

ESF Exploratory Workshop on
 Improved Quantitative Fire Description With Multi-Species Inversions of Observed Plumes
 Farnham Castle (United Kingdom), 14-16 September 2009

Selected Fire Highlights

Johann Georg Goldammer

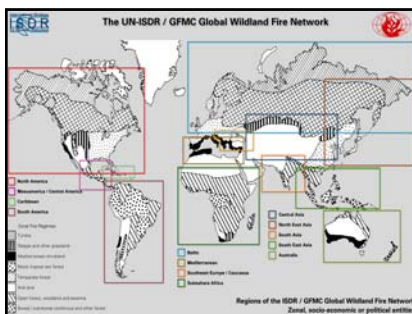
Max Planck Institute for Chemistry
 Global Fire Monitoring Center (GFMC)
 United Nations University (UNU)

Overview

- Selected examples of current hotspots from some regions of the Global Wildland Fire Network (GWFN)
- Views of past fire experiments for validation and calibration

The UN-ISDR / GFMC Global Wildland Fire Network

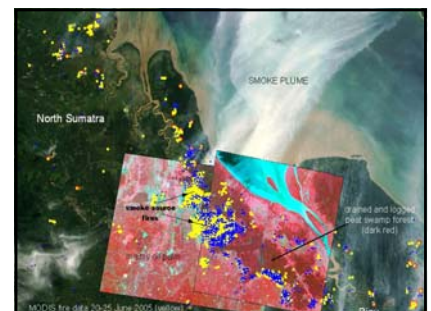
North America – Mesoamerica – South America – Caribbean – Mediterranean
 Southeast Europe / Caucasus – Sub-Sahara Africa – South Asia – Southeast Asia
 Australasia – Northeast Asia – Central Asia – Baltic



Regional South East Asia Wildland Fire Network

Southeast Asia

- Rain forests
- Monsoon forests
- Peat-swamp forests
- Mountain coniferous and deciduous forests
- Savannas



Impacts Vegetation Fire Smoke on Human Health and Security

- Smoke effects in South East Asia 1997-98
- > 250 million people in SE Asia affected by smoke in various degrees (increased morbidity and mortality; long-term health effects)
- > 250 human death toll by aircraft and maritime accidents




Regional South Asia Wildland Fire Network

Mainland South Asia

Countries sharing similar problems and cooperating in the regional network:


- > Nepal
- > Bhutan
- > India
- > Sri Lanka
- > Pakistan



Regional South Asia Wildland Fire Network

Particular fire regimes:

- > Seasonal climate with extreme dry seasons
- > Traditional fire use within forests
- > Soil denudation by fire
- > Consequences: Erosion, flash floods
- > Impact on air quality in the region




Regional Sub-Sahara Wildland Fire Network

The Fire Continent

Sub-Sahara Africa:

- > Savannas (Grass-, tree- and bush savannas)
- > Increasing pressure on the Zaire basin

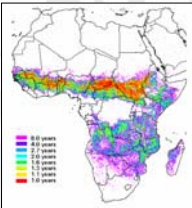


Regional Sub-Sahara Wildland Fire Network

The Fire Continent

Sub-Sahara Africa:

- > Fire intervals: 1-8 years
- > Increasing conflicts with land use

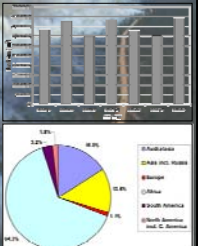


Regional Sub-Sahara Wildland Fire Network

The Fire Continent

Sub-Sahara Africa:

- > Share of globally burned area: 64% (in 2000)
- > Absolute: 240-290 million ha

