

Status of the ARM Aerial Vehicle Program at DOE/PNNL

***Interagency Coordinating Committee for Airborne Geosciences
Research and Applications
(ICCAGRA)***

***Washington, D.C.
May 21st, 2008***

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Pacific Northwest National Laboratory***

Outline

- AVP Overview
- Field campaigns
- Field campaign support
- Future of AVP

AVP
Overview
Field
Campaigns
Support
Future

AVP History

- June 2006: Former ARM UAV program was re-competed as ARM AVP among DOE National Labs
- Oct 2006: PNNL proposal (PI J. Voyles) successful

AVP
Overview

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ARM Facilities



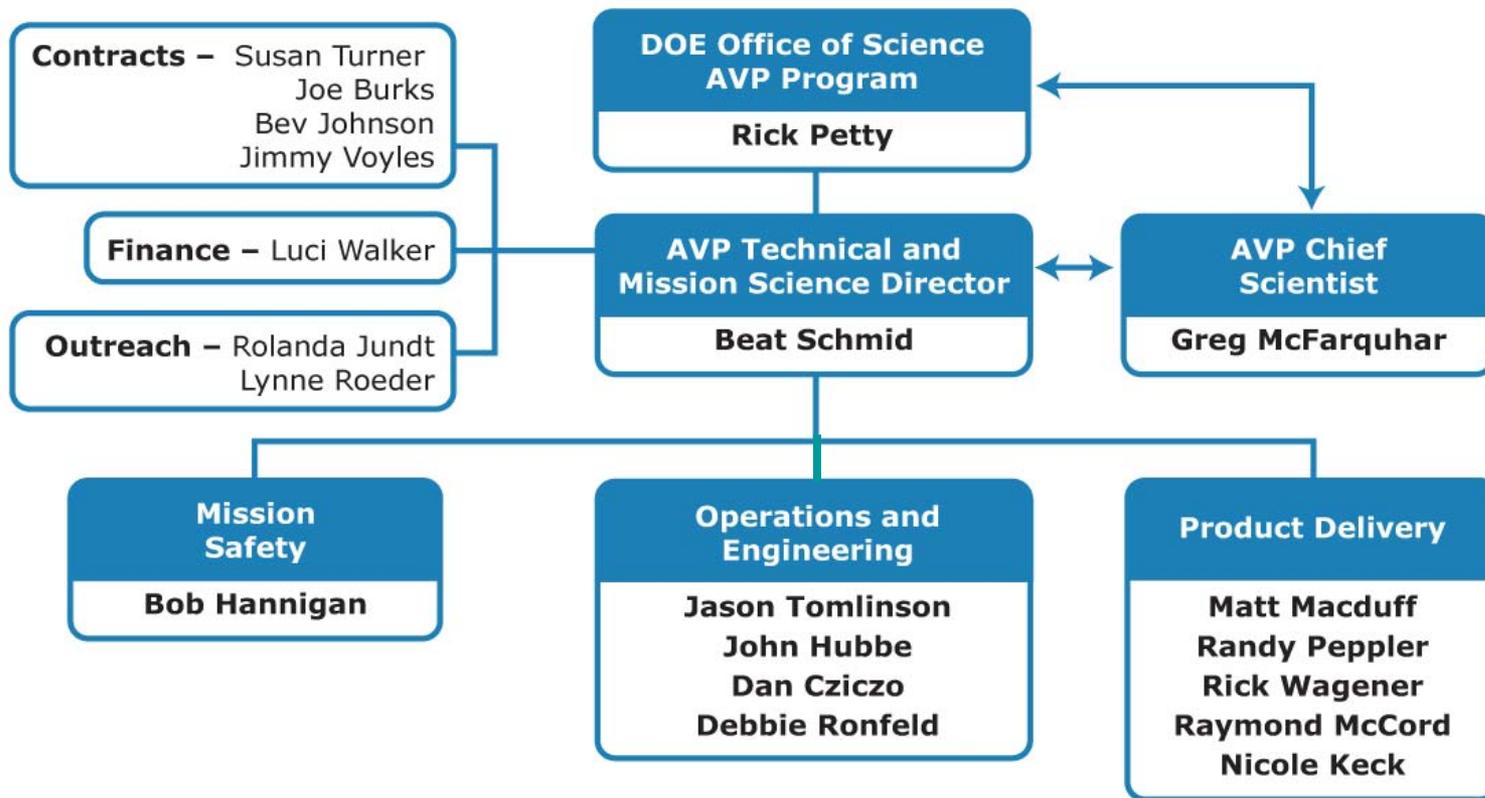
AVP
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AVP Organizational Chart



