

Theme 1: Advancing GURME objectives through facilitation of research

GAW IP, Habitat-III & New UN Urban Agenda, Res 68 Cg-17, WMO-IAUC MoU, WUDAPT workshop, UMHEWS and Integrated urban services



WMO OMM

World Meteorological Organization

Organisation météorologique mondiale

Alexander Baklanov, WMO

GURME SAG Meeting, WMO, 7-8 April 2017

Annual meeting of the WMO GAW Urban Research Meteorology and Environment (GURME) Science Advisory Group (SAG)

WMO, Geneva, 7 – 8 April 2017

- The main objective of the GURME SAG meeting is to overview the current status of SAG activities and its Pilot Projects, contribute to the WMO Urban cross-cutting focus (Res. 68 Cg-17), evaluate new applications, initiate new projects and elaborate the SAG further working plans (based on the GAW IP).
- The GURME SAG continues focusing on the development of models and associated research activities to enhance the capabilities of the NMHSs in providing urban-environmental forecasting and air quality services of high quality, illustrating the linkages between meteorology and air quality. In support of the WMO's integrated urban services initiative and the creation of the SAG-Apps, the GURME SAG's focus is now centered on models and applications applicable to describe the urban environment and how these environments interact with the regional and global scales.

GURME SAG Web-sites:

- <http://mce2.org/wmogurme/> ;
- <http://www.wmo.int/pages/prog/arep/gaw/urban.html>



WMO Global Atmosphere Watch Program



GAW

GAW Implementation Plan: 2016-2023

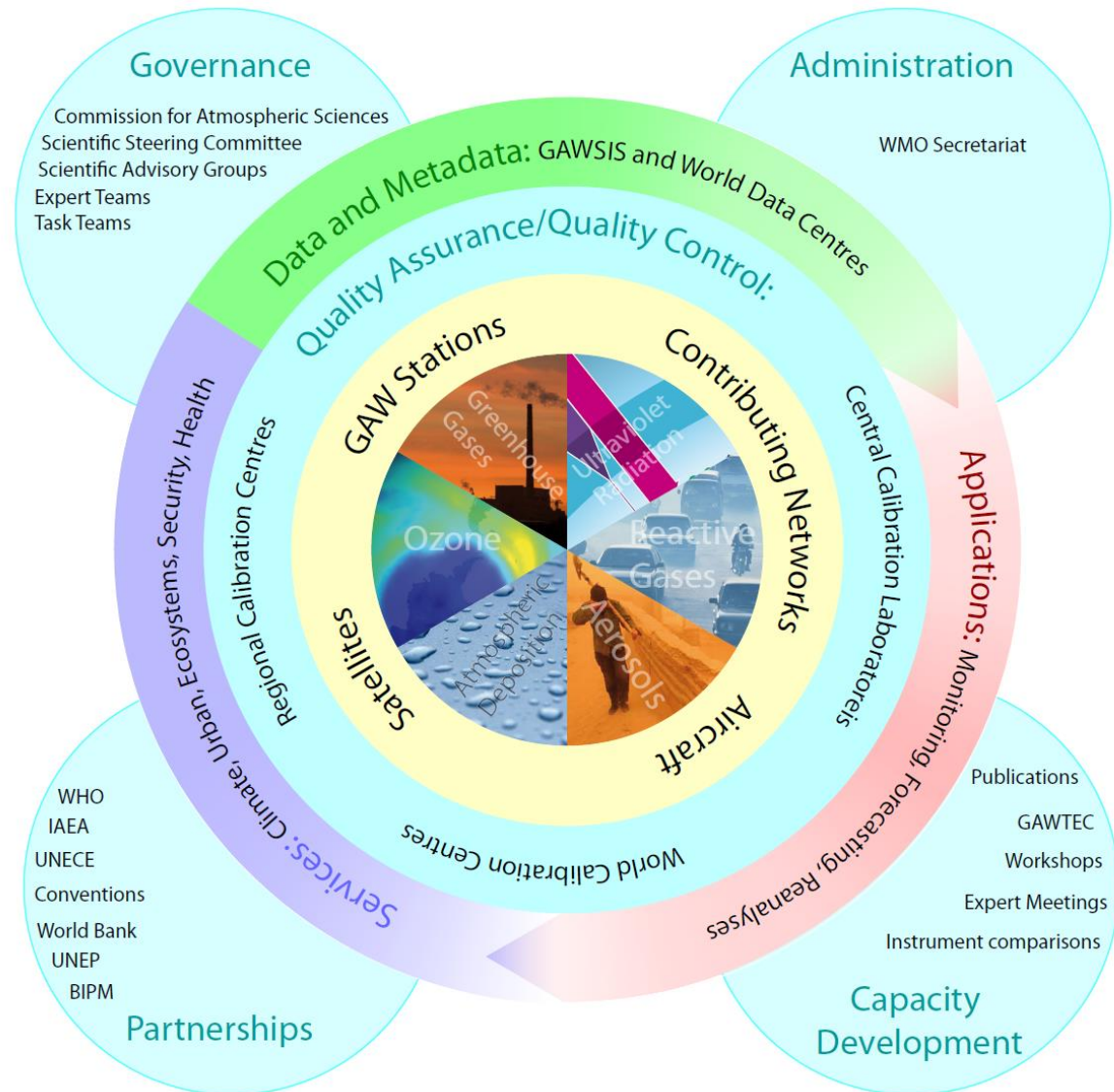
GAW Mission:

