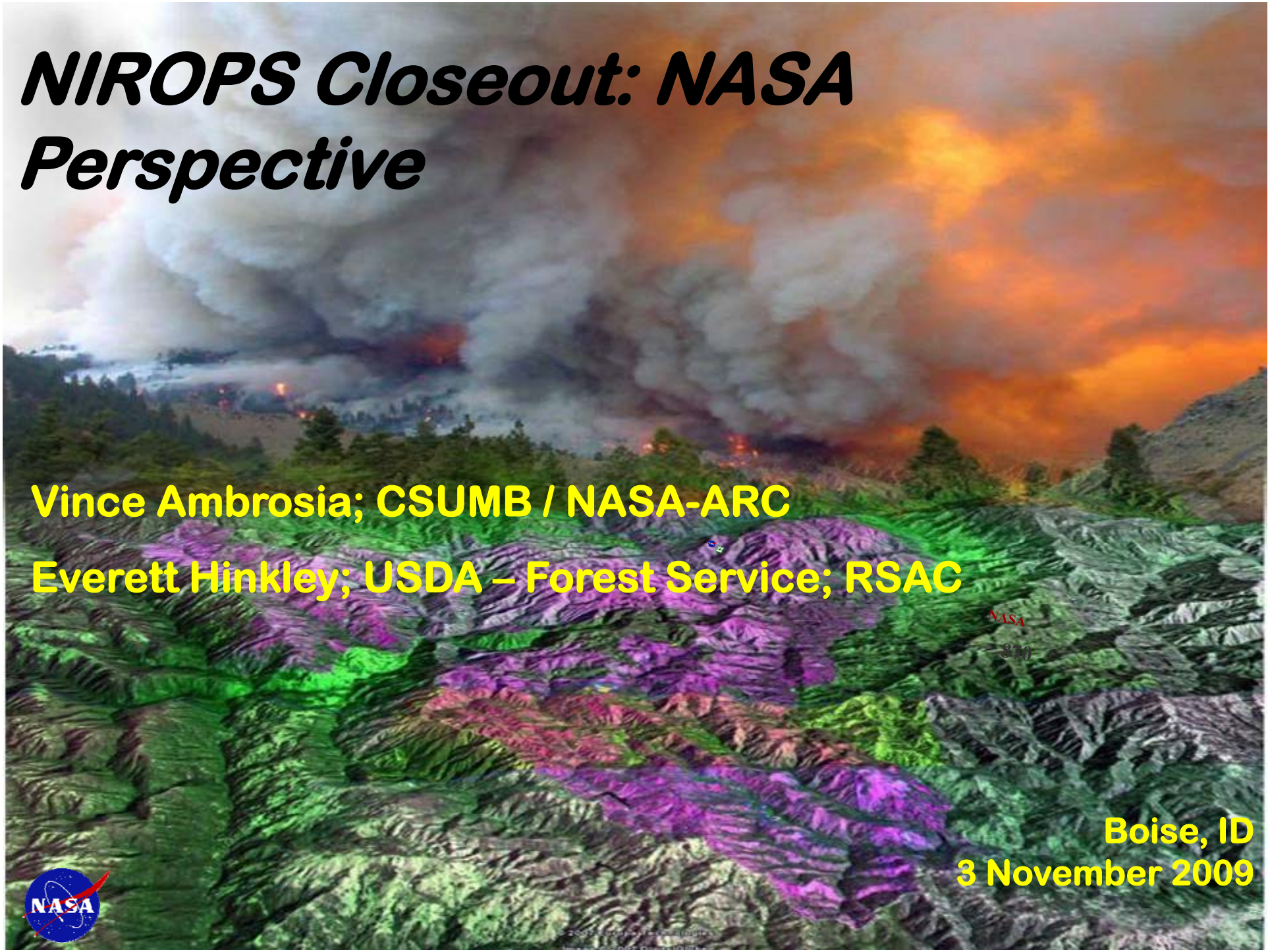
NIROPS Closeout: NASA Perspective



Vince Ambrosia; CSUMB / NASA-ARC

Everett Hinkley; USDA – Forest Service; RSAC

Boise, ID
3 November 2009

2009 WRAP / Western States Missions

- ***Submitted Proposal to Receive Support under NASA Applied Science "Stimulus" Announcement:***
  - **TITLE: "*Sustaining and Transitioning NASA Airborne Wildfire Observation Capabilities: Disaster Monitoring Improvements for California and the Nation*"**
  - **MAJOR FOCUS ELEMENTS:**
    - **Emergency Fire Mission Continuity Support through FY2011;**
    - **Mature collaboration with CalFire to foster technology transfer and adaptability.**
  - **PROPOSAL DURATION: July 09-Sept. 2011 (2 years).**
  - **BUDGET: $1.3M**
  - **DISPOSITION: Funded.**
- **Additional "Stimulus" Support to NASA Airborne Sciences:**
  - **Develop NASA DFRC B-200 KA as a sensor platform.**
  - **Integrate Inmarsat Com package on B-200 KA.**

