDING



● AWS in Milano

● AWS outside Milano

In the area:

N. 20 **urban weather stations** by national Climate Network® of Fondazione OMD
www.fondazioneomd.it/climate-network

KEY STRENGTHS OF THE AWSs NETWORK:

- Homogeneous criteria for the positioning of stations in the urban environment (*top Urban Canopy Layer*)
- Same type of sensors in all stations (Vaisala WXT520-530 + redundant temperature sensor PT1000)
- Metrological traceability of measurements (traceability to national metrological standards through an uninterrupted calibration chain)
- Quality control and quality assurance procedures
- Automatic and manual daily validation by expert meteorologists

PERIOD of the Climatology:

- 2012 – 2018 for all the AWSs
- CLINO 1961-1991 and CLINO 1981-2010 for Milano Downtown

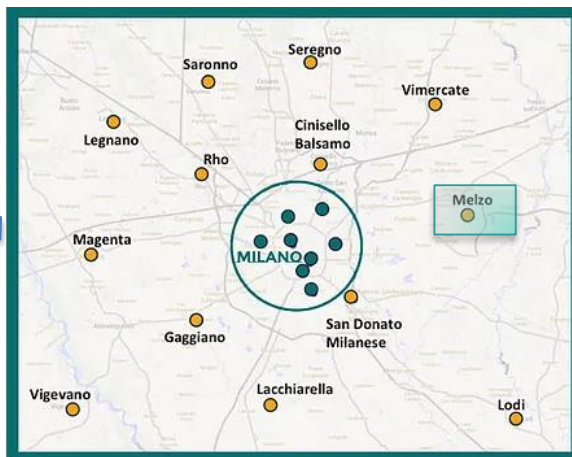
Climatology for professional activities and adaptation to urban climate change in the Milano area

RISULTS 2019

- The **Climatic Database**: beside most of the usual climatological statistics, it implements the climate parameters and indicators that can be used directly by professionals in design calculations or as decision support
- The **Application Guidelines** to support professionals in the comprehension and use of climate data and indicators in the urban environment and to unify the technical vocabulary of the different disciplines in relation to the climate issue
- Technical seminars and **Capacity building courses** for professionals, designed to give them the basics of urban climatology needed to:
 - understand **spatial and temporal characteristics** and implications of different climate data
 - evaluate **associated uncertainties**
 - choose **climate data consistent** with the other input data, the context and the purpose

PROFESSIONAL ACTIVITY:

- ☒ Energy
- ☐ Building and plant design
- ☐ Urban planning
- ☐ Meteoric runoff management
- ☐ Public green management
- ☐ Public health and well-being



FUNDAMENTAL VARIABLE:

- ☒ Temperature
- ☒ Relative Humidity
- ☐ Precipitation
- ☐ Wind direction and speed
- ☐ Solar radiation
- ☐ Stroke C-G

CLIMATE INDICATOR:

- ☐ Mean temperature
- ☐ Absolute maximum temperature
- ☐ Mean absolute maximum temperature
- ☐ Absolute minimum temperature
- ☐ ...
- ☒ Humidex – average number of hours > 35°C
- ☒ Cooling Degree Day
- ☐ ...

TIME RESOLUTION:

- ☐ Decadal
- ☐ Monthly
- ☐ Seasonal
- ☐ Heating season
- ☒ Cooling season
- ☐ Yearly
- ☐ CLINO 1961-90 (MI downtown)
- ☐ CLINO 1981-00 (MI downtown)

**90 climate
indicators**
in each urban
AWS
METADATA

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CASE STUDY **2019**

The application of ClimaMi Database to update the
PGT Plan of Government of the Territory of MELZO

PURPOSE:

To characterise local climate and quantify outdoor microclimate comfort, with special attention to Urban Heat Island intensity, extreme events frequency and intensity (heatwaves),

GOALS:

The introduction of local quantitative climate indicators in:

