UNOOSA United Nations Office for Outer Space Affairs

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Use of Space Systems for Wildland Fire Early Warning, Monitoring and Decision Support in Wildfire Disaster Management

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and

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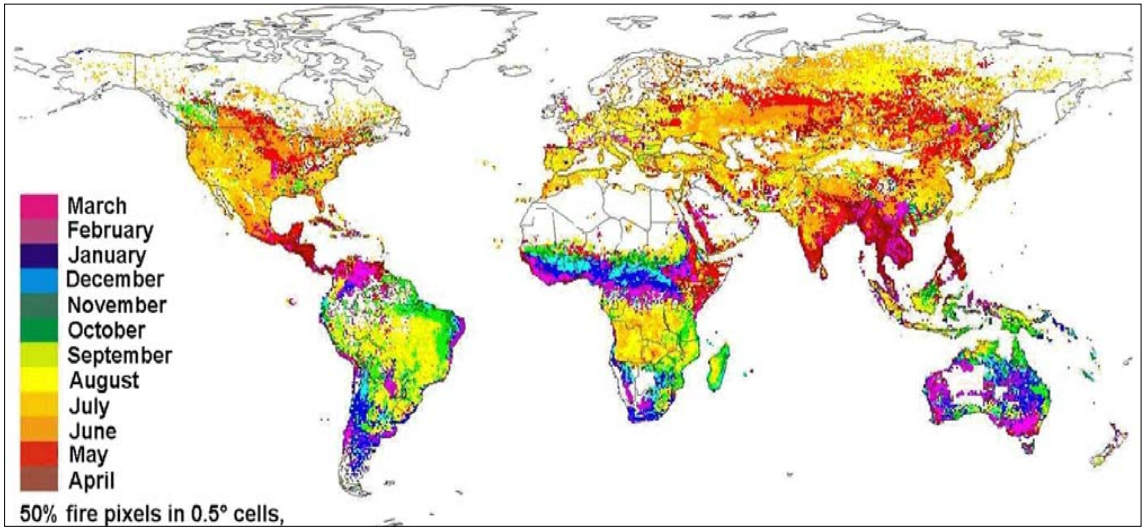
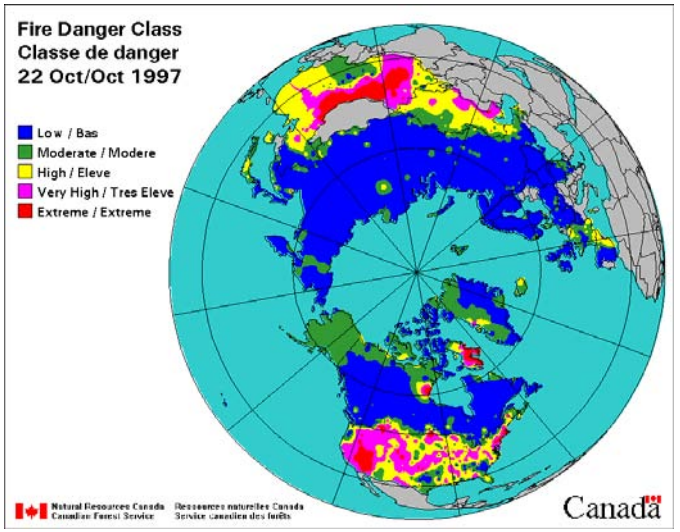
GEO Secretariat

GOFC-GOLD GLOBAL OBSERVATION OF FOREST AND LAND COVER DYNAMICS

GEO GROUP ON EARTH OBSERVATIONS





Wildand Fire: A Global Source of Multiple Hazards

Significant Ecosystem damage

- **Degradation in forest/grassland health due to uncontrolled burning**
- **Agriculture and land degradation with losses in production**
- **Hydrological changes resulting in desertification and flooding**

Significant loss of life, including negative societal impact and economic losses

- **Losses and vulnerability at urban-rural interface increasing**
- **Global health impact due to smoke and emissions**
- **Disruption of transport due to changes in visibility**
- **Costly fire suppression programs**

Potential impact on climate change

- **Global carbon cycle impact**

Global Partnership

- Global Fire Monitoring Center (GFMC), Max Planck Institute for Chemistry, c/o Freiburg University / United Nations University, Germany on behalf of the UNISDR Wildland Fire Advisory Group / Global Wildland Fire Network
- Canadian Forest Service (CFS), Edmonton, Canada
- Bushfire CRC, Australia
- Global Observation of Forest and Land Cover Dynamics (GOFC-GOLD) Secretariat, Edmonton, Canada
- University of Maryland (UMD), USA
- World Meteorological Organization (WMO)
  - World Weather Research Programme (WWRP)
- Bureau of Meteorology Research Centre (BMRC), Melbourne, Australia
- European Centre for Medium Range Weather Forecasting (ECMWF)
  - Instituto Nacional de Meteorologia, Spain
  - Finnish Meteorological Institute, Finland
  - MetOffice, UK

Natural Resources Canada
Ressources naturelles Canada

Australian Government
Bureau of Meteorology

WWRP

Proposal Objectives

- **To develop a global early warning system for wildland fire based on existing and demonstrated science and technologies**

- **To develop an information network to disseminate early warning of wildland fire danger that reaches global to local communities**

