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Overview of GURME

(The WMO GAW Urban Research Meteorology and Environment project)

Liisa Jalkanen
WMO Secretariat

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World Meteorological Organization

Independent technical UN agency

187 Members manage through WMO Congress and Executive Council

Secretariat in Geneva (staff 280)

Technical Departments

Observing and Information Systems (OBS)

Climate and Water (CLW)

Weather and Disaster Risk Reduction Services (WDS)

Research (RES)

Atmospheric Research and Environment Branch (ARE)

Atmospheric Environment Research Division (AER)

Global Atmosphere Watch (GAW)

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THE GAW MISSION

- Systematic long-term monitoring of atmospheric chemical and physical parameters globally
- Analysis and assessment
- Development of predictive capability

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GAW observations

- **Stratospheric Ozone**
- **Tropospheric Ozone**
- **Greenhouse Gases (CO_2, CH_4, N_2O, CFCs)**
- **Reactive Gases (CO, VOC, NO_y, SO_2)**
- **Precipitation Chemistry**
- **Aerosols (chemical, physical, AOD)**
- **UV Radiation**
- **(Natural Radionuclides, Rn^{222}, Be^{7}, ^{14}CO)**

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GAW Station Information System

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GAWSIS Online - comprehensive information on all GAW stations

- *Database*
- *Search / Update*
- *Inventory / Audit*

(Supported by Switzerland)

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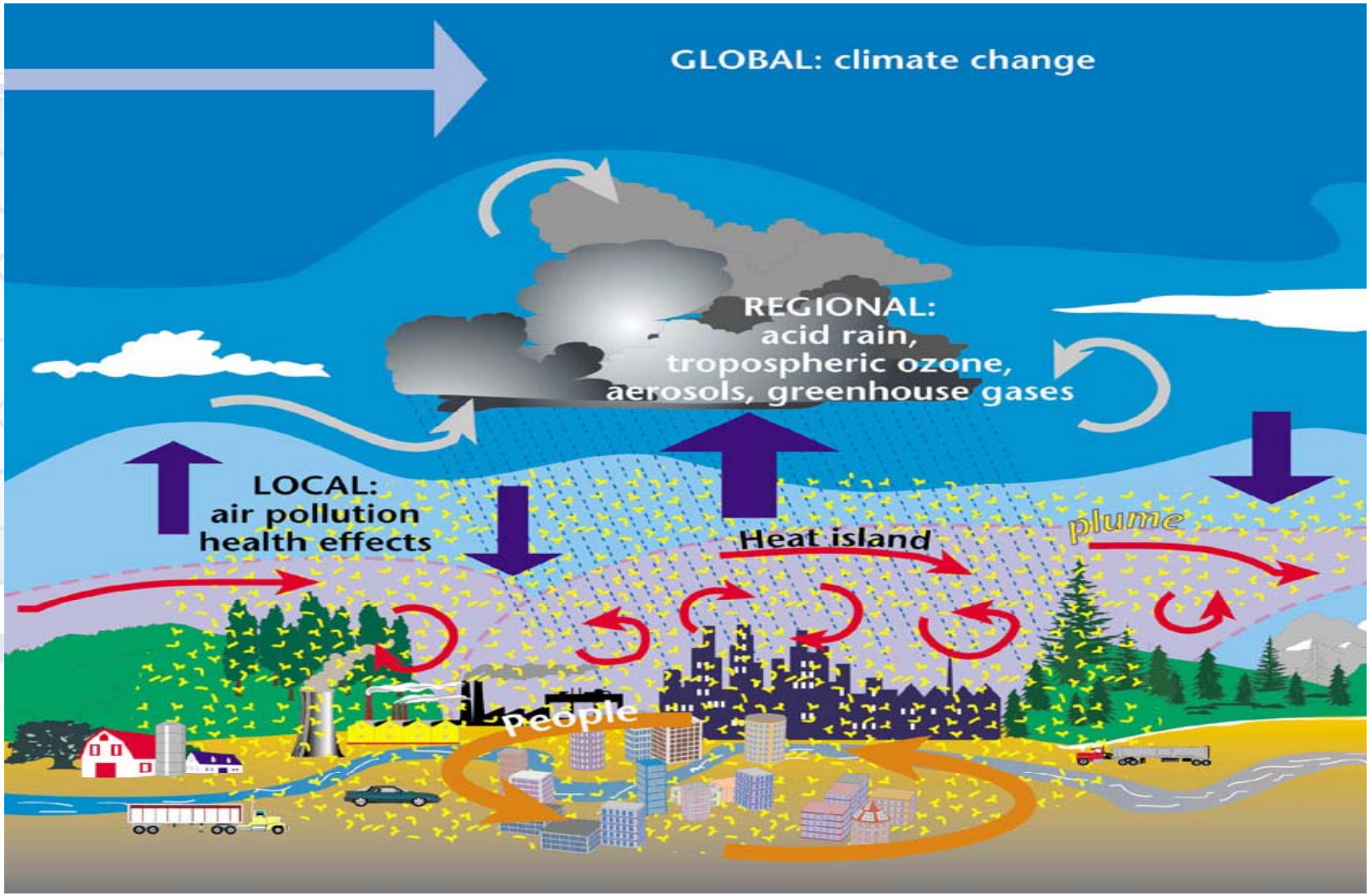
GAW Urban Research Meteorology and Environment
GURME project