2010 Mission Platforms

Ikhana UAS

Operations: ~50K ft; >4000 nm
Endurance: ~24-hours
Speed: 170-200 kts
Payload: 2400 lbs of instruments
C&C and sensor telemetry: C-band (local) & Ku-band (global)
COA Issues

King Air B-200

Operations: ~32K ft; 1883 nm
Endurance: ~4.0 hours
Speed: 250 kts
Onboard Operators: 4 (inc. flt team)
Payload: 2000 lbs of instruments
Sensor telemetry: Inmarsat (planned)

Sensor System:
AMS Wildfire Instrument

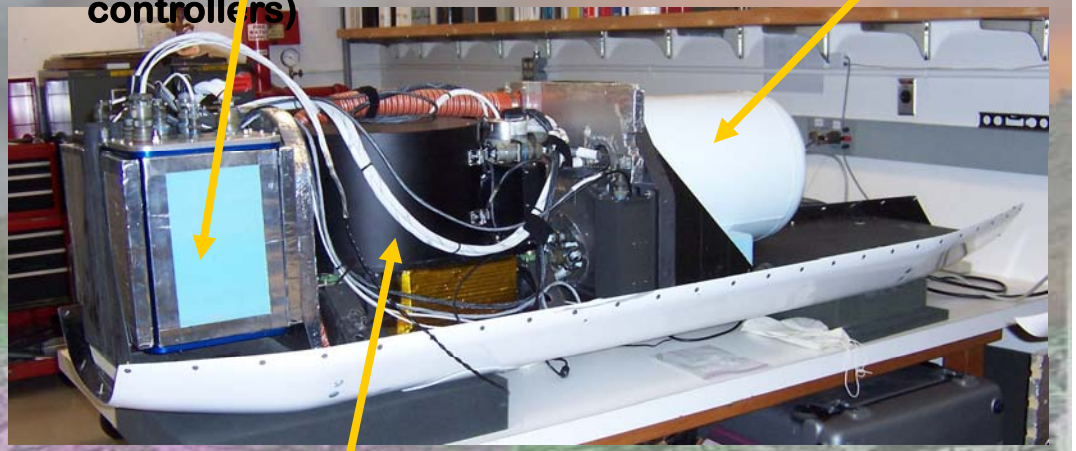
AMS Wildfire Sensor

Band	Wavelength μm	
1	0.42 - 0.45	
2	0.45 - 0.52	(TM1)
3	0.52 - 0.60	(TM2)
4	0.60 - 0.62	
5	0.63 - 0.69	(TM3)
6	0.69 - 0.75	
7	0.76 - 0.90	(TM4)
8	0.91 - 1.05	
9	1.55 - 1.75	(TM5) (high gain)
10	2.08 - 2.35	(TM7) (high gain)
11	3.60 - 3.79	(VIIRS M12) (high gain)
12	10.26 - 11.26	(VIIRS M15) (high gain)
13	1.55 - 1.75	(TM5) (low gain)
14	2.08 - 2.35	(TM7) (low gain)
15	3.60 - 3.79	(VIIRS M12) (low gain)
16	10.26 - 11.26	(VIIRS M15) (low gain)