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AVP Goals

1. **Routine observations** of clouds, aerosols and radiative properties
2. **Episodic Field Campaigns (Intensive Observation Periods (IOP))** designed to contribute to our fundamental understanding of clouds, radiation and aerosols and their effects on global change
3. **Instrument maturation program** where miniaturized in-situ and remote sensing instruments will be purchased or developed,
 - small size and modularity of instruments will make them amenable to UAVs and larger aircraft

CLASIC (2007)

- Cloud and Land Surface Interaction Campaign
- ARM Southern Great Plains Climate Research Facility
 - June 8-July 2, 2007
- Coordination between 9 aircraft
 - CLASIC
 - CIRPAS Twin Otter, NASA P3, NASA ER2, NASA J-31, Twin Otter International, Duke University Helicopter, and Cessna 206
 - CHAPS
 - NASA B-200 and DOE G-1
- A data workshop was held in March 2008 and the finalized data should be available by end of the year

CLASIC/CHAPS 2007 (*in situ*)

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G-1



CIRPAS Twin Otter



C206



Duke Helicopter



CLASIC/CHAPS 2007 (*remote sensing*)

AVP
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ISDAC (2008)

- AVP Overview
- **Field Campaigns**
- Support
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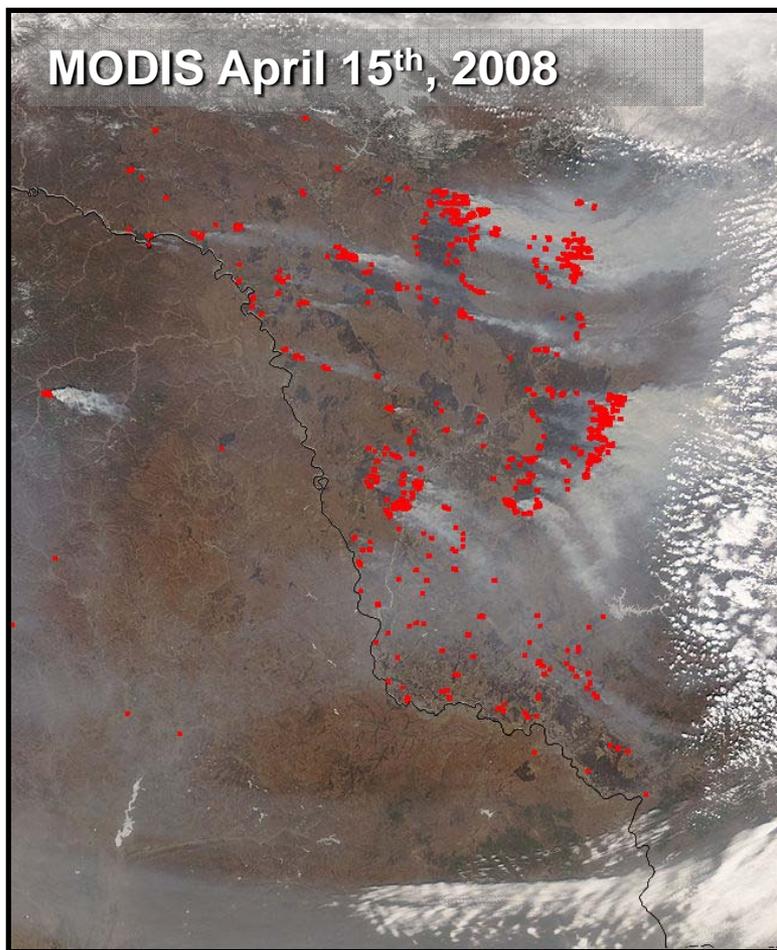
ISDAC (2008)