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GAW Urban Research Meteorology and Environment Project (GURME)

- To **enhance the capabilities** of NMHSs in providing urban-environmental **forecasting and air quality services** of high quality, illustrating the linkages between meteorology and air quality;
- To provide NMHSs with **easy access** to information on measurement and modeling techniques;
- To promote a **series of pilot projects** to demonstrate how NMHSs can successfully expand their activities into urban environment issues;
- In **collaboration** with other WMO programmes, WHO and environmental agencies, to **better define meteorological and air quality measurements** focusing specifically on those that support urban forecasting.

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GURME Tasks For The Strategic Planning Period 2008-2015

Observational Needs
- Chemical
- Meteorological

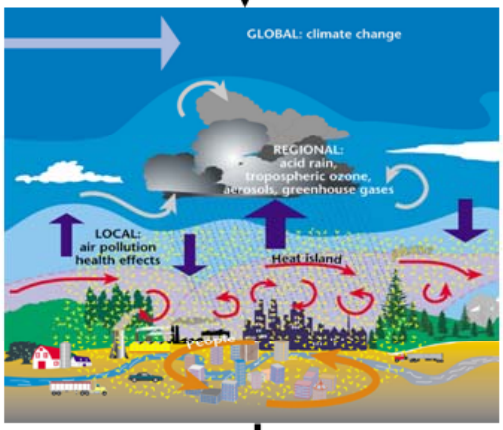
(Tasks: 3,6,17)

Assimilation

Modeling Needs
- Weather prediction
- Chemical weather and air quality prediction

(Tasks: 8,11,13,15)

Demonstration



Coordination

Capacity Building
- Workshops
- Training

(Tasks: 2,4)

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

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GURME Scientific Advisory Group (SAG)

Chair: Greg Carmichael

Members: Leong Chow Peng

Alexei Liakhov

Peter Manins

Paul Mason

Wang Jinxing

Liisa Jalkanen

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Example of GURME project: Latin American Cities

Sao Paulo, Brazil

Mexico City, Mexico

Santiago, Chile

Improvement of AQ forecasting in Latin American cities through capacity building

- First Air Quality Forecasting Workshop for the Latin American Cities October, 2003, Santiago, Chile;
- Workshop on application of WRF/Chem Model and Use of Remote sensing
- Training Workshop on AQF in Lima for Latin American countries e.g. Peru, Ecuador, Colombia, Bolivia, Argentina.

NMHSs - Universities - Environmental Agencies

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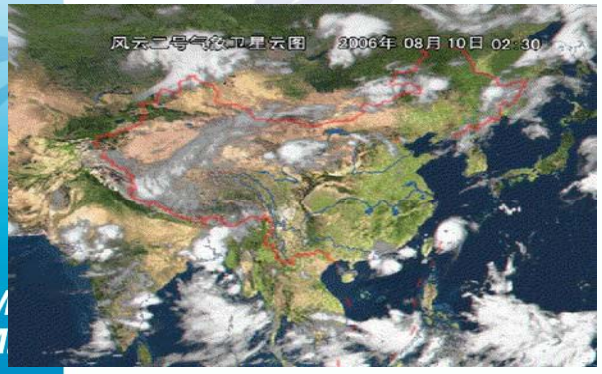
Another example: Shanghai MHEWS

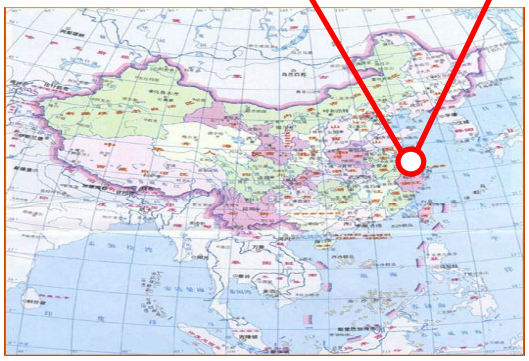
Shanghai is a mega-city situated on the shores of the East China Sea and the Yangtze River Mouth