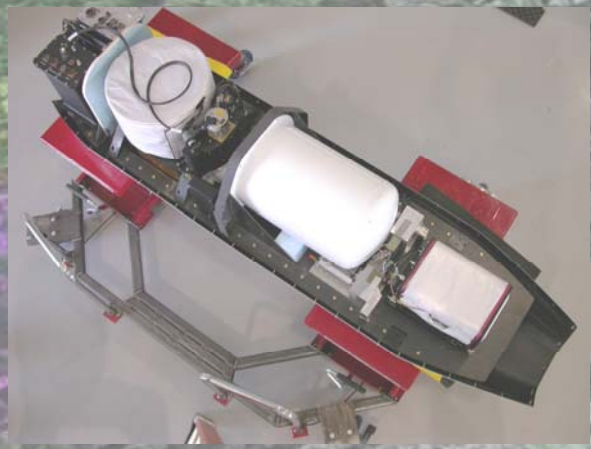
Total Field of View: 42.5 or 85.9 degrees (selectable)
IFOV: 1.25 mrad or 2.5mrad (")
Spatial Resolution: 3 – 50 meters (variable)

Two environmental enclosures (data disks & GPS; and power supplies & controllers)

Data System Enclosure

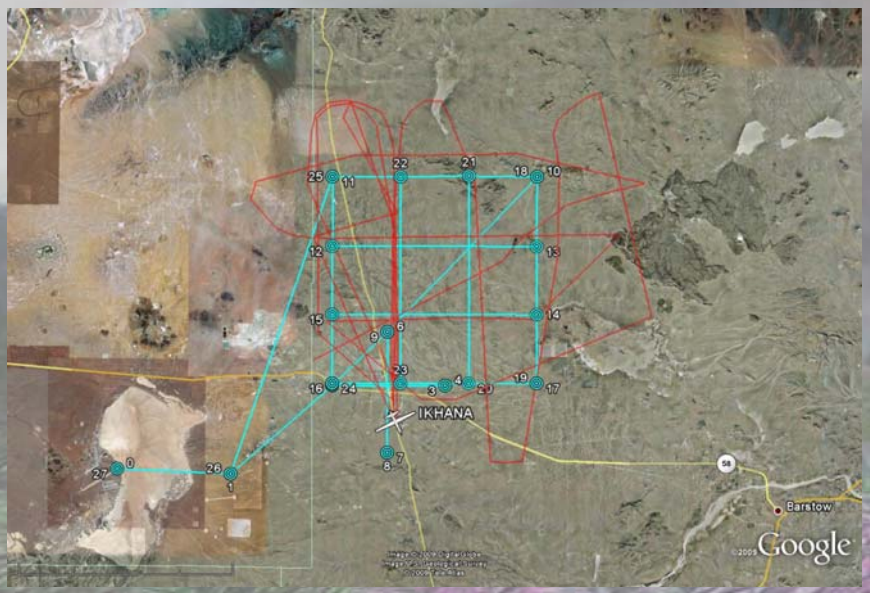


Scan Head



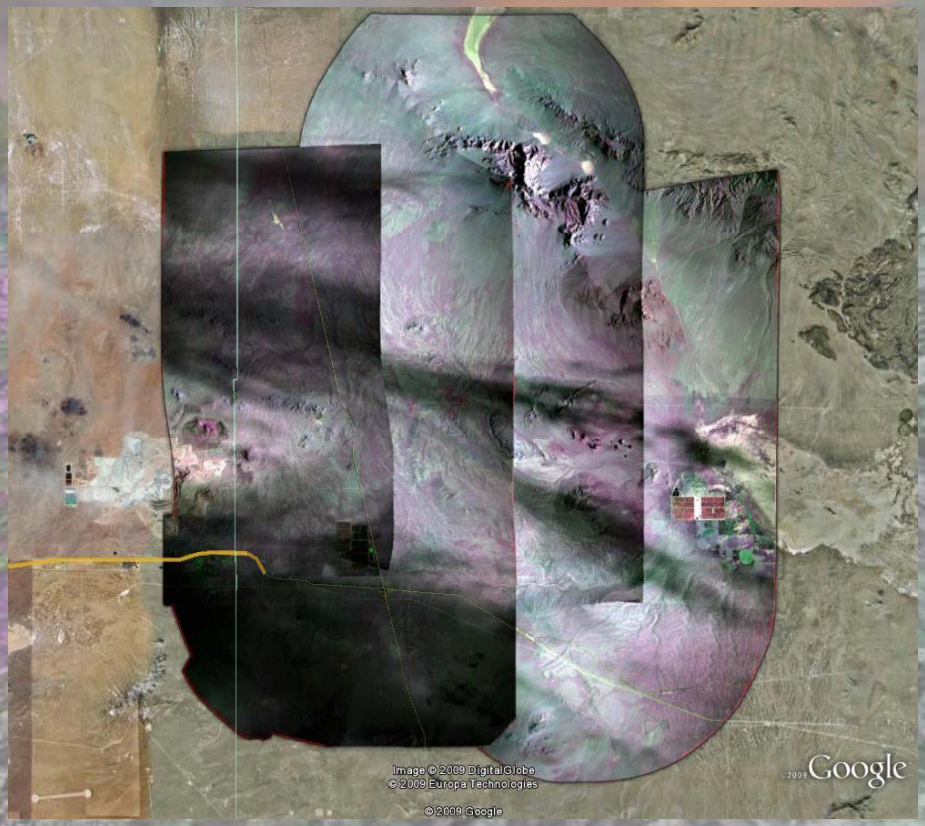
2009 Mission Series: Test Flight

11 September 2009



Flight Plan & Ikhana Location

Kramer Junction
Automated Mosaic



Additions to CDE

On-Board Algorithm Development

- **Develop useful fire spectral band combinations for different collection scenarios (day / night):**
  - **DAY**: b12 (10.26 -11.26 um), b9 (1.55- 1.75 um), b11 (3.60- 3.79 um) as R-G-B;
  - **NIGHT**: b12 (10.26 -11.26 um) for night ops
- **Develop R/T "hot-spot detect algorithm":**
  - **Modified CCRS algorithm:**

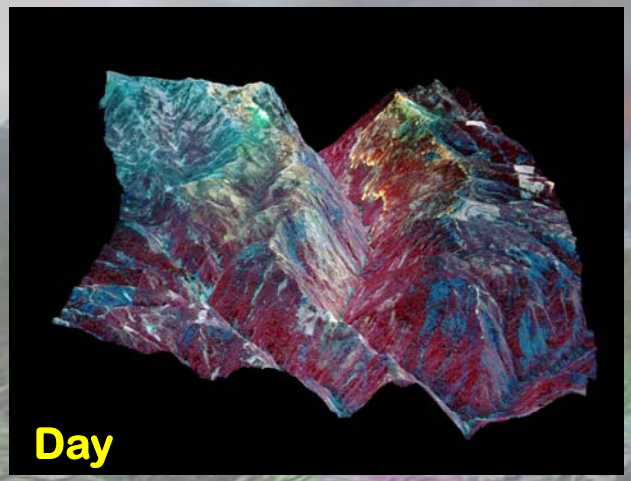
    Fire = If b11 (3.60- 3.79 um) brightness temp > 380^0 K; and b12 (10.26 -11.26 um) brightness temp > 240^0 K; and b11 - $b12^0$ > 12K; and Band 7 (0.76 – 0.9um) < .22 (screen high reflectance commission errors).
- **Develop R/T BAER visualization spectral band combinations:**
  - b10 (2.08 – 2.35 um), b9 (1.55- 1.75 um), b7 (0.76 – 0.90 um) as RGB
- **Develop R/T post-fire, calibrated NBR algorithm data:**