- **To develop an information network to quickly detect & report fires**

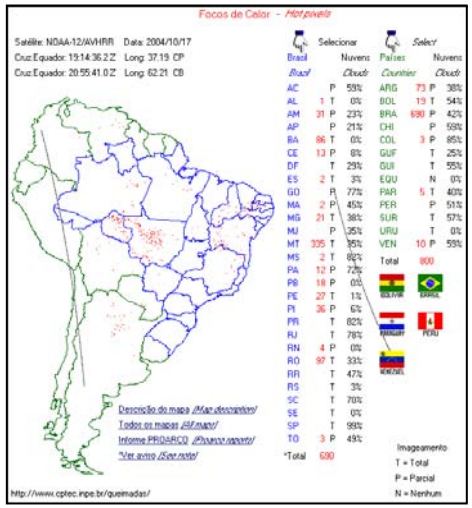
- **To develop an historical record of global fire danger information for early warning product enhancement, validation and strategic planning purposes**

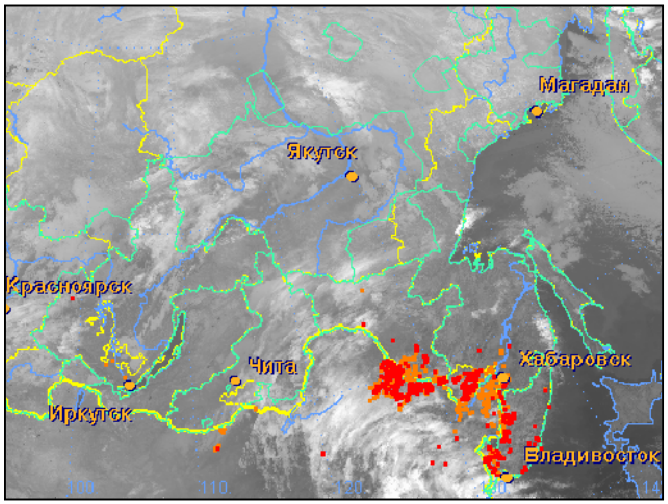
- **To design and implement a technology transfer program to provide training for global, regional, national, and local community applications in:**

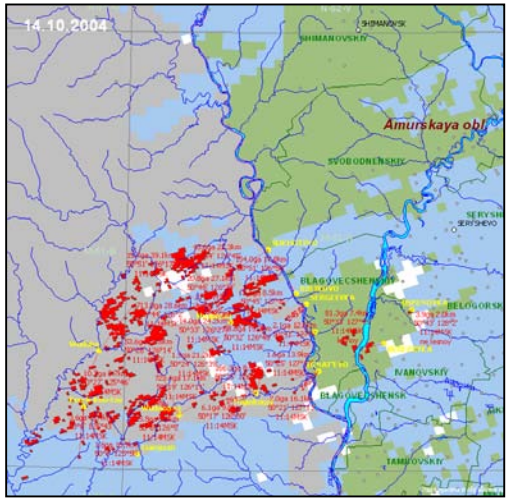
  - **rapid fire detection**
  - **early warning system operation**
  - **methods for local to global calibration of the System, and**
  - **using the System for prevention, preparedness, detection, and fire response decision-making**

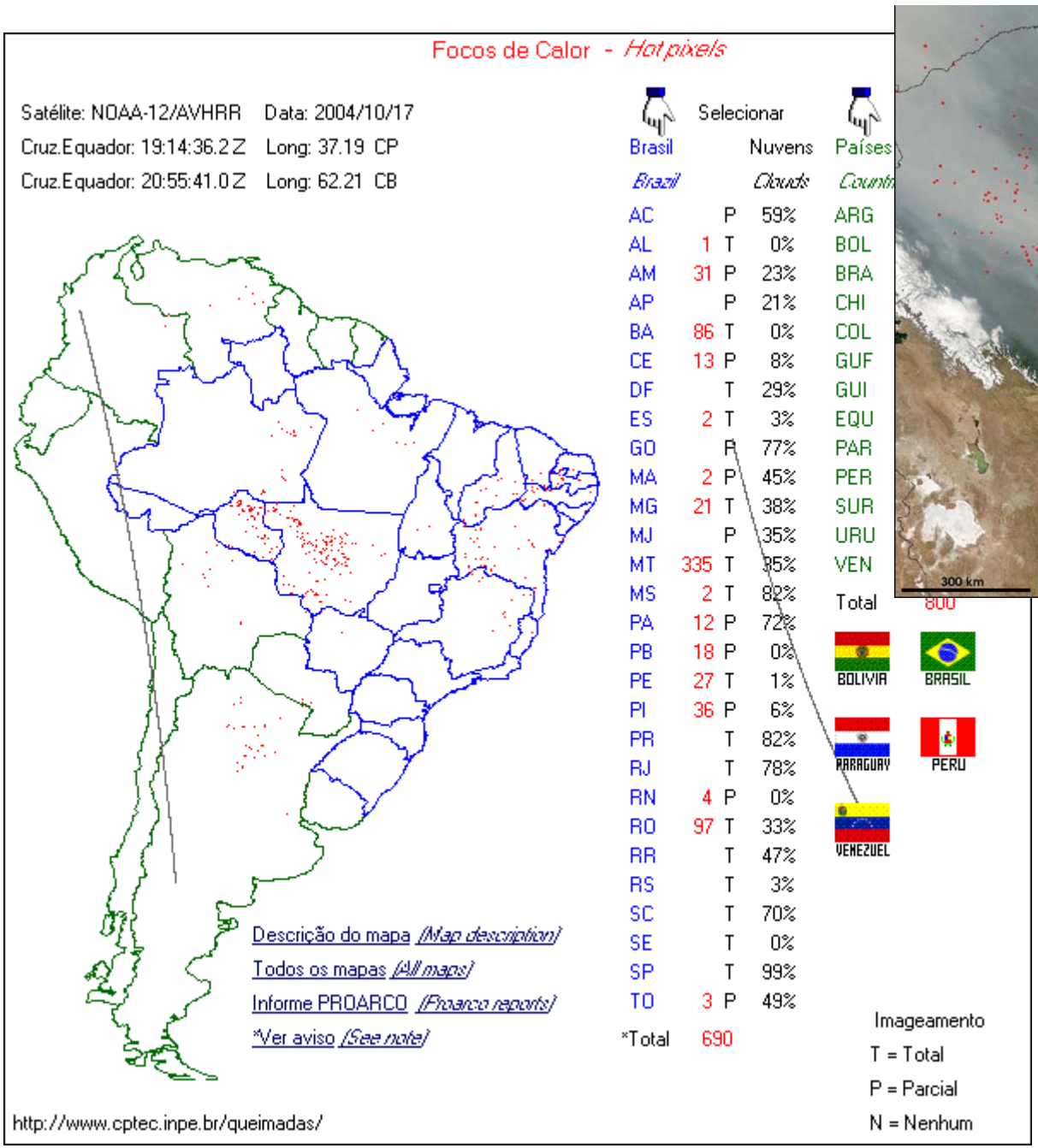
Integration and Coordination of Existing Monitoring Systems

