A Global Early Warning System for Wildland Fire

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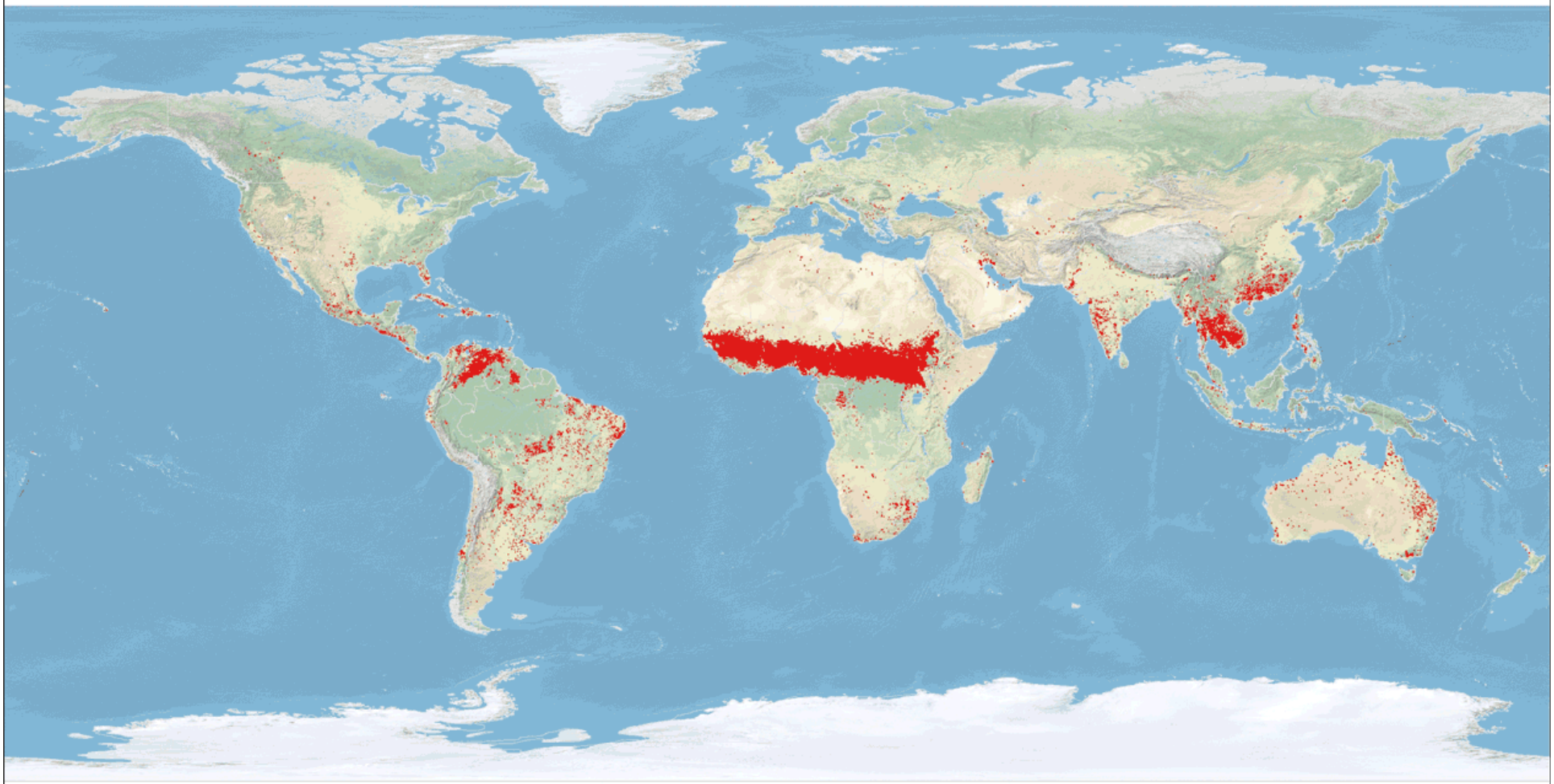
Chris Justice, *University of Maryland*

GOFC-GOLD GLOBAL OBSERVATION OF FOREST AND LAND COVER DYNAMICS

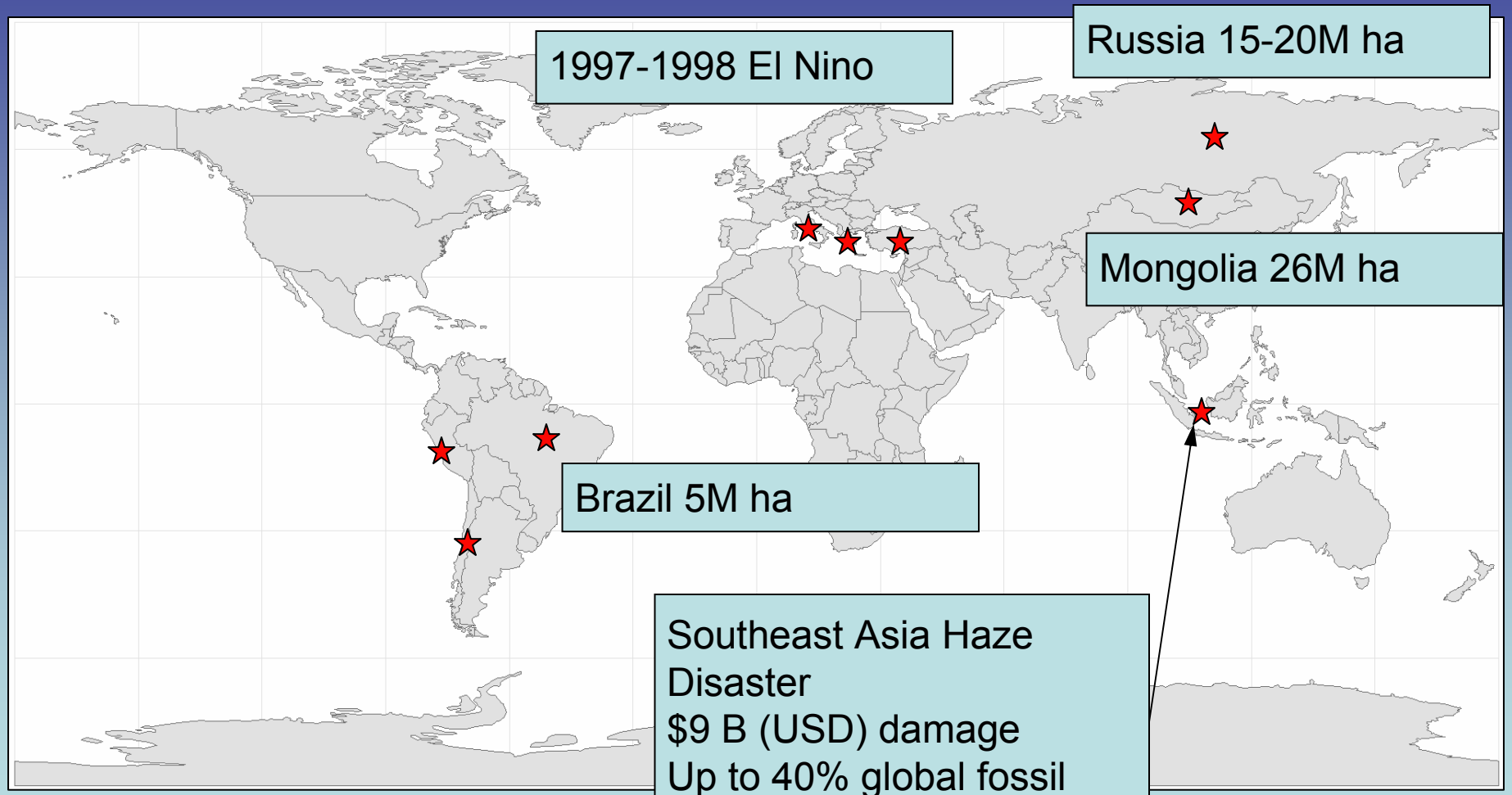
MODIS Rapid Response Active Fire Detections for 2007



January February March April May June July August September October November December

Active fires, shown in red, are detected using MODIS data from the Terra Satellite.
Source: MODIS Rapid Response http://rapidfire.sci.gsfc.nasa.gov/
Fire Information for Resource Management System (FIRMS)
http://maps.geog.umd.edu