- Systematic long-term monitoring of atmospheric chemical and physical parameters globally
- Analysis and assessment
- Development of predictive capability
(GURME and Sand and Dust Storm Warning System)
and now for chemical weather
(e.g. incl. volcanic ash, wildfires)



GAW SSC Chair G. Carmichael

WMO OMM



GAW – enhancing modeling



GAW

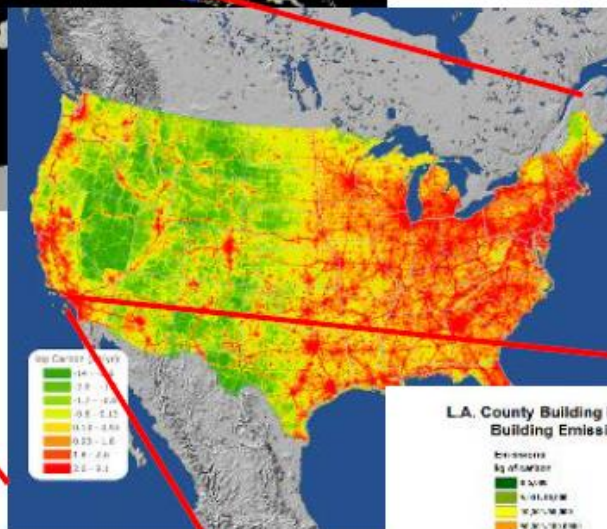
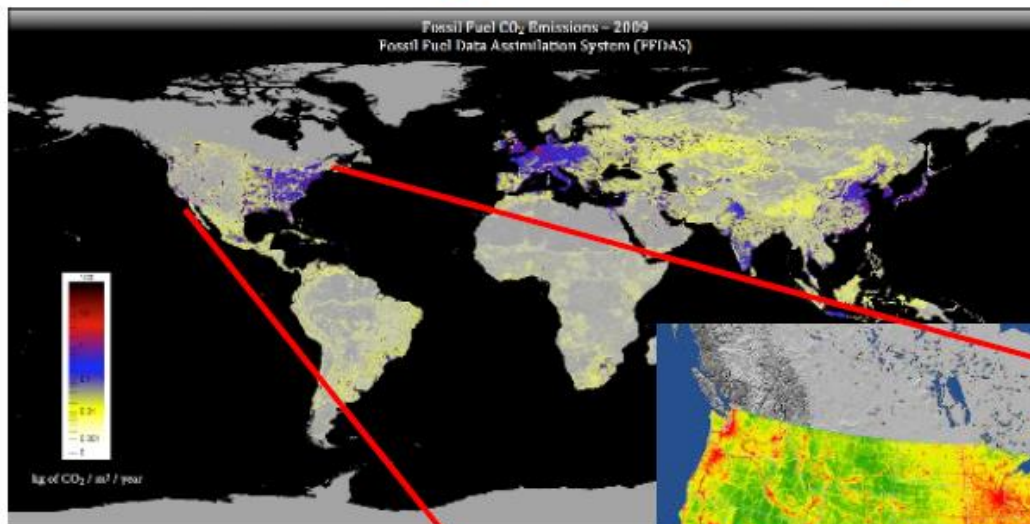
Expand GAW's role in enhancing predictive capabilities (wrt atmospheric composition and its uses)

- ☑ through further developing urban air quality forecasting capabilities through (GURME) ,
- ☑ establishing a new SAG (“Apps”) – usefulness exchanging chemical observational data in NRT))
- ☑ expanding collaborations with WWRP/WCRP/WGNE and others