- Field campaign overlapped with the NASA ARCTAS and NOAA ARCPAC campaigns all based in Fairbanks, AK
 - 2 coordinated flights with the NASA B-200
 - 1 intercomparison flight with the NOAA P-3 within an aerosol layer and clouds
- Highly successful project
 - 2 golden cases for cloud aerosol interaction
 - Several cases of very high aerosol concentration resulting from biomass burning in southern Russia
 - 1 CALIPSO and 2 Cloudsat validation flights
 - Added 9 flight hours

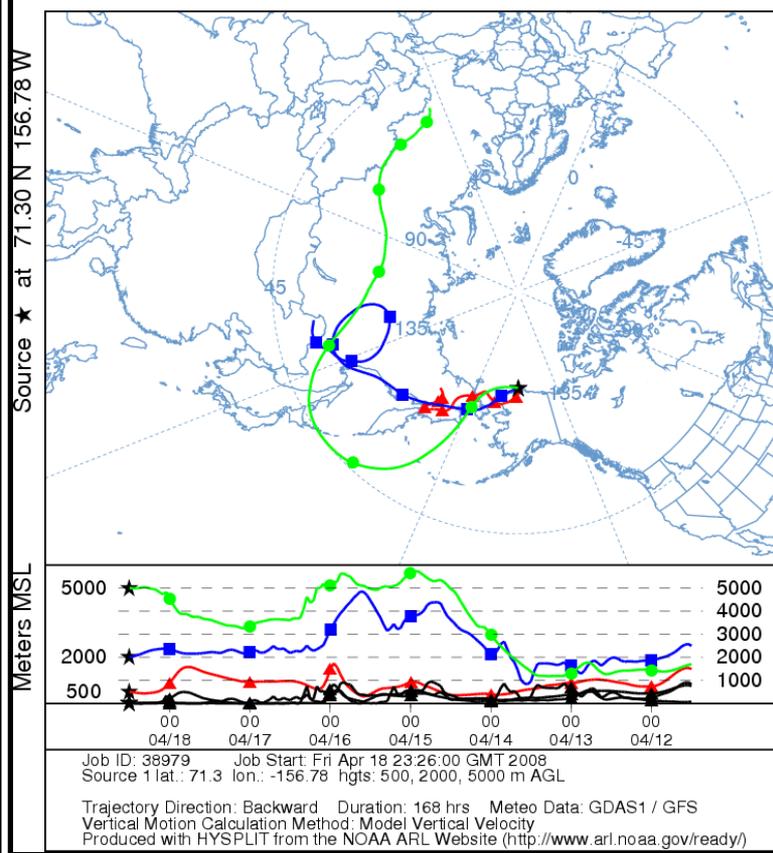
Biomass Burning

Flights 22-24 (18th) and Flights 25 & 26 (19th)

MODIS April 15th, 2008



NOAA HYSPLIT MODEL
Backward trajectories ending at 12 UTC 18 Apr 08
GDAS Meteorological Data



