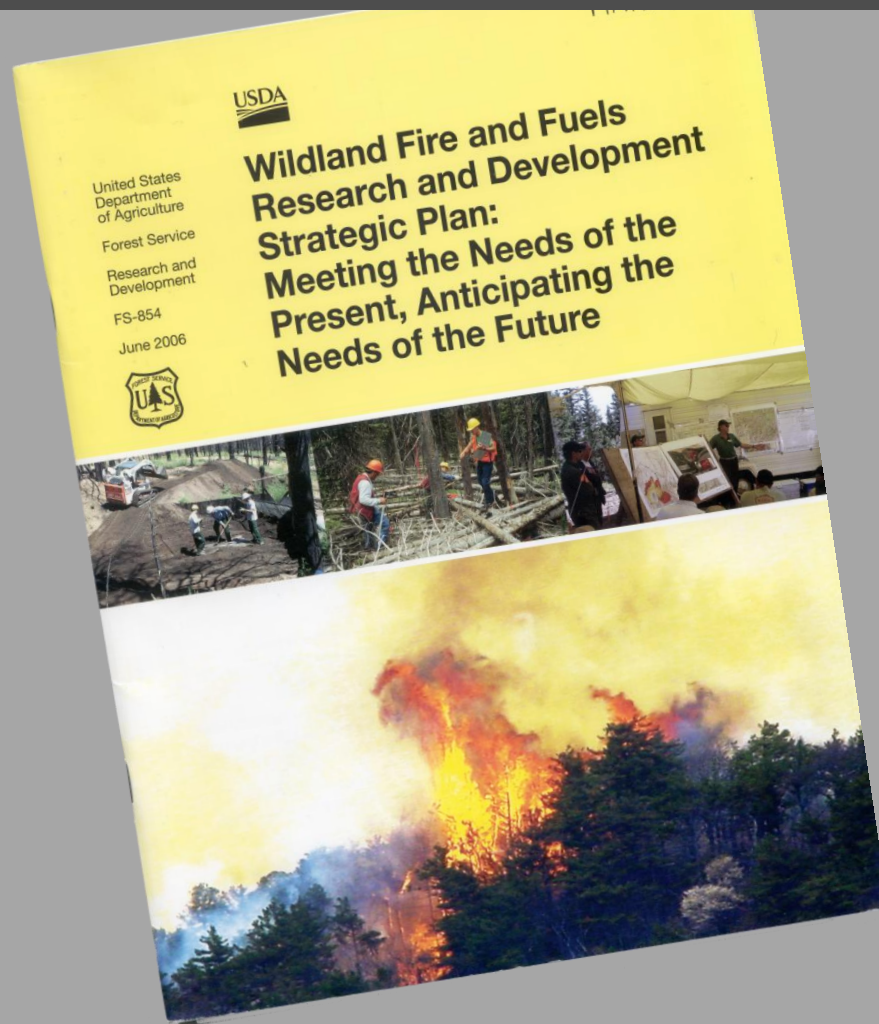




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# Wildland Fire and Fuels Strategic Program Area Core Fire Science