Recent Wildfire Disasters



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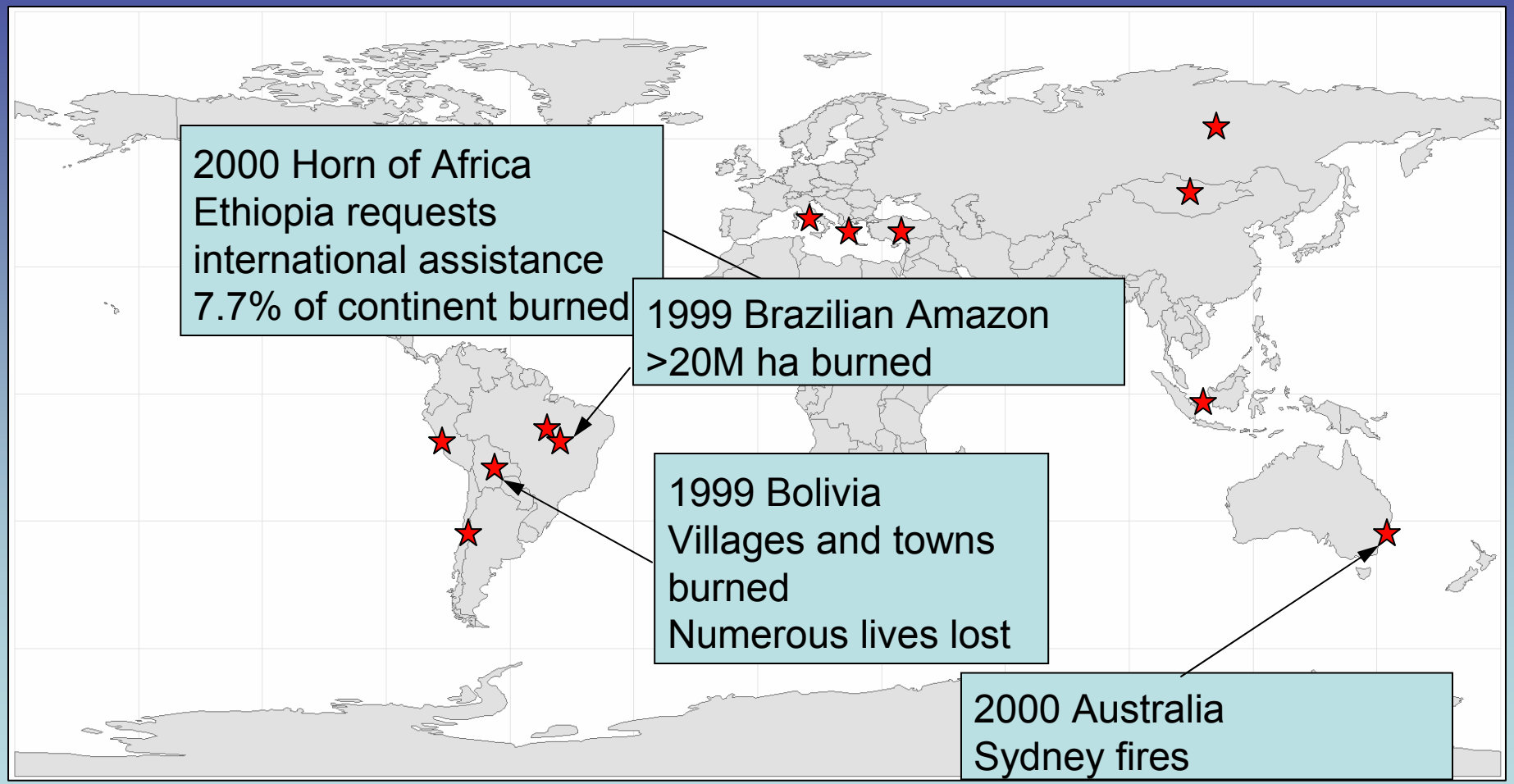

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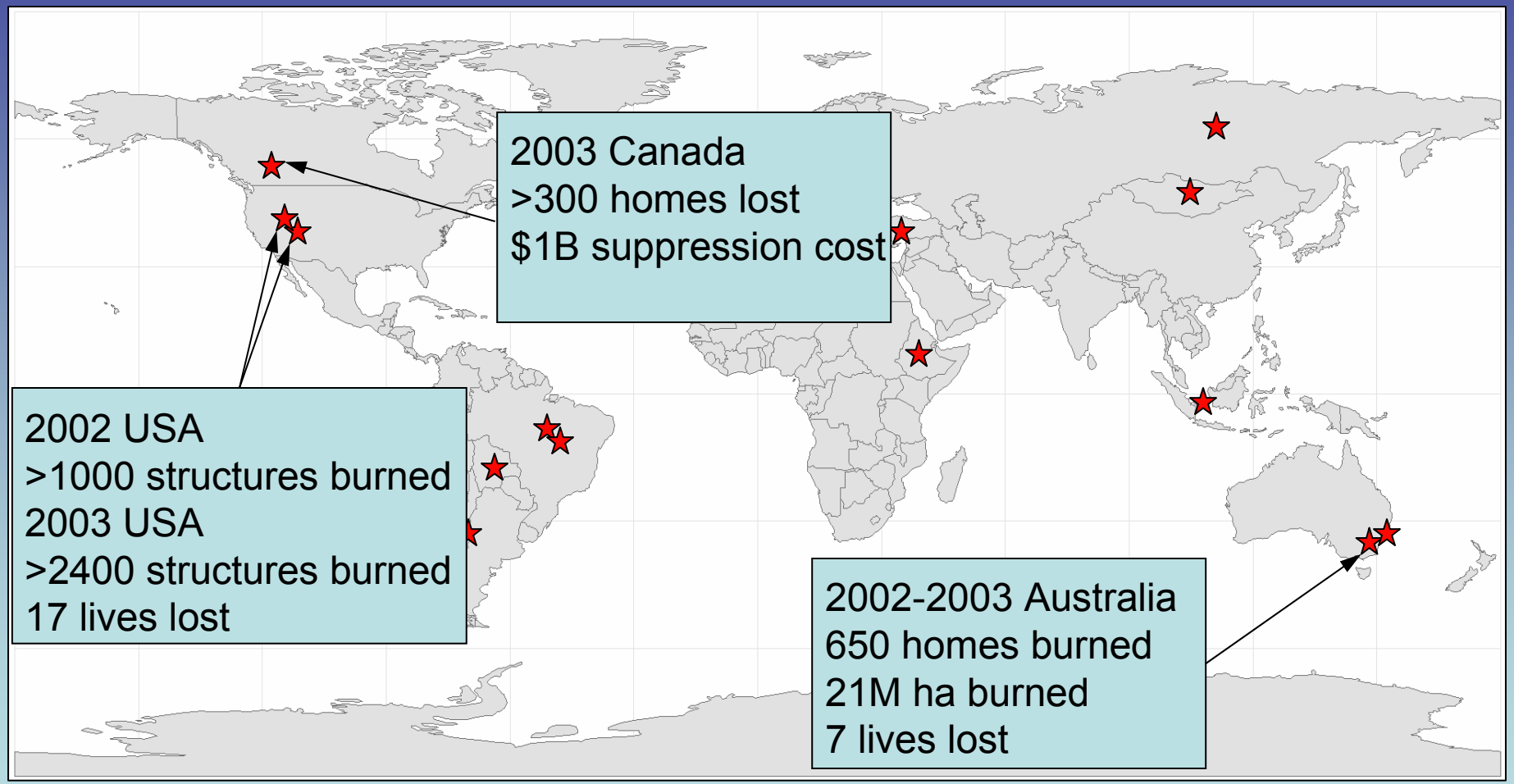

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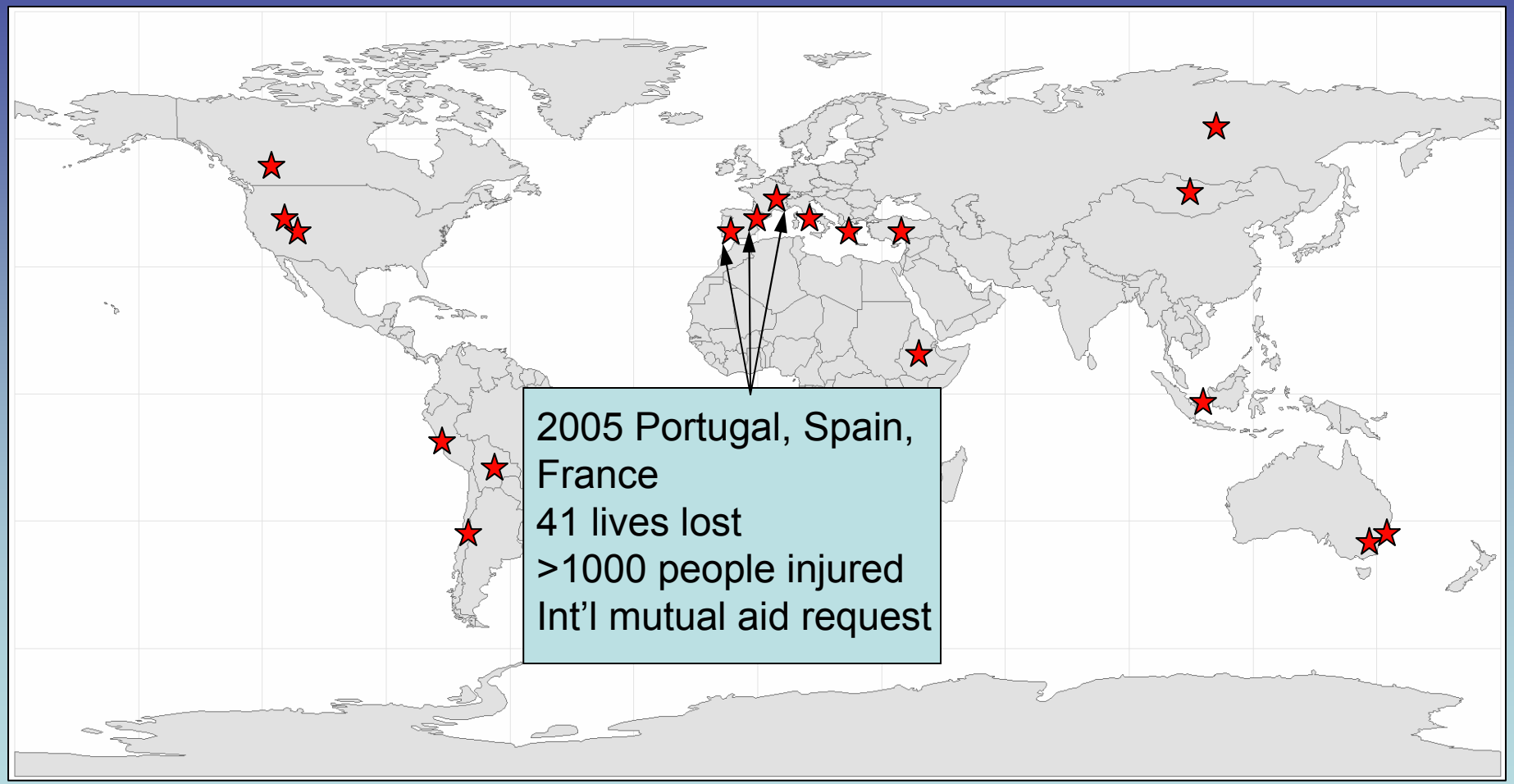

