Project Proposal to EWC-III
Global Early Warning System for Wildland Fire

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Development of a Global Early Warning System for Wildland Fire within the Global Multi-Hazard Early Warning System

Global and monthly variation of wildland fires
Development of a Global Early Warning System for Wildland Fire

Fire causes: land-use fires, carelessness, arson, natural wildfire

Some uncontrolled fires become large disastrous events
Development of a Global Early Warning System for Wildland Fire

There are many negative economic, social, and environmental impacts of uncontrolled wildland fire.
Development of a Global Early Warning System for Wildland Fire

Global Burnt Area: African subset 'percentage of the total surface area of each 1/2 degree cell burned - year 2000'
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 - Information dissemination and technology transfer
- Canadian Forest Service (CFS), Edmonton, Canada - Fire Weather Index monitoring system, decision tools, outreach
- Bushfire CRC, Australia - End user products and evaluation
- Global Observation of Forest and Land Cover Dynamics (GOFC-GOLD) Secretariat, Edmonton, Canada - Outreach, Support, product evaluation
- University of Maryland (UMD), USA - Remote sensing hotspot detection and vegetation specification
- World Meteorological Organization (WMO) - Operational Framework and Development Support
  - World Weather Research Programme (WWRP)
- Bureau of Meteorology Research Centre (BMRC), Melbourne, Australia - Ensemble/Deterministic Weather and Climate Global Fire Products
- European Centre for Medium Range Weather Forecasting (ECMWF) - Ensemble/Deterministic Weather and Climate Global Fire Products
  - Instituto Nacional De Meteorologia, Spain
  - Finnish Meteorological Institute, Finland
  - MetOffice, UK

Natural Resources Canada
Ressources naturelles Canada

Global Partnership

Instituto Nacional de Meteorología España

GOFC-GOLD Global Observation of Forest and Land Cover Dynamics

UNIVERSITY OF MARYLAND

Canadian Forest Service

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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 quickly disseminate early warning of wildland fire danger that reaches global to local communities.
- 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: a) early warning system operation, b) methods for local to global calibration of the System, and c) using the System for prevention, preparedness, detection, and fire response decision-making.
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 modeling.
- Adapt FWI System to operate in a forecasting mode providing probability of event characteristics.
- Integrate global hotspot 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 hotspot 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.
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.
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.

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.
Thank You
Development of a Global Early Warning System for Wildland Fire

DEFINING THE CURRENT STATE AND RISK

The necessary science and technology exists, but a globally coordinated effort by multiple international partners is required.
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
**WWRP Fire Weather Workshop**

**Fire Weather and Fire Risk Indices** for fire management and emergency response agencies employed on time scales hours (emergency response) to monthly and seasonal time scales

- Improved medium to extended period (0-10 days) products
- Range of globally based NWP products,
- High temporal and spatial resolution,
- Characterise uncertainty through ensemble-based modes.
- Real time production and availability of such fire danger indices would enhance their overall use.

**Forest Fire Danger Index (FFDI)**, used in Australia to assess the likelihood and severity of bushfires.

<table>
<thead>
<tr>
<th>FFDI-Risk</th>
<th>Code</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>5 Moderate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 Very High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 Extreme</td>
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</tbody>
</table>
Why Ensemble Techniques:
Single Weather Model Run suffers from
  • Uncertainty in Initial Conditions
  • Atmospheric Predictability
  • Uncertainty in Forecast
  • Model Representations

Multiple model runs, based on slightly different initial conditions or using slightly different model configurations and/or parameterizations.

“Poor Man’s Ensemble
ECMWF
TIGGE

FIRE RISK
FORECASTS 0-10 days
40 y CLIMATE SUMMARY
Linking with WMO Programmes

- World Weather Watch Programme
- WMO Space Programme
  - Natural Disaster Prevention and Mitigation Programme
- World Climate Programme
- Atmospheric Research and Environment Programme
- Applications of Meteorology Programme
- Hydrology and Water Resources Programme
- Education and Training Programme
- Technical Cooperation Programme
- Regional Programme
National Meteorological Services
Provide meteorological, hydrological and related services
- Protection of life and property
- Safeguarding the environment
- Contributing to national security and development
- Promotion of capacity building
- Meet international and regional commitments including support to WMO’s Programmes and activities
- Contributing to international and regional cooperation

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