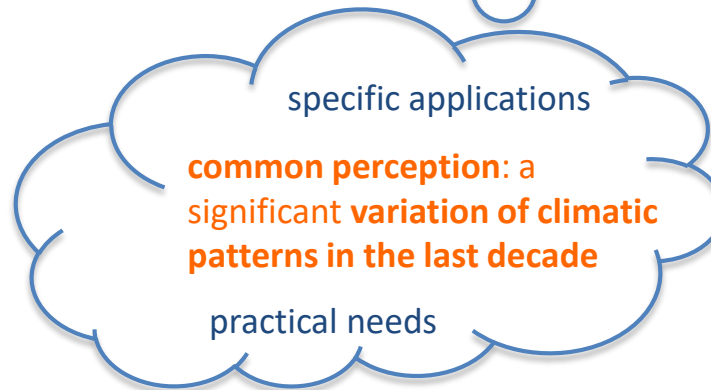
- the **strategic environmental assessment** of the PGT:
 - characterization of the current situation
 - **monitoring plan of the PGT** impacts on local climate
- the **variant of the PGT** :
 - to **evaluate alternative scenarios of urban interventions**, been considering among the variables (social, economic, logistic, environmental, etc.) that are combined and weighed trough a multi-criteria analysis that provides a quantitative assessment of each scenario
 - to assess the **consistency of the urban regeneration projects** with respect to the objectives and criteria identified in the participatory phase

Climatology for professional activities and adaptation to urban climate change in the Milano area




TECHNICAL COMMITTEE and STAKEHOLDER OF ClimaMi

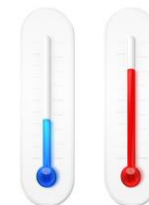


MULTIDISCIPLINARY COMMITTEE:
*CLIMATOLOGISTS, ENGINEERS,
ARCHITECTS, URBAN PLANNERS*

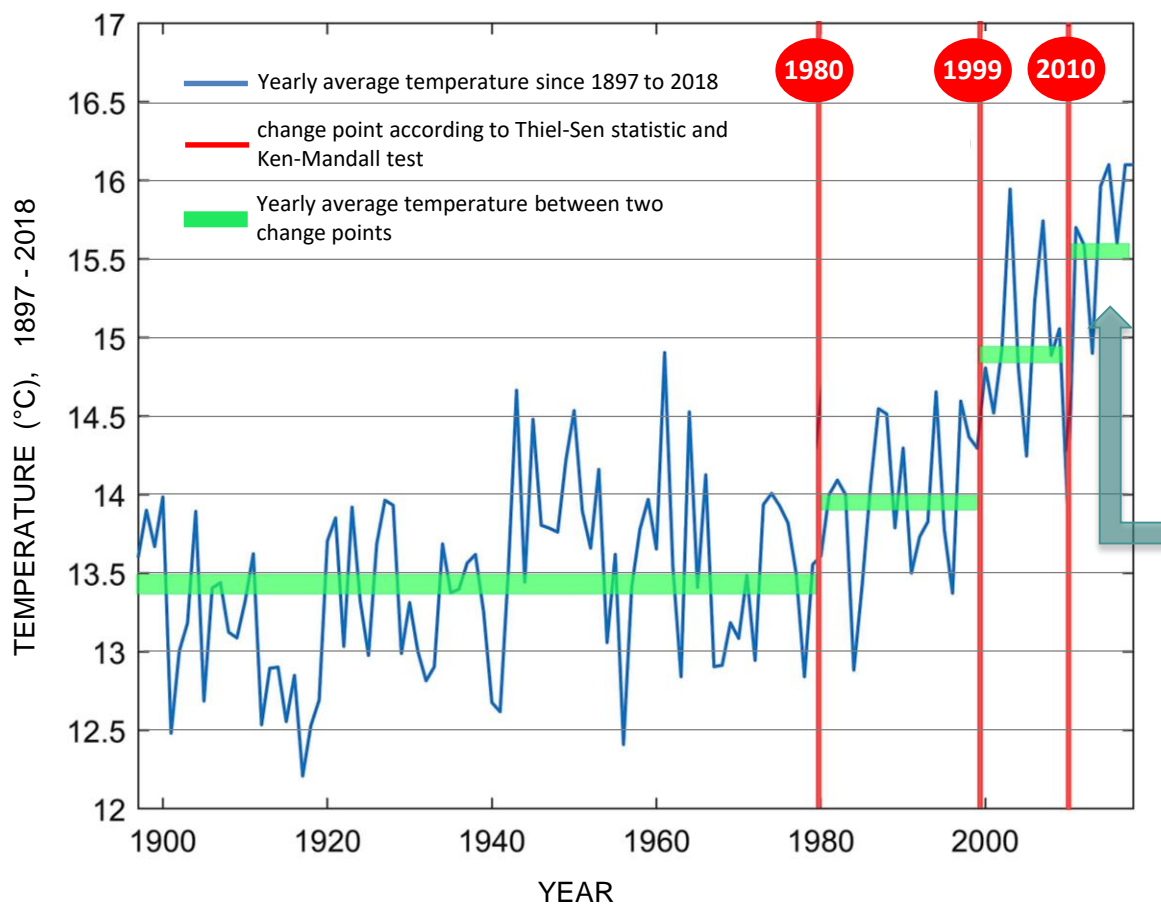


Milano Downtown (historical centre)