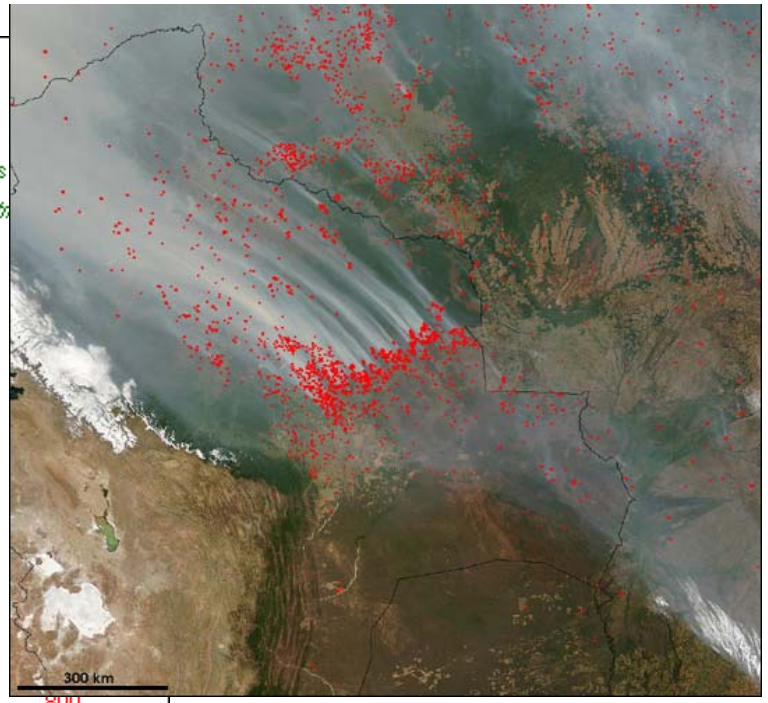
- To enhance rapid fire detection and classification capabilities at national and regional levels
- To create systems for rapid information dissemination