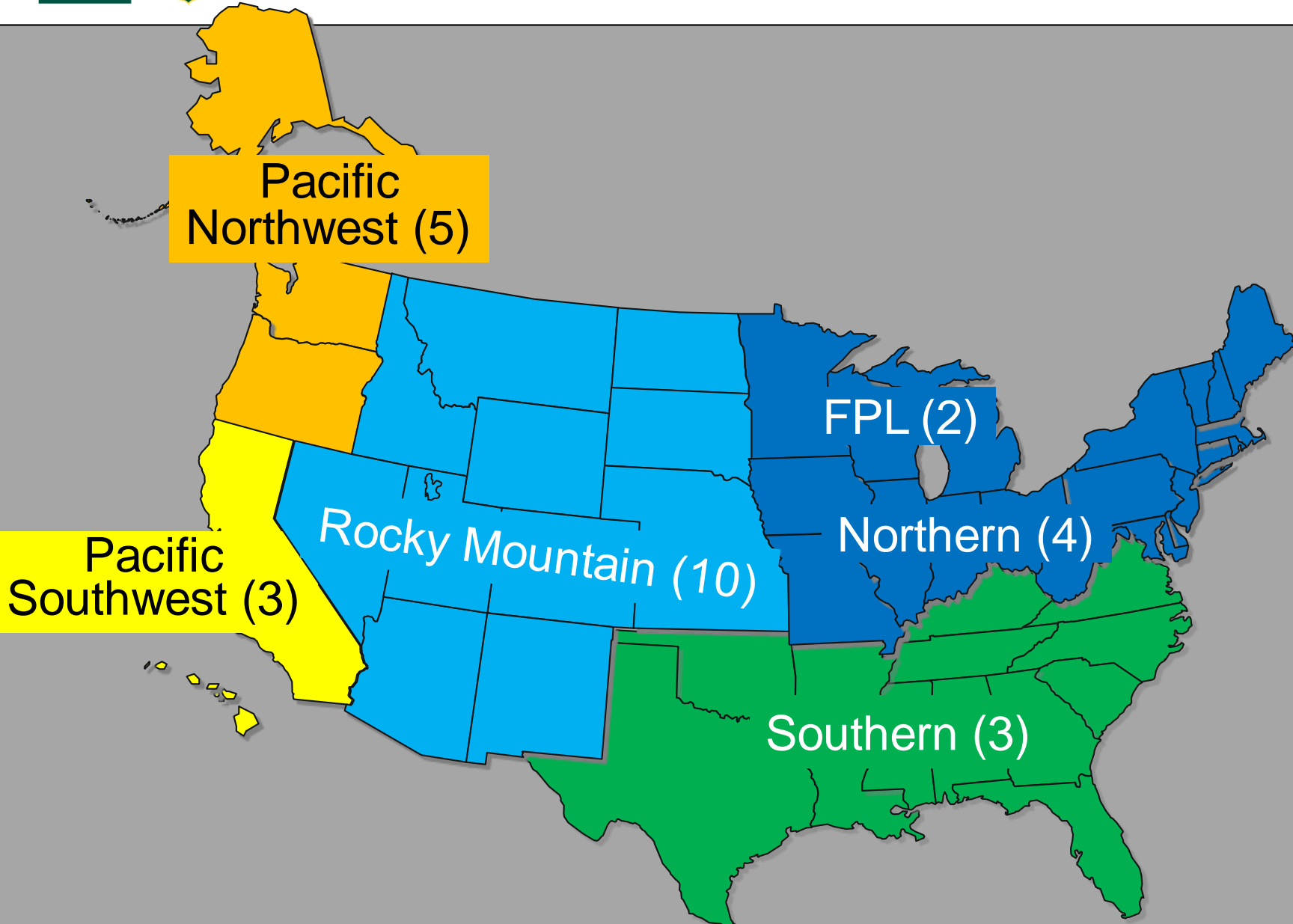




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# RGEG Scientists



Pacific Islands U.S. Territories Puerto Rico



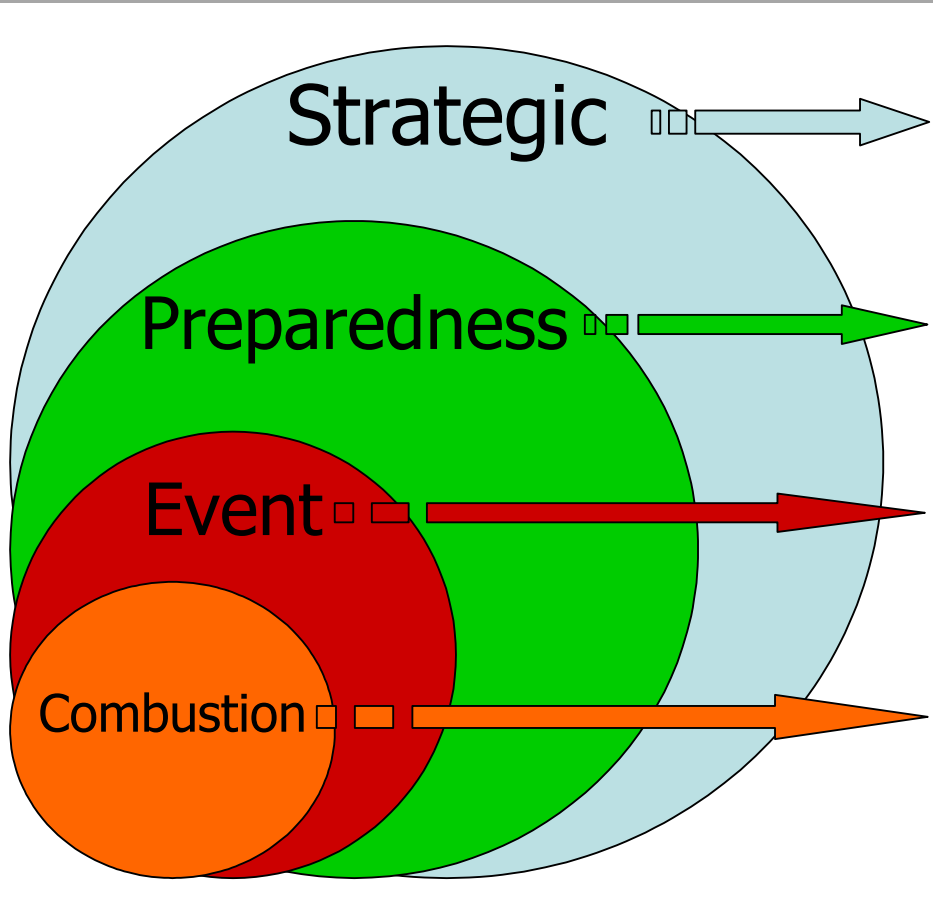
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# Improved Understanding

- Combustion processes
- Fuels
- Fire weather
- Fire behavior
- Fire transitions

# Scales



Ecosystem to global; year to century

$10 - 10^6$  m; hour to decade

$10 - 10^3$  m; hour to days

Atomic –  $10^2$  m;  $10^{-3}$  to 10's seconds



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# Core Fire Science

