Suborbital Science Program

Sensor Program Element

Airborne Science & Technology Lab
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U.C. Santa Cruz

University Affiliated Research Center

Sensor Element Functions

Engineering Support:

Assists with payload integrations and promotes the portability of systems by developing common platform interfaces and infrastructures

Sensor Operations:

Maintains a small suite of facility sensors and support equipment for multi-disciplinary ESD use and provides flight planning for remote sensing missions.

Sensor Technology Development:

Engages in airborne instrument technology development, specializing in infrared sensors and high-speed airborne data systems.

Engineering Support

Payload Integrations:

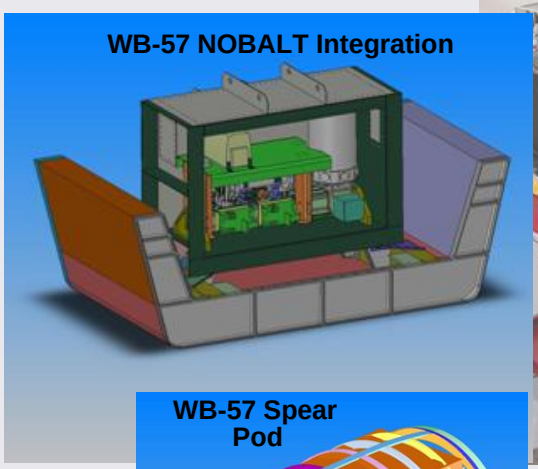
Ikhana UAS:
AMS, DCS, MicroMaps

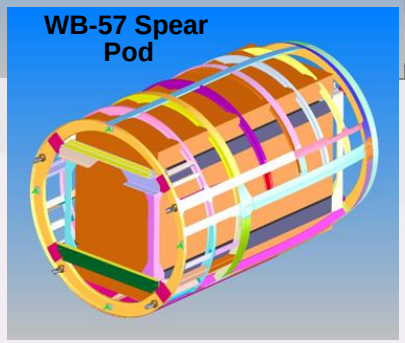
WB-57:
NOBALT, DCS, Remote Sensing Spear Pod

ER-2:
DCS & video

B-200s
LVIS Lidar, DCS

J-31:
CAR, POS-AV

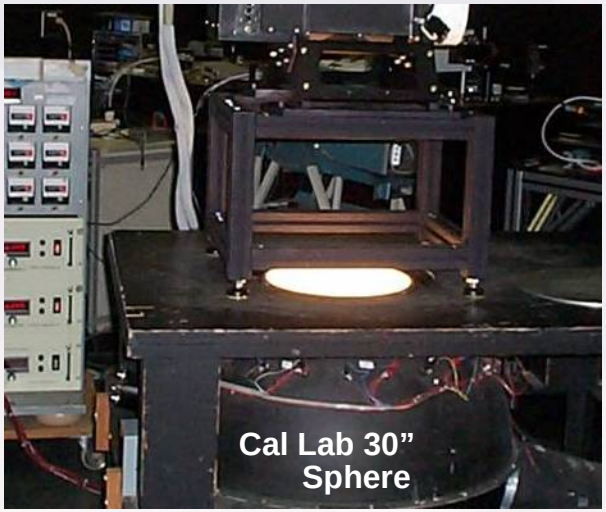




AMS in Ikhana Sensor Pod

IR Instrument Calibration Lab

Provides NIST-traceable spectral and radiometric measurements for multiple radiometers and imaging devices



Operational Systems

Sensor Systems:

UAS-Modular Sensor System (AMS)

DCS & Video Cameras

MODIS & ASTER Airborne Simulators (joint w/ EOS)

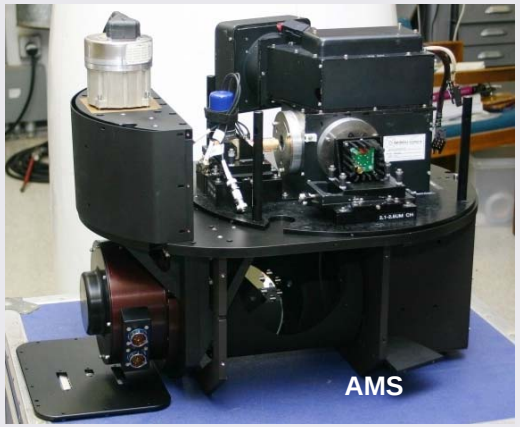
Support Equipment:

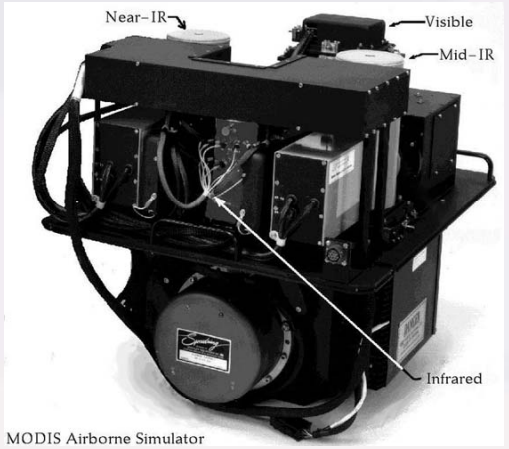
POS-AV stand-alone precision navigation systems

Navigation Data Recorders and Experimenter Interface Panels

Misc. pressure housings, power supplies, high-altitude heaters, etc.