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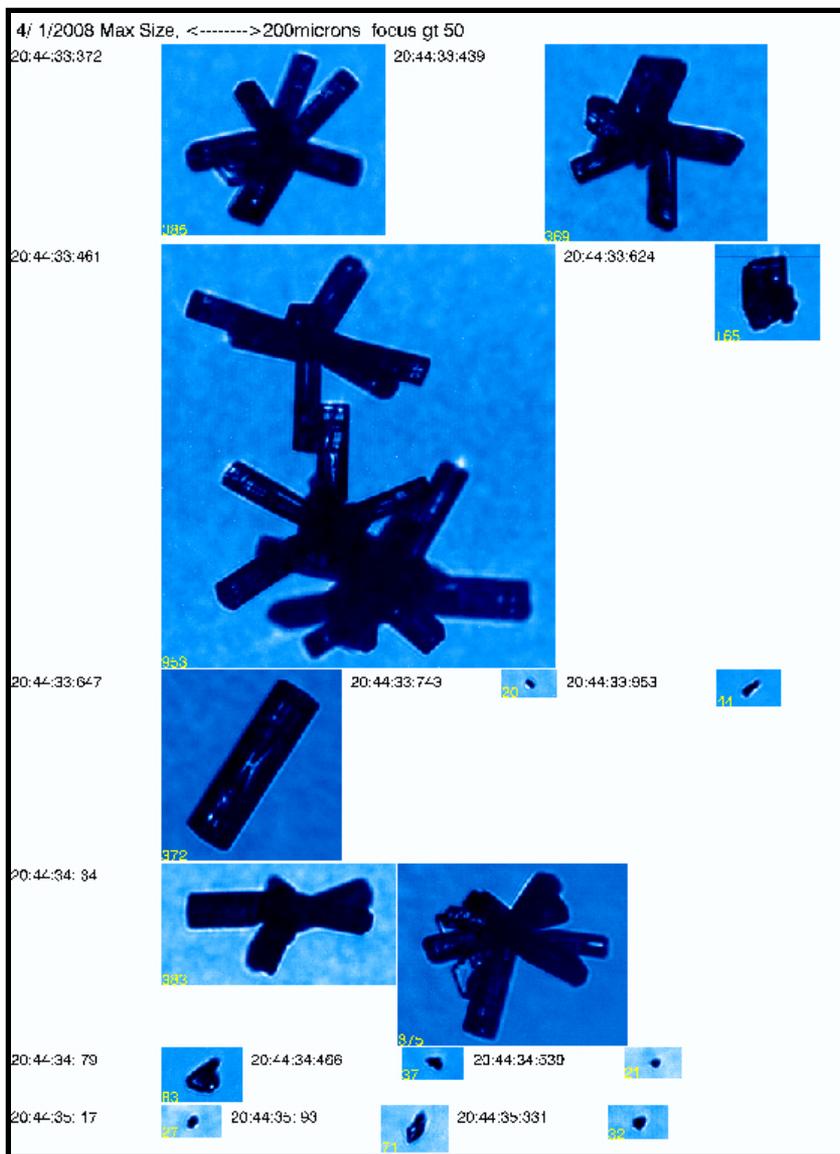
Future

AVP
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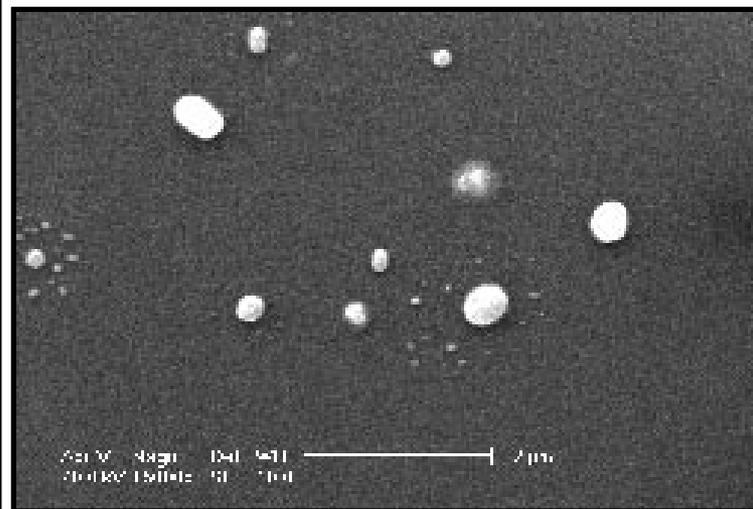
Field
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Courtesy: Paul Lawson, SPEC



Courtesy: Alexander Laskin, PNNL

New Instruments

AVP
Overview

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SPLAT-II



PNNL: Alla Zelenyuk

CFDC



TAMU: Sarah Brooks



RACORO (2009)