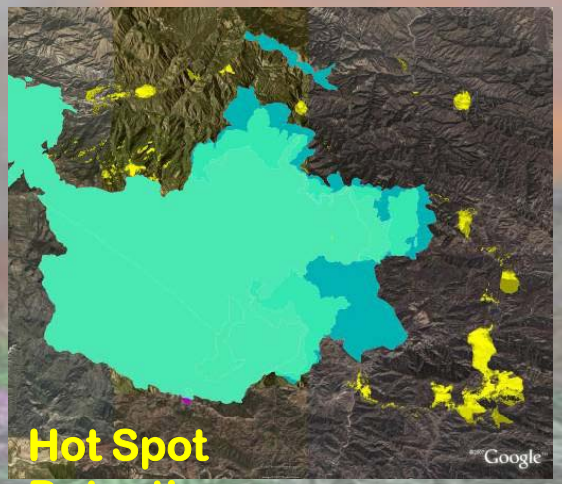
$$\frac{b7 - b10}{b7 + b10}$$

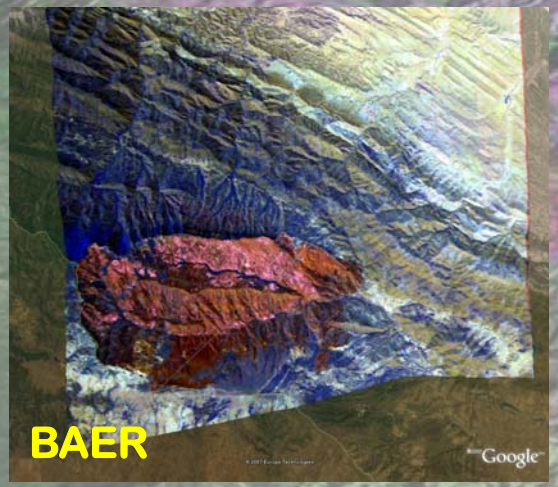
where, (b10 (2.08- 2.35 um); b7 (0.76 – 0.90 um))

On-Board Algorithm Development

Develop automated on-board product-generation processes for different collection scenarios: Day / Night; R/T Hot Spot Detection Algorithm; R/T BAER visualization; Post-Fire NBR Algorithm