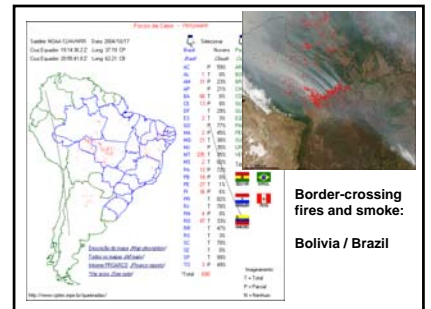


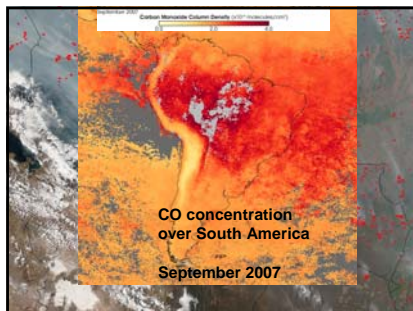
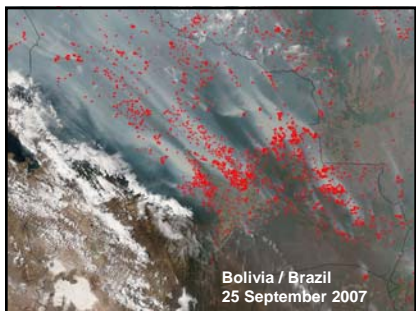


Regional South America Wildland Fire Network

South America: A facet-rich fire region

- Equatorial rain forest
- Cerrado / Cerradao
- Araucaria and *Nothofagus* forests
- Degraded grasslands and savannas



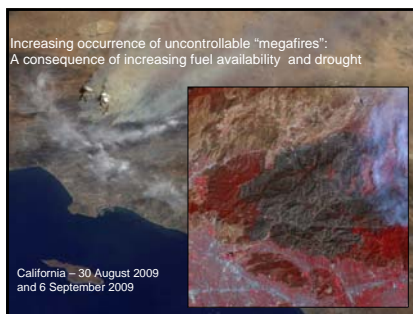


Regional North America Wildland Fire Network

FAO North American Forestry Commission (NAFC)
 Fire Management Working Group (established 1962)

Regional Partner of the
Global Wildland Fire
Network since 2004

Close cooperation with
Australasia



Increasing vulnerability at the Residential Perimeters

U.S.A.: October 2003
Suburban fires in California: Loss of 3640 homes, 33 commercial properties, and 1141 other structures causing a total damage of more than \$US 2 billion.

U.S.A.: October 2007
530,000 ha, >2000 houses / structures destroyed, insured losses: \$US 1.1 billion.

U.S.A.: 2008 - 2009
never ending ...

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Regional Northeast Asia Wildland Fire Network

A culturally and ecologically facet-rich region

Network foundation:
 March 2004
 Host: Korea Forest Service (with UNISDR)

Members:
 South Korea
 Japan
 China
 Russia (Far East)

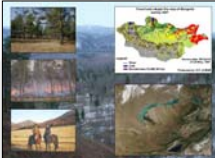
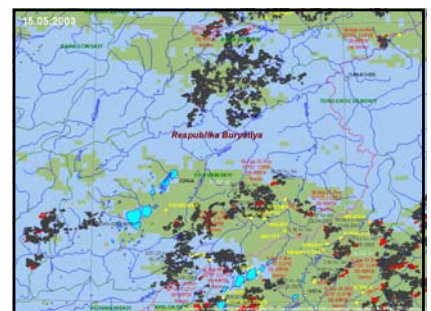
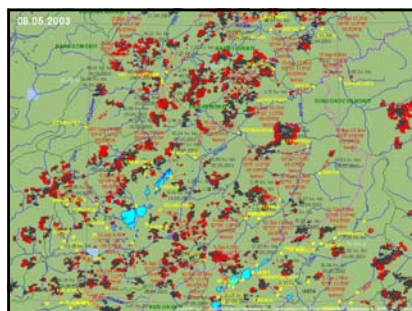
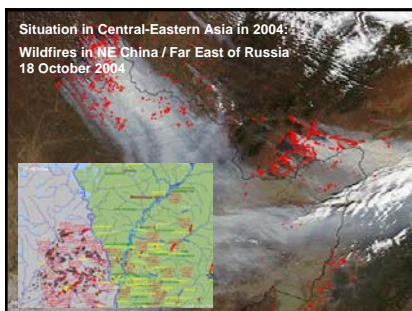
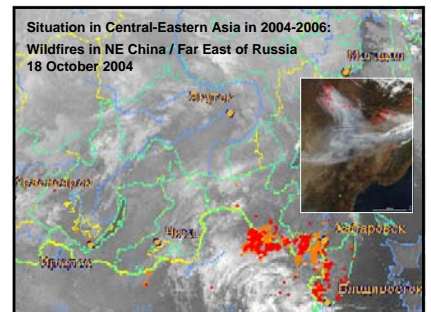
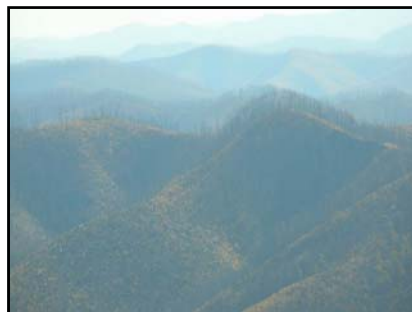
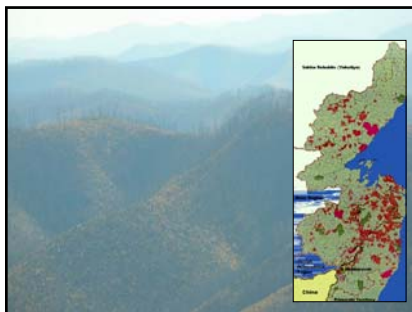