- 1. Physical Fire Processes** – that govern fire behavior, including combustion processes, heat and energy transfer, fire-fuel interactions, and complex fuel beds.
- 2. Fire Characteristics at Multiple Scales** – such as larger scale spatial/temporal processes, including regional climate patterns, landscape-scale management, and fire severity.
- 3. Fire Danger Assessment** – including information on fuel moisture, flammability and ignitability, fuel bed variability, and fire-weather development





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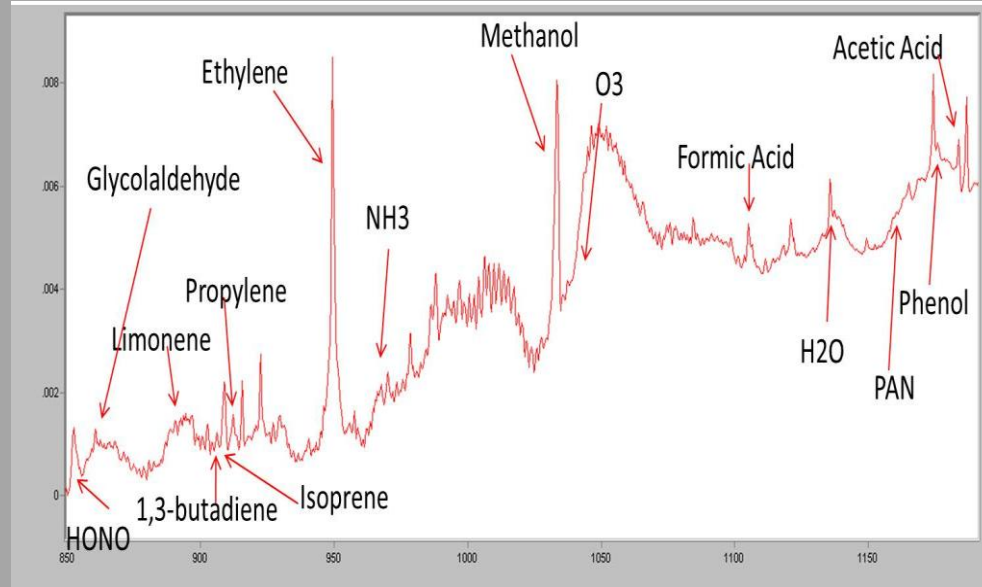
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# Physical Fire Processes



