Satellite Support to National Fire Detection, Global Volcano Monitoring
**Background**

- America's wildland fire losses could be significantly reduced if the fires could be detected while they are still small enough to be quickly suppressed.

- The agencies of the fire community have estimated that if fires could be reliably detected and responded to while less than 10 acres in size then $200M per year could be saved in fire suppression costs alone.
Background (Cont.)

- Average USFS wildfire cost $2.6M to suppress in 1994
  - not including value of lost timber
- The Departments of Interior and Agriculture spend more than $600M annually to manage fires on Federal lands
- State and local wildland-fire suppression costs annually total in the tens of $millions
DETECTION AND REPORTING TIMELINE

Nominal Wildfire Conditions

Wildfires detected and responded to while less than 10 acres can be suppressed quickly and at significantly lower cost.
Wildfire Detection Requirements

- **Coverage:**
  - Continuous coverage of CONUS, Alaska, and Hawaii

- **Minimum Threat:**
  - .25 acres in timber (40% obscuration)
  - 1 acre in grass
  - 2 acres in Alaska (all vegetations)

- **Reporting:**
  - Initial: not later than 5 minutes
  - Final: not later than 5 minutes after initial

- **Report parameters:**
  - location, absolute accuracy = 1 km.
  - time of detection
  - confidence of valid report

- **Probability of warning:** 95%

- **False Alarm Rate:** <10% of reports
The remote detection of fires and volcanic activity could revolutionize understanding of wildfires and volcanoes as weather satellites did hurricane forecasting.
Currently, less than half of America's 65 potentially active volcanoes are monitored for signs of activity, most only for premonitory microearthquake activity.
The World’s Most Active Volcanoes

Worldwide, barely 10 percent of the world's potentially active volcanoes are under constant surveillance by volcano scientists.
About 10 volcanic eruptions a year penetrate the altitude range of air traffic.

- Over 15 years, more than 80 jets have been damaged by ash clouds.
- 7 passenger airliners experienced loss of engine power, endangering more than 1,500 passengers.
- Repair and replacement costs as of May 1994 have exceeded $200 million.
Interagency Process

Senior Steering Group

MOA

Security Policy

Near-Term Program

Far-Term Program

Participants: National Security
  Deputy Under Secretary of Defense (Space)
  Department of the Air Force
  National Reconnaissance Office
  Central MASINT Office

Civil Agencies
  U.S. Geological Survey
  National Oceanic & Atmospheric Agency
  Bureau of Land Management
  U.S. Forest Service

National Aeronautics & Space Administration
The Demonstration/Validation Phase will deploy an operationally-configured prototype architecture to demonstrate utility to users. The Multi-Agency Funding will fund prototype development and operations.

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Program Evolution
**Architecture**

*Satellite Support Architecture*

(Air Force)

(NRO)

GOES

(NOAA)

*Plus International WX Satellites*

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**USGS Advanced Systems Center**

*Warning Messages (Unclassified)*

USGS (Volcanoes)

National Emergency Coordination Center

NOAA (Ash Clouds)