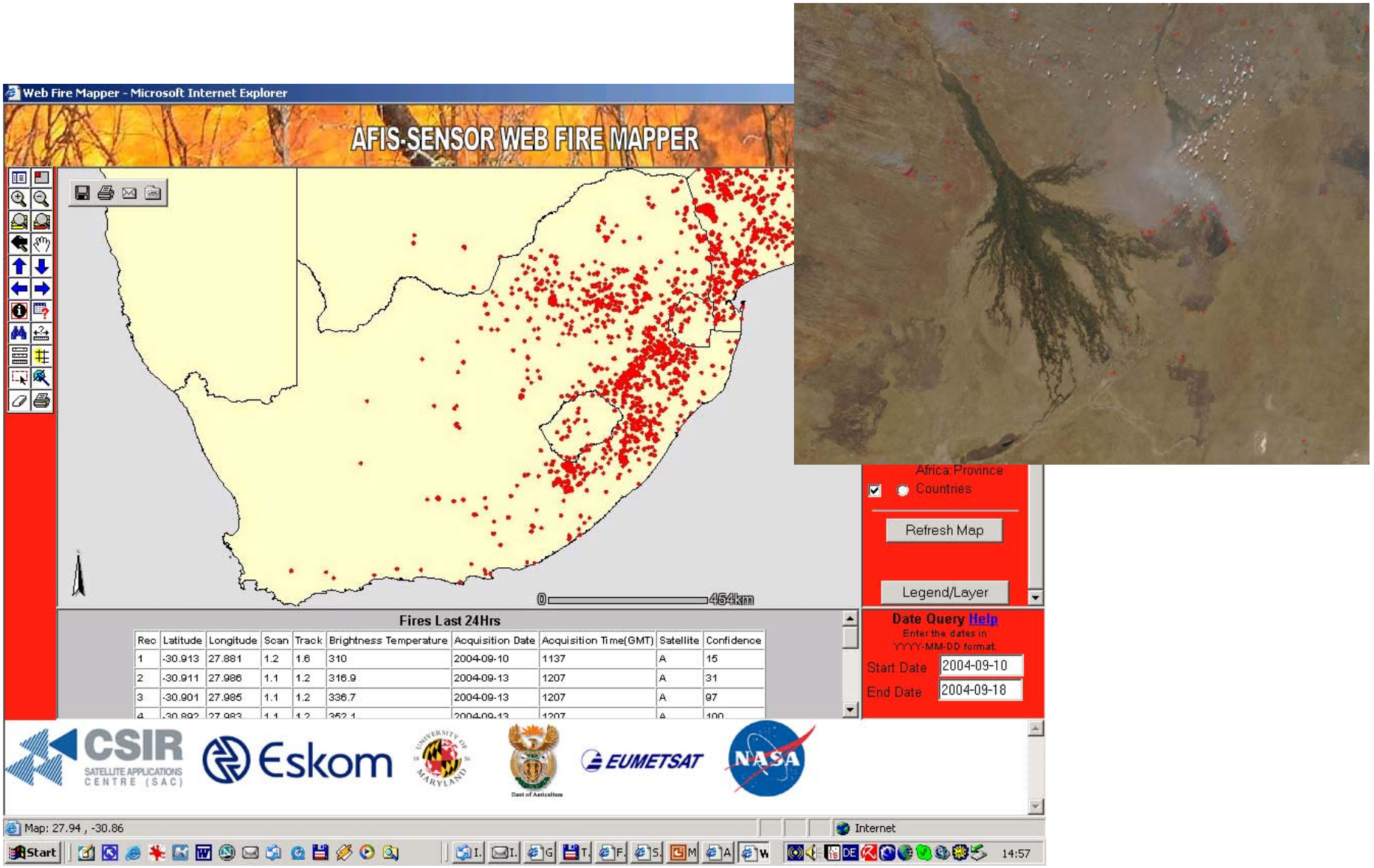




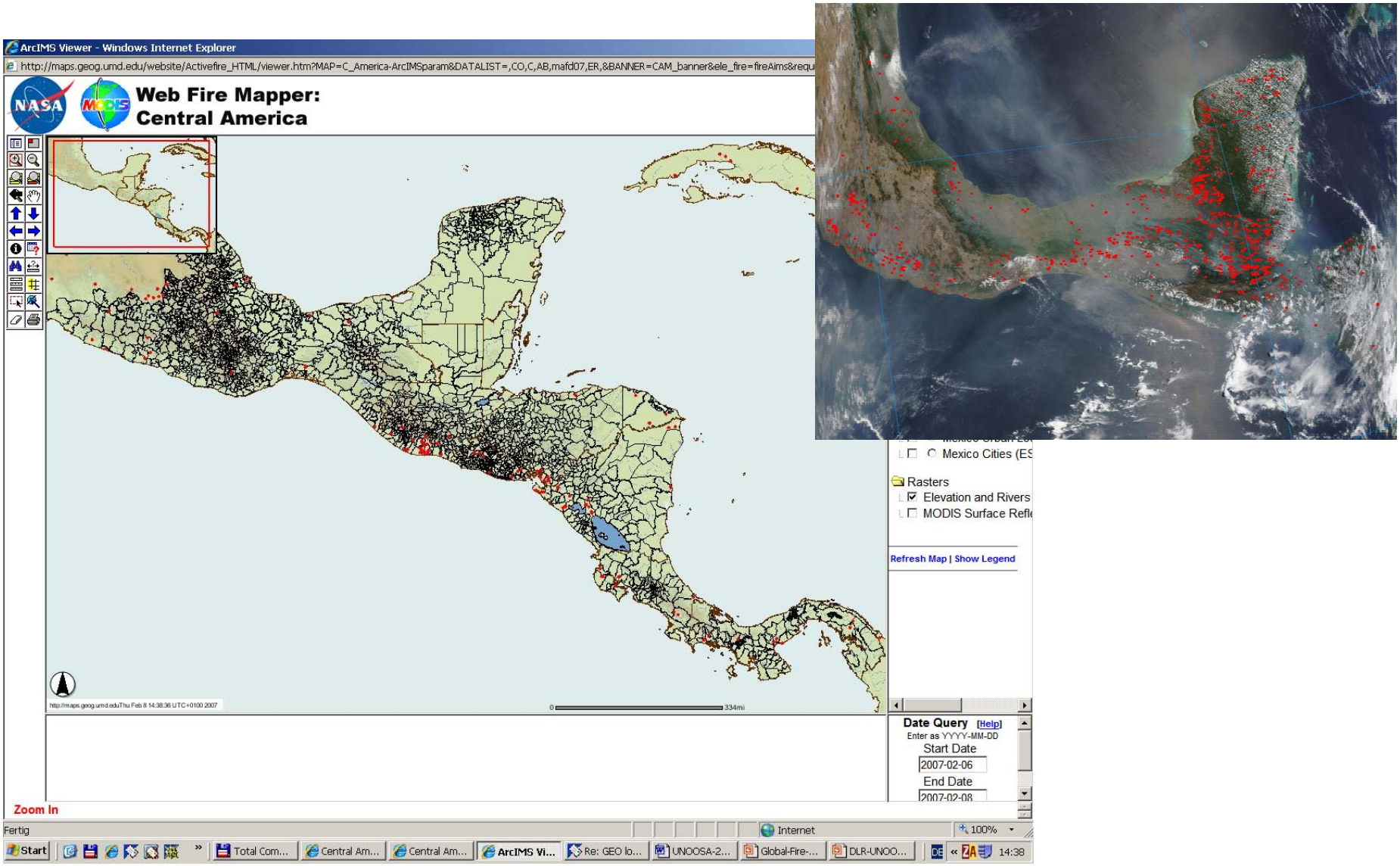




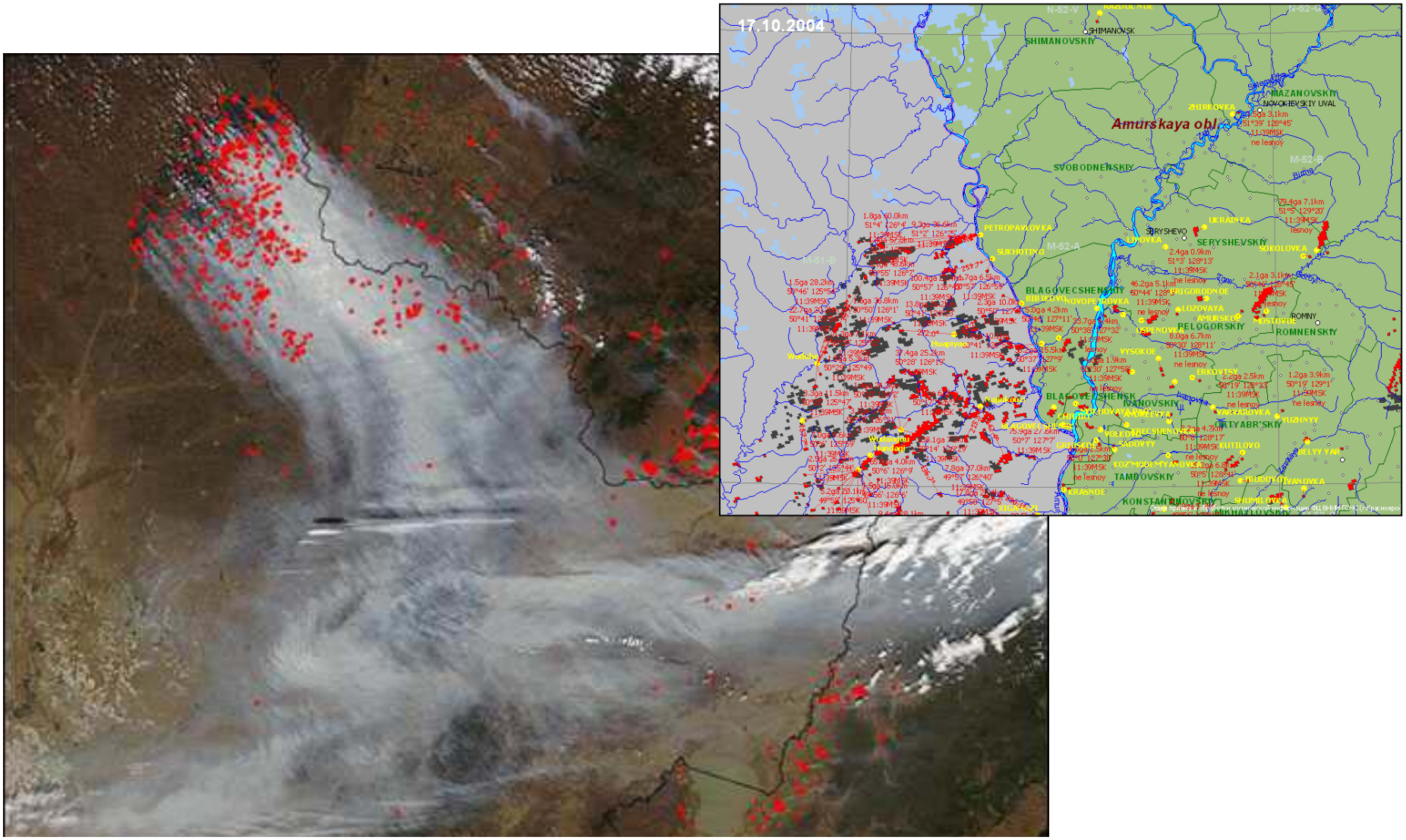
South America Fire Monitoring



Southern Africa Fire Monitoring

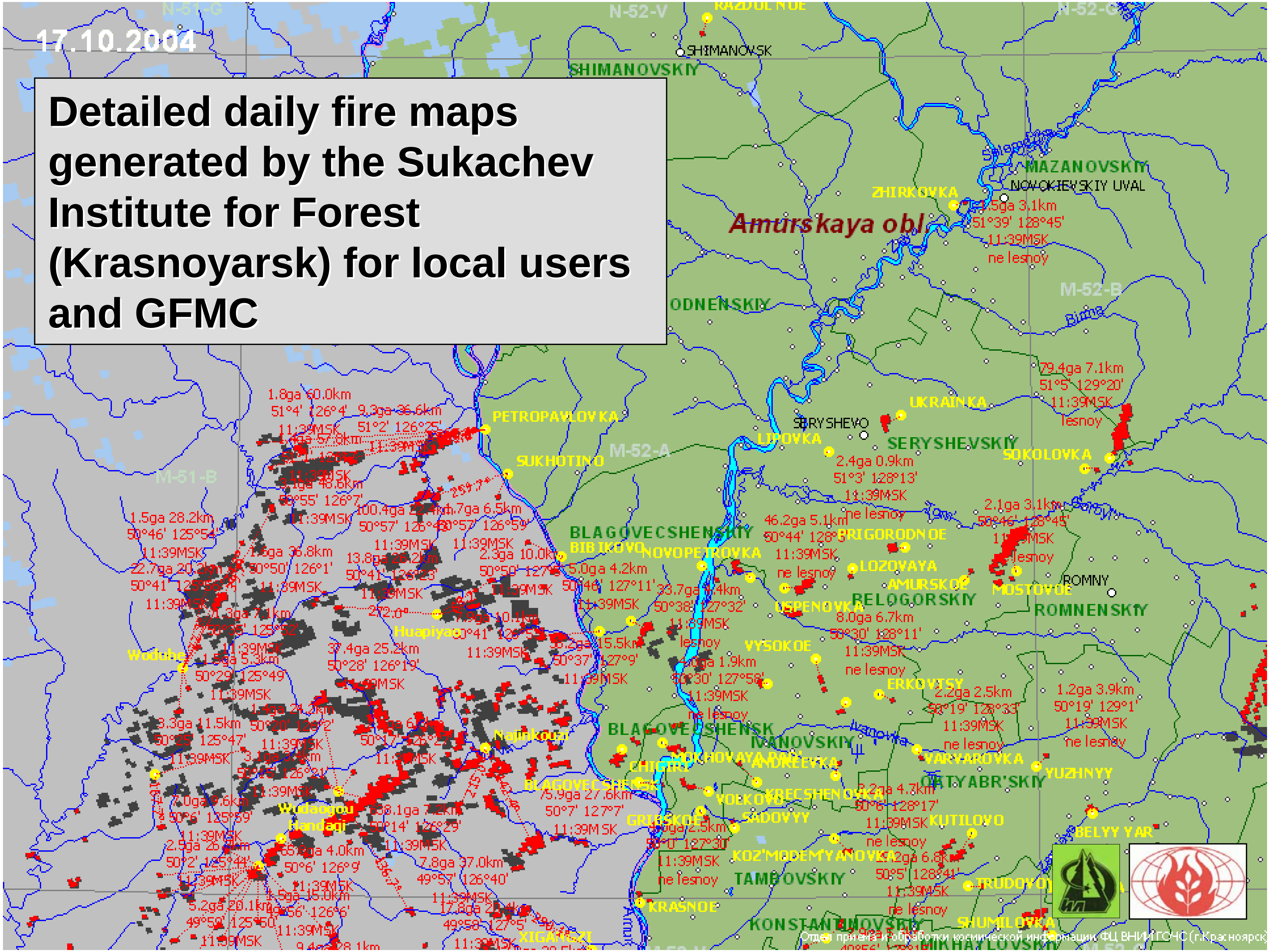


Central America Fire Monitoring



Central Asia Fire Monitoring

Detailed daily fire maps generated by the Sukachev Institute for Forest (Krasnoyarsk) for local users and GFMC



Activities: Early Warning System Development