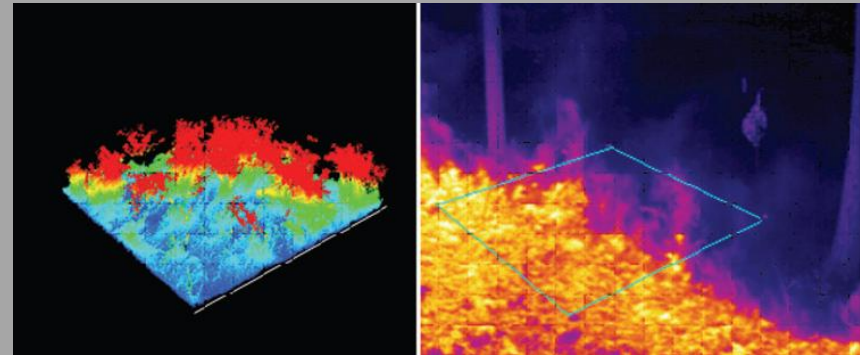


# Physical Fire Processes

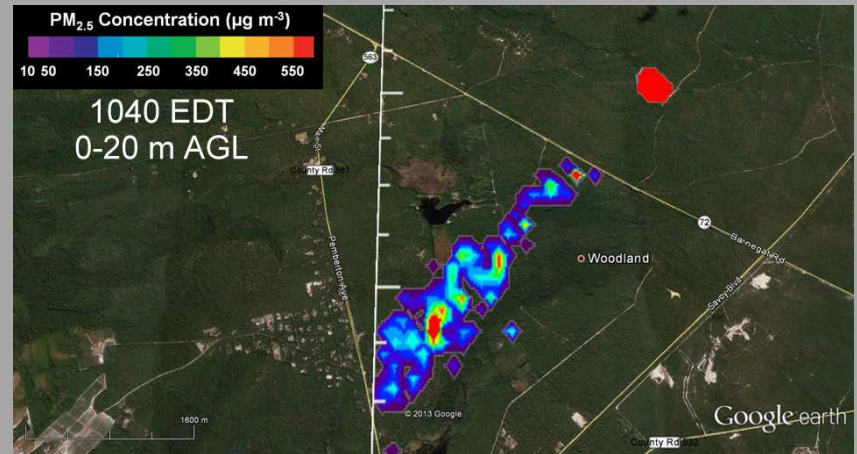




