Funded since January: 2023

INCT Klimapolis

The German-Brazilian BmBF Project and Brazilian "National Institute of Science and Technology"

Funded by CNPq/Brazilian Ministry of Science and Technology, Coordination: Maria de Fátima Andrade (IAG/USP, São Paulo), and Judith Hoelzemann (UFRN, Natal/RN)

Brazilian Urban Areas in a transdisciplinar perspective: evaluation, scenarios and solutions for adaption to climate change and sustainable development

Instituto Nacional de Ciência e Tecnologia
INCT - CNPq/MCTI Call 58/2022, Brazil, 2023 – 2027++

www.klimapolis.net

Research Themes

Research to improve understanding of climate impacts in urban areas

1. Climate change impacts, adaptation and vulnerability
2. Urban climate
3. Flooding, water shortage and other extreme events

Research to advance understanding of environmental impacts on society

4. Air pollution control and source attribution
5. Urban Health
6. Regional urban footprint

Research to improve urban design and stakeholder engagement

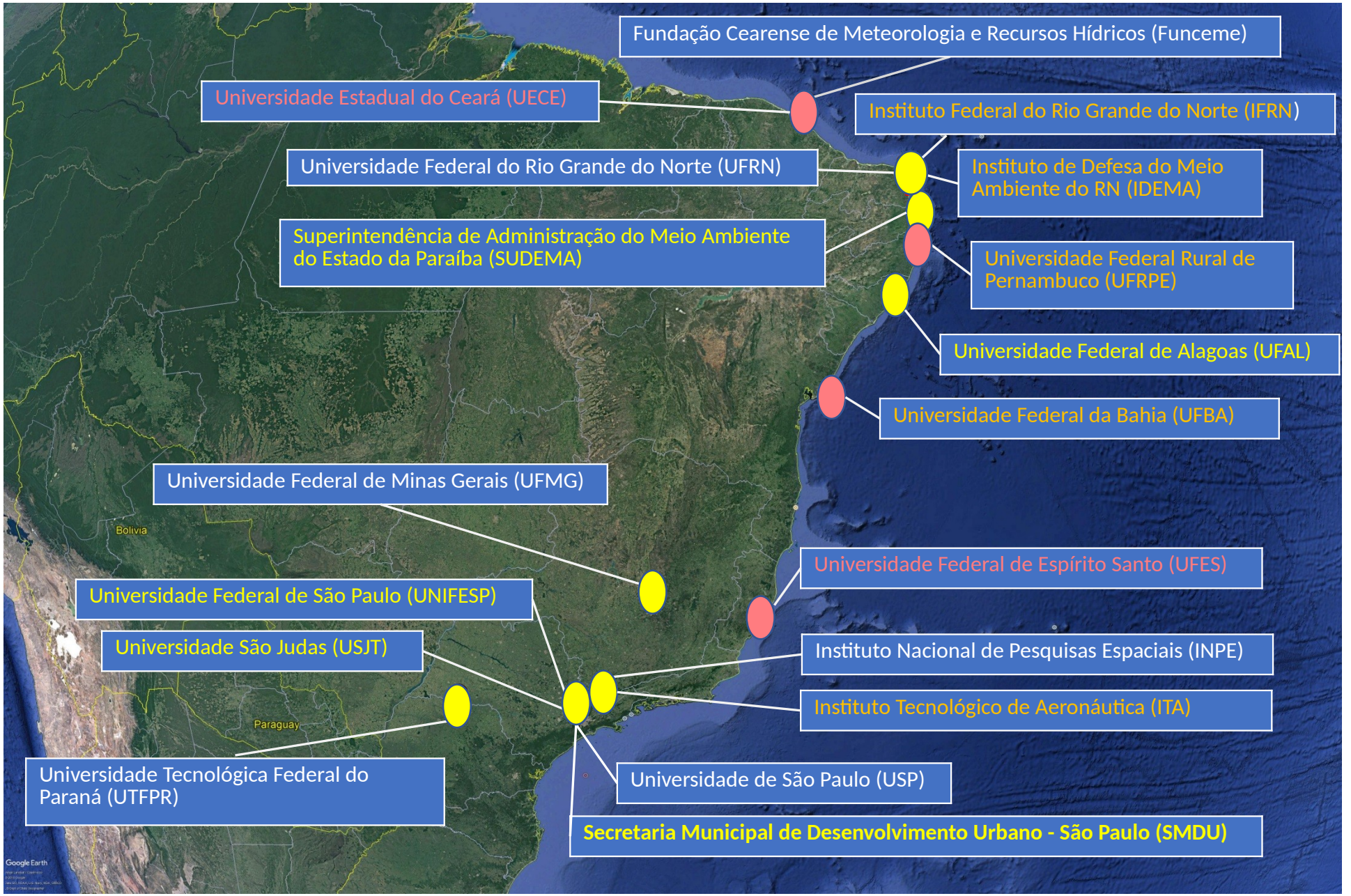
7. Urban planning and design from city to neighbourhood scales
8. Social learning
9. Governance including regulations, procedures, accountability