DCS Camera


AMS



MODIS Airborne Simulator

FY06 Sensor Operations

MAS

- **CC-VEX (Maring)- 12 Flights (ER-2)**
- **Monterey Bay (Bontempi) - 1 Flight**

MASTER

- **Southern CA Faults (LaBrecque) - 16 Flights (B200)**
- **ASTER Mapping Improvements (LaBrecque) – 2 Flts (B200, ER2)**
- **EOS thermal data Validation (King) – 5 Flights (ER-2)**

DCS Tracking Camera

- **Snow Products (Maiden) - 7 Flights (Twin Otter)**
- **Coral Bleaching (Bontempi) - 9 Flights (Twin Otter)**
- **AVIRIS (Wickland) 8 Flights (Twin Otter)**
- **ASTER Mapping Improvements (LaBrecque) – 3 Flts (B200/ER2/Twin Otter)**

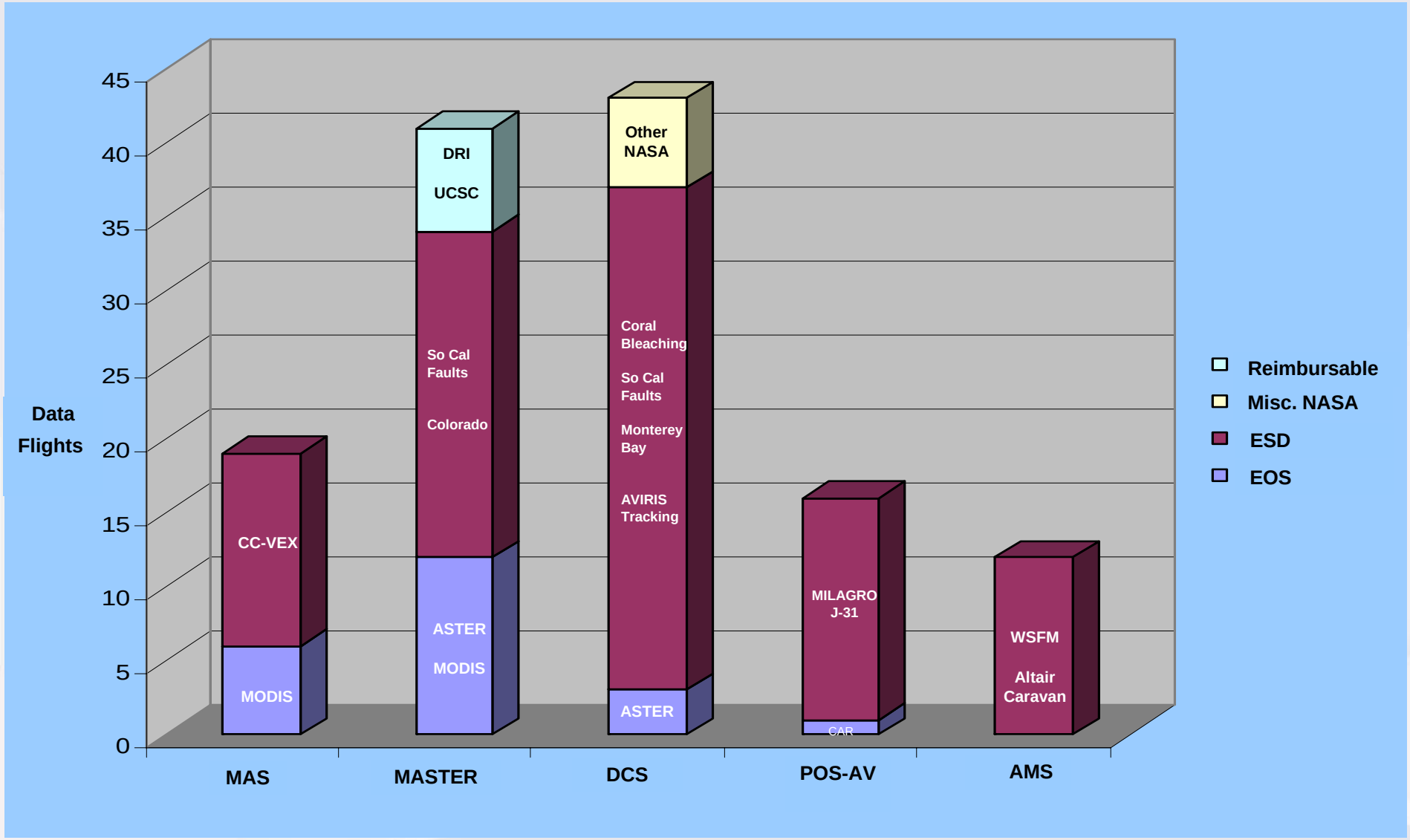
AMS

- **Western States Fire Mission (Ambrose) – 5 Flights (Altair UAV)**
- **WRAP Hunter Liggett (Ambrose) – 4 Flights (Cessna Caravan)**