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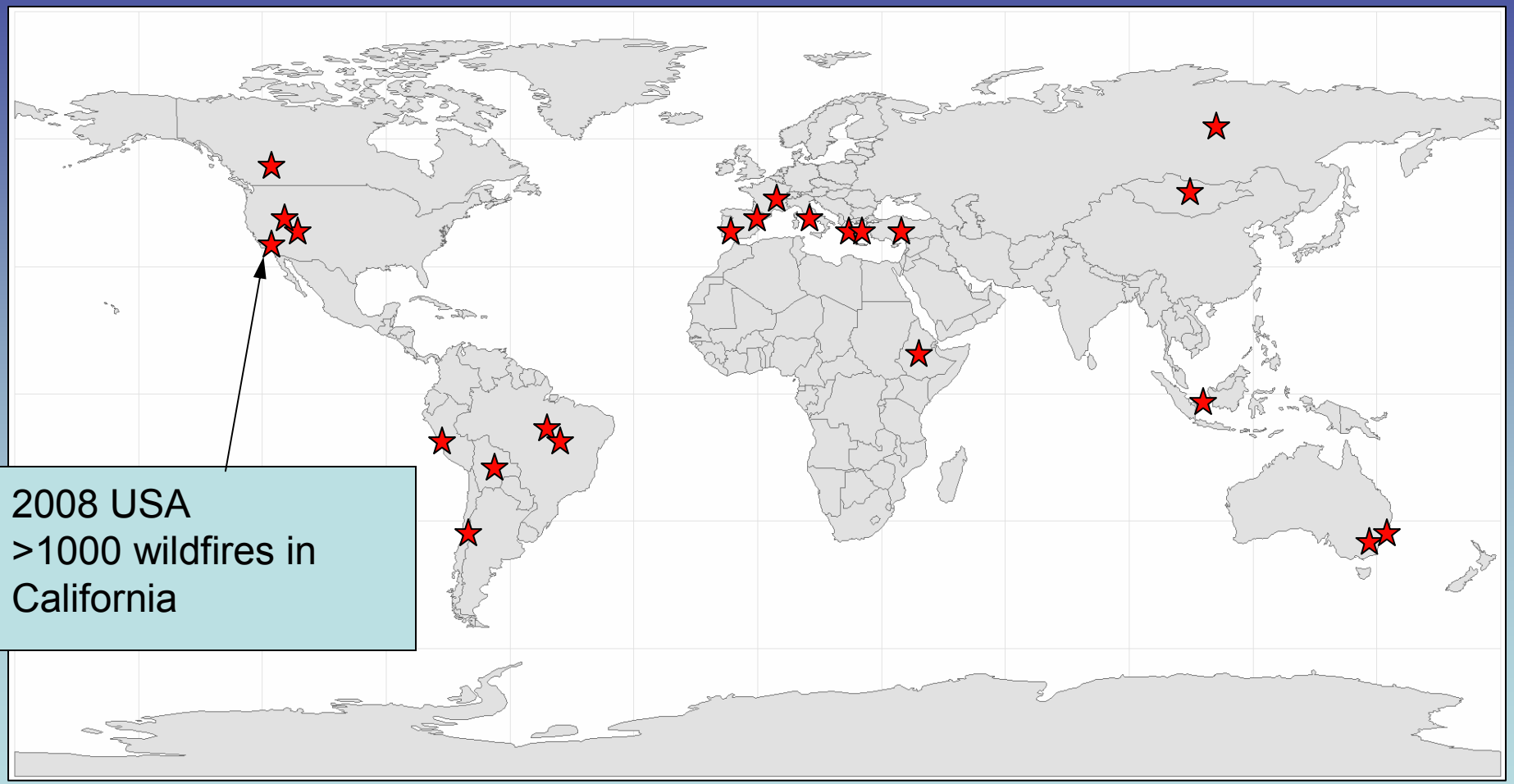


There are many negative economic, social, and environmental impacts of uncontrolled wildland fire.

Many of these impacts can be mitigated, and sometimes prevented, through early warning of wildfire disaster conditions.

Early warning allows implementation of:

- fire prevention
- fire detection
- resource mobilization

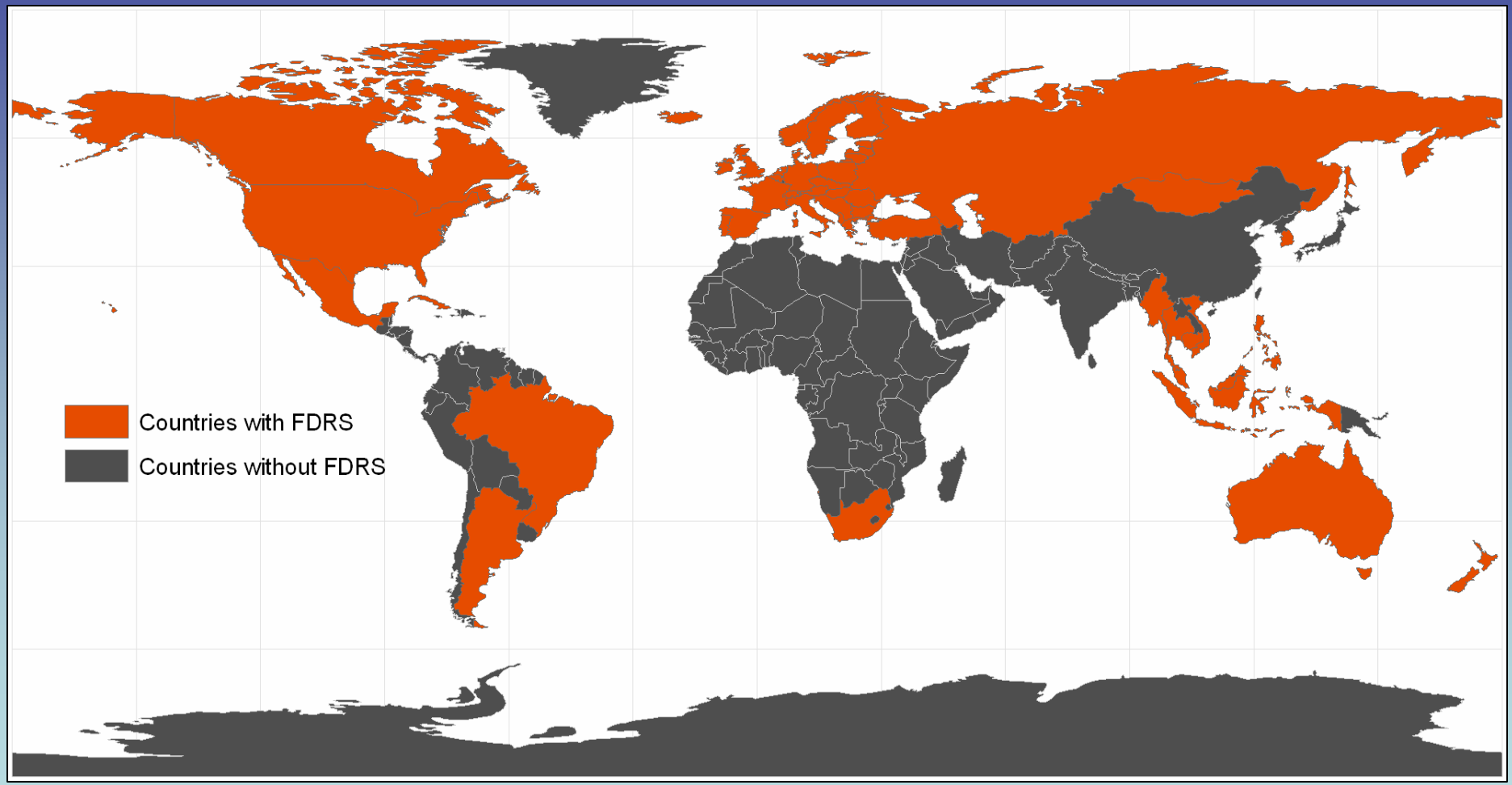
before wildfire disasters occur.

A Global Early Warning System provides international coordination and sharing of:

- fire risk intelligence
- suppression resources and expertise during times of wildland fire disaster

Fire Danger Rating and fire weather forecasting are the backbone of wildland fire early warning

Countries with Fire Danger Rating Information *

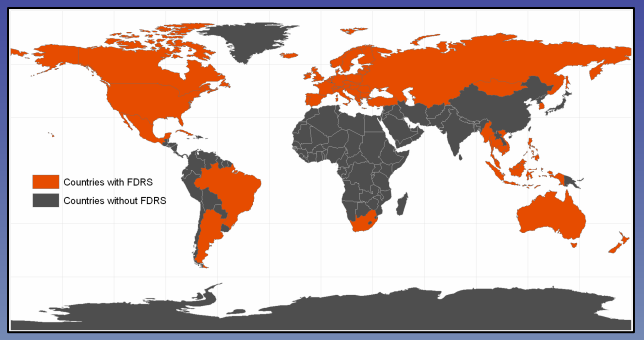


* FDR information is provided on an operational basis.
Type of information and level of implementation varies widely.

Global EWS for Wildland Fire: Basic Structure

Global	• International coordination of fire risk and activity information (current and future)
Regional	• Coordination of regional fire information and resource-sharing
National	• Sets national standards (training, equipment) • Collects, processes fire and weather data, distributes to local level • Direct national resource movements • Fire permits, fire bans (centralized)
Sub-National or Local	• Implements fire operations: prescribed fire planning, staff training, monitors fire/weather data, field level fire management decisions

Global Level Products



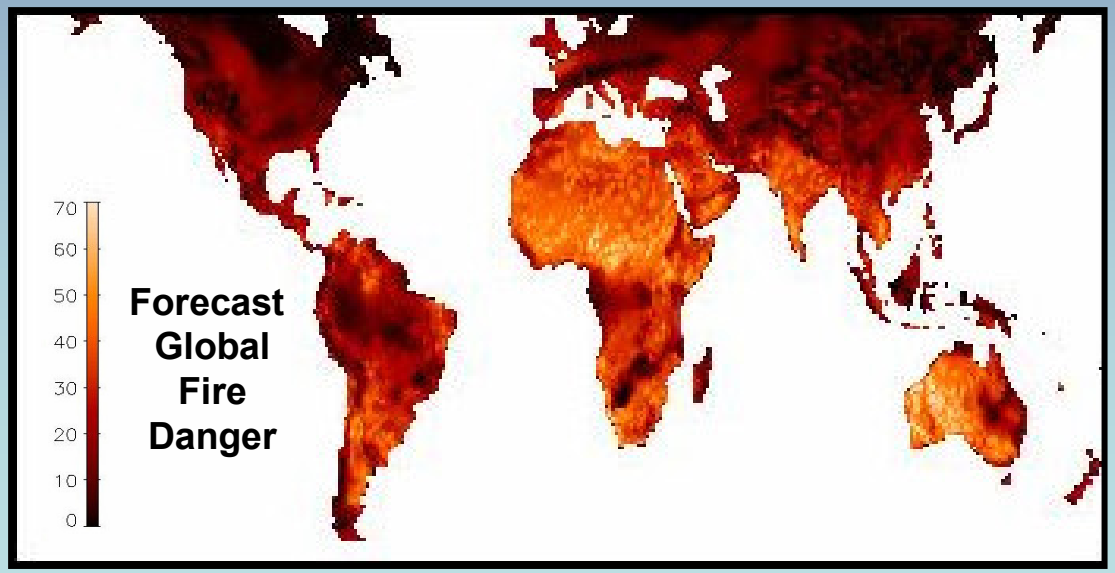
Fire Danger Rating Products

Actual fire danger

- compilation of current national FDR's
- continuous updating - approx. 6 hours

Forecast fire danger

- 1 to 14 day forecast fire weather
- global modeling of several national FDR's (FWI, McArthur, etc.)