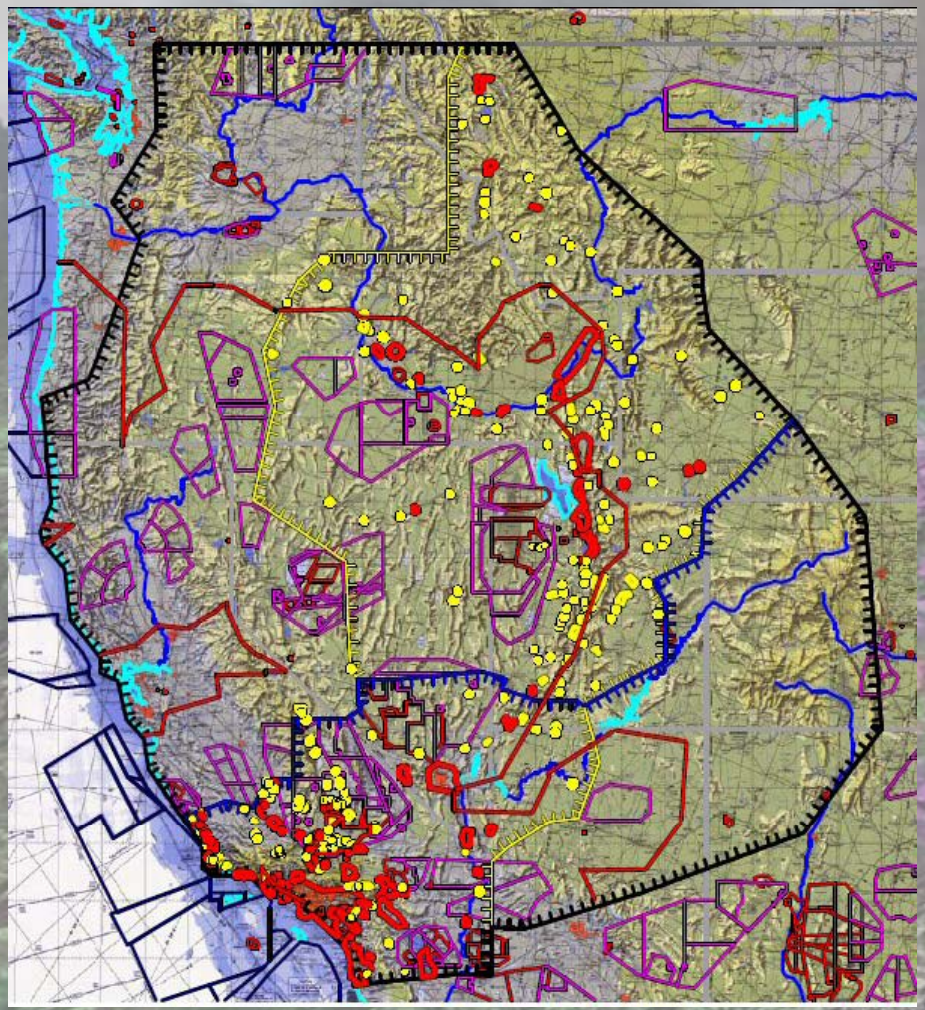


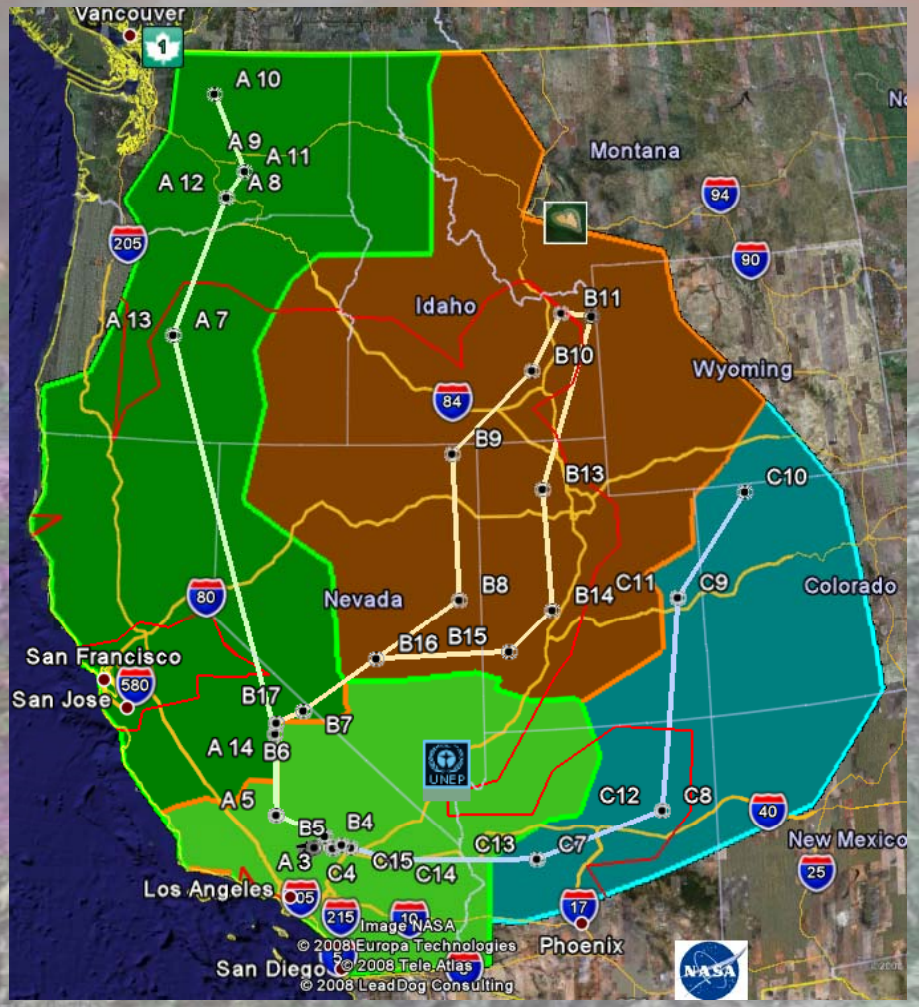




Ikhana UAS: 2009 COA Changes