- **Review and summarize literature and data on global fire activity to assess risk to global communities and areas of priority.**
- **Adapt current fire danger (CFS Fire Weather Index, FWI) monitoring system for global application.**
- **Develop protocols for utilizing current weather forecasting models for fire danger modelling**
- **Adapt FWI System to operate in a forecasting mode providing probability of event characteristics.**
- **Integrate global active fire databases with FWI data, presenting a current global fire status product (shows where current fire problems are, and provides basis to assess severity of forecasted fire danger conditions)**
- **Utilize historical active fire and FWI data to calibrate FWI System components for early warning purposes.**
- **Studies to assess form and utility of products with end users and their social and economic impact**

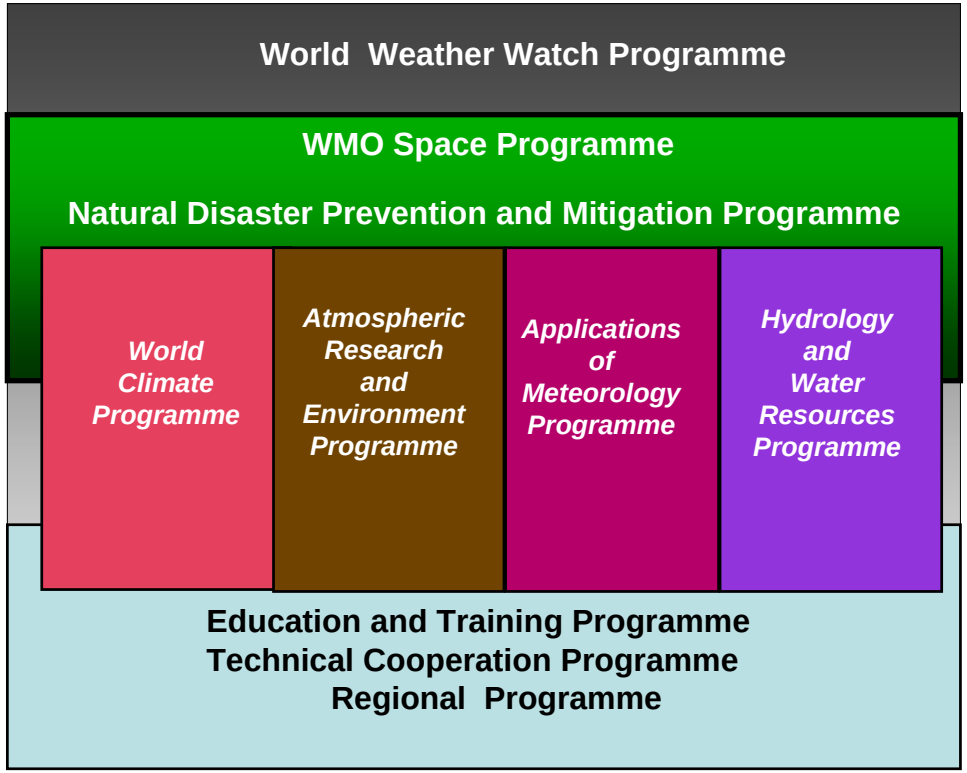
Responsible partners: CFS, UMD, GFMC, BMRC,BCRC, ECMWF