INCT Klimapolis Structure

	Themes
Sub-networks	
1	**Air and Noise**
2	**Water e Soil**
3	**Climate Variability**
4	**Adaption to Climate Change**
5	**Health and Life Quality**
Transversal / Organizational Axes	
1	**Knowledge Co-Production, Social Learning, quantitative and qualitative Indicators in human sciences**
2	**Observations, Models , and Geoprocessing**
3	**Expansionand Consolidation of network (Brazil and internationally)**

	Themes
Structuring Projects	
1	**Real World Experiments**
	1.1 Low Cost Sensors
2	**Data Platform Klimapolis and Website**

Klimapolis - Brasil

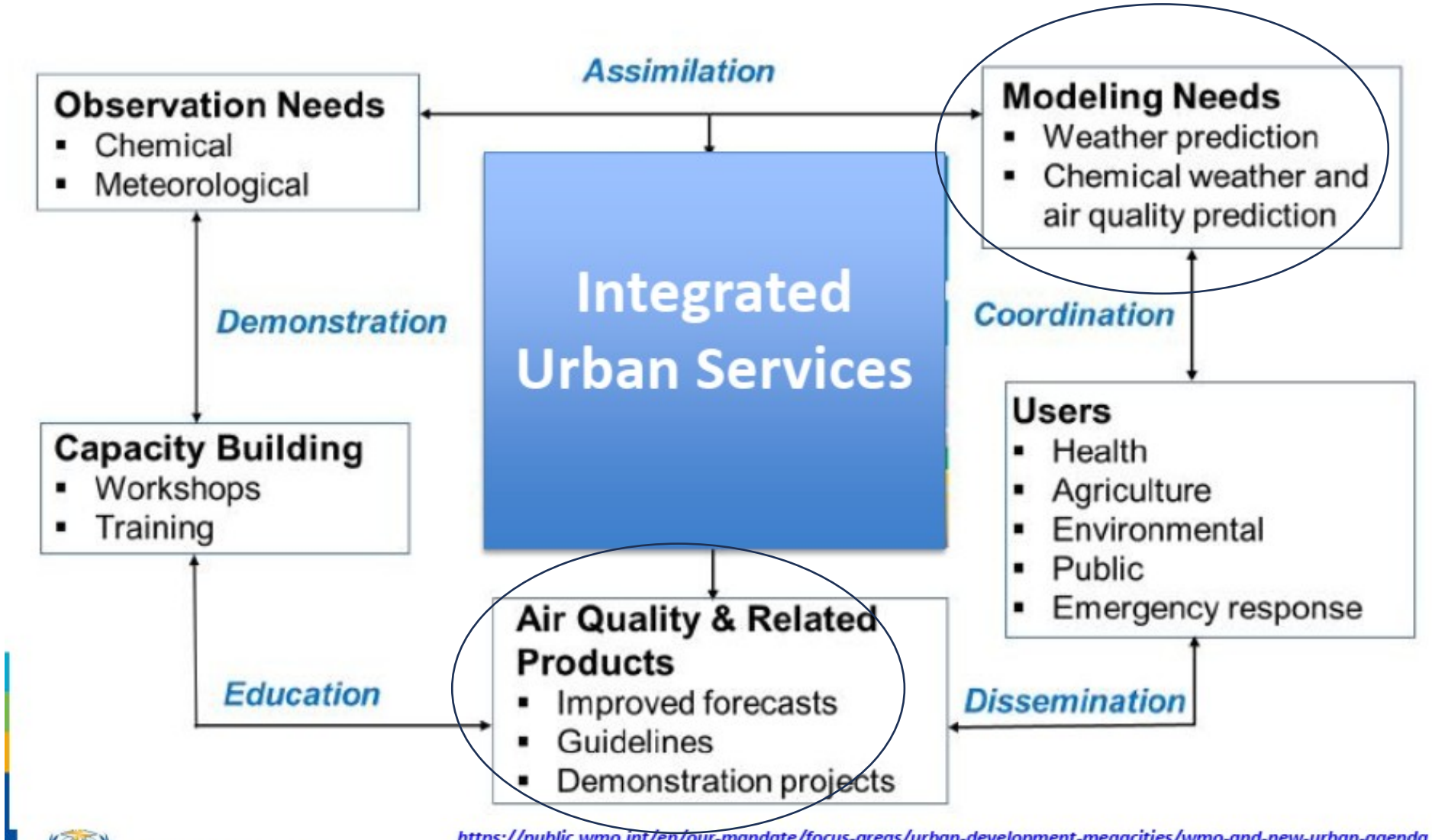


The urban research in Meteorology and Environment in the scope of the WMO/GAW GURME

The United Nations has identified “sustainable cities and communities” as one of its Sustainable Development Goals (SDGs).