Elements of the GAW Programme

“Nesting” – from the planet to a building



- Global consistency
- Consistency across scales
- standardization



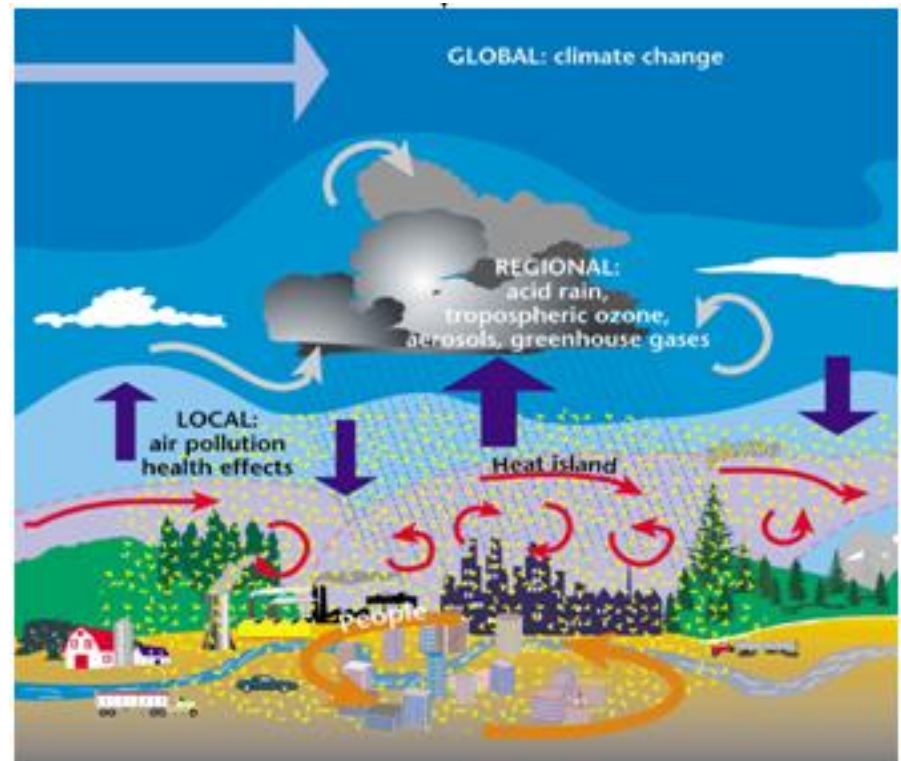


WMO GAW Urban Research Meteorology and Environment Project (GURME)



- To enhance capabilities of MeteoServices in providing urban-environmental forecasting and air quality services
- To better define meteorological and air quality measurements focusing specifically on those that support urban forecasting
- To provide cities with easy access to information on measurement and modeling techniques
- To promote city pilot projects to demonstrate successful expanding MeteoServices into urban environment issues

GURME is an integral part of urban research and services



Hazards and Risks in the Urban Environment:

- **Poor air quality**
- **Extreme heat/cold and human thermal stress**
- **Hurricanes, typhoons, extreme local winds**
- **Wild fires, sand and dust storms**
- **Urban floods**
- **Sea-level rise due to climate change**
- **Energy and water sustainability**
- **Public health problems caused by the previous**
- **Climate change: 70% of GHG emission - urban**