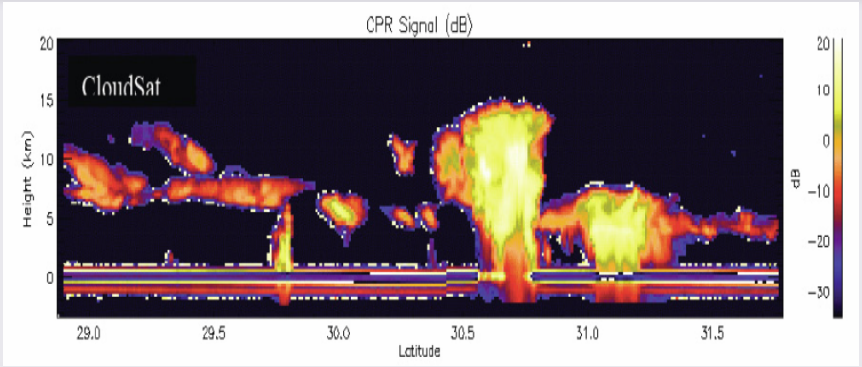
POS-AV

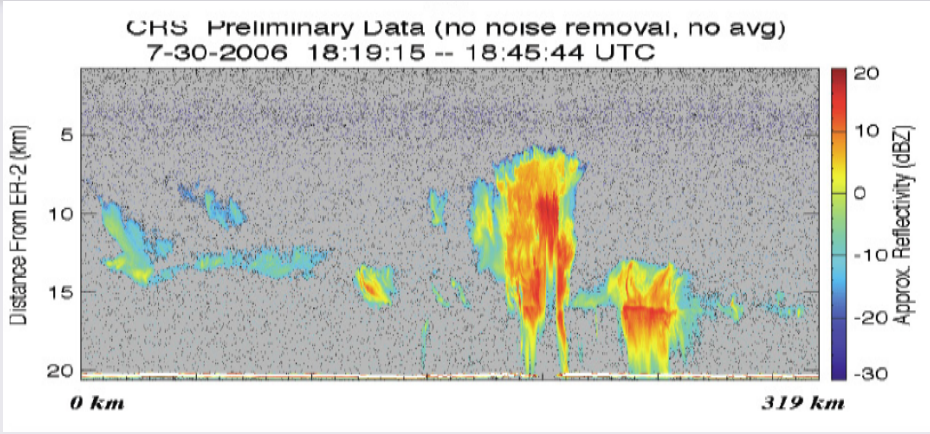
- **MILAGRO (Maring) – 16 Flights (J-31)**

FY06 Sensor Utilization

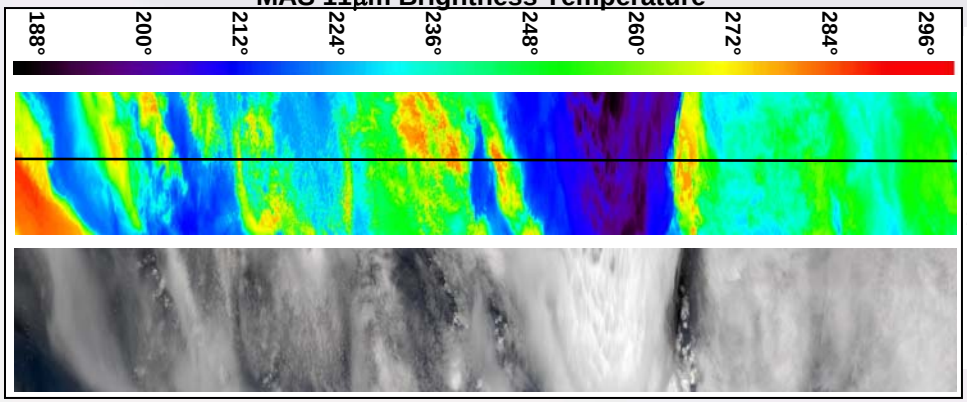


Data Collections: CCVEX

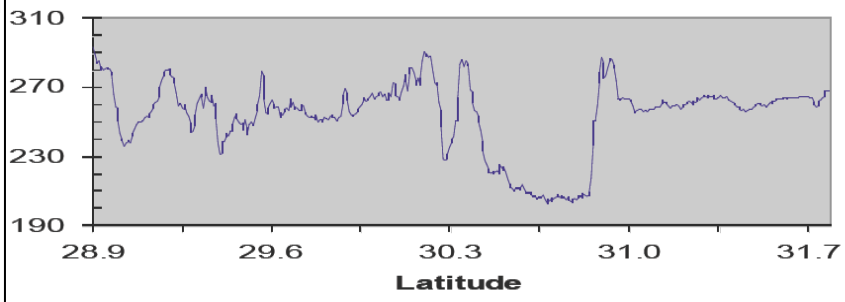


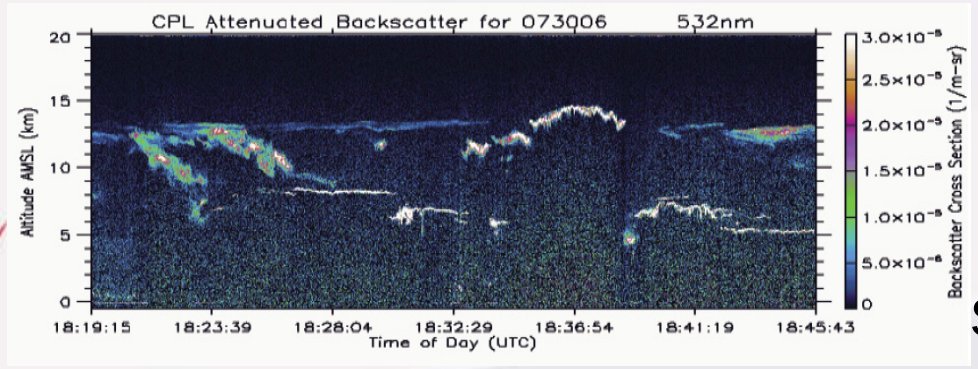


MAS 11µm Brightness Temperature



MAS 11.0um Nadir Temperature (Kelvin)