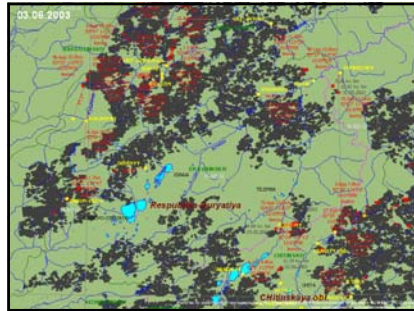
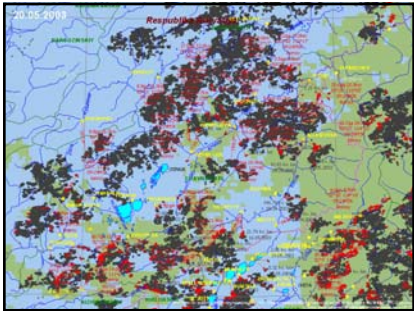
Regional Central Asia Wildland Fire Network

An initiative of the UN-ECE / FAO Team of Specialists on Forest Fire

Endorsed by the
 Central Asia Forestry Congress
 Bishkek, Kyrgyzstan
 25-27 November 2004

Core Members:
 Russia, Mongolia, China
 Kazakhstan, Tajikistan, Kyrgyzstan



Extreme spring fire severity in the Trans-Baikal Region due lack of precipitation between August 2002 and May 2003

Buryatia Republic:	36.0 mm
Chita Oblast:	45.7 mm

Fire Research:
 The Fire Research Campaign Asia – North (FIRESAN)

Dendrochronology – History of regular fire occurrence and forest stand formation

The Fire Research Campaign Asia – North (FIRESAN)

High-intensity fires as a consequence of fire exclusion

The Fire Research Campaign Asia – North (FIRESAN)

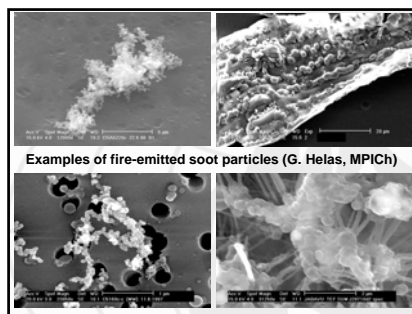
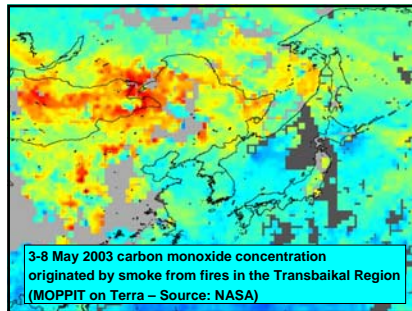
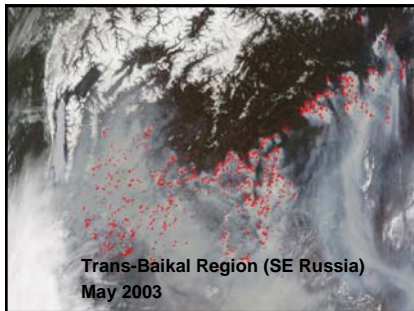
Measurement of emissions from boreal forest fires