- dense population: 18 millon
- rapid economic development: aiming to be the economic, financial, trade, and transportation center of China.
- Threat of Multi-Hazard to Shanghai:

frequently affected by natural hazards such as typhoons and associated marine hazards such as storm surge, heavy storms, heavy fog, heat-waves, and by atmospheric pollution episodes

Shanghai GURME project: air pollution, heat island, urban relevant meteorological measurements





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GURME measurements: Passive Samplers

Project lead: Greg Carmichael, Martin Ferm

Measured gases: SO_2, NH_3, O_3, NO, NO_2, HCOOH, CH_3COOH, benzene, ethyl benzene, toluene, xylenes.

Ideal for: Mapping concentrations in cities, siting of more advanced stations, personal monitoring.

Advantages: small, no electricity needed, no inlets, large measurement range, technical personnel not needed at site, 100 % time coverage can be obtained, simple to deploy, easy to mail, inexpensive.

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GURME FOCUS:

Air Quality Forecasting

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GURME Air Quality Forecasting (AQF) Workshops (WS)

- Regional WS on AQF
  August 2000, Kuching, Malaysia
- Expert Workshop on AQF
  October 2002, Cuernavaca, Mexico
- Expert WS on AQF for Latin American project
  October 2003, Santiago de Chile
- Training WS on AQF WRF Chem and Satellites
  January 2006, Sao Paulo, Brazil
- Training WS on (Basic) AQF for Latin American Countries
  July 2006, Lima, Peru
- WMO GURME Training Course on Air Quality Forecasting for India and South Asia
  8 – 12 December 2008, Pune, India

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Important findings from the AQF workshops include:

- There is growing experience and interest in air quality forecasting;
- Air quality forecasting and management share a common science-base;
- Improvements in AQ forecasting will come from:
  1. Better understanding of local situations and of key processes (e.g., local winds, boundary layer dynamics);
  2. Increasing accuracy in the meteorological forecasts;
  3. The act of doing – increased experience will lead to enhanced capability;
  4. Improvements in emission estimates.

GURME Experts Meeting In Cuernavaca Mexico

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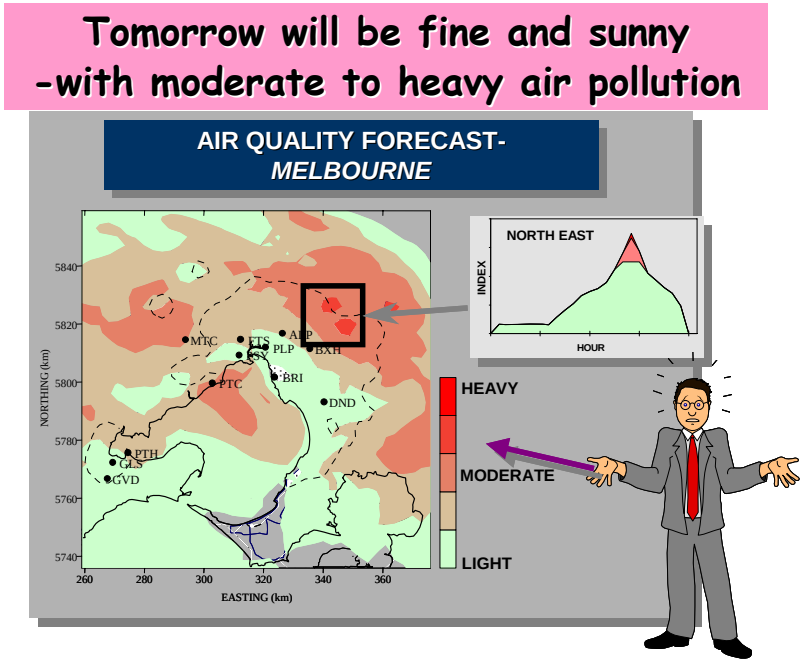
GURME Training Course on Chemical Weather Forecasting

- Develop and deliver to staff in national meteorological services, scientists and others involved in air quality issues.
- Designed to provide the background knowledge needed to design, develop, implement and evaluate a basic air quality-forecasting program.
- The course contains practical advice, introduces the participants to available tools and methods
- Developed by the GURME Training Team (GTT)
- The first 5-d training workshop was held in Lima, Peru July 2006
- All above material available on the web
- **Pune course** new items, local experts



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Good news is:

Air quality forecast can be changed!