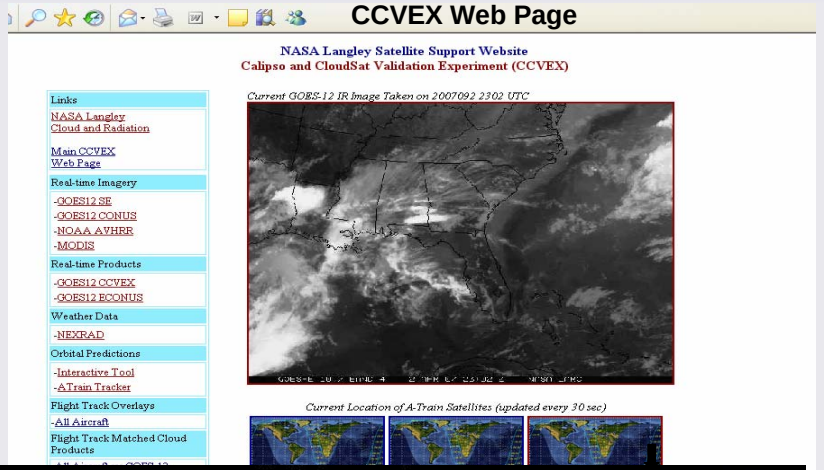
Suborbital Science Program

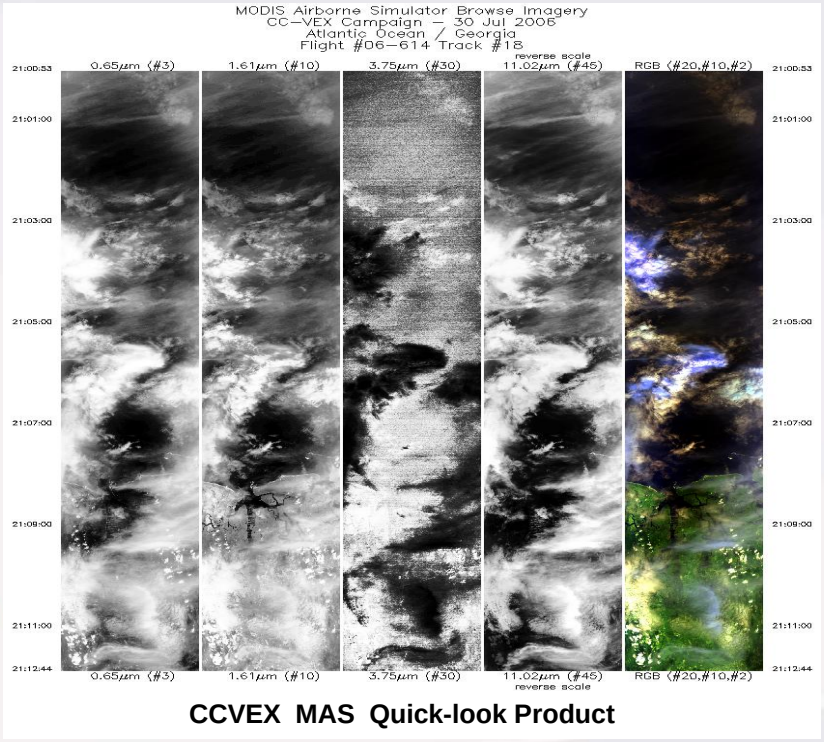
Science Support: CCVEX

Daily Generation of:

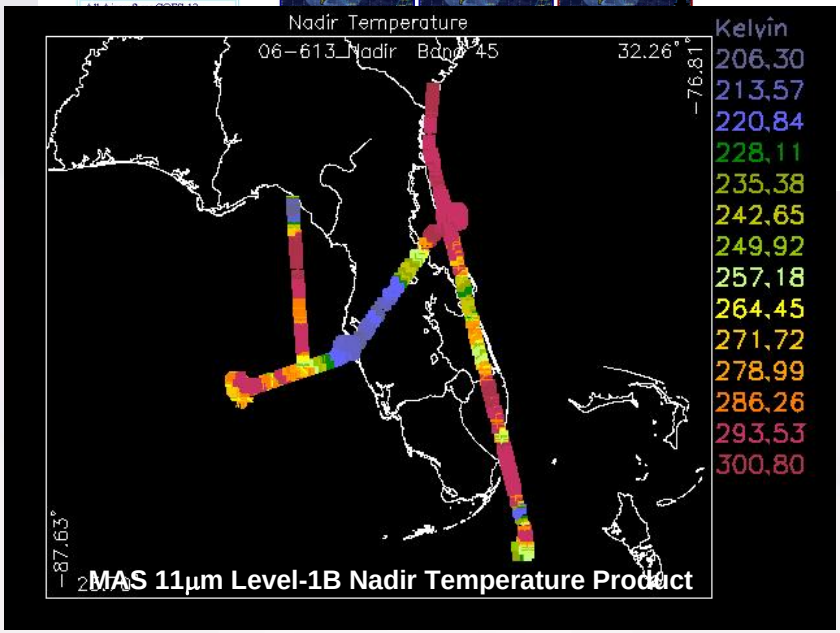
- **MAS Quick-Looks**
- **Preliminary Level 1B & L2 MODIS products**
- **Nadir Temperature data & plots**
- **ER-2 Navigation Data Products**

