







GOFC-GOLD GLOBAL OBSERVATION OF FOREST AND LAND COVER DYNAMICS

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Presentation Outline

Wildland fires and space-based data
Fire danger and early warning
Overview of the Global Fire EWS
Regional early warning and capacity building
Future activities in fire early warning

Global Fire EWS website at FIRE GLOBE Global Fire Monitoring Center:

http://www.fire.uni-freiburg.de/gwfews/index.html





Global Wildland Fire



Jan Feb Mar Apr May June July Aug Sep Oct Nov



Credit: NASA/GSFC, MODIS Rapid Response http://rapidfire.sci.gsfc.nasa.gov/firemaps/

- 300-450M ha of vegetation is burned around the world each year (~size of India)
- most fire is unmonitored and undocumented
- fires occur on all vegetated continents and in all biomes.
- vast majority of fire is humancaused; primarily land management in grasslands (crops, livestock, wild game)
- approx. half of all fire occurs in sub-Saharan Africa
- some fires inevitably become disaster fires causing
 - death
 - long-term health impacts
 - socio-economic impacts





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Wildland Fire and Space-based Data

Wildland Fire Information Needs:

- 1. How many fires will start today, tomorrow, ...?
- 2. How large will these fires grow?
- 3. Will any of these fires threaten human health and safety, property or have social, economic, and/or environmental impacts?
- 4. What will it take to control these fires?

Goal: mitigate or prevent disaster fires through early warning and preparedness planning





Wildland Fire and Space-based Data

EO Data Needs:

- 1. Fire Monitoring
 - Current fire activity (hot spots)
 - Fire behaviour (Fire Radiative Energy, fire spread rate, vegetation/fuel data)
- 2. Fire Mapping
 - fire perimeters, unburned islands
 - fire severity (dNBR)
- 3. Fire Modeling

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- Climate change and fire modeling
- Carbon emissions calculation •
- Building predictive tools for fire mgt. (early warning) ٠







What is Fire Early Warning?

Wildland Fire Danger – a measure of the potential for fire to start, spread and do damage; it is a primary fire management decision-aid tool.

Early warning is advanced knowledge of future fire danger conditions









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Why Fire Early Warning?

Fire early warning provides:

- Time to implement fire management actions 1. that mitigate or prevent wildland fire disaster before fires occur
- Guidance in the planning and appropriate use 2. of prescribed fire









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Pre-Suppression Planning Guide

Wildfire Threat Level	Resources on Standby	Alert Period	Dispatch Time
Low	crews, hand tools	mid-day	60-min
Moderate	crews, hand tools	all day	30 min
	pumps, water tanks	mid-day	60 min
High	crews, hand tools	all day	15 min
	pumps, water tanks	all day	30 min
	control line-building equipment	mid-day	60 min
Extreme	crews, hand tools	all day	15 min
	pumps, water tanks	all day	15 min
	control line-building equipment	all day	30 min
	aircraft, burnout equipment	mid-day	60 min







Prevention and Detection Planning Guide

		Detection	
Potential Ignition Lev	vel Prevention Activity	Activity	Period
Low	None	None	None
Moderate	Post local warning signs	towers	mid-day
High	Local media warnings Prescribed fire restrictions	towers vehicle patrol	all day mid-day
Extreme	TV and radio warnings Prescribed fire exclusion Local community meetings	towers vehicle patrol aircraft patrol	all day all day mid-day







Regional EWS Prototype: Central and South America



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Southeast Asia – Calibration of FFMC









Next Steps in Regional Early Warning



- 1. Training in FDRS/EWS and fire management
- Develop local decision-aids 2.
- 3. Train the trainer local capacity building





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Photo: Working on Fire



Future EO Data Applications

- regional system calibration with fire data
- spatial rainfall (esp. at low amounts)
- biomass (fuel load), affecting emissions as well as fire behaviour
- vegetation phenology change (leafless/leaf-out condition)
- vegetation green-up/curing (live:dead ratio)
- snowcover/snowfree dates
- fire behaviour: fire radiative energy, indicating fuel consumption and emissions; fuel consumption with rate of fire spread, indicates fire intensity





Fire and Carbon Emissions Modeling





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Area Burned Data









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Date of Burn

MODIS hot spots used to determine daily fire activity





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Carbon Emissions Modeling







Fire Weather Interpolation

Fire weather is interpolated to each fire (averaged by weather associated with each MODIS hot spot)



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Fire Danger and Climate Change

Change in Future Fire Weather Severity







Thank You

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