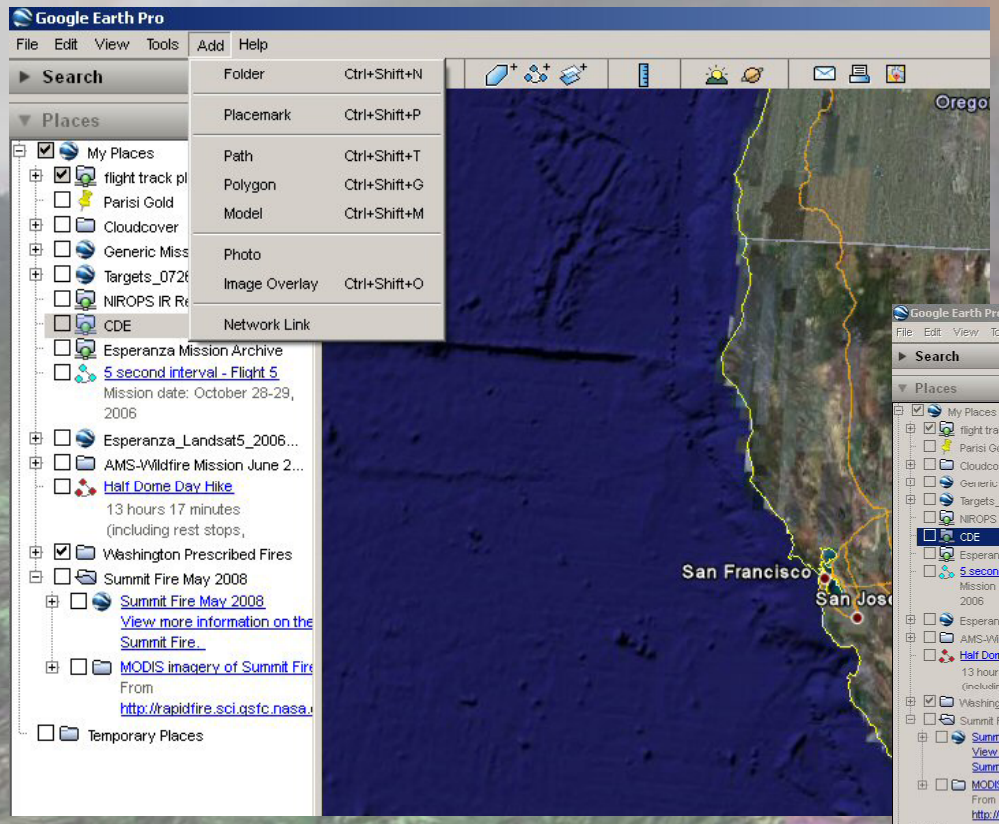
Maintain operations within 50 nm of either a Restricted Area (R) or Military Operations Area (MOA).