The Urban Research Meteorology and Environment Project (GURME), as part of World Meteorological Organization (WMO) Global Atmospheric Watch (GAW), is an integral part of urban research and services

GAW Urban Research in Meteorology and Environment Project (GURME): Integrated Urban Services



WMO OMM

https://public.wmo.int/en/our-mandate/focus-areas/urban-development-megacities/wmo-and-new-urban-agenda
http://www.wmo.int/pages/prog/arep/gaw/urban.html
http://mce2.org/wmogurme/

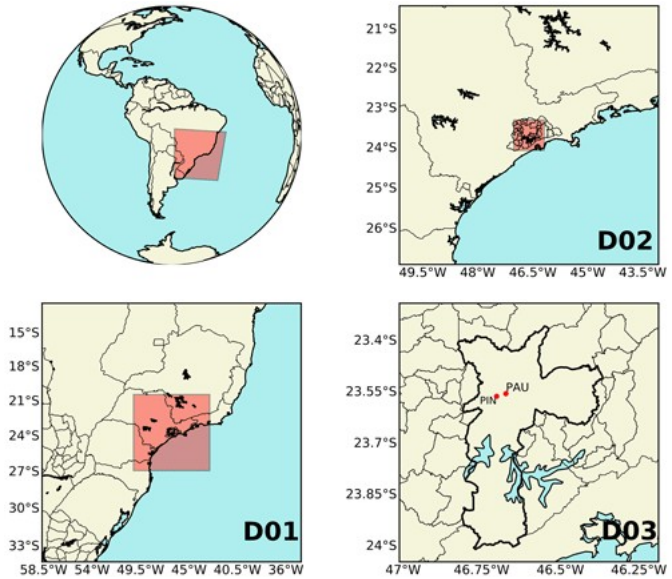
Examples of Models focusing in urban aspects

- Regional models include complex nonlinear chemistry, transport, radiation, and microphysical processes at larger spatial scales. Some examples of integrated work linking scales will be presented, for the Metropolitan Region of São Paulo in Brazil.

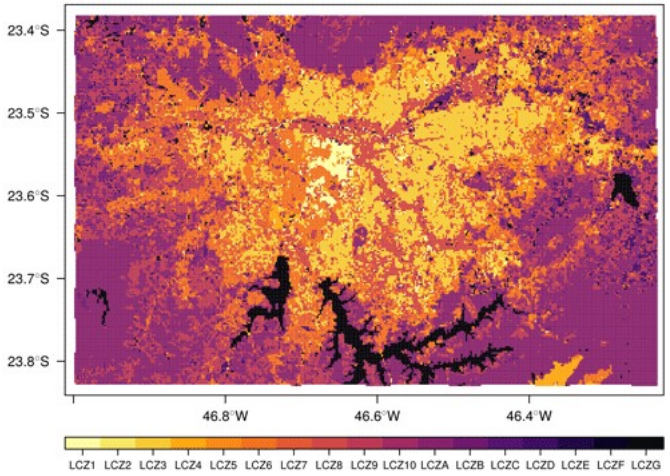
- The population of MRSP is 22,048,504 Population [2021] – *Estimate*