Global Level Products

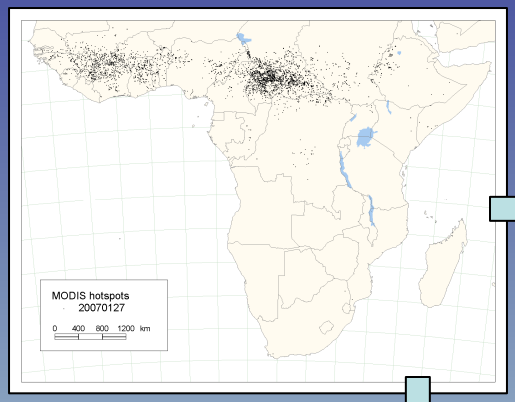
Early Warning Products

1 to 14 day forecasts of:

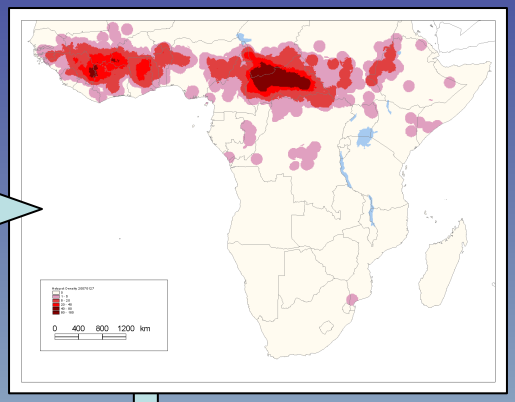
- Ignition, fire spread, drought (low, mod, hi, extreme)
- Fire threat (combined fire potential and current fire activity)
  - smoke transport, C emissions, health warnings
- Fire mgt decision-aids
  - prevention, detection, suppression planning
  - decision criteria for resource-sharing agreements