- Routine AVP Clouds-with-Low-Optical-Water-Depth (CLOWD) Optical Radiative Observations
- The purpose is to obtain representative statistics of cloud microphysical properties of boundary layer clouds and, in particular, CLOWD-type clouds
- Steering Committee:
 - Andrew Vogelmann, Greg McFarquhar, John Ogren, Dave Turner, Jennifer Comstock, Graham Feingold, and Chuck Long

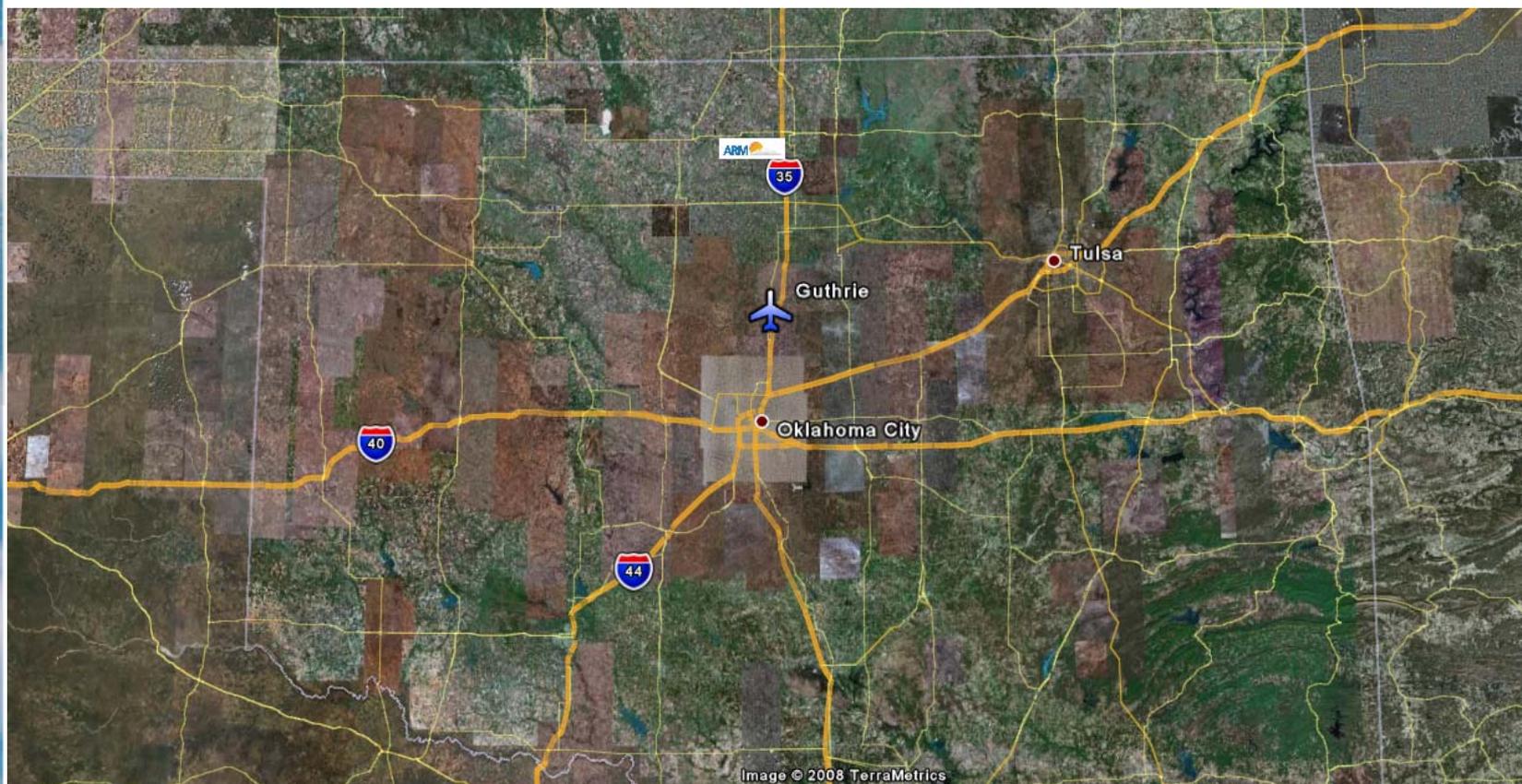
RACORO (2009)