CCVEX Web Page Construction





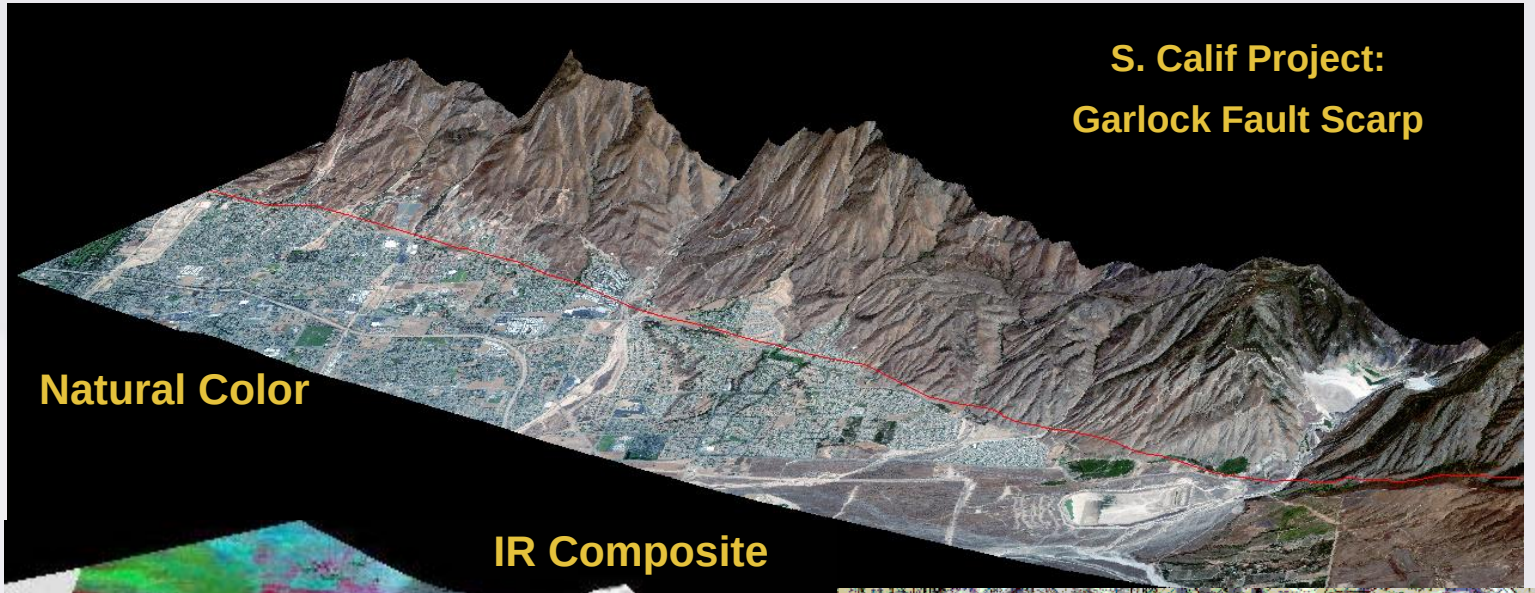
CCVEX MAS Quick-look Product

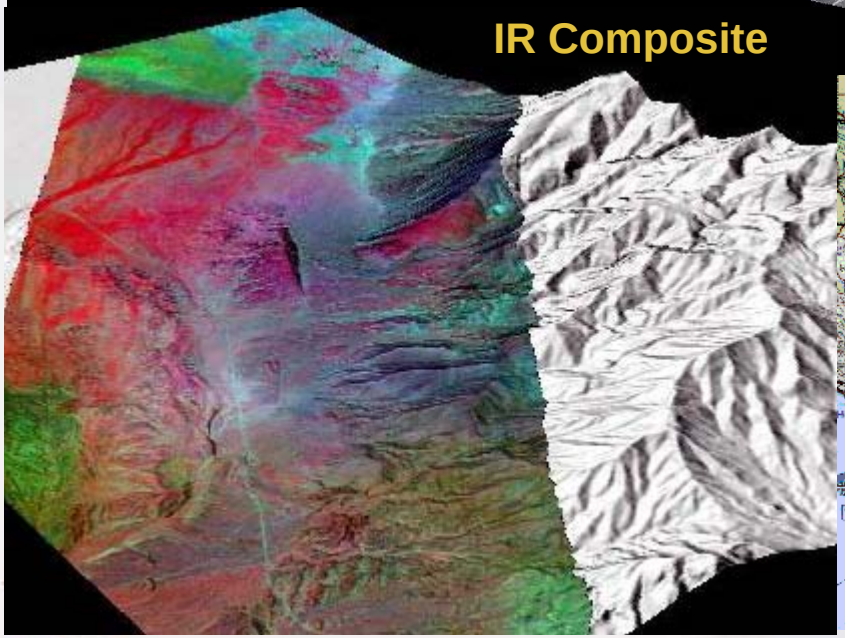


MAS 11μm Level-1B Nadir Temperature Product