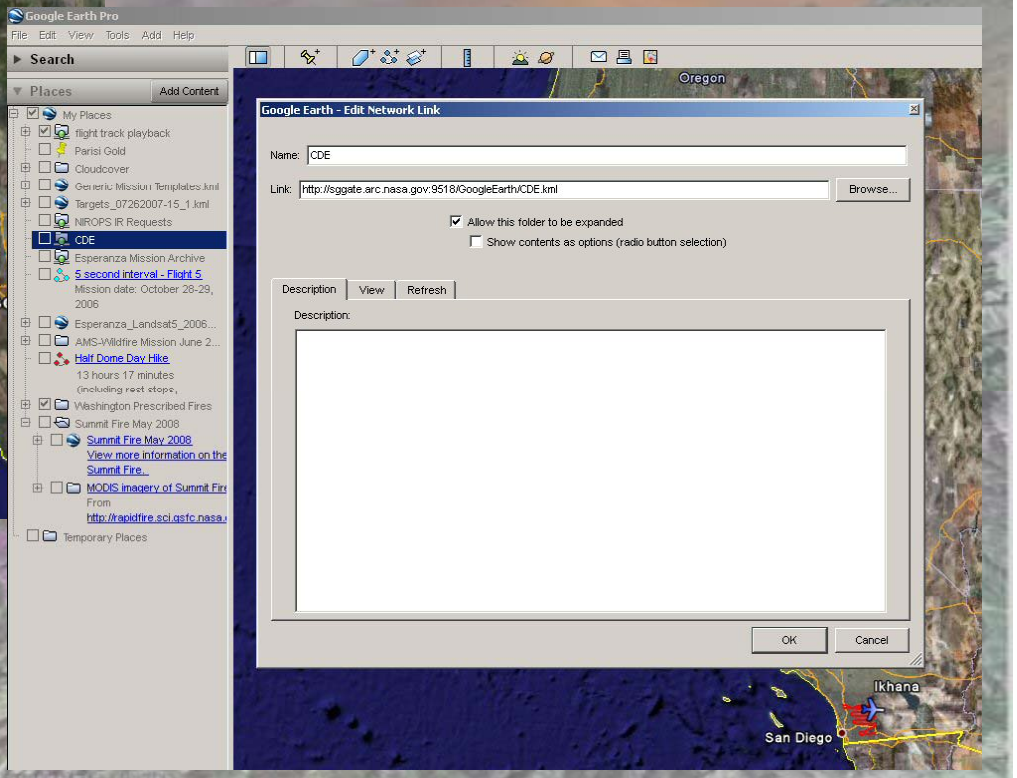
Accessing the Wildfire CDE

Step 1: Add Network Link



Step 2: Enter URL:

http://sggate.arc.nasa.gov:9518/GoogleEarth/CDE.kml



Additional Information

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vincent.g.ambrosia@nasa.gov

Wildfire Research and Applications Partnership (WRAP)
Web Site:

http://geo.arc.nasa.gov/sge/WRAP