WMO for UN New Urban Agenda

WEATHER CLIMATE WATER



WORLD
METEOROLOGICAL
ORGANIZATION



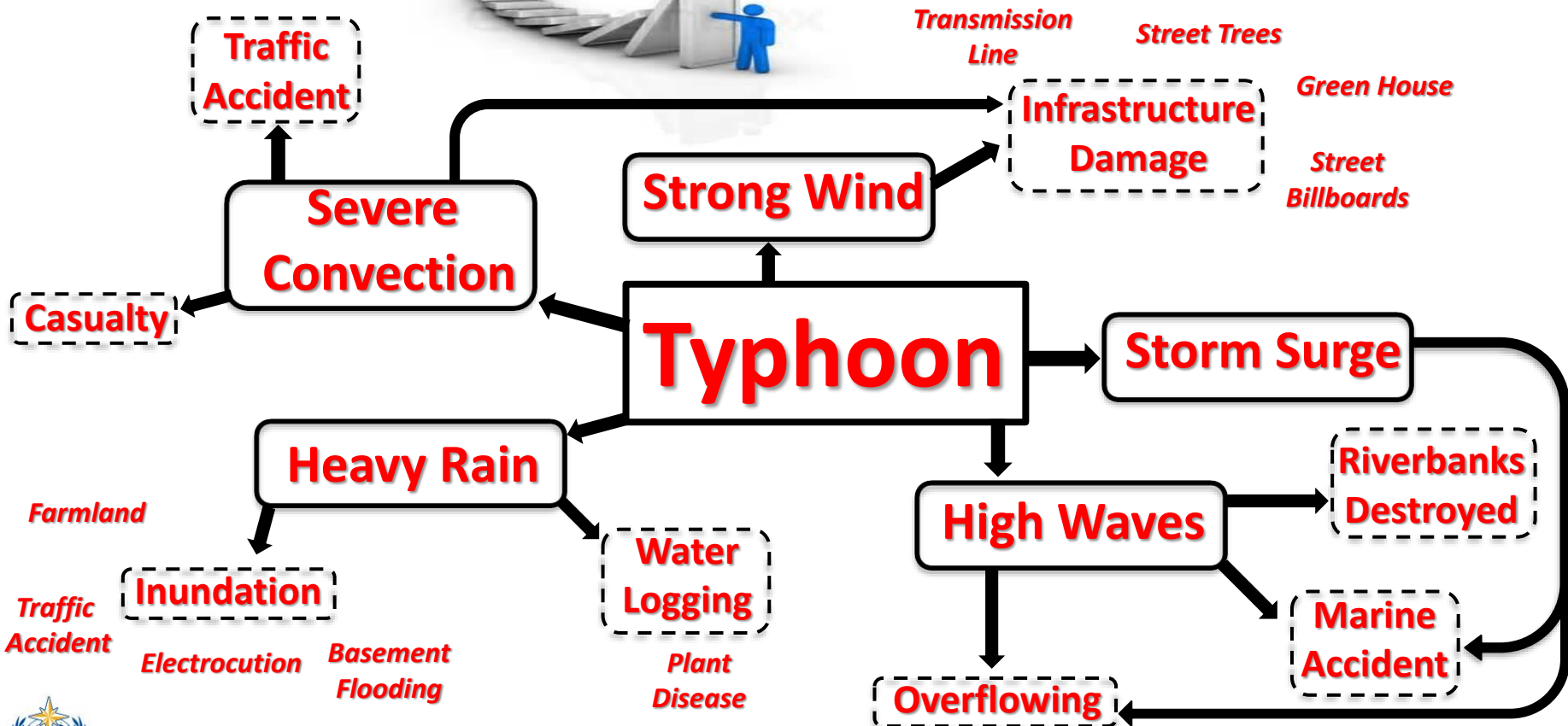
The 17th World Meteorological Congress (2015) Resolution 9.8: Establishing WMO Cross-cutting Urban Focus

**Key Task for Cg-18: Elaboration of Guidelines for
Integrated urban services**

**Integrated weather, climate, hydrology and
related environment services for sustainable cities**

Through a domino effect, a single extreme event can lead to a broad breakdown of a city's infrastructure:

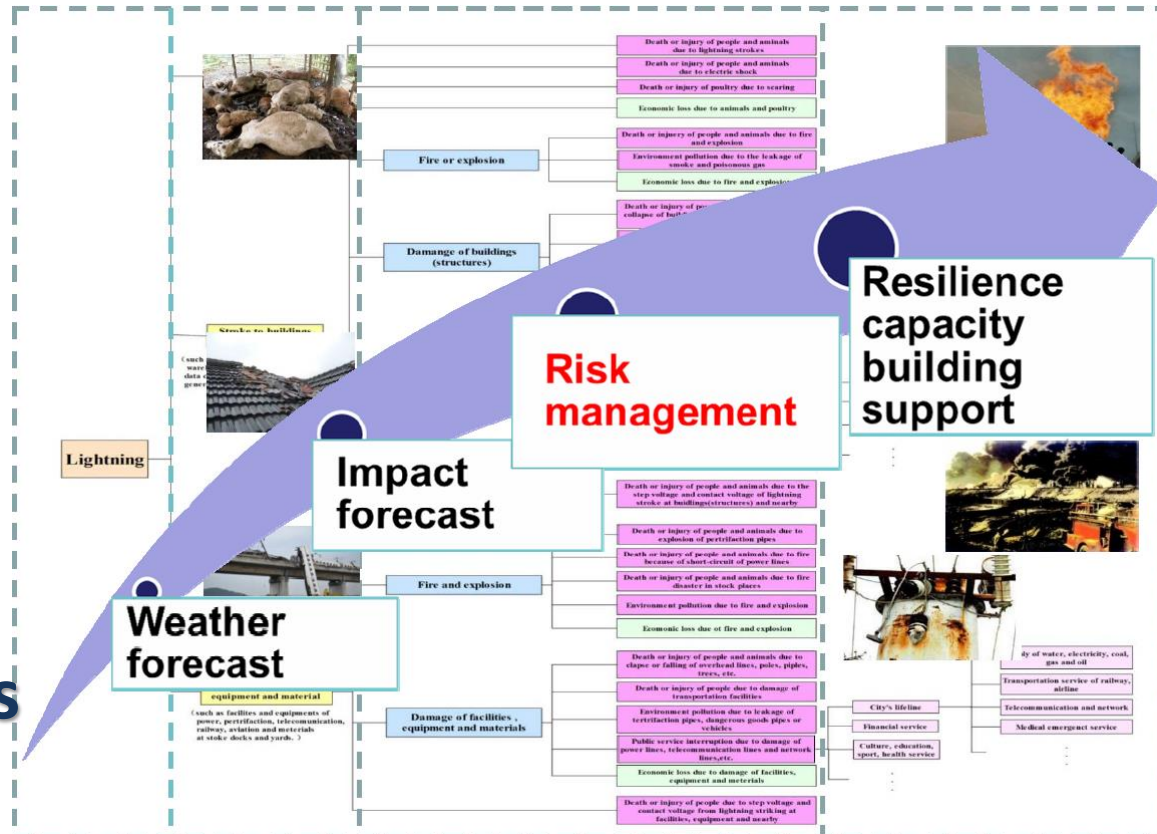
Example of Hazard Domino Effect (Typhoon)