# Physical Fire Processes



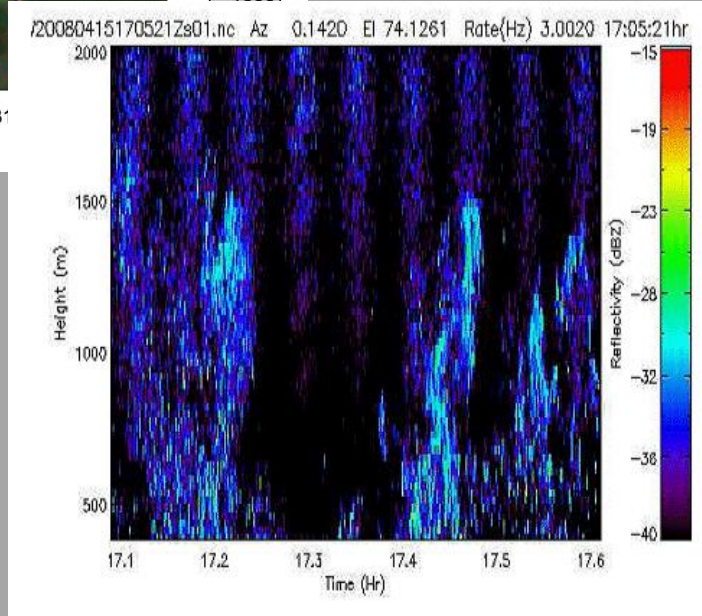
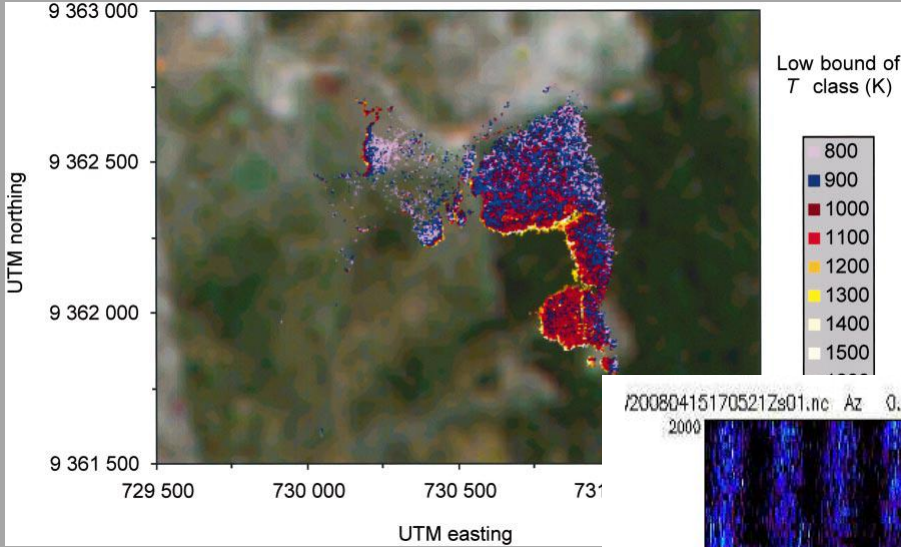
Hiers et al, 2009 doi:10.1071/WF08084