- Radiatively active trace gases (CO_2 , CO , H_2 , CH_4)
- Aerosol
- Halogenated compounds (CH_2Br , CH_2Cl)

The Fire Research Campaign Asia – North (FIRESAN)

The Bor Forest Island Fire Experiment:
 200 years of observation (1993-2192)





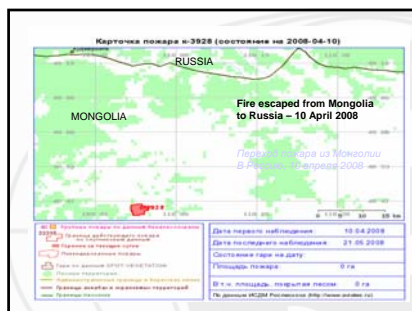
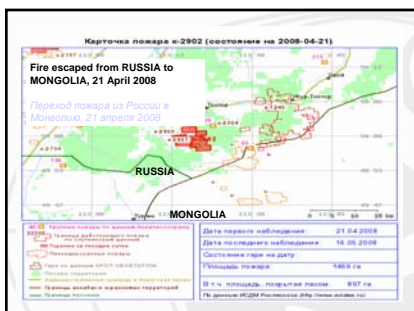
Smoke Impacts of peat and forest fires

Composition of vegetation fire smoke
 Acute toxicity:

- > **Particulates below 2.5µm**
- > Formaldehyde
- > Acrolein
- > Polycyclic Aromatic Hydrocarbons (PAHs)
- > Free radical precursors
- > Carbon monoxide

Particulate effects on the respiratory / cardiovascular systems

- > **Respiratory infections** in adults and children
- > **Acute and chronic changes** in pulmonary function
- > **Acute attacks**
- > Cardiovascular diseases (CVD)
- > Hospital admissions
- > **Increase of daily mortality**

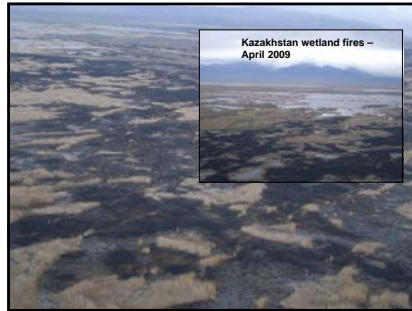
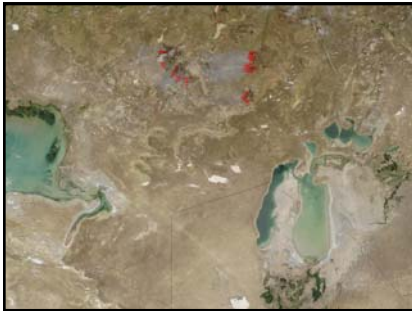


Impacts on Human Security

- **Pyrogenic transfer of radioactivity**

Increase radiation of radio-caesium observed in Canada 2003:
 A consequence of the extended vegetation fires on radioactively contaminated terrain in Central Asia

(Wotawa et al., 2006)



Impacts on Human Security

- Pyrogenic transfer of radioactivity

Severe problems in Belarus / Ukraine / Russia:

Radioactive fire emissions from the Chernobyl accident site

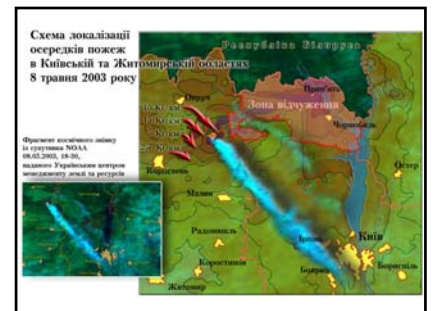
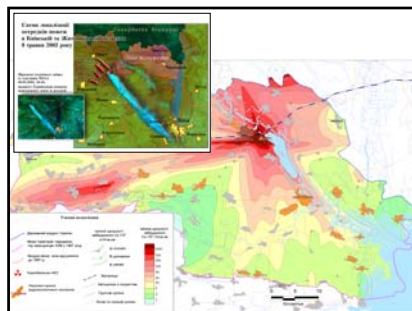