Solution: Integrated Urban Services

Urban activities are a priority and specific cross-cutting element within the WMO strategy

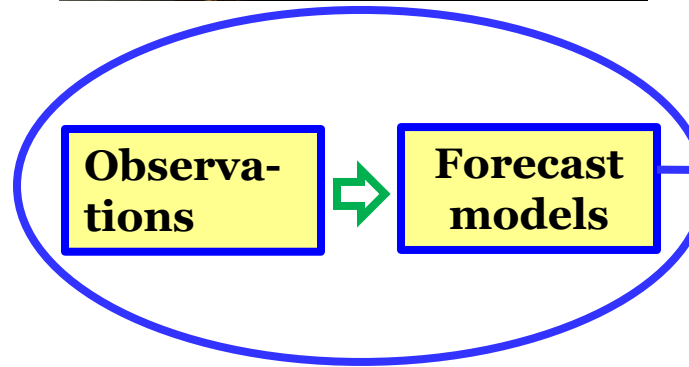
- Integrated Urban Weather, Water, Environment and Climate Services
- Multi-Hazard Early Warning Systems
- Focus on impact based forecast and risk based warnings





GURME Pilot Project (MHEWS Shanghai) (EXPO-2010)

- Multi-Hazard Early Warning System (MHEWS)
- Enhanced observing system
- Enhanced air quality & weather forecasting (heatwaves, AQ, +)
- Field experiment (jointly with NCAR)
- Workshop activities



Heat wave and cold spell forecast

UV forecast

Ozone forecast

Haze forecast

Pollen forecast

Bacterial Food Poisoning

Influenza forecast

Heat index, Sunstroke, and Diarrhea forecast for EXPO 2010

Habitat-III & New UN Urban Agenda

United Nations Conference on Housing and Sustainable Urban Development, Quito, Ecuador, 17 – 20 October 2016.

The WMO team members on HABITAT-III:

Prof. Greg Carmichael <gcarmich@engineering.uiowa.edu>, Chair of WMO GAW SSC,
University of Iowa

Dr. Luisa T. Molina <ltmolina@mit.edu>, GURME SAG member, MIT & Molina Center, USA

Prof. James A. Voogt <javoogt@uwo.ca>, IAUC President, Canada

Prof. Edward Ng <edwardng@cuhk.edu.hk>, Chinese University of Hong Kong

Dr. Young-Gon Lee, presenting the WISE project for Seoul, NIMS/KMA, Korea

Dr David Satterthwaite <david.satterthwaite@iied.org>, IPCC, International Institute for
Environment and Development (IIED), UK

Dr. Marcelo Mena <marcelomena@gmail.com>, deputy minister of the Environment, Chile, co-
leader of the GURME Pilot Project for Chilean cities,

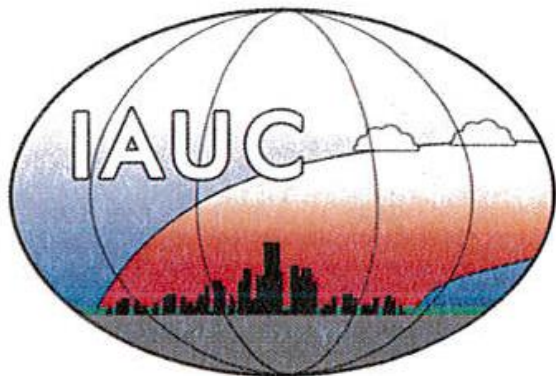
and myself (Alexander Baklanov) as the WMO focal point on the HABITAT-III conference.