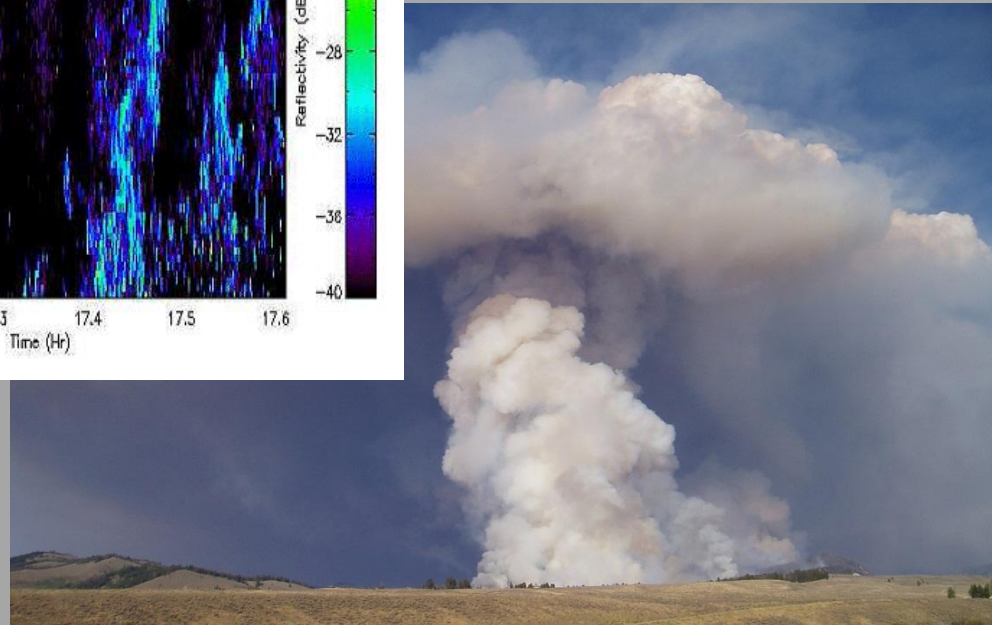
Heilman, JFSP 09-1-04-1 Final Report



# Physical Fire Processes



## Fire event dynamics



## Integrated measurements



Photo from JFSP  