Global Level Products

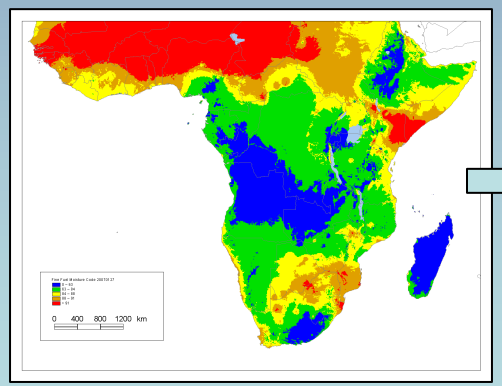
Sub-Sahara Prototype Example



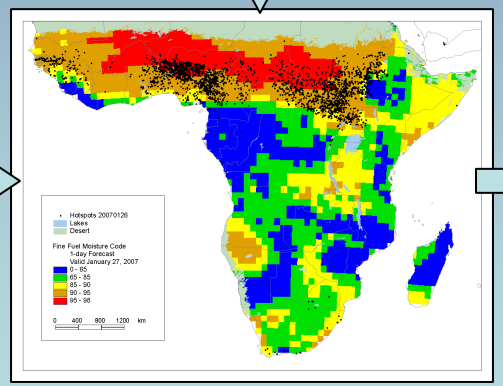
Hot spots



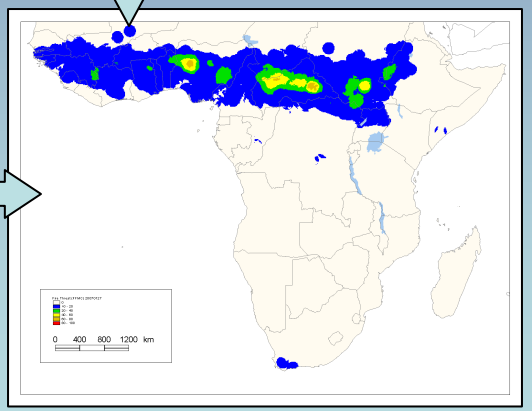
Hot spot density



Forecast (1-14 day) fire danger

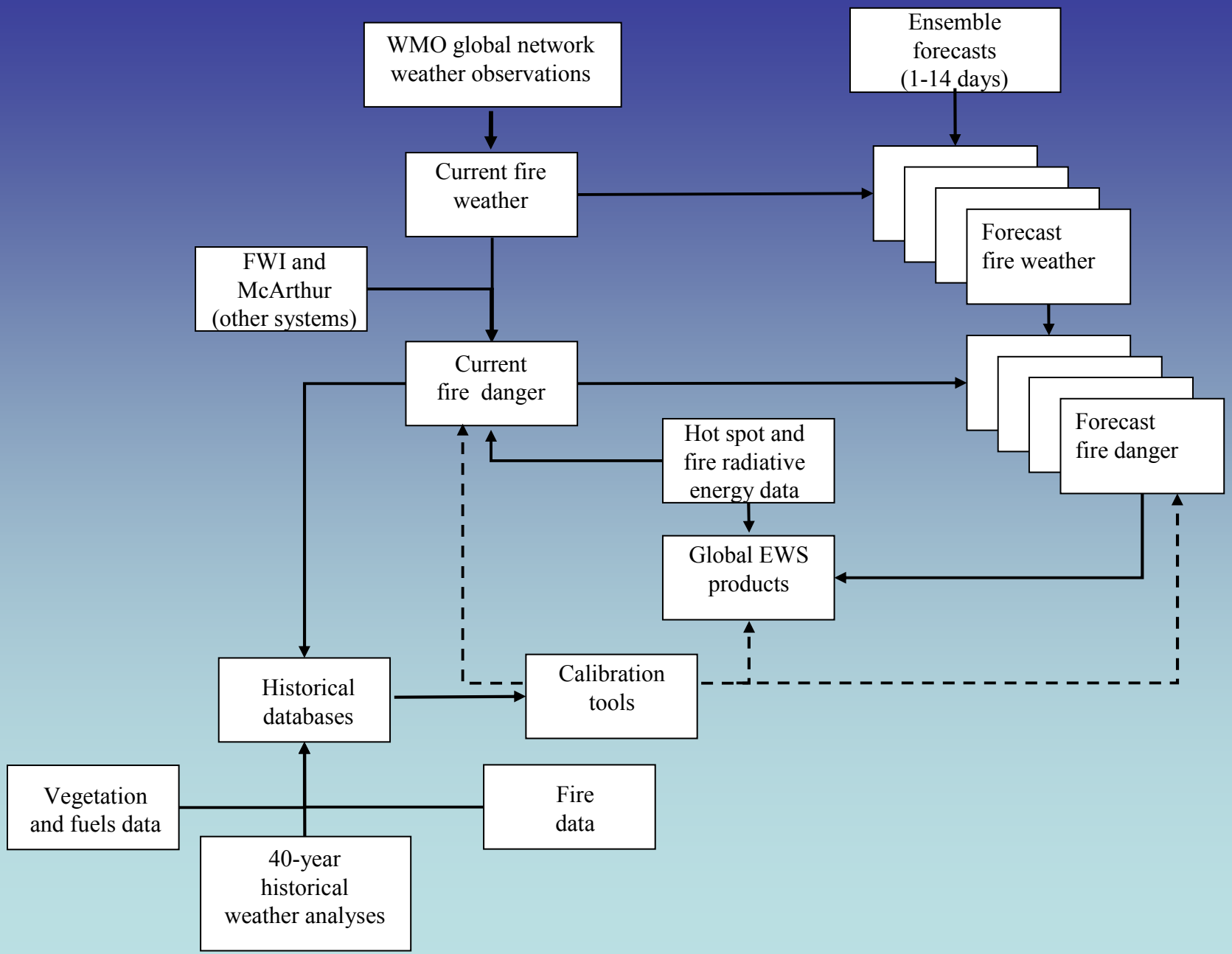


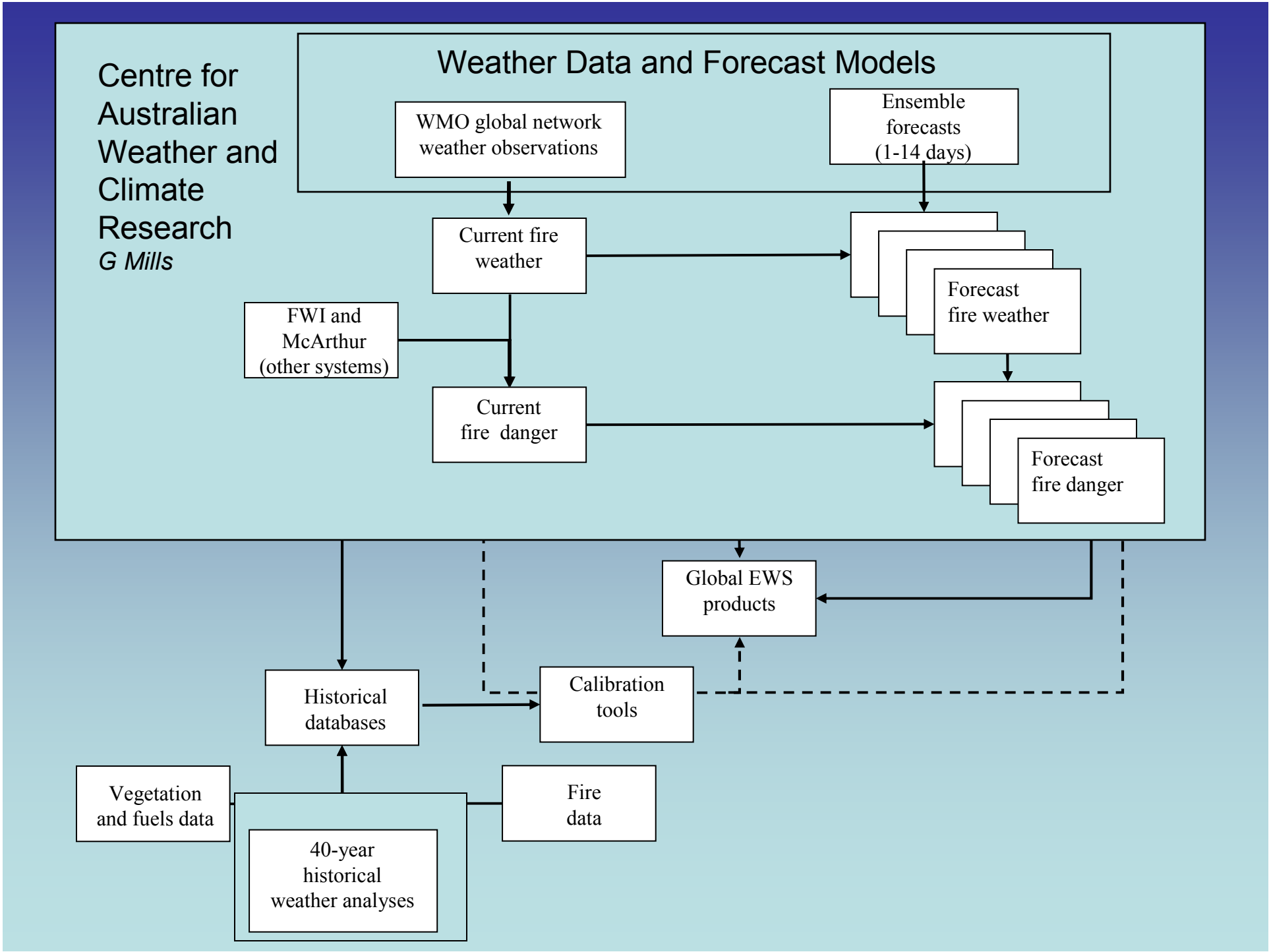
Fire danger and hot spots



Wildland fire threat

Global EWS for Wildland Fire: Model Structure




Centre for Australian Weather and Climate Research
G Mills
Weather Data and Forecast Models
WMO global network weather observations
Ensemble forecasts (1-14 days)
Current fire weather
Forecast fire weather
FWI and McArthur (other systems)
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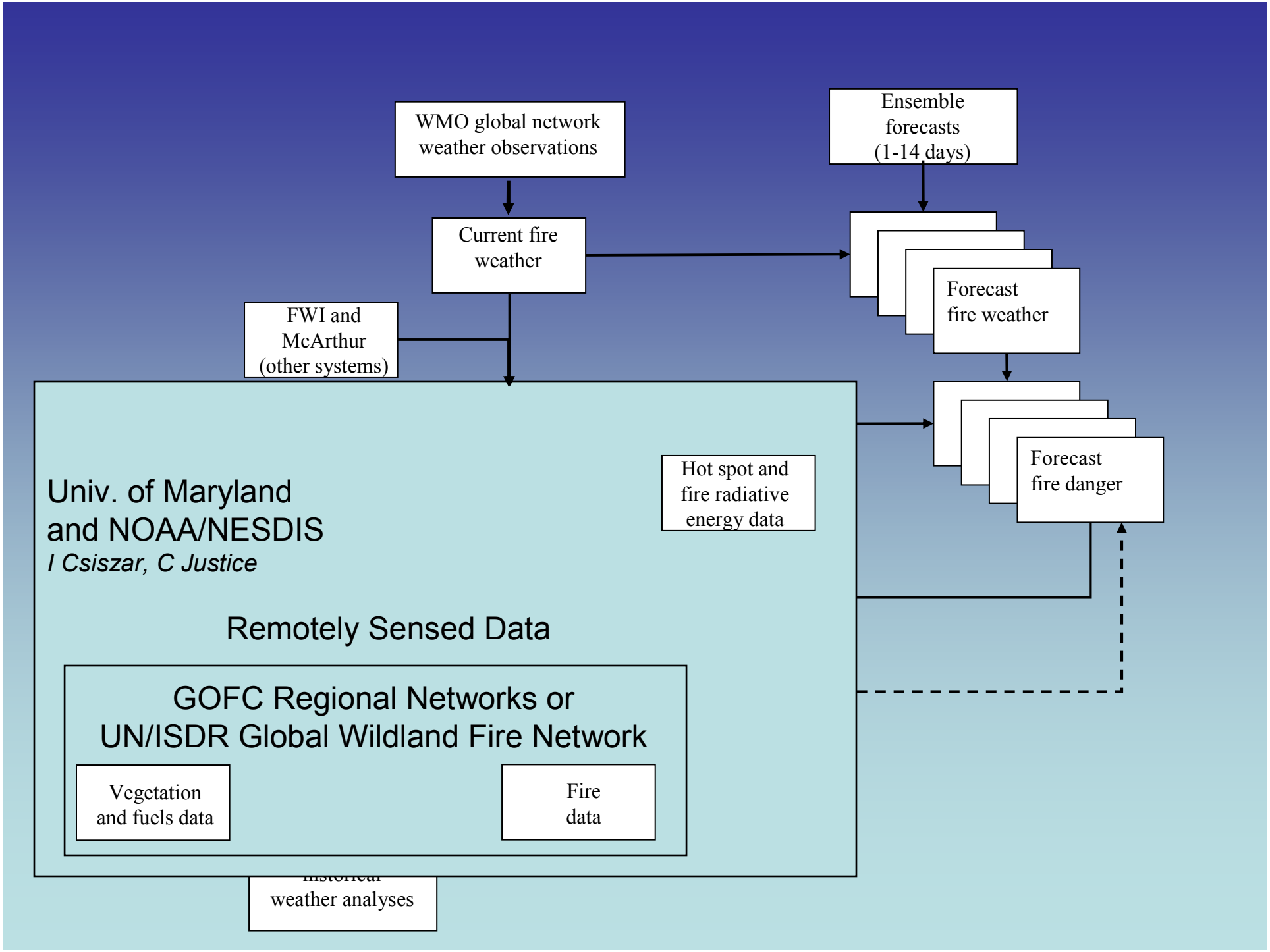
Forecast fire danger
Global EWS products