WMO contribution to UN New Urban Agenda

- Collaboration to draft the **UN New Urban Agenda** in accordance to the **WMO Integrated Urban Strategy**
- WMO contribution and involvement into **Area 5: Urban Ecology and Environment**, including: Issues 17: 'Cities and Climate Change and Disaster Risk Management' and 15: 'Urban Resilience'
- Participation in drafting 'UN System- internal discussion of a tentative outline for the **Global Sustainable Development Report (GSDR) 2016**'
- Assessing and **organizing the secretariat work**, communication strategy (aligned to WMO, WHO and UNEP) **on urban matters** for HABITAT-III.
- Elaboration of the **WMO Cross-Cutting Urban Focus** and Outline for implementation framework 2016-2019 (CAS-16, CG-17 and EC-18).
- WMO relevance to urban design and planning, observations and seamless services, operations and resilience (**integrated urban hydrometeorological/climate/environmental services**)
- Long-term experience of **GURME project, Shanghai and other cities demonstration** studies
- MoU between the **International Association for Urban Climate (IAUC)** and WMO
- **Proposal** on 'Climate-smart city early warning and predicting system' **to the Green Climate Fund**





INTERNATIONAL ASSOCIATION FOR URBAN CLIMATE

MEMORANDUM OF UNDERSTANDING BETWEEN WMO and IAUC



World
Meteorological
Organization

Weather · Climate · Water

WMO and IAUC agree to establish and maintain cooperation relative to matters of common interest to both Organizations, in particular, implementation of the WMO Cross-Cutting Urban Focus in support of the United Nations New Urban Agenda.

Signed on behalf of the
International Association for Urban
Climate
(IAUC)

Mr James Voogt
President

Signed on behalf of the
World Meteorological Organization
(WMO)