Fire Science Digest,  
Aug. 2013

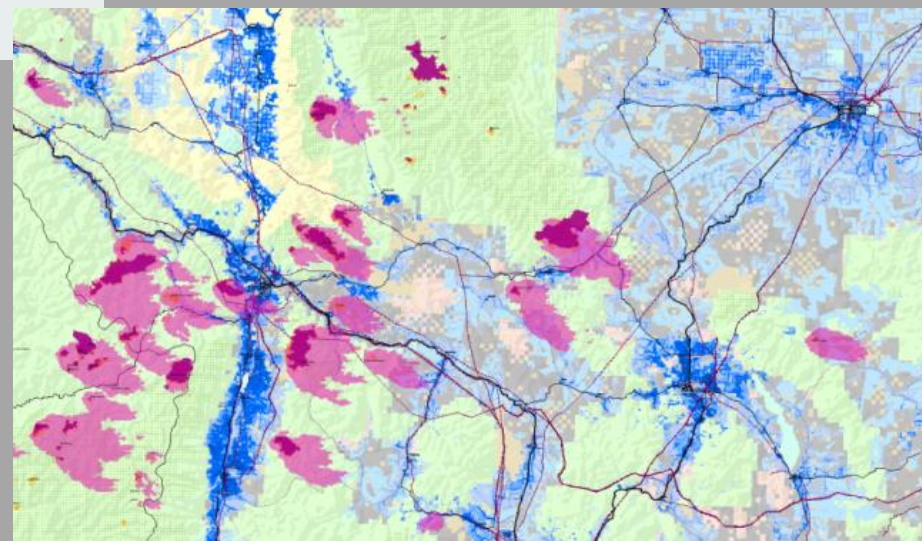
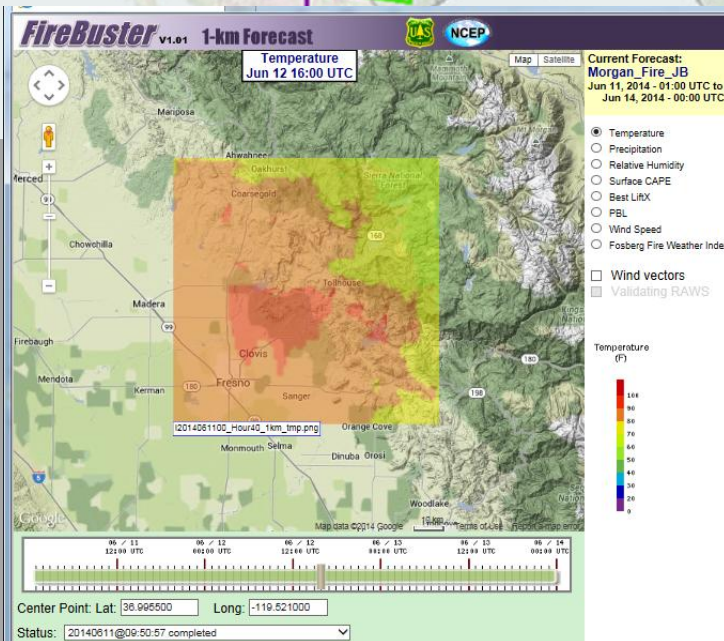
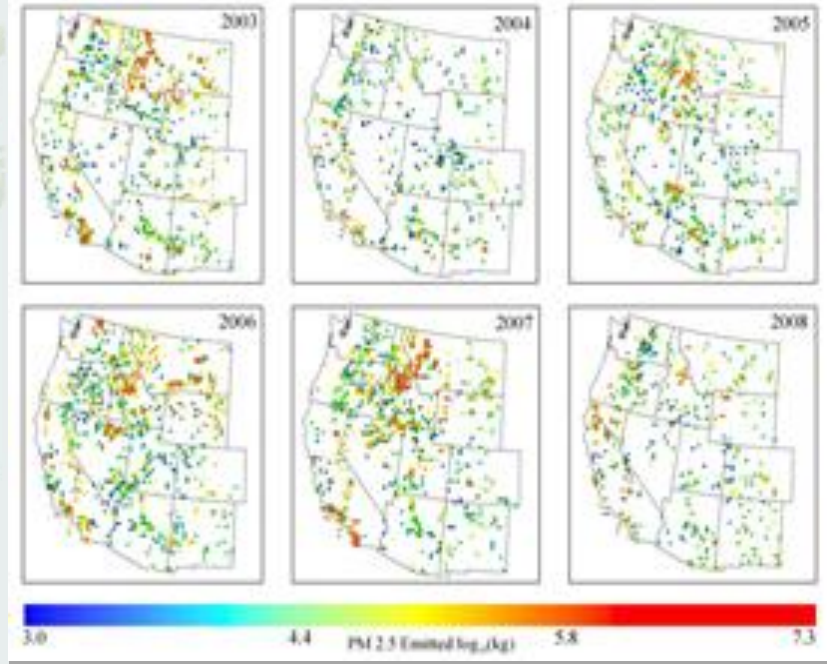
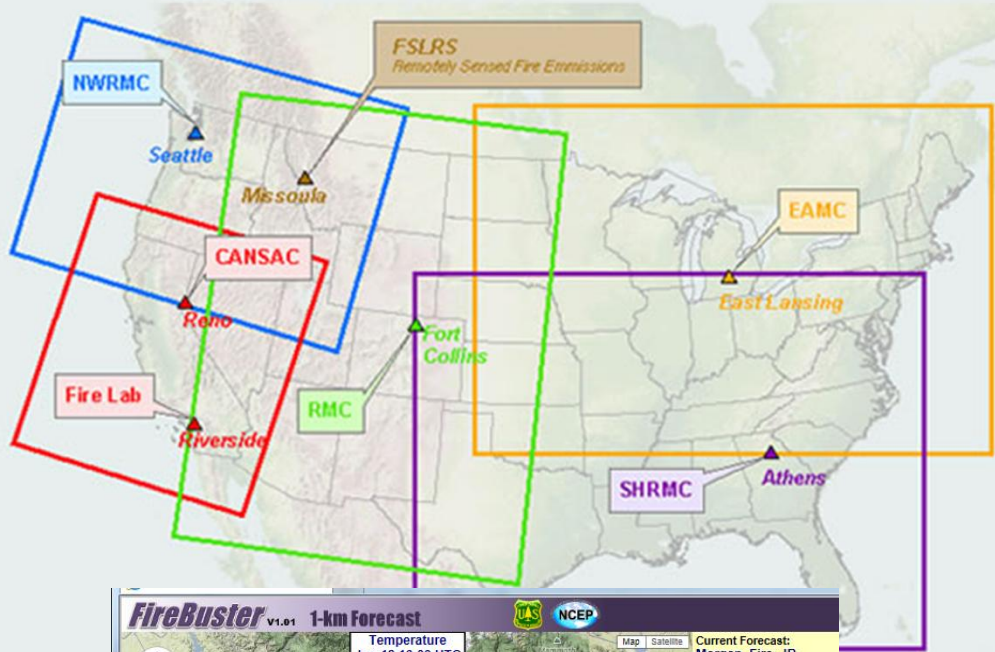