CLINO	T average (°C)	SUMMER (June – August)	
		Daily MIN T (°C) *	Daily MAX (°C) T *
1961-1990 	13,6	23,2	33,1
1971-2000 	13,8	23,3	33,6
1981-2010 	14,5	24,1	34,7



* 95th percentile

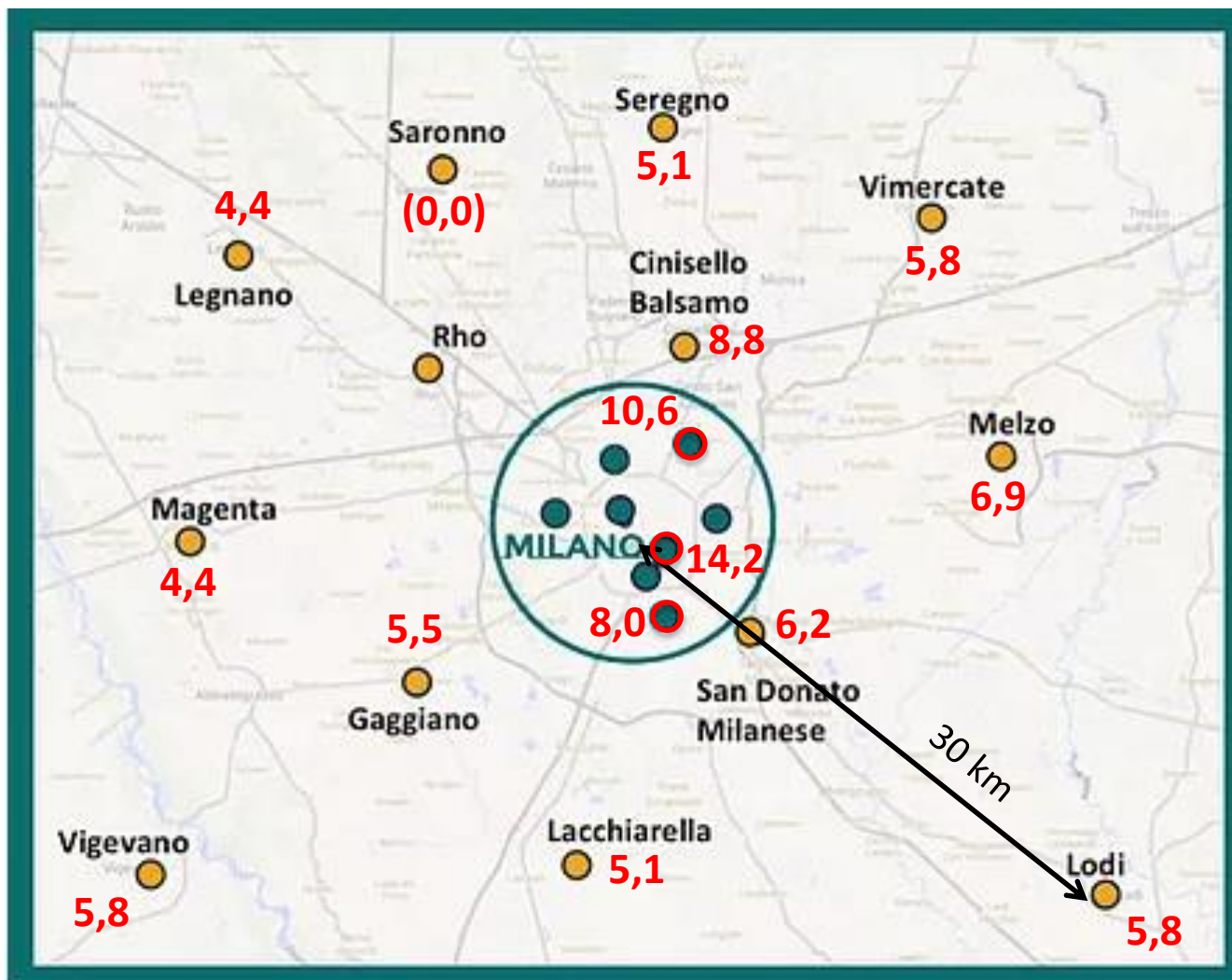