Situation in Ukraine - Consequences of the Chernobyl failure: Increasing wildfire hazard in non-managed and insect-damaged forests

Consequences of the Chernobyl failure

The Chernobyl firefighters scrap yard

Consequences of the Chernobyl failure




Regional Wildland Fire Networks

Regional Baltic Wildland Fire Network
 Core Activity Region within the UN-ECE Region:
 FAO / ECE Team of Specialists on Forest Fire

Active since the 1990s

Established by the
 UN-ECE/FAO Team of
 Specialists on Forest Fire




Germany, UK, Denmark, Sweden, Finland:
 New Approaches in maintenance and restoration of biodiversity and ecosystem functioning by application of prescribed fire



The Eurasian Fire in Nature Conservation Network



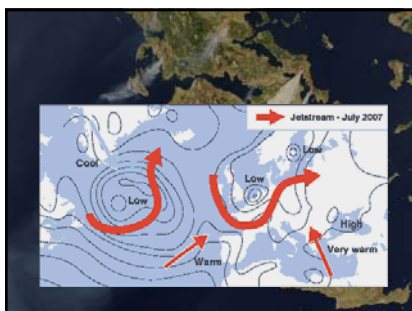


Germany: Prescribed burning for fuel reduction in pine forests (2008)

Regional Southeast Europe / Caucasus Wildland Fire Network

A Region in transition

Antalya 2004:
 Antalya Declaration on Cooperation in Wildland Fire Management

Rural exodus and abandonment of land use after more than 2000 years of intensive cultivation:
 Combustible materials available to fire – leading to unprecedented severities and intensities of wildfires



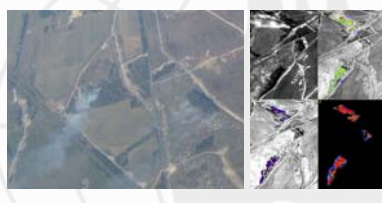

German Research Network

Test of the Advanced BIRD Airborne Simulator (ABAS) for the development of the BIRD (Bi-spectral IR Detection) satellite



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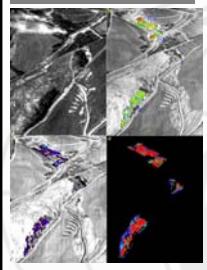


German Research Network

ABAS tests

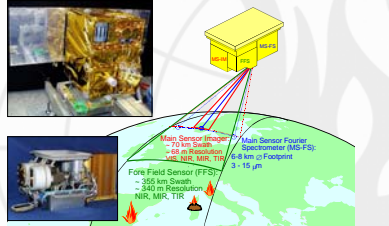
Temperatures:

- Blue: 320 - 400 K (47-127°C)
- Green: 400 - 500 K (127-227°C)
- Yellow: 500 - 600 K (227-237°C)
- Red: > 600 K (> 237°C)



German Research Network

BIRD: Bi-spectral IR Detection (Launch: 22 October 2001)



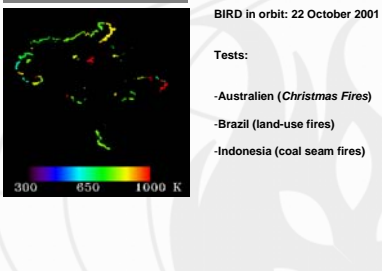
Main Sensor (MSP) - 70 km swath, 15 m resolution, 4-8 km of FoV on fire
 Main Sensor Fourier Spectrometer (MS-FS) - 4-8 km of FoV on fire
 Fore Field Sensor (FFS) - 350 km swath, 3-15 μm, NIR, MIR, TIR

German Research Network

BIRD in orbit: 22 October 2001

Tests:

- Australien (*Christmas Fires*)
- Brazil (land-use fires)
- Indonesia (coal seam fires)




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Thanks for Your Attention

