

### Introduction

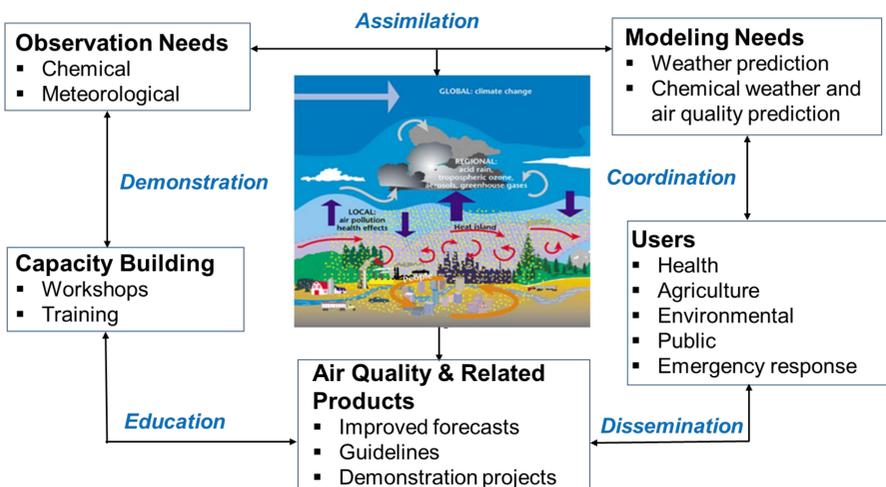
The WMO Global Atmospheric Watch (GAW) Urban Research Meteorology and Environment Project (GURME) is an integral part of the urban research and services of WMO/GAW Programme, a unique long-term international framework that provides the technical basis for integrated observations, analysis and assessment of atmospheric chemical composition.

GURME focuses on developing improved air quality forecasting systems and contributes to a broader urban services initiative being developed at WMO. This presentation describes the current activities of GURME, which include defining meteorological and air quality measurements that support urban forecasting; providing cities access to air quality numerical prediction systems and monitoring information that serve as the basis for health-related prediction services; promoting pilot projects for different cities to demonstrate successful expansion of MeteoServices for urban environmental issues; and building capacity through its research projects, identifying those environments that constitute gaps in the overall directions of the GURME program.

### GURME's Mandate and Objectives

GURME was created under GAW in 1995 in response to request from National Meteorological and Hydrological Services (NMHS) for assistance in dealing with urban issues:

- To enhance the capabilities of NMHS in providing urban-environmental forecasting and air quality services of high quality,
- In collaboration with other WMO programs, World Health Organization and environmental agencies, to better define meteorological and air quality measurements focusing specifically on those that support urban forecasting
- To provide NMHS with easy access to information on measurement and modeling techniques
- To promote pilot projects to demonstrate how NMHSs can successfully expand their activities into urban environment issues.



### GURME's Focus on Integrated Urban Services

Population growth and urbanization are amongst the main drivers for the demand for increased and more accurate environmental assessments and predictions. In response to these increasing pressures, WMO 17th Congress (May 2015) stressed that

- WMO and its Members can make a tangible positive impact on the **urban environment** by providing **forecasts and integrated services** that are targeted to the wide-ranging needs of urban authorities and population.
- **Integrated urban services** will be relevant for **urban resilience and sustainable development**.

GURME is putting a renewed focus on enhancement of monitoring and modelling of urban atmosphere environment to address increasing urban prediction needs and establishment of case studies for understanding air pollution, health and climate connections in different types of megacities and urban complexes..

**GURME activities ultimately are aiming at providing early warnings and mitigating hazards that have direct impacts on population health.**

### GURME's Research Activities

- Lowering the barriers to carry out modeling at increasing resolutions and the urban context
- Addressing identified gaps especially where the research questions transcend disciplines and require leveraging a broader community
- Promoting seamless modeling approaches all the way to urban systems



Release of the PanAm2015 Legacy Database as a test bed

Partnering with the UK/India PROMOTE initiative where it aims to investigate meteorology and AQ interactions in the PBL with a view to improve the SAFAR forecasting system

Initiating review on urban surface characteristics accessibility and use in high resolution modelling

Participating in and sponsoring expert meetings: IWAQFR, CCM, WWOSC



### GURME's Demonstrations and Research to Operations

GURME has fostered demonstration projects in Latin America, India and China to increase the accessibility, knowledge and capacity for air quality predictions. Pilots coordinated by GURME have often led to AQ forecasting systems that continue to be operated after the Research and Development phase.