Period of interest
for **ClimaMi** project

HEATWAVES in the period 2012-2018

Average Number of days/year involved in HW

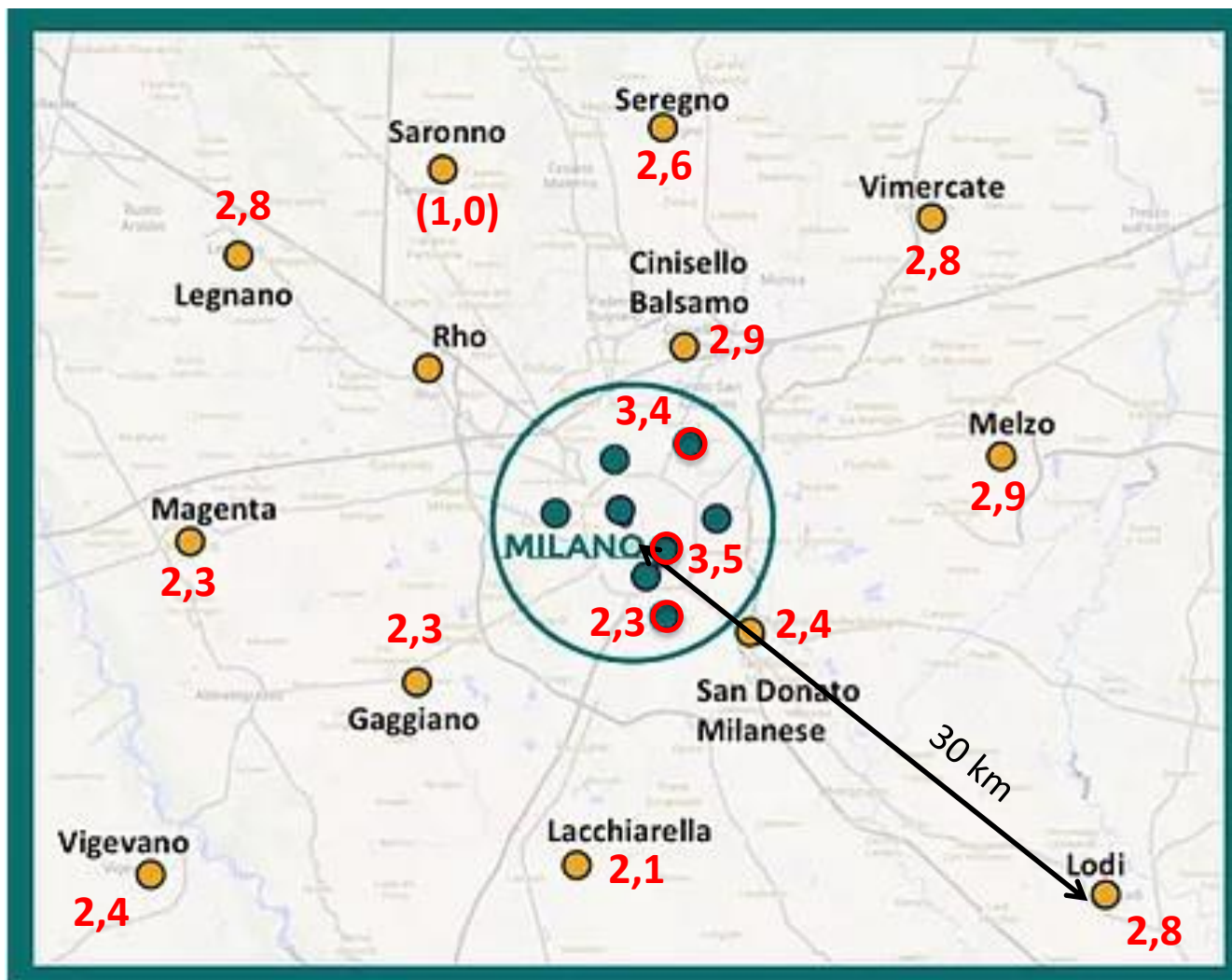
(definition by the WMO-WHO 2015 Guidelines; ref. CLINO 1961-1990)