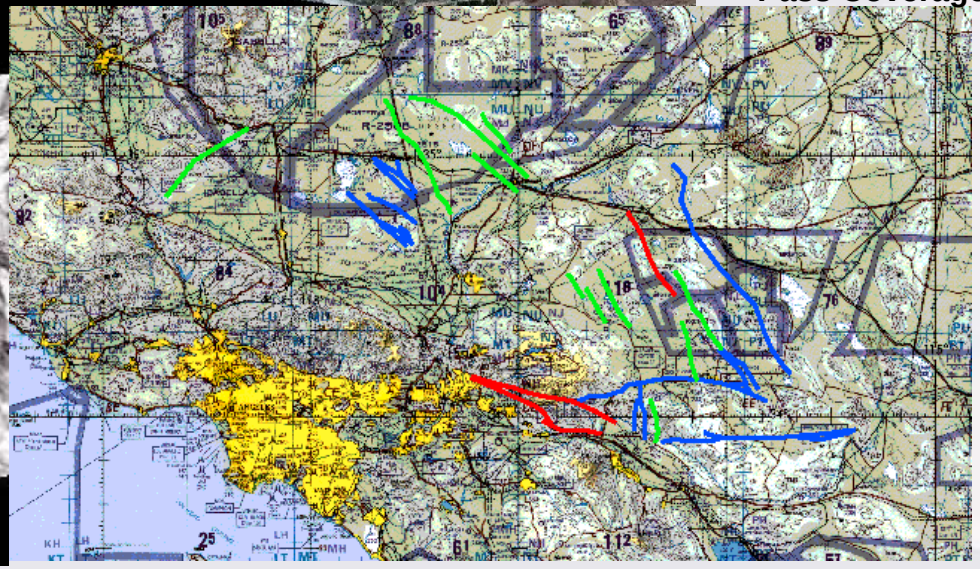
Suborbital Science Program

DATA Collections: MASTER POS-AV

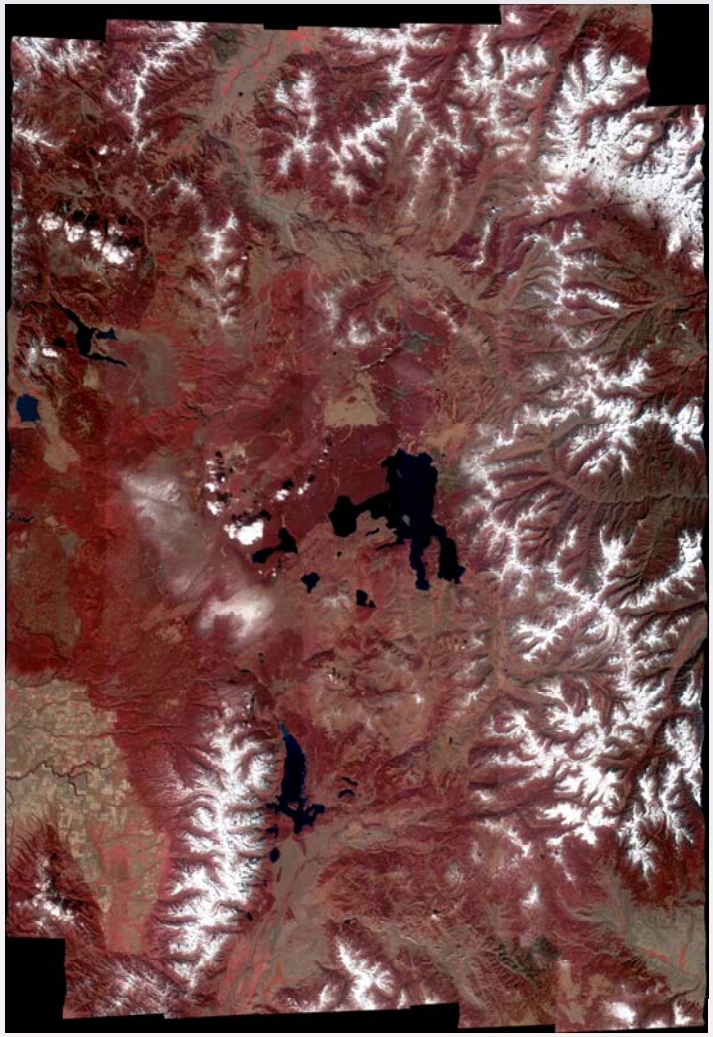




B200 Flight Lines (Day/Night Repeat-Pass Coverage)