Activities: Operational Implementation

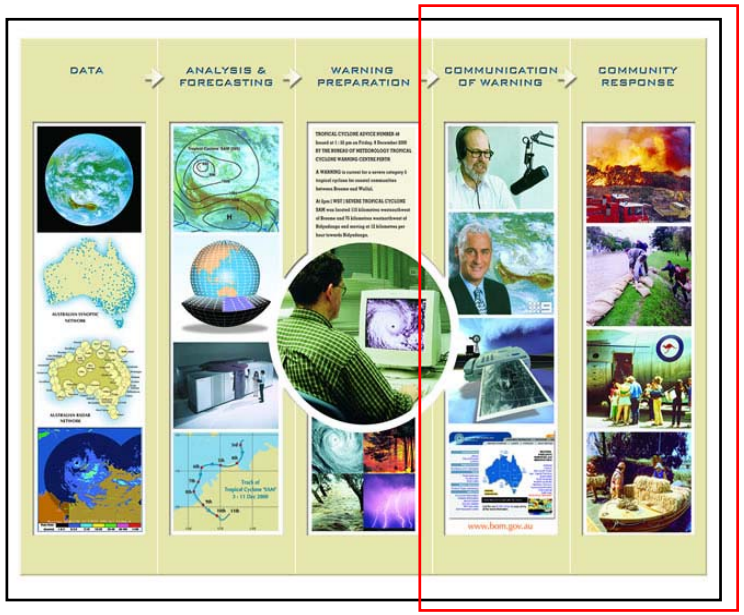
- **Develop procedures within the robust framework of the World Weather Watch (global network of operational meteorological services) to run the early warning system on a daily operational basis**
- **Analysis and production of current fire danger assessment**
- **Analysis and production of forecasted fire danger**
- **Dissemination of early warning information through multiple channels**
- **Establish procedures with operating services to maintain and update the System as new tools and products are developed**

Responsible partners: BMRC, WMO, WWRP, ECMWF, BCRC, GFMC, UMD

Global Early Warning System for Wildland Fire undertaken in collaboration with WMO-

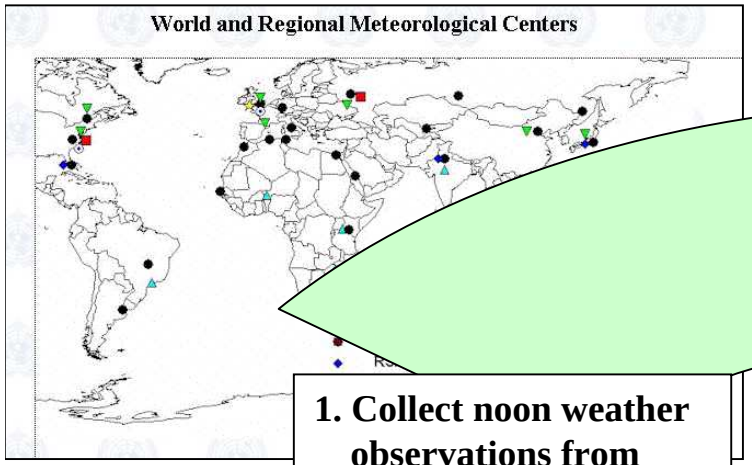


National Meteorological and Hydrological Services



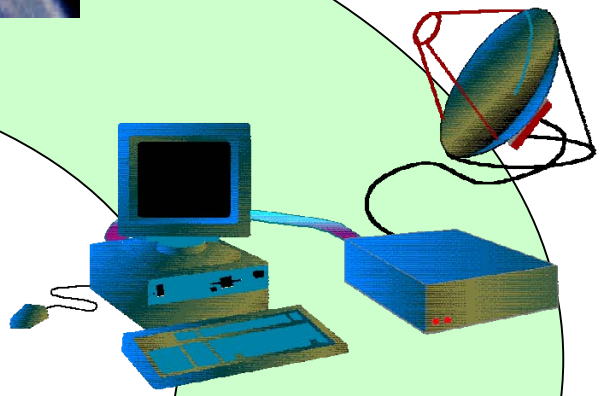
NMHS's routinely involved in services for multi-hazards and have established mechanisms for coordination and treatment dealing with responsible authorities, public etc. Provides an effective end-to-end process

Global Early Warning System for wildland fire product generation and operational dissemination through WMO/NHMS to provide a reliable and effective delivery and usage. Dissemination also available through GFMC/CFS/Community Based Fire Management (CBFiM)

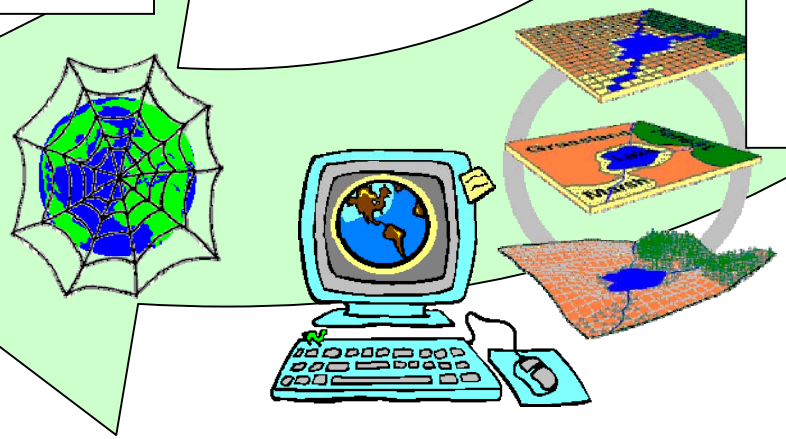


1. Collect noon weather observations from WMO centres

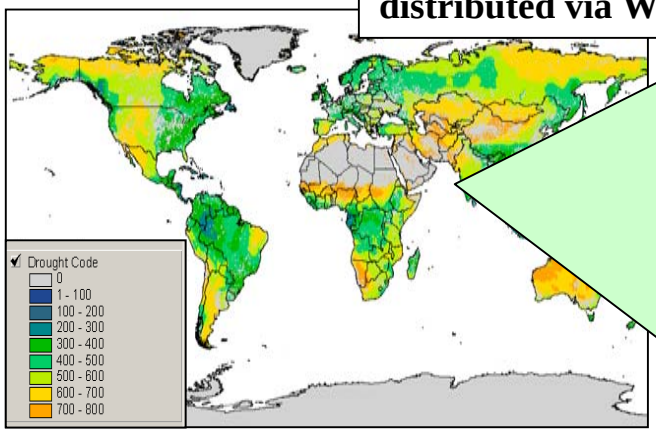
2. Transfer data



3. Extract and decode weather data; interpolate conditions to build grid layers in a GIS; produce daily early warning maps