Historical databases
Calibration tools
Vegetation and fuels data
Fire data
40-year historical weather analyses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Univ. of Maryland and NOAA/NESDIS
I Csiszar, C Justice
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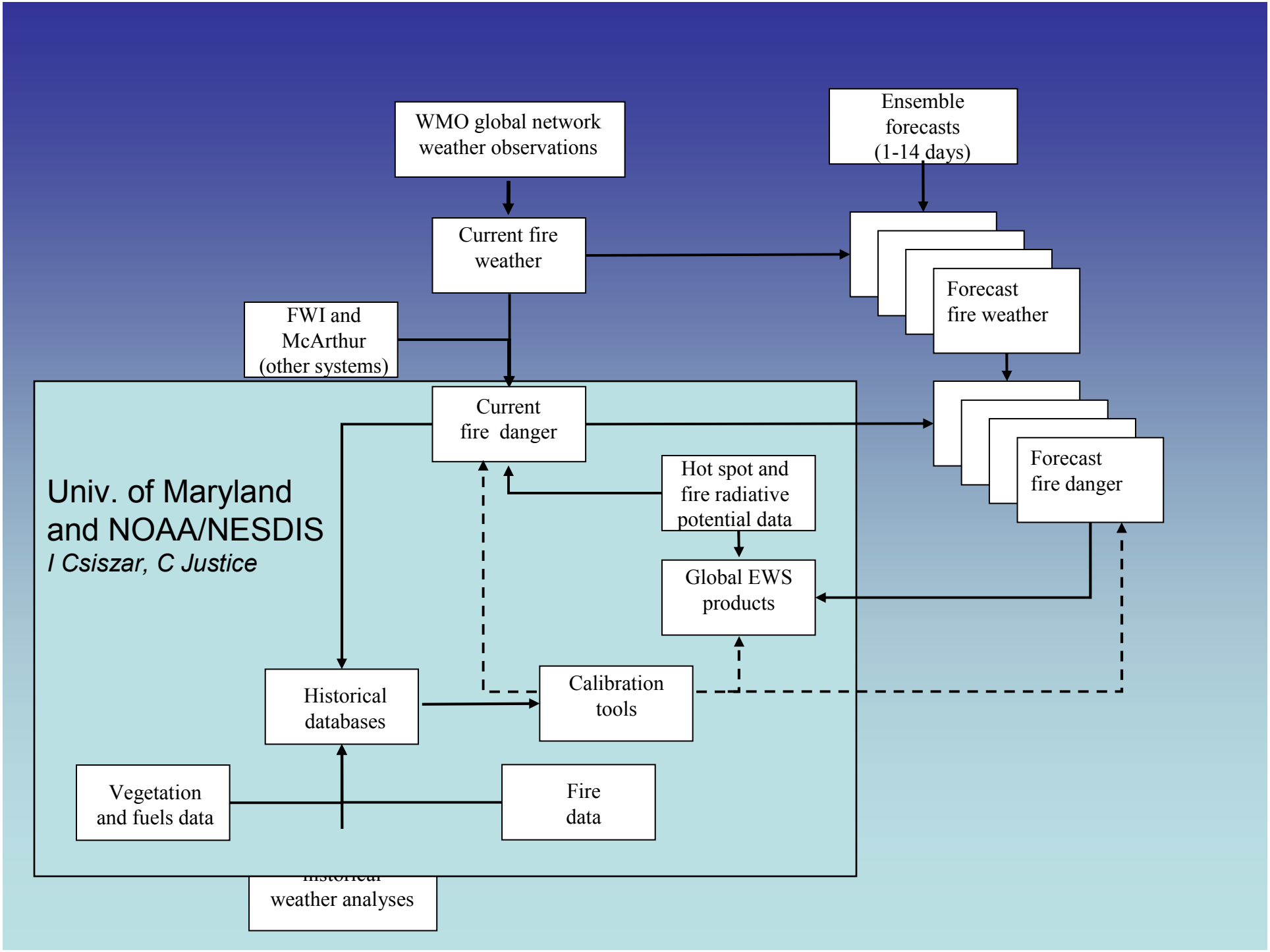
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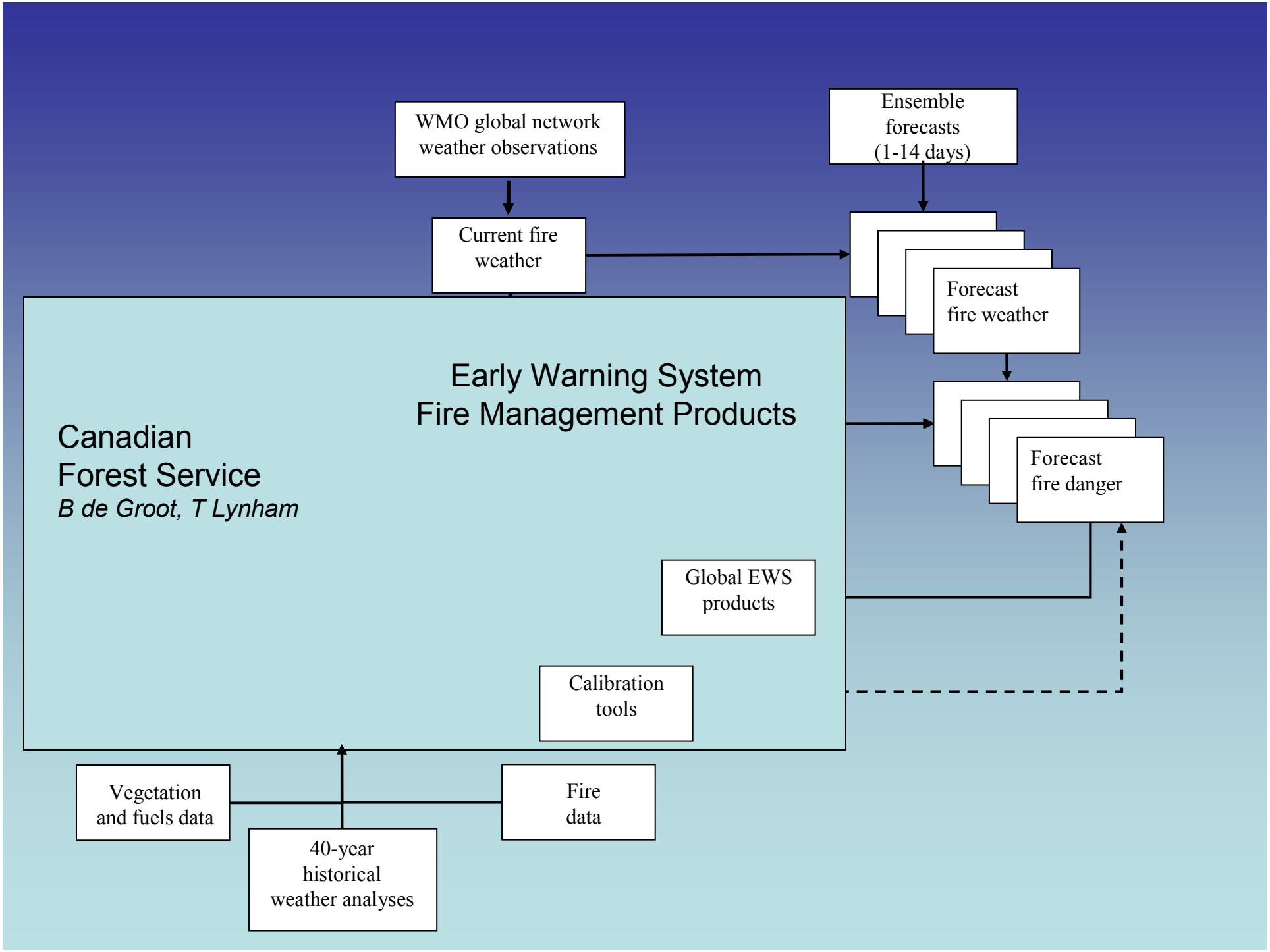
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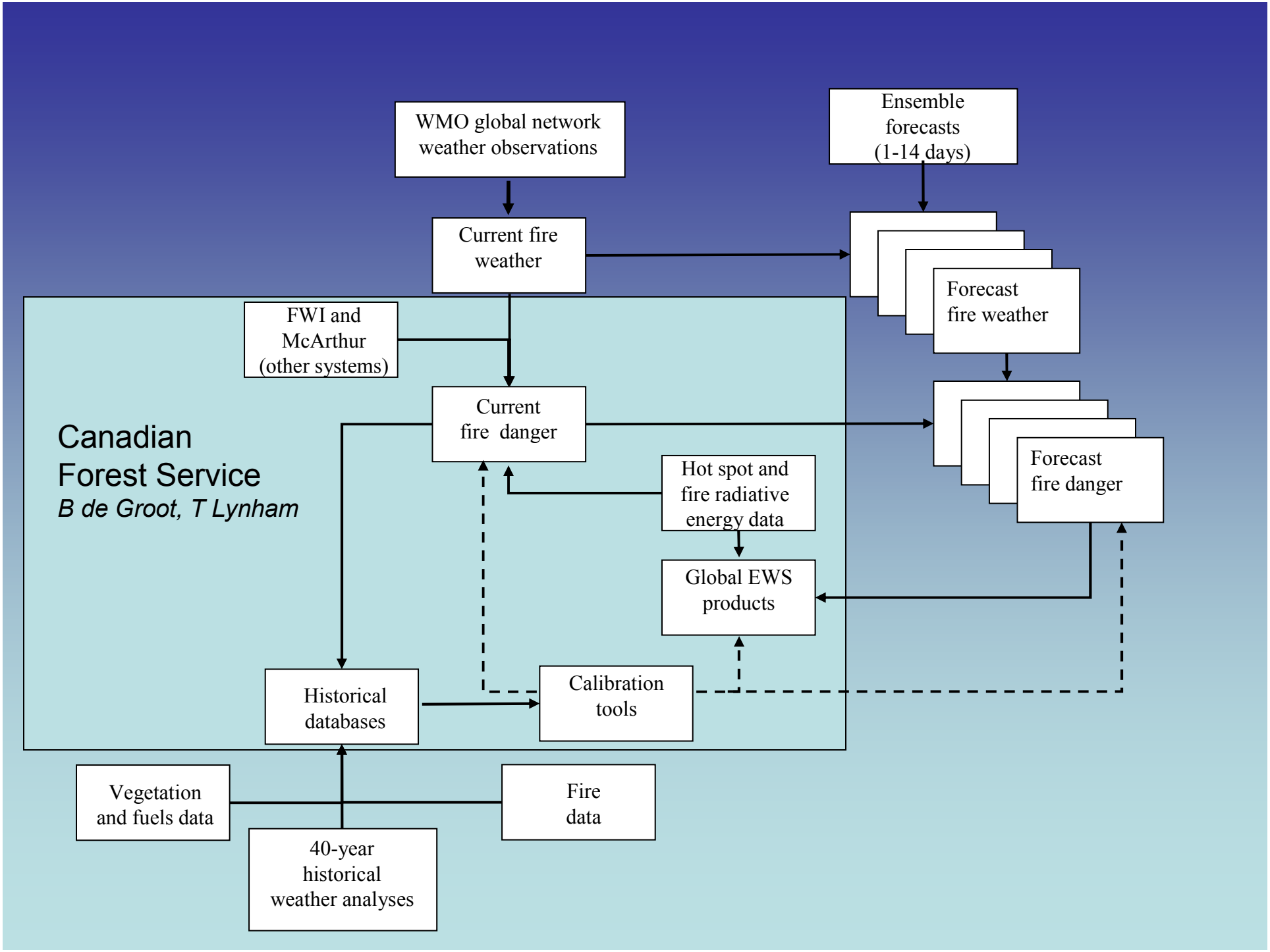
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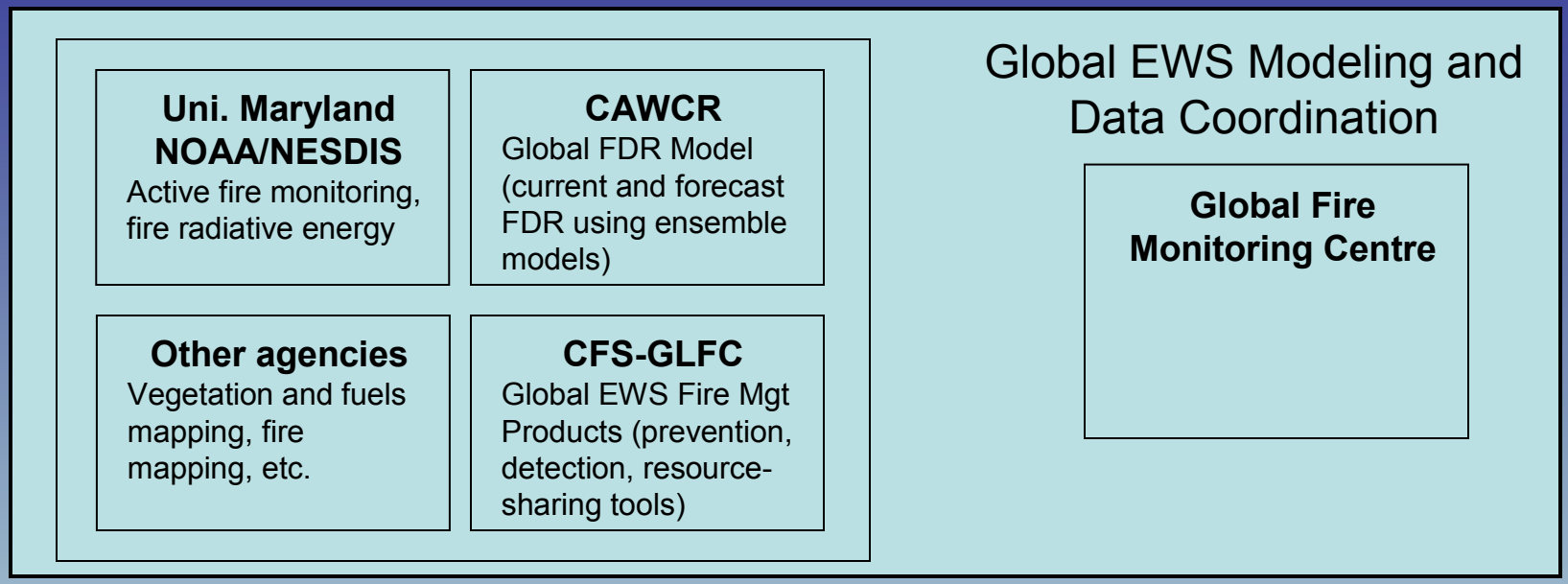
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CFS-GLFC
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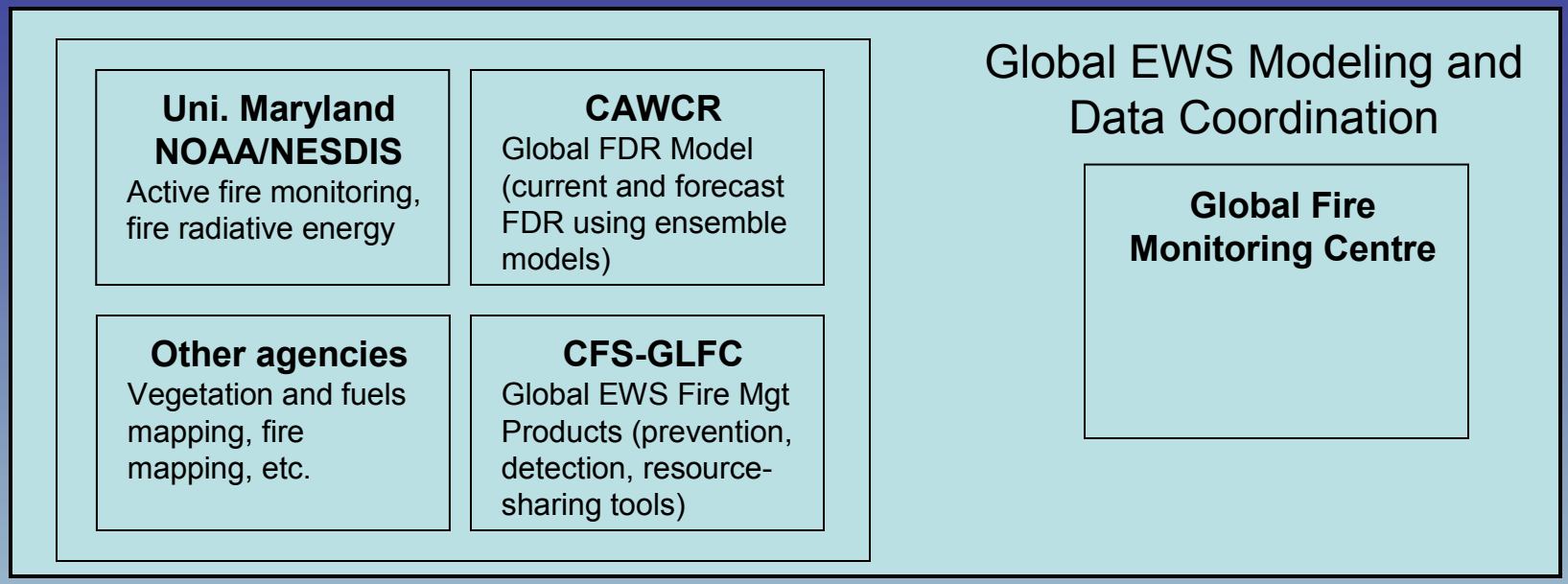
Global EWS Modeling and Data Coordination
Global Fire Monitoring Centre