Application of Munich in São Paulo – Brazil

Model of Urban Network of Intersecting Canyons and Highways



WRF simulation domains of 25 km (D01), 9 km (D02), and 1 km (D03) spatial resolution. D03 provides the meteorological information for MUNICH, the city of São Paulo is outlined in a thick black line, and the red dots show MUNICH domain locations.



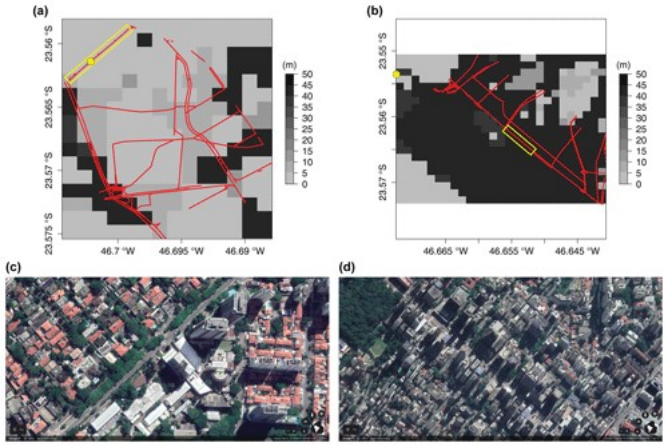
WUDAPT

Local climate zones for SPMA

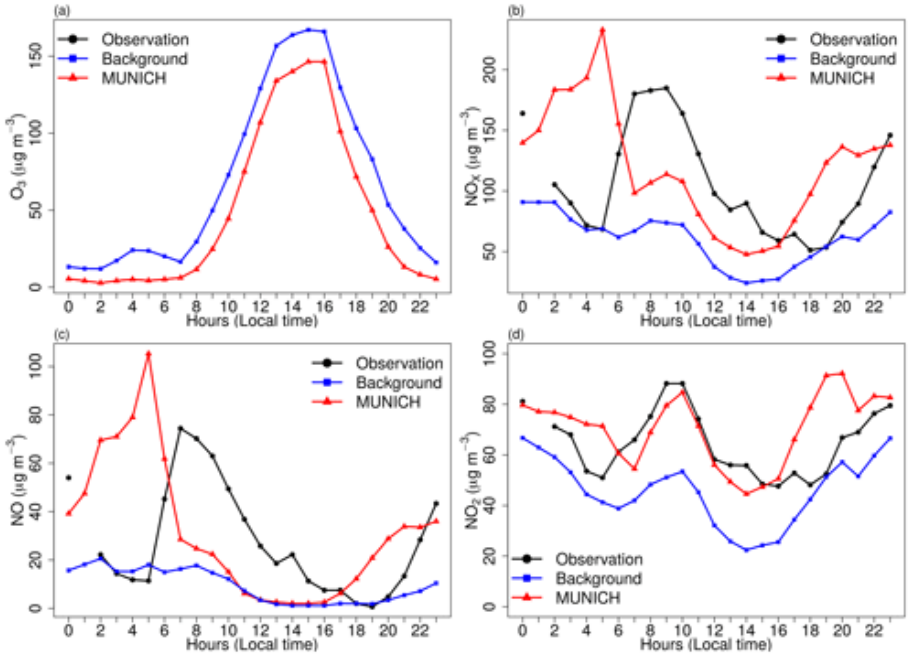
Input data	Source
Meteorological input	WRF 3.7.1 simulation centered in SPMA (DX = 1 km)
Street links coordinates and with lanes number	VEIN emission model (Ibarra-Espinosa et al., 2018)
Street links emissions	VEIN emission model (Ibarra-Espinosa et al., 2018)
Building height	World Urban Database and Access Portal Tools project (WUDAPT) database for SPMA (http://www.wudapt.org/, last access: 28 May 2020)
Background concentration	O_3, NO, and NO_2 from the Ibirapuera air quality station (AQS)
VOC speciation	Ethanol, formaldehyde and acetaldehyde from WRF-Chem emission file from Andrade et al. (2015); other species are based on concentration shown in Dominutti et al. (2016)