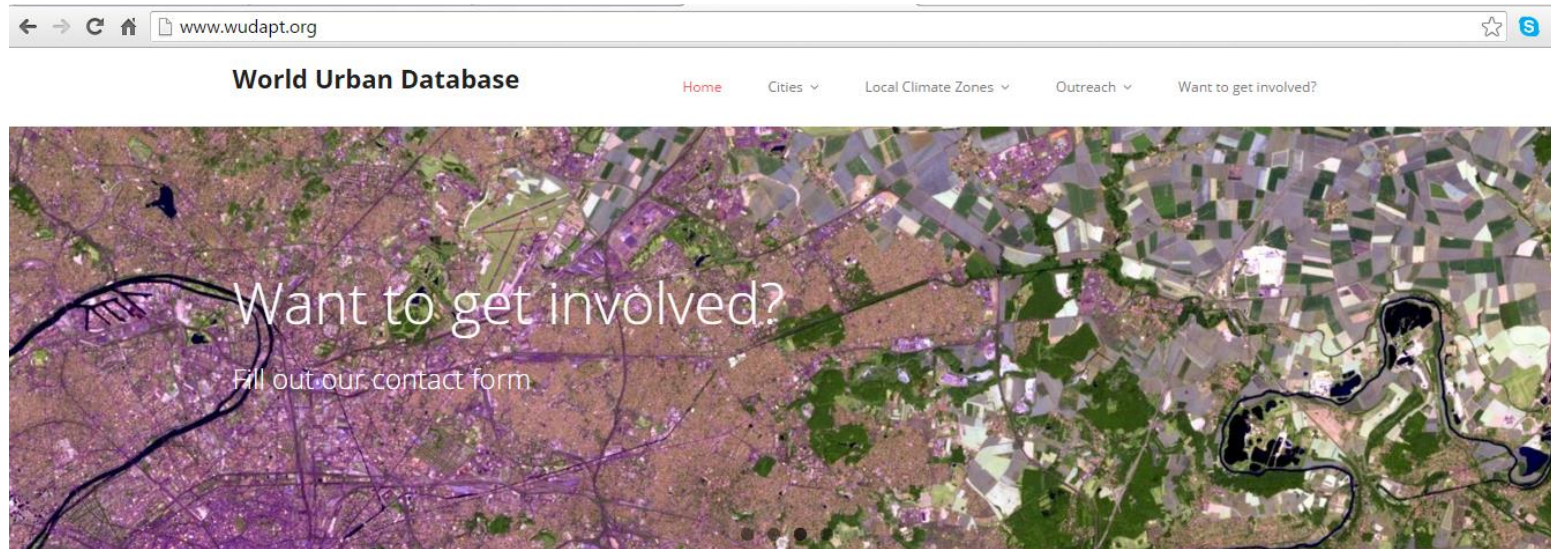
Prof. Petteri Taalas
Secretary-General



Done in Dublin the 13.5.16

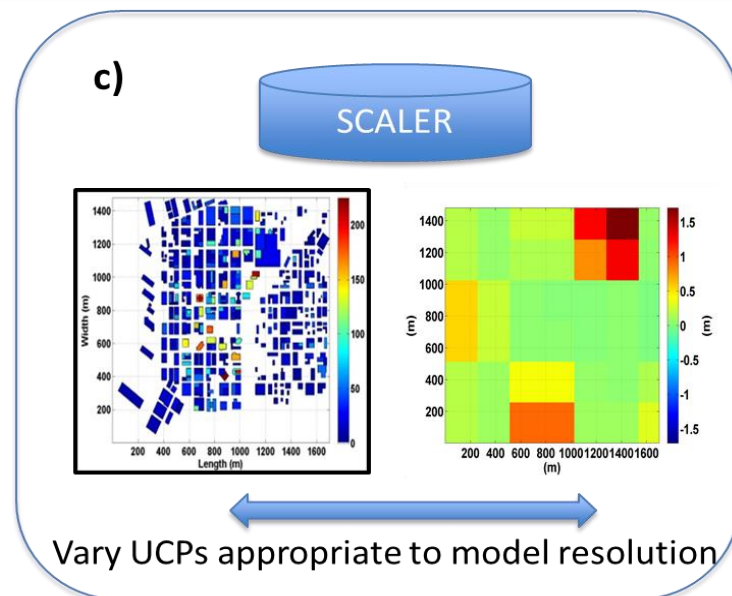
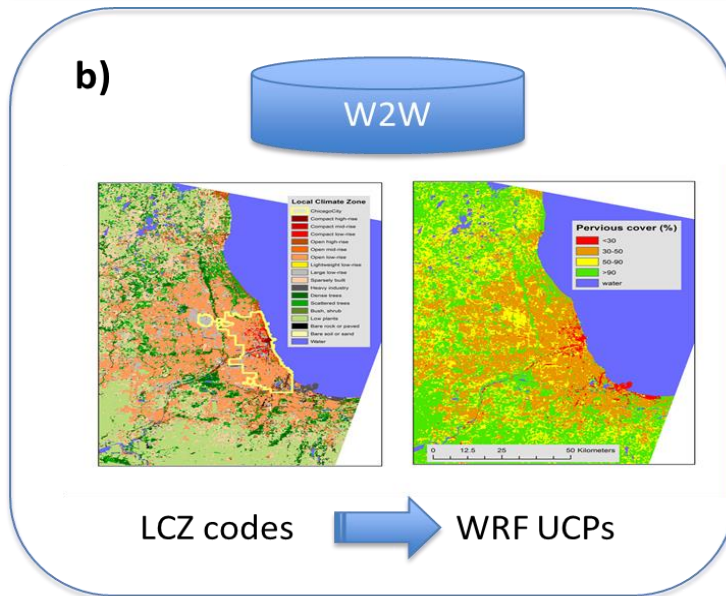
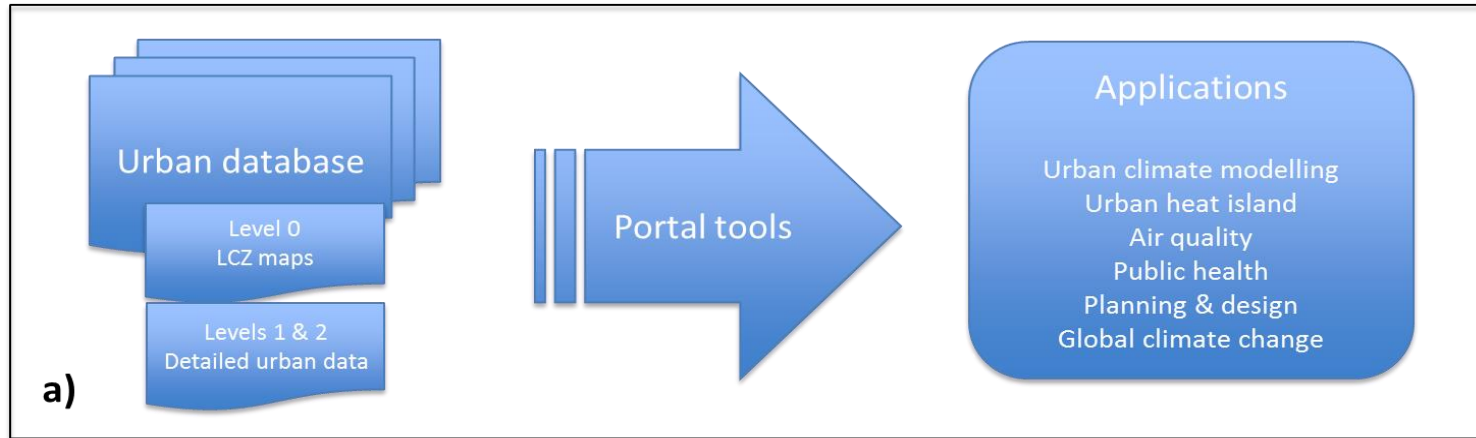
Done in Geneva the 11.4.16