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Routine Measurements with the Cessna 206

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- Aerosol Optical Properties
 - 2000 to 2008
- Carbon Cycle Gases
 - 2006 to 2008
- Currently reviewing proposals for 2009

WIKI

- Interactive site
 - Similar to a community bulletin board
 - Post preliminary data plots
 - Foster discussion

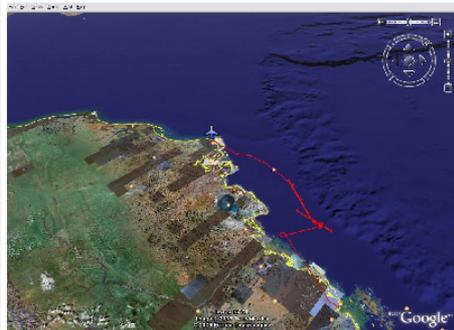
ARM Wiki » AVP » ISDAC » Isdac Research Flights » Isdac Flight 3031and 32

- ↓ [Flight Paths](#)
- ↓ [Resources](#)
- ↓ [Comments](#)

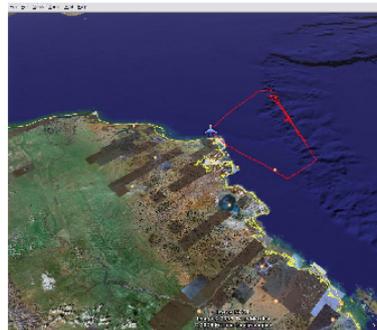
Date	Flight	From	To	Start	End	Hours
4/26/08	F30-Project-22	Fairbanks	Barrow	18:49Z	22:36Z	4.0
4/26/08	F31-Project-23	Barrow	Barrow	23:44Z	03:40Z	4.1
4/27/08	F32-Project-24	Barrow	Fairbanks	04:32Z	06:33Z	2.2

Flight Paths

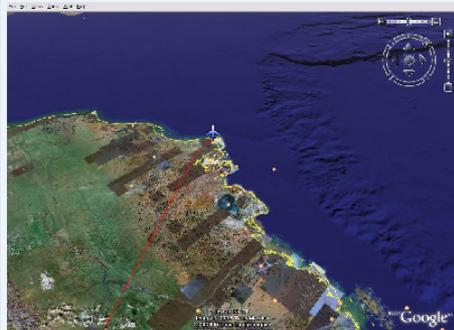
080426-ft30



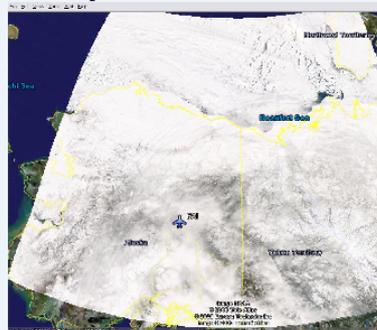
080426-ft31



080427-ft32



MODIS Image



Resources

Barrow April 26		Barrow Field Update
		Micro Pulse Lidar 06:00Z to 16:00Z on the 26th
		Micro Pulse Lidar 14:00Z to 23:59Z on the 26th
		Micro Pulse Lidar 00:00Z to 09:00Z on the 27th
	080426-ft30.kml	Flight 30 path
	080426-ft31.kml	Flight 31 path
	080427-ft32.kml	Flight 32 path
	20080426_satellite.kmz	MODIS Image for Google Earth
	20080426_00Z.kmz	00Z Backtrajectory
	20080426_12Z.kmz	12Z Backtrajectory
	20080427_00Z.kmz	00Z Backtrajectory

Comments

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Future of the Program

- Foster instrument maturation program
 - Workshop to discuss the current status of cloud microphysics, aerosol and radiation instrumentation
- Continued support of routine measurements with the Cessna 206
- Continued support of at least 1 IOP or routine campaign per year
- Increase the amount of products available to PI's
 - i.e. WIKI and Google Earth



Thank you

Jason Tomlinson

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