- Gavidia-Calderon et al. Simulation of O_3 and NO_x in São Paulo street urban canyons with VEIN (v0.2.2) and MUNICH (v1.0). GMD, 2021

Application of Munich in São Paulo - Brazil



Pinheiros neighborhood **(a)** and Paulista Avenue **(b)** MUNICH domains and building height; the red lines are the streets considered in VEIN; the yellow dot shows Pinheiros AQS and Cerqueira César (AQS).
(source: © Google Maps 2019).



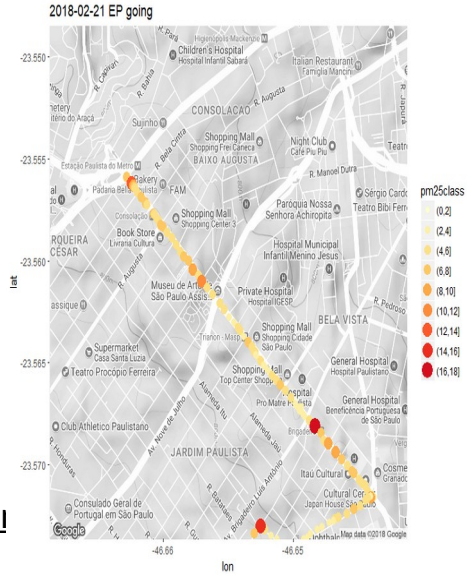
Diurnal profile of MUNICH results, background, and concentration for **(a)** O_3, **(b)** NO_x, **(c)** NO, and **(d)** NO_2 for Paulista Avenue.

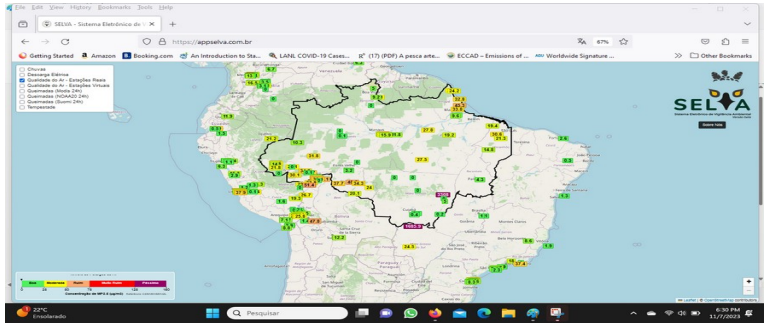
- Gavidia-Calderon et al. Simulation of O_3 and NO_x in São Paulo street urban canyons with VEIN (v0.2.2) and MUNICH (v1.0). GMD, 2021