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WMO large interest in early warning systems (EWS) especially multi-hazard (MH), that is: MHEWS

Air pollution is part of multi-hazards

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Shifting Disaster Risk Reduction from Reaction to Prevention

- Traditionally, disaster risk management approach has been focused on emergency response and recovery measures

- Shifting disaster risk management to a more comprehensive approach, involving
  - Prevention
  - Preparedness and contingency (unforeseen event) planning
  - Emergency response and recovery measures.

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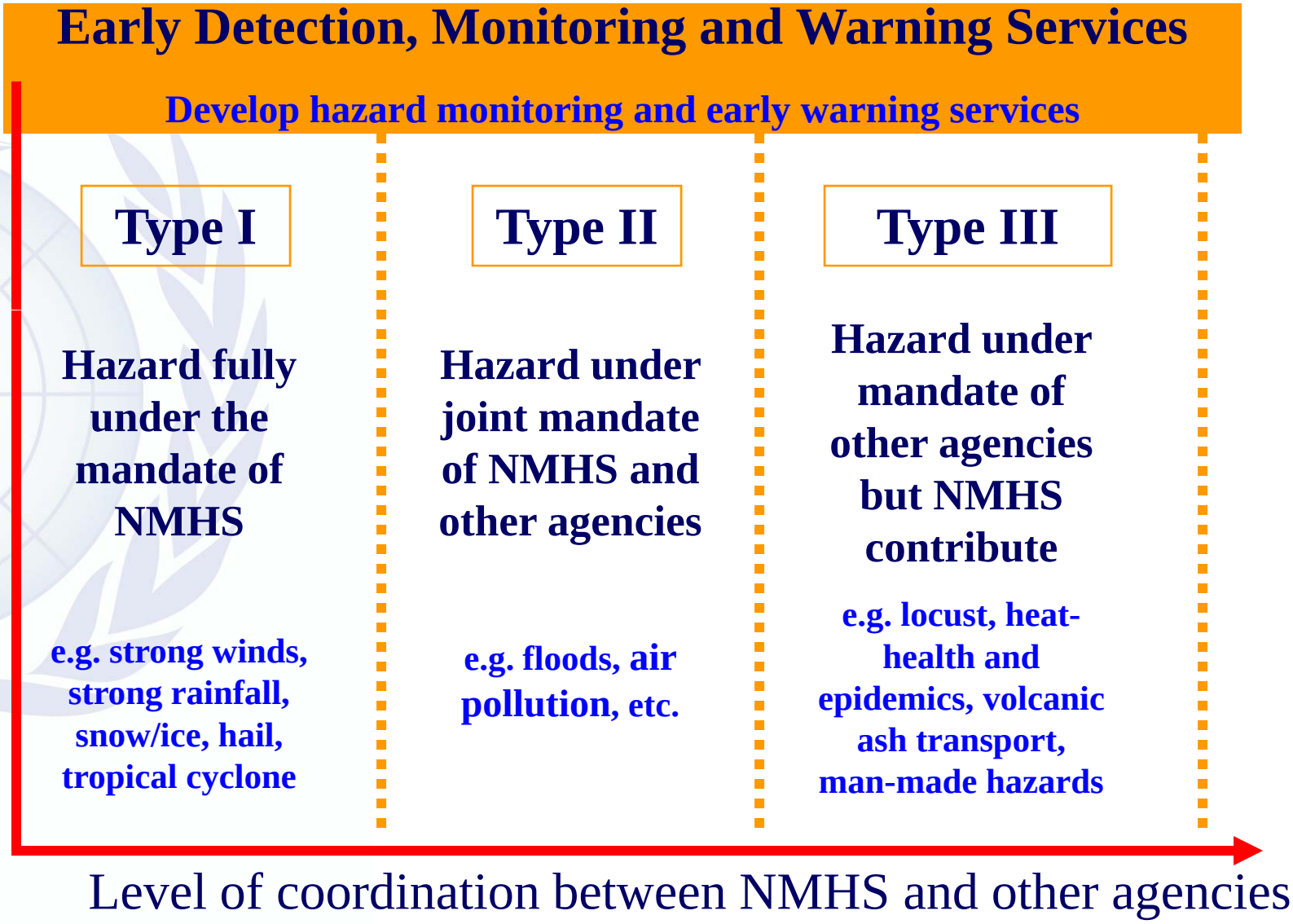
Need for Coordination between Agencies for Development and Issuance of a Warning Message



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Collaboration critical for success!

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