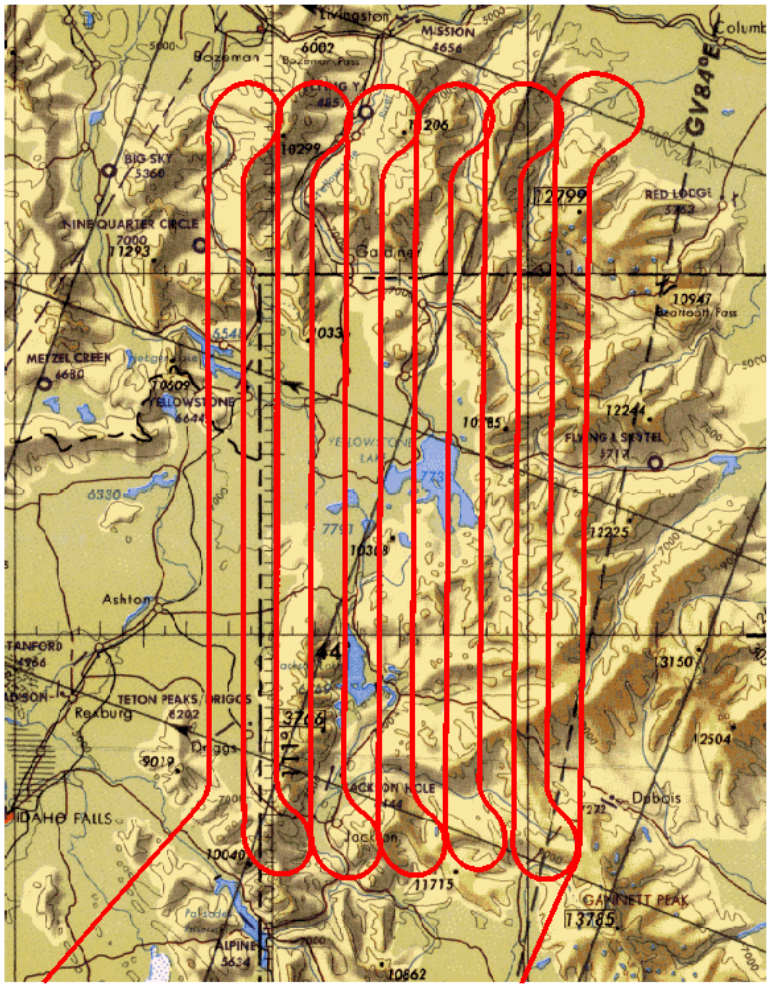


MASTER Data Collections: Yellowstone



MASTER 12 Flight Line Ortho Mosaic

ER-2 Flight Lines



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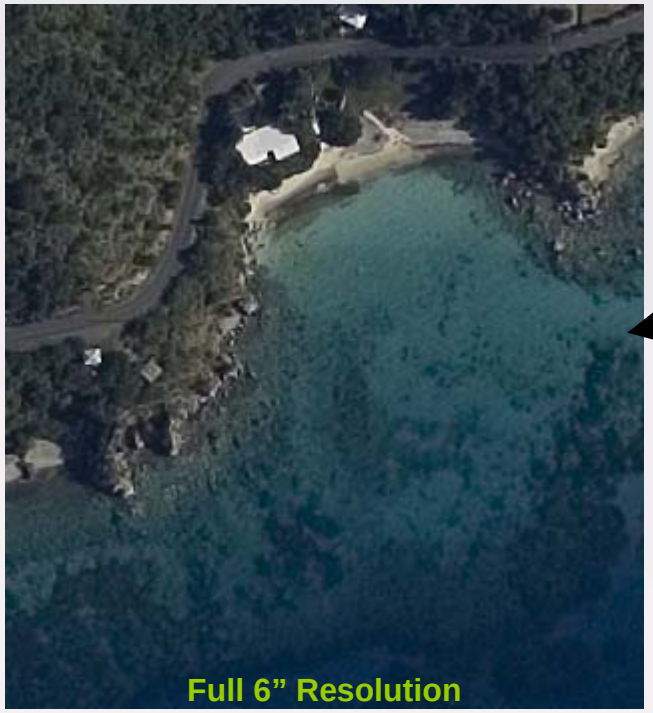
Data Collections: DCS Tracking Camera