HEATWAVES in the period 2012-2018

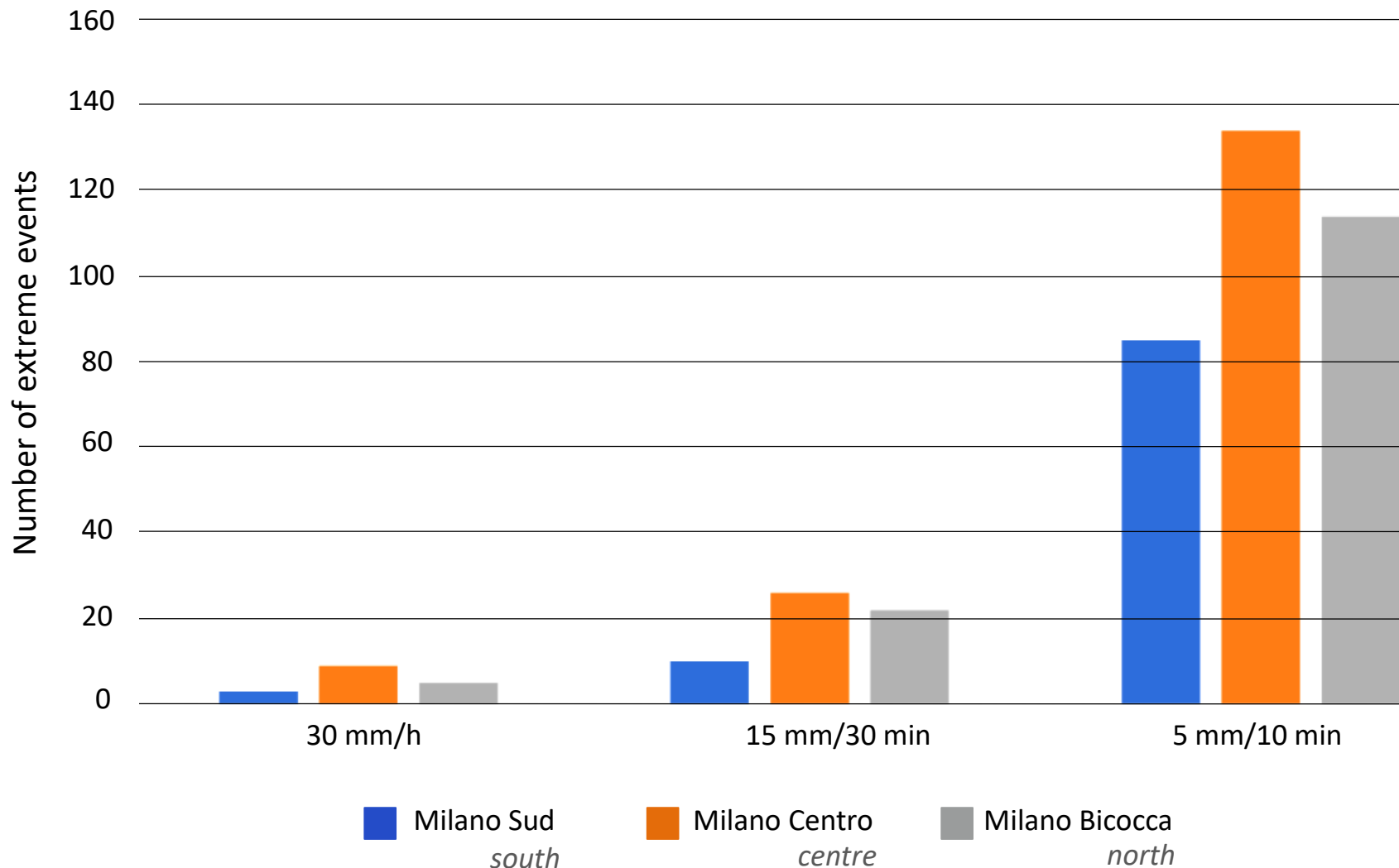
Average duration (days) of the extreme event

(HW definition by the WMO-WHO 2015 Guidelines; ref. CLINO 1961-1990)



MILANO - EXTREME EVENTS of PRECIPITATION in the period 2012-2018

(thresholds defined by ClimaMi technical committee)