4. Map products displaying current fire danger are distributed via WWW



Typical data flow

Activities: Technology transfer:

- Through the WMO framework and the United Nations University, provide training and workshops in:
  - Early Warning System operations
  - Basic understanding of fire danger and early warning
  - Calculating FWI components
  - Provision of FWI algorithms
  - Developing and implementing decision-aids based on early warning to mitigate the impacts of fire through prevention, preparedness, detection, and fire response
  - Involvement of local communities in the application of early warning information in wildland fire management (Community-Based Fire Management – CBFiM), especially in wildfire prevention, and preparedness for coping with wildland fire disasters (including smoke pollution and public health)

- Promote the early warning system project through presentations to land and forest fire managers at conferences, professional meetings, etc.
- Publish documents on the early warning system

Responsible partners: GFMC, GOFC-GOLD, BCRC, CFS

Development of a
Global Early Warning System for Wildland Fire

Training in early warning system operation and practical application to fire management.

Development of a
Global Early Warning System for Wildland Fire

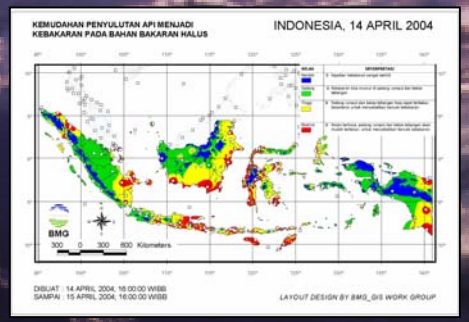
Technology transfer aimed at the local level
is critical to community-based
implementation of an early warning system.

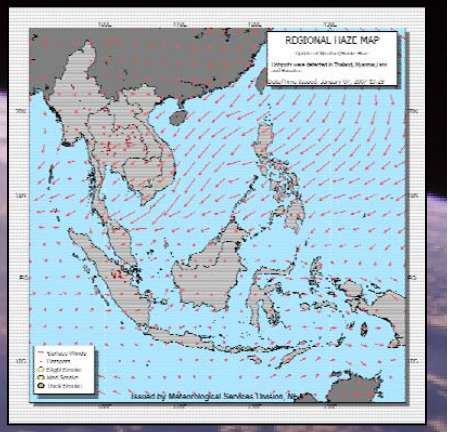
Expected Impacts

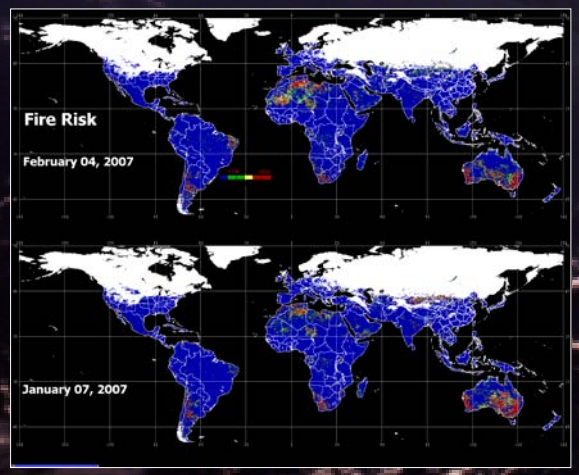
- Early warning of wildland fire danger will, on a global basis, provide local communities with an opportunity to mitigate fire damage by assessing threat likelihood and possibility of extreme behaviour enabling implementation of appropriate fire prevention, detection, preparedness, and fire response plans before wildfire problems begin.
- A globally robust operational early warning framework with an applied system that will provide the foundation with which to build resource-sharing agreements between nations during times of extreme fire danger.
- Development of local expertise and capacity building in wildland fire management for system sustainability through technology transfer and training.

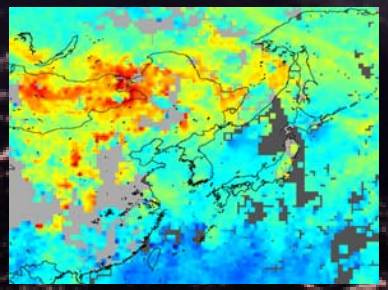
Opportunities of partners to join the Global Early Warning System for Wildland Fire

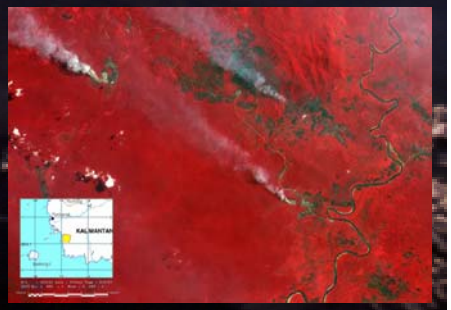
Coordinate with existing and upcoming systems of wildland fire early warning and monitoring
http://www.fire.uni-freiburg.de/fwf/fwf.htm











Thanks for your attention