World Urban Database and Access Portal Tools (WUDAPT): an urban weather, climate and environmental modeling infrastructure



- The WUDAPT project is a start to developing a comprehensive global archive of standardized urban data and associated that will be needed to address these challenges.
- WMO is expecting to explore the WUDAPT framework as a means towards addressing its new urban services mandates expressed in Resolution 68(CG-17)
- Proposed project to NSF "BIGDATA2017: Inferring and applying worldwide climate zones for urban meteorology analysis"

Structure of WUDAPT project and current portal tools:



b) W2W which is designed to integrate LCZ data with WRF model

c) SCALER which permits the extraction of data appropriate to model resolution



WMO GAW Implementation Plan: 2016-2023

GURME ToRs:

1. Address the research barriers to **advance the predictive capacity at increasing resolutions**, and in the urban context in particular: through the coordination of reviews in the current state of science **in urban-scale forecasting and associated monitoring**, establish activities where gaps exist.
2. Develop activities on those research questions/issues that transcend disciplines and require leveraging a broader community to **develop improved forecasting concepts and tools to resolve complex urban environments** at increasing scales; facilitate data sharing and establishment of test beds.
3. Given the integrative nature of modelling, the on-going scientific trend towards **seamless predictions and the evolution of technology, actively engage other WMO advisory and working groups within WWRP, GAW** and the rest of its organization, to address this complex and multidisciplinary challenge.
4. While megacities will continue to receive particular attention, orient its research **to cover the full array of urban environments** that are key to the broader scientific question of urban-scale modelling.
5. Collaborate explicitly **with the SAG-Apps** on projects at the interface of regional and local scales and contribute actively to **facilitating data assimilation efforts focused on integrated/coupled models and at finer and finer scales**.
6. Continue to nurture its **engagement with the health community** as the main partner in assessing the needs, evaluating the benefits and communicating **resulting services to society** within these urban environments.
7. **Build capacity through its research projects**, identifying those environments that constitute gaps in the overall directions of the GURME program and encourage in its projects the development and testing of derived services. The products themselves would take the form of forecasts, alerts and warnings and/or real-time/NRT maps or databases.
8. Forge **stronger collaborations with CBS and/or individual operational centres** to transition products in dissemination systems in a form that is well suited for large or targeted audiences.



GURME Tasks For The Strategic Planning Period 2008-2015

Observational Needs

- Chemical
- Meteorological

(Tasks: 3,6,17)

Assimilation

Modeling Needs

- Weather prediction
- Chemical weather and air quality prediction

(Tasks: 8,11,13,15)

Demonstration

Capacity Building

- Workshops
- Training

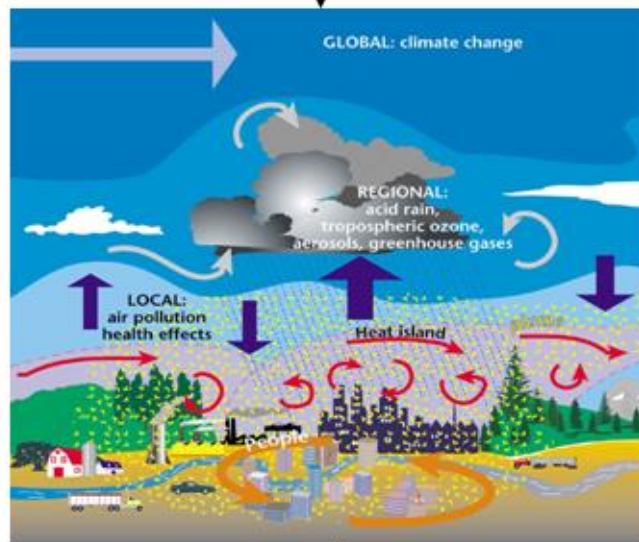
(Tasks: 2,4)

Coordination

Users

- Health
- Agriculture
- Environmental
- Public
- Emergency Response

(Tasks: 9,14,16,18)



Education

Air Quality & Related Products

- Improved Forecasts
- Guidelines
- Pilot Projects

(Tasks: 1,5,7,12)

Dissemination