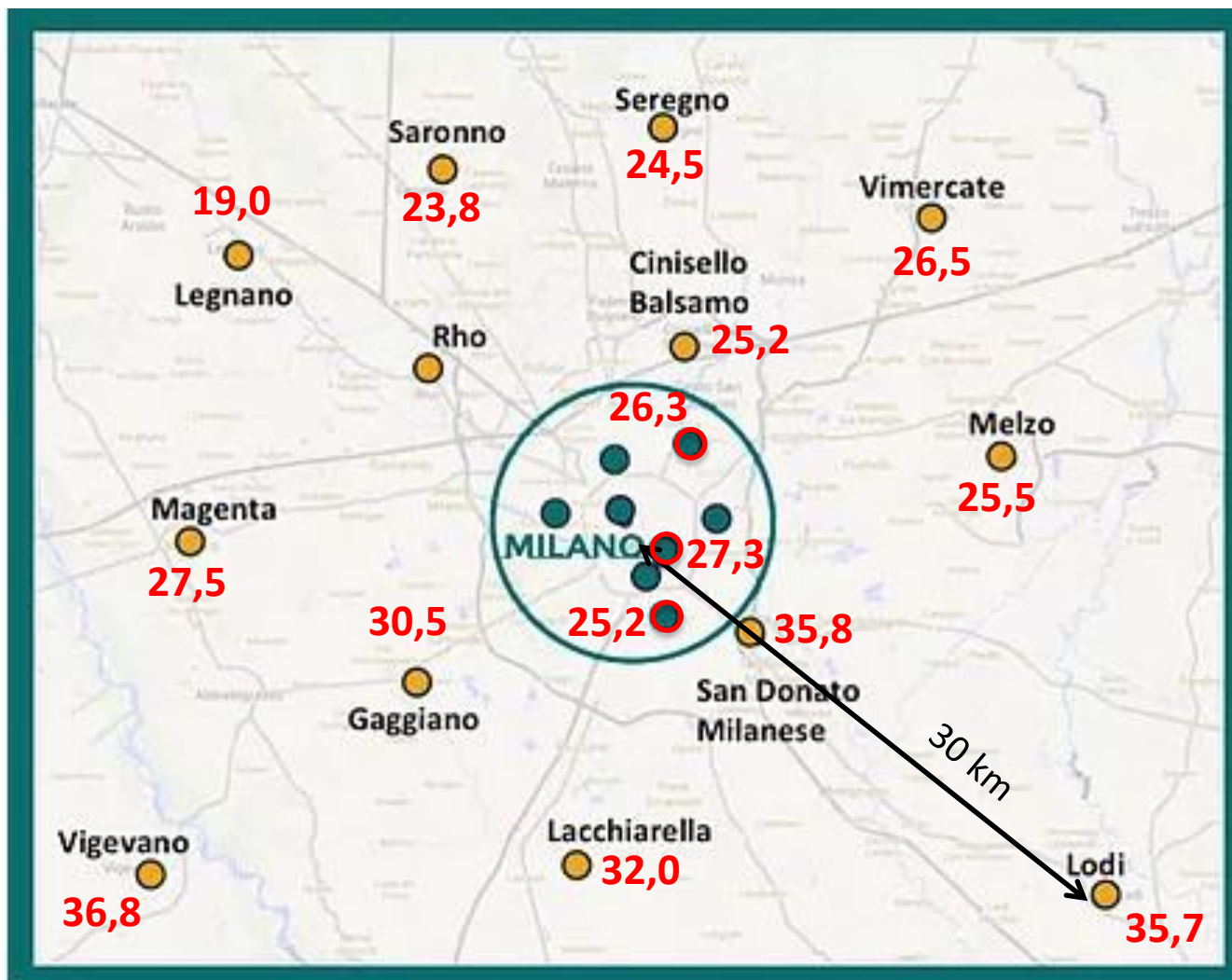


PUBLIC HEALTH, URBAN PLANNING

WELL-BEING in the period 2012-2018

Number of days/year with hourly