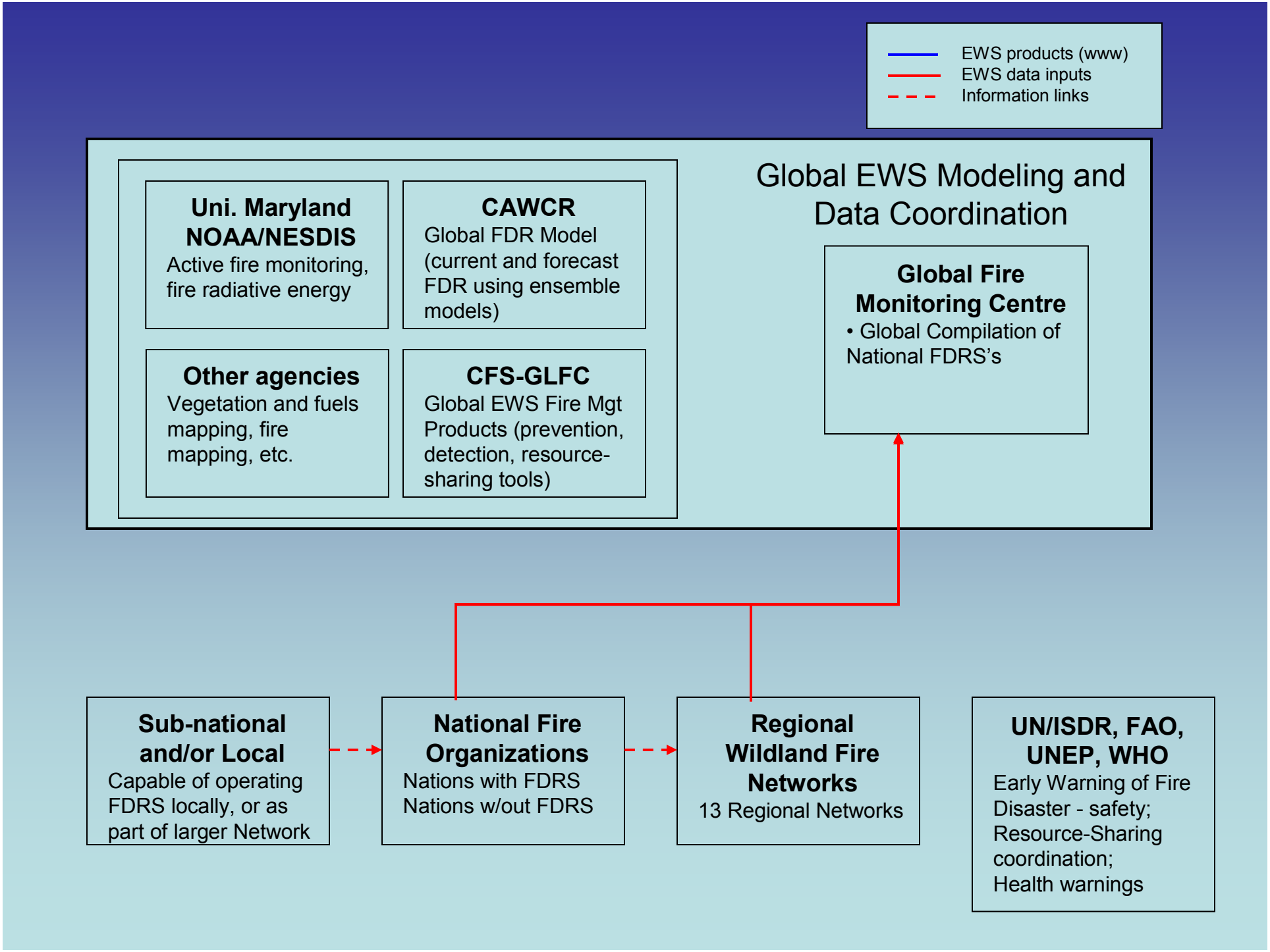


Sub-national and/or Local
Capable of operating FDRS locally, or as part of larger Network