#### Examples of GURME Projects

##### Latin American Cities Project

The initial emphasis of the project was on capacity building with Air Quality Forecasting workshops organized with GURME's direct involvement



and support in Chile, Brazil, Peru, Mexico and Costa Rica. This has led to transfer of an operational forecast model to Chilean Met Office.

Currently the Chilean project focuses on a broad spectrum of PM2.5 forecasting in several cities, from large (e.g., Santiago) to small (e.g., Coyhaique).

##### Mexico City: Urban health, air quality and climate

Mexico City has recently implemented air quality forecasting system to support the government in taking effective actions to reduce population exposure to high pollutants concentrations and extreme weather conditions and to prepare the public about associated health effects.

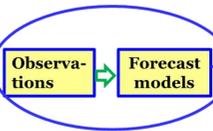
The city has developed a comprehensive climate action plan with **resilience building** as a specific strategic focus to ensure that citizen have the ability to act in an emergency or disaster situation.



mobile "Aire" application

##### Shanghai Multi-Hazard Early Warning System (MHEWS)

GURME supported the development of the health forecast component of the MHEWS established for the Shanghai World Expo in 2010. It is now run continuously as a legacy and a model for MHEWS. It has been extended to include other Chinese cities.



- 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



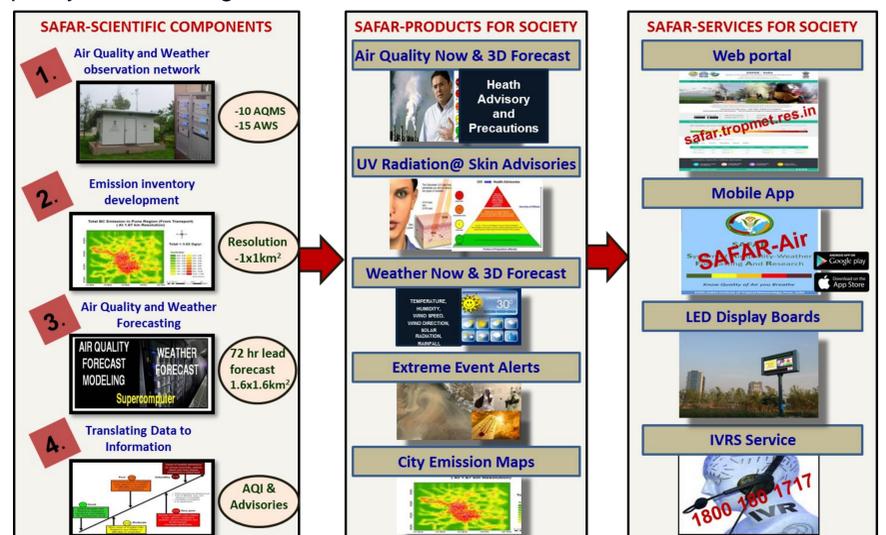
Led by Tang Xu, Shanghai Met Service

##### Integrated Urban Services (WMO-Shanghai-IUWCS Project)

collaboration among the met services of Shanghai, Beijing, Jiangsu, Zhejiang, Guangdong and Shenzhen.

##### SAFAR Early Warning System

GURME facilitated the transfer of expertise to establish the first operational real-time System of Air Quality & Weather Forecasting and Research (SAFAR) for Delhi and Pune, in advance of the 2010 XIX Commonwealth Games. SAFAR is a seamless early warning system enriching local people with advance information on air quality, related health advisory, weather, harmful radiations, extreme event and environmental awareness to deal with their adverse impacts and hence protect citizens by early preparedness and interventions. The capacity is now being extended to Mumbai and Ahmedabad.



**GURME Science Advisory Group:** Veronique Bouchet (Chair) – Environ and Climate Change Canada, Montreal, Canada; Luisa Molina (co-Chair) – Molina Center for Energy and the Environment, USA; Gufran Beig - Indian Institute of Tropical Meteorology, India; Sue Grimmond – University of Reading, UK; Jhoon Kim – Yonsei University, Seoul, Korea; Pablo Saide – Chile (currently at NCAR, Boulder, USA); Paulo Saldiva – University of São Paulo, Brazil; Heinke Schluenzen – University of Hamburg, Germany; Ranjeet Sokhi - University of Hertfordshire, UK; Jianguo Tan – Chinese Meteorological Administration, Shanghai, China.

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**Acknowledgements** to Liisa Jalkanen, Greg Carmichael and all past and current GURME SAG members for contributions to current poster.