Humidex $\geq 35^{\circ}\text{C}$

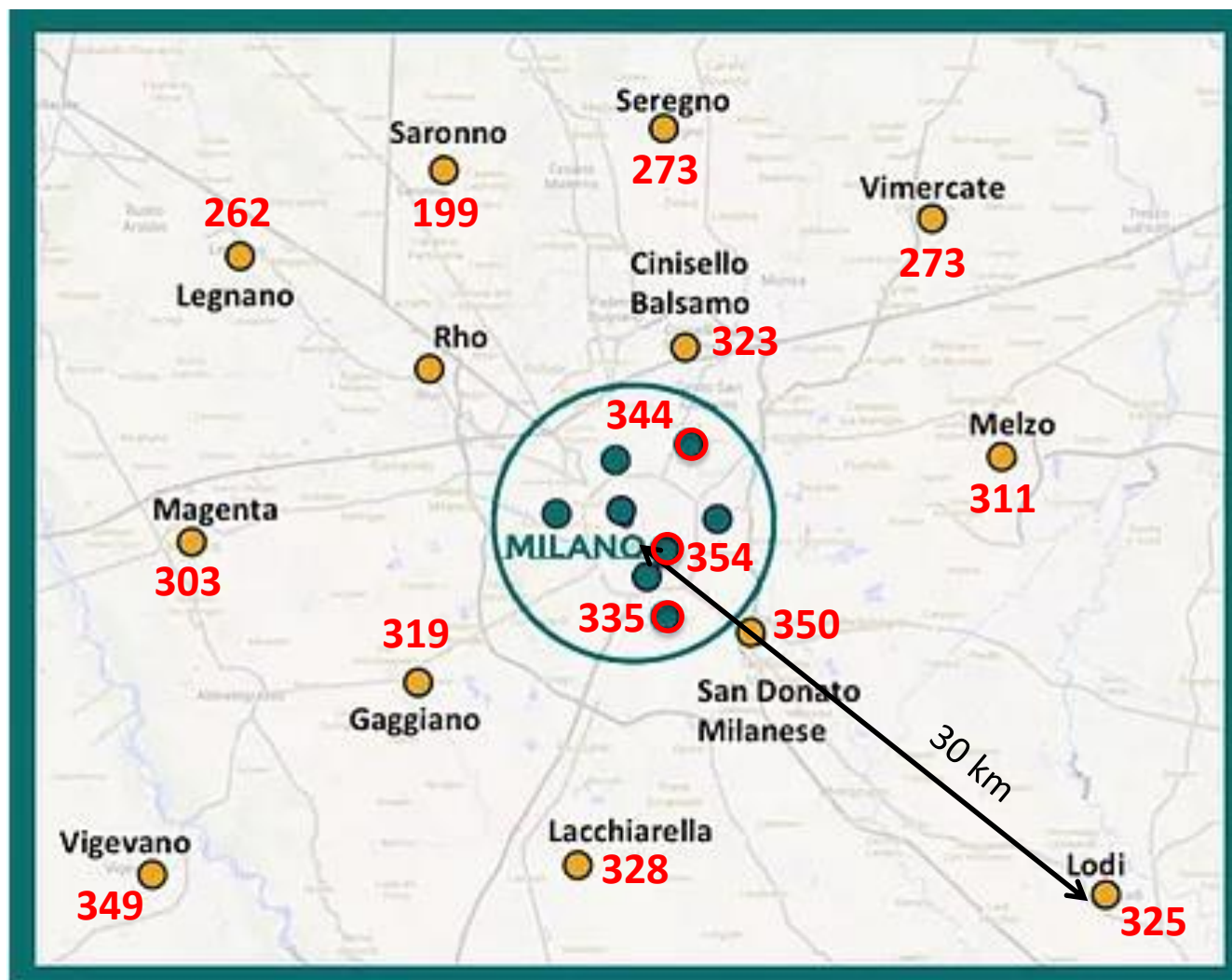
(definition of Humidex and threshold in the WMO-WHO 2015 Guidelines)