Methodology: MUNICH Domains - Pinheiros

Methodology: MUNICH Domains - Av. Pa

Low cost Sensors examples of use in Brazil

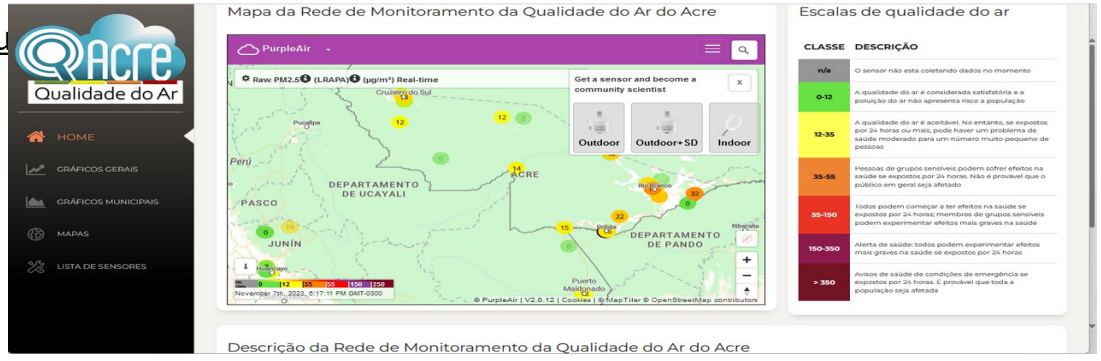




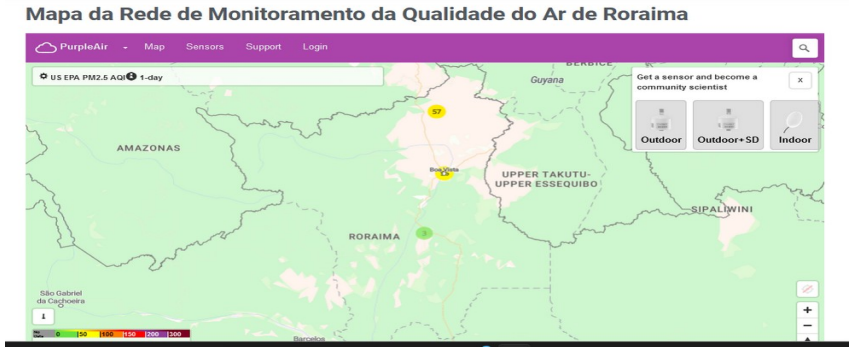
https://www.mgp-quito.eu/proqas-mar da-qu

EnvCity Air Quality Prototype

Profa. Leila Martins, UTFPr



http://www.acrequalidadedoar.info/



Summary

- Global challenges facing cities
- More extensive monitoring
- Improved emission inventories
- Benefit from Advances process-based modelling approaches (high resolution + urban process)
- International coordination efforts to develop best practice
- Multiscale approach- Air quality in cities is determined by both local and regional contributions which are critical do reach air quality improvement for the whole city
- Multiannual study to provide robust conclusions – 3-5 Years
- Multiple pollutants and sources
- Source apportionment analysis – PM composition
- Sensitivity to emissions
- Model evaluation

São Paulo - SP

APCB 2024

Air **P**ollution **C**onference **B**razil

& 5th CMAS South America

05- 07 - June 2024

Climate, energy, air pollution control, monitoring and modeling applications

AIR POLLUTION CONFERENCE BRAZIL
CMAS SOUTH AMERICA
COMMUNITY MODELING AND ANALYSIS SYSTEM

CONFERENCE SESSIONS

The conference will include platform and poster sessions in the following areas

- Session 01 - Air Quality, Climate and Energy
- Session 02 - Air Pollution Control
- Session 03 - Emerging trends and innovations in air pollution research
- Session 04 - Emissions Inventories, Models, and Processes
- Session 05 - Environmental Odours
- Session 06 - Indoor air quality and its implications
- Session 07 - Machine Learning and Reduced Form Models Developments and Applications
- Session 08 - Model Development

Important Dates

- **ABSTRACT SUBMISSION:** December 01, 2023
- **ACCEPTANCE NOTIFICATION:** December 29, 2023
- **EARLY BIRD REGISTRATION:** February 15, 2024
- **EXTENDED ABSTRACT SUBMISSION:** May 04, 2024. *

  All presenters (oral and poster) need to provide an extended abstract (Click Here to Download Template

- Session 06 - Indoor air quality and its implications
- Session 07 - Machine Learning and Reduced Form Models Developments and Applications
- Session 08 - Model Development
- Session 09 - Modeling to Support Exposure and Health Studies and Community-scale Applicatior
- Session 10 - Multiscale Model Applications and Evaluations
- Session 11 - Particulate matter and its effects on human health and the environment
- Session 12 - Policy and regulatory frameworks for air pollution control
- Session 13 - Remote Sensing/Sensor Technology and Measurements Studies
- Session 14 - Urban climate processes and Methods
- Session 15 - Street Scale Air Quality Modeling

Air Pollution Conference Brazil & 5th CMAS South America

- Courses:

  1-4 June: CMAQ& Smoke training

  Dr. Saravanan Aruchalanan (UNC)

  Dr. Huy Tran (UNC)

  8 June: Munich + Street-in-Grid + WUDAPT

  Dr. Karine Sartelet (ENPC-France)

  Dr. Lya Lugon (ENPC-France)

  Dr. Yang Zhang

Contact:

inctklimapolis@gmail.com

klimapolis.net

@Klimapolis_

@KlimapolisLab

@instituto_klimapolis

@inctklimapolis