National Fire Organizations
Nations with FDRS
Nations w/out FDRS

Regional Wildland Fire Networks
13 Regional Networks

UN/ISDR, FAO, UNEP, WHO
Early Warning of Fire Disaster - safety;
Resource-Sharing coordination;
Health warnings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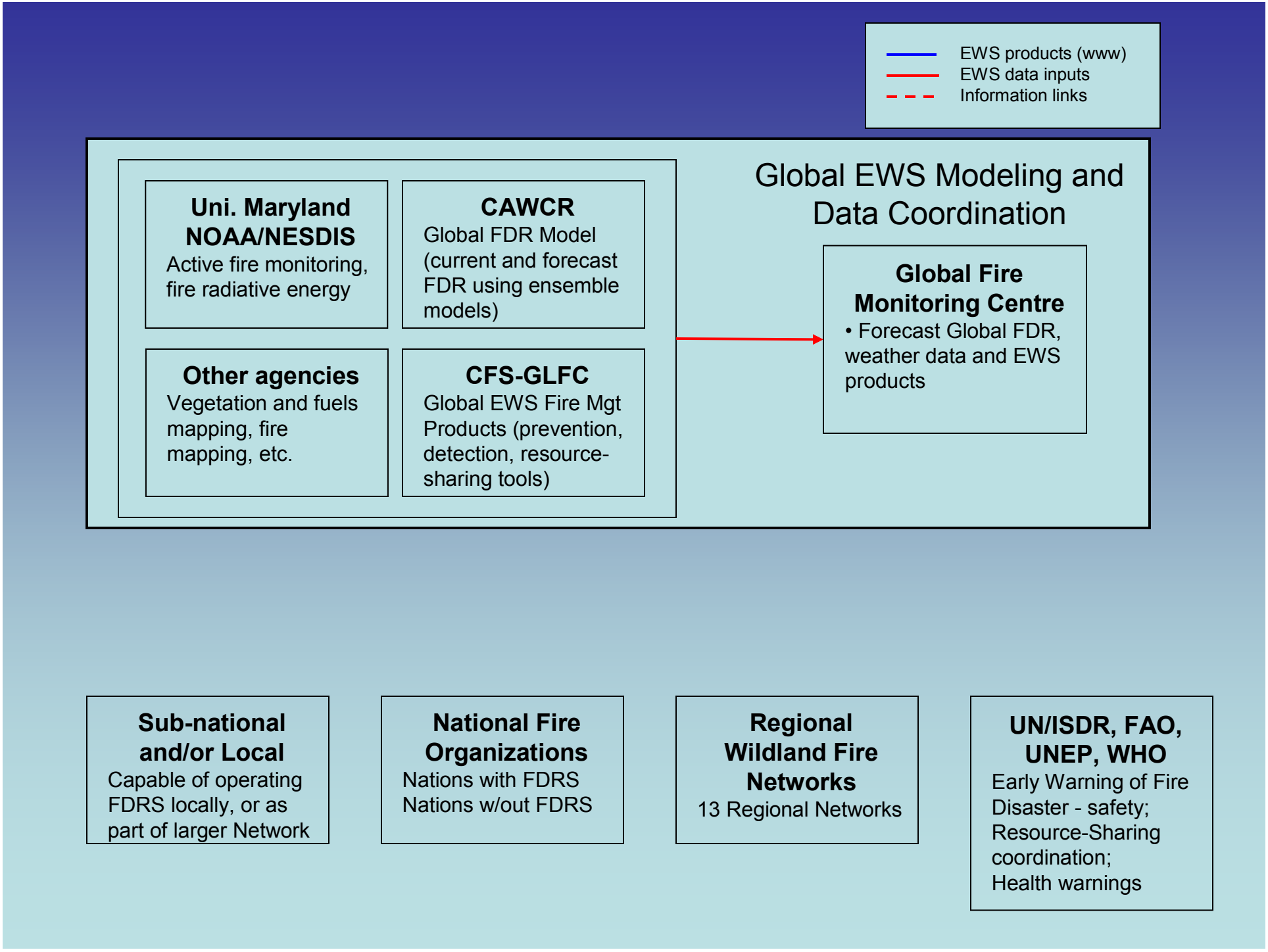
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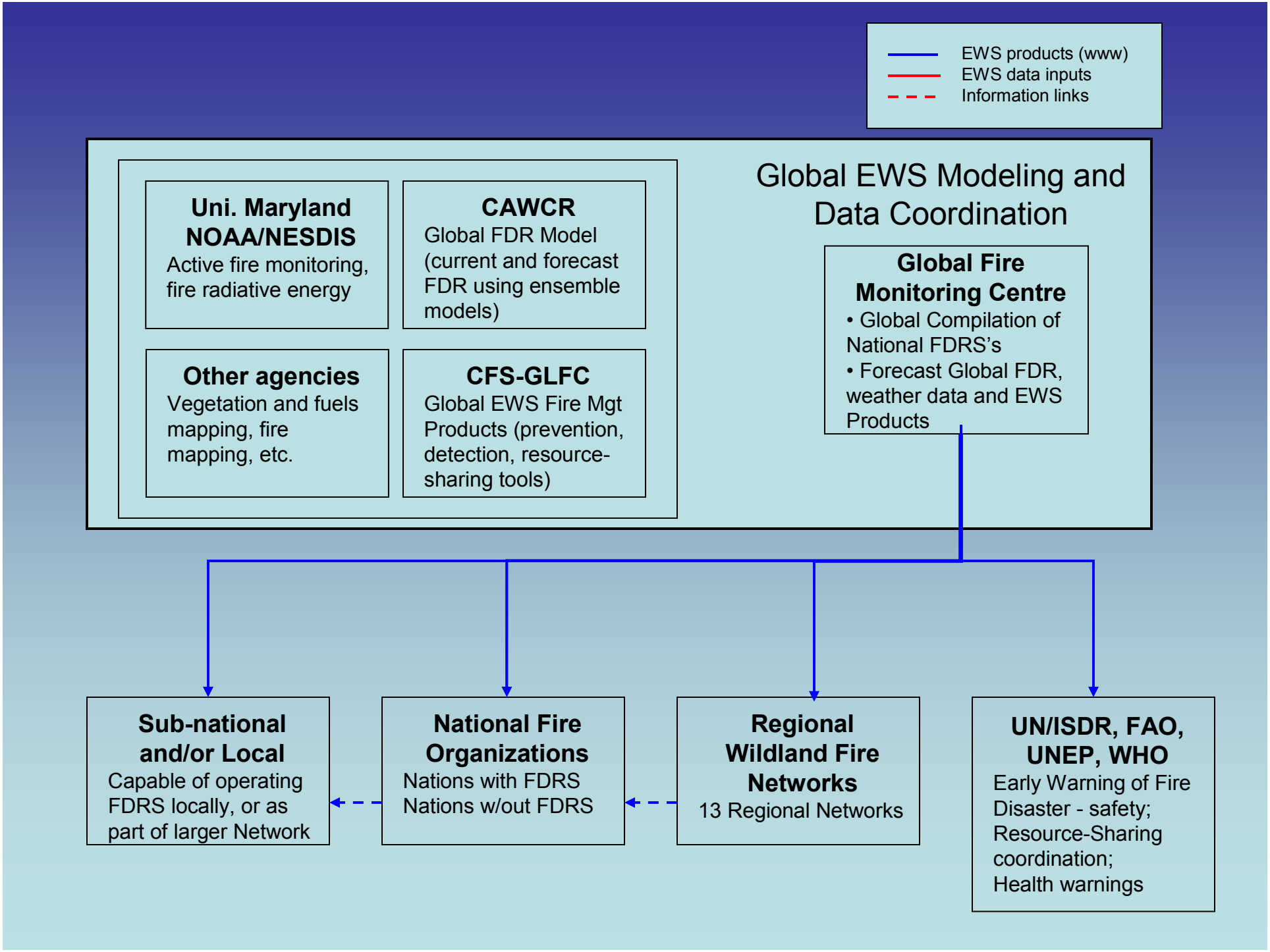
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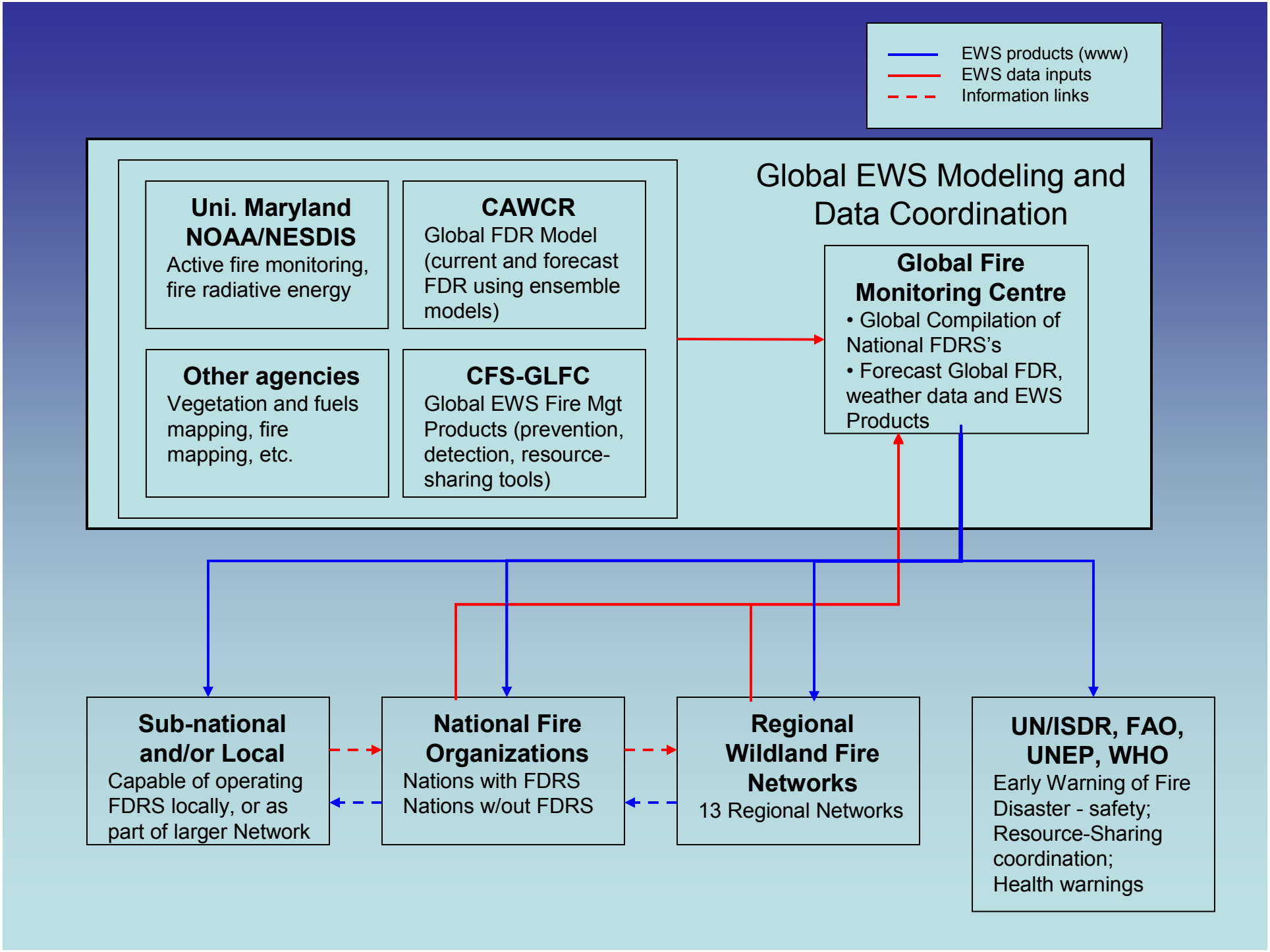
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Expected Impacts

The Global EWS for Wildland Fire will provide:

- daily fire danger rating information to countries without operational fire danger rating systems
- forecast weather and global early warning information to all countries
- a common system with which to implement international resource-sharing agreements during times of wildfire disaster

Next Step

Secure funding

- Most cost is related to in-kind funding for human resources; minor other costs
- 3-yr timeframe to implement system
- If minimal funding, initially develop system for a specific global region (several potential areas)