ENERGY DEMAND - Summer Air Conditioning

COOLING DEGREE DAYS (°C) in the period 2012-2018

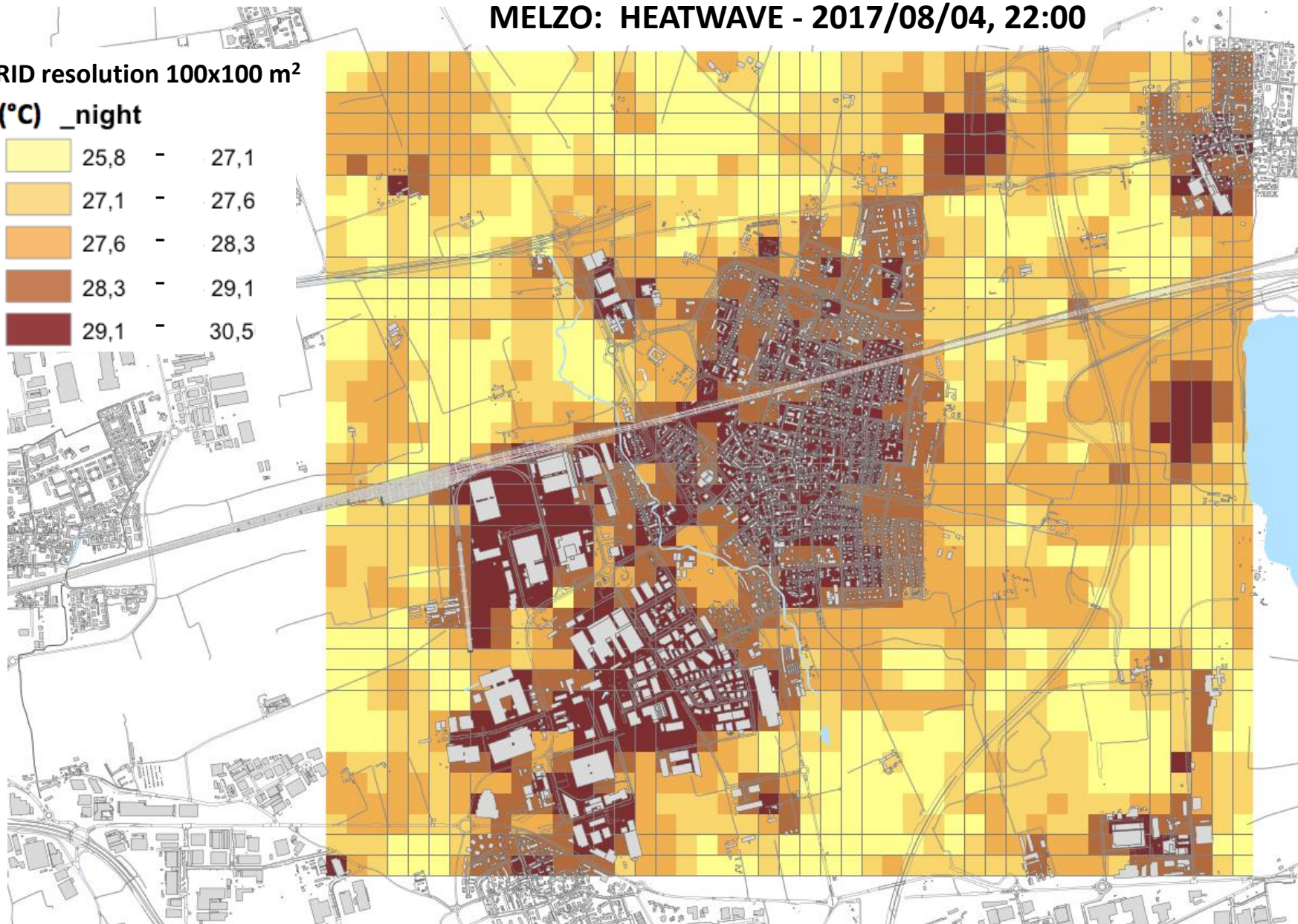
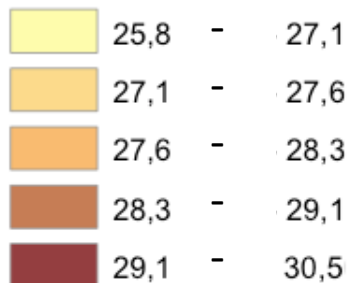
(definition of CDD based on Humidex Index and indoor temperature standard by UNI)



MELZO: HEATWAVE - 2017/08/04, 22:00

GRID resolution 100x100 m²

T (°C) _night



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FURTHER DEVELOPMENT in 2020

- The **Atlas of temperatures on a climatic basis**: processing of the spatial distribution of some indicators of the DB ClimaMi related to temperature (*AWSs + satellite data*)
- A **methodological survey on** the topic of **precipitation**
- Some **case studies** focused on projects **at the building and district scale**
- More **in-depth** Technical seminars and **Capacity building courses** for professionals

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Thank you for your attention

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Project Manager of ClimaMi

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