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# Fire at Multiple Scales



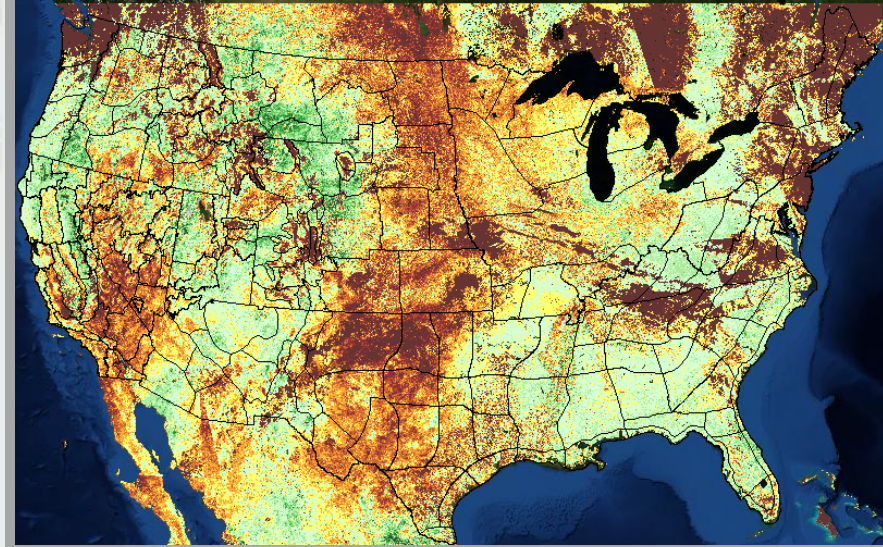
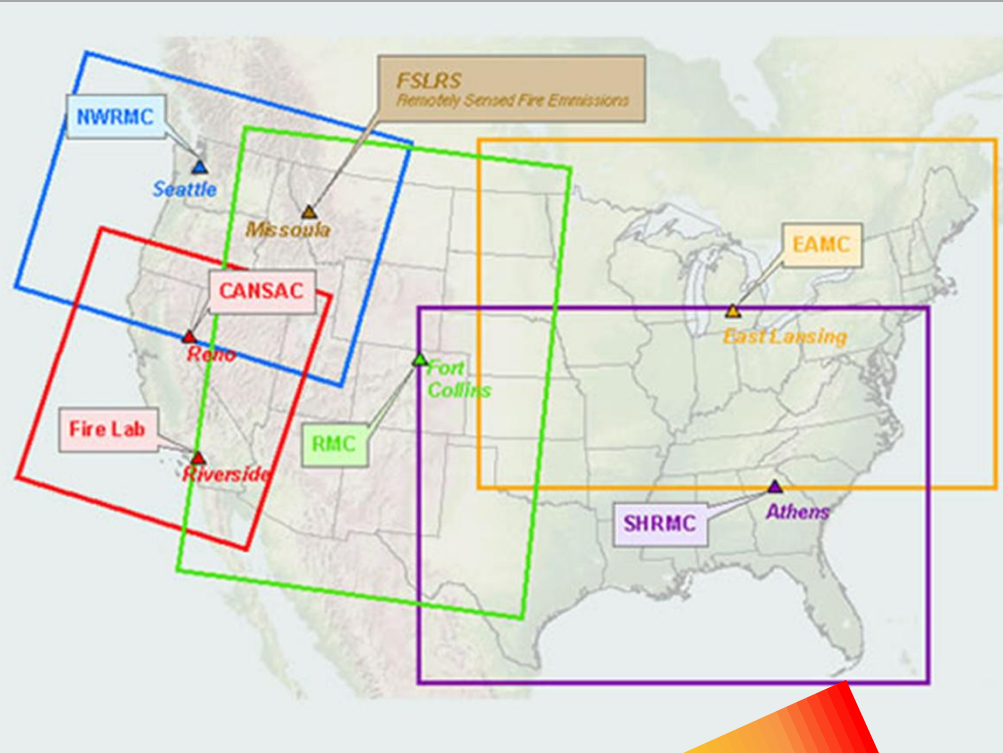




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# Fire Danger



Seasonal severity  
forecast

Live fuel moisture



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# Desired Future Outputs

- Fully-dimensioned, physics-based fire model
- Biome-independent fire danger assessment system
- Capability to fully characterize fire across multiple spatial and temporal scales