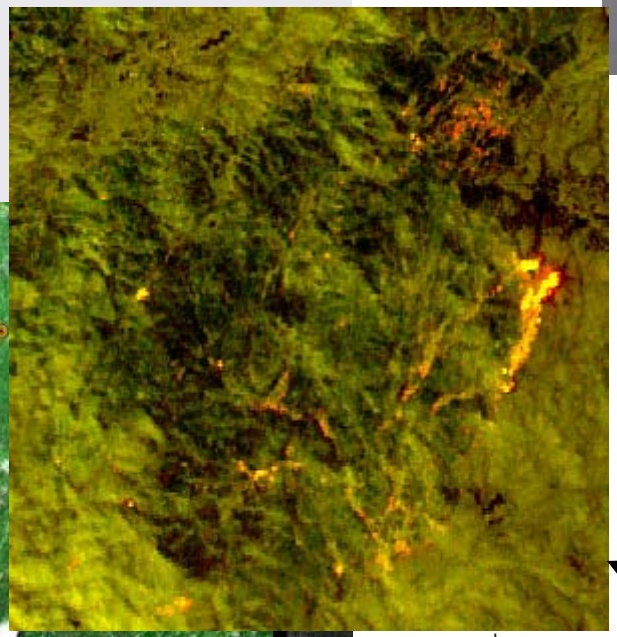
Coral Reef AVIRIS
Twin Otter Missions

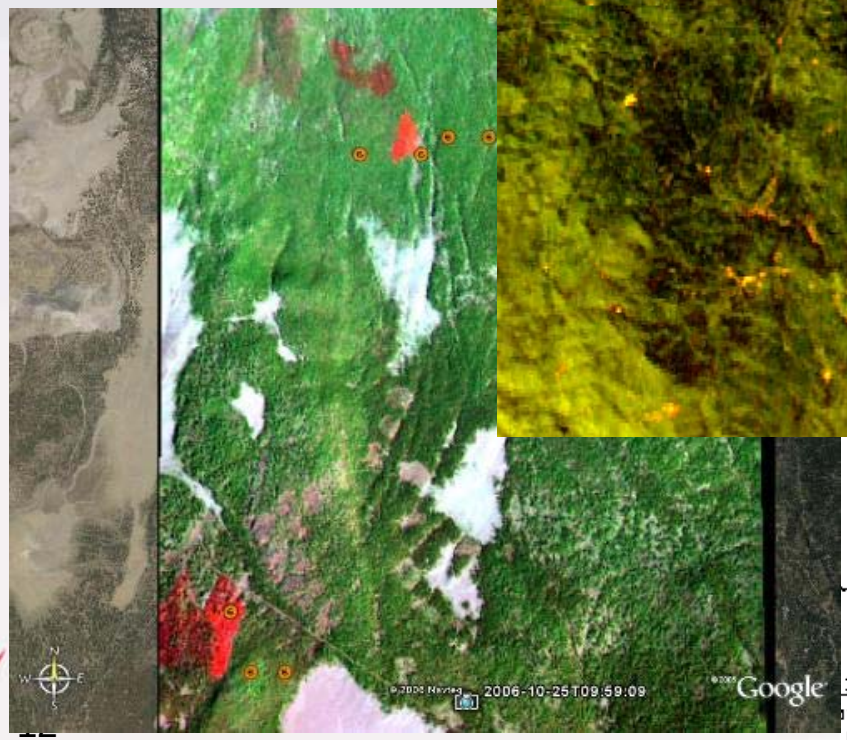
Puerto Rico (natural color)



UAS-AMS: Western State Fire Missions

- **Demonstrated extensive real-time onboard data processing**
- **Payload Sat-Com (3 Mbs down X 9.6 Kbs up)**
- **CDE & Google Earth Internet Image Distribution**
- **Joint SSP & REASON-CAN**





Real-time Data Display: Yosemite Area
10/25/06

Sensor Web Implementation
(Western States Fire Mission, 10/06)

Airborne Element

Line Scanner

POS/AV IMU/DGPS

Digitizer

Functions:

- Image Data Capture (ADC)
- NAV Data MUX

Shared Disk

Full Res. 200Hz Data (RS-232)

Payload Computer and Telemetry System (PCATS)

Functions:

- Level- 1B & 2 data generation
- Image Geo-Rectification
- Ku-Band serial interface

Sat Com Link

High Speed (3Mbs) Full Res. Data

Low Speed (9.6Kbs) C&C

Ground Element

CDE Clients

CDE Server

Functions:

- Collaborative Decision Environment
- Intelligent Mission Mgmnt. SW
- Image & Map Server

Mass Storage

Ground Computer

Functions:

- Query Handling
- Science Algorithm Processing
- Sensor C&C

Product QA/QC

DEM/DOQ Database

Sensor Technology Development

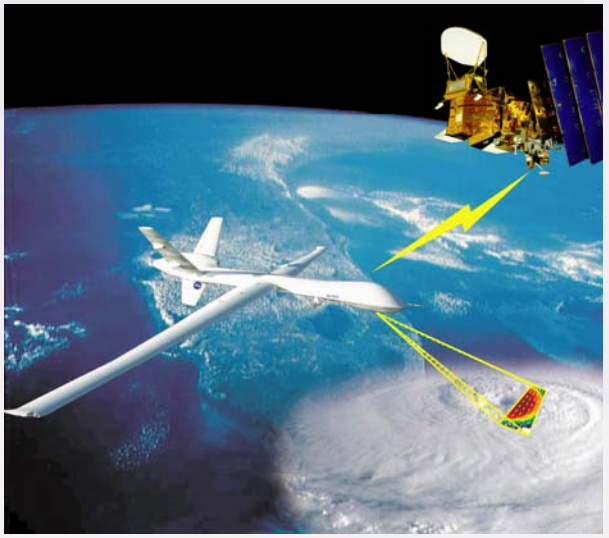
Ongoing Projects:

- UAS Autonomous Modular Sensor System
- PCATS High-speed telemetry interface computer
- New Navigation Data Recorder
- Upgraded tracking cameras (DCS, Video)
- Expanded Suborbital Web Portal

AMS and PCATS Data Systems

HQ Solicitations Supported:

- ROSES: AURA validation UAS payload
- ROSES: IPY UAS payload development
- ESTO-IIP: Ongoing evaluation of suborbital support requirements



’07 Upcoming Data Collections

MAS: CLASIC (ER-2)

MAS: TC-4 (ER-2)

MASTER: So. Calif. Seismic Surveys (DoE B-200)

AMS & PCATS: Western States Fire Missions (Ikhana)
: Ocean Color Imager test flights (Caravan or Twin Otter)

DCS: Misc. AVIRIS & MASTER Missions (various aircraft)

New Suborbital Program Web Portal

Contains Information on:

- Program overview
- Platforms
- Instrumentation & Integrations
- New Technology
- Missions

Online Flight Request Tool

Eventually to include:

- Real-Time Display of Mission data
- Internet portal for connectivity with payloads
- Interface to IMM/CDE and “Sensor Web” environments

suborbital.nasa.gov

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