Rapid Deployments to Wildfires (RaDFIRE - 2016)
University of Wyoming King Air Research

RaDFIRE (Rapid Deployments to Wildfires) project

Links

- Radar and Lidar quicklooks
- Plot of flight hours
- Planning and tracking tools
- Active Fire KML file
- RaDFIRE KMZ file with link to active fire map
- Media Links
  - Wildfire Today article
  - KTVB Story
  - UWyo News
  - High Country News story
  - Pictures from the Aircraft

Reasearch Flights					
Date	**Flight# (*.kml)**	**Status**	**Times (UTC)**	**Hours**	**Crew/Notes**

Order RADFIRE Data

- King Air 1 Hz files
- King Air high rate 25 Hz files
- Optical array probes 2D images
- Wyoming Cloud Radar Level 1
- Wyoming Cloud Radar Level 2
- Wyoming Cloud Lidar Level 0
- Wyoming Cloud Lidar Level 1

User Information

- Planning Chart
- EOL Facilities

Aug 31 2016	Ferry 2	Ferry back from Boise, ID		2.2	T Drew D Kingsmill B Heesen N Guy
Aug 30 2016	RF04	Sampled west and south side of Pioneer fire in heavy cloud layer, observing plume development. Overpasses on quickly developing plume to west of core as stratus layer cleared.	2132-2507	3.5	T Drew D Kingsmill B Heesen N Guy
Aug 30 2016	RF03	Multiple overpasses of Pioneer fire during morning and early afternoon. Sampled rapidly developing plumes over main core of Pioneer fire.	1622-1959	3.5	T Drew D Kingsmill B Heesen N Guy
Aug 29 2016	RF02	Penetrated pyrocumulus cloud with two passes, very turbulent environment. Flew along the south/southeast edge of the Pioneer fire pyrocumulus complex. Also made several overpasses of a growing plume on the south-southwestern front.	2213-2544	3.4	T Drew D Kingsmill B Heesen N Guy
Aug 29 2016	RF01	Mainly a ferry flight to Boise, ID airport with brief detour over the Berry Fire. WCR transmit not turned on. Licor 7000 reference gas not turned on. Apparent water in nose boom, processed with BIAS.	1757-2047	2.8	T Drew D Kingsmill B Heesen N Guy
Flight Hours: 15.4 hours were flown out of 18 allocated.					

- Software Repository
- Projects & Data Requests
- Planning and tracking tools
- Facility User's Guide

Facility Instruments

- In Situ
- Wyoming Cloud Radar
- Wyoming Cloud Lidar

Contact

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RadFIRE 2016 Pictures

RF01

- David Kingsmill
- Nick Guy

RF02

- David Kingsmill
- Nick Guy

RF03

- David Kingsmill

- Nick Guy

RF04

- David Kingsmill
- Nick Guy

8/30/16 RADFIRE Pilot notes (Research Flight 4)

Crew: Drew, Kingsmill, Guy, Heesen

Flight Time: 3.5

Planned: N-S oriented 5 leg pattern. Then probably a single line N-S over the growth with repeated passes.

Actual: Took off and climbed to FL 230 initially. After getting maneuvering clearance, continued the climb to FL 270 due to poor visibility. Flew the first line, but offset line two to the west because of the poor visibility. While on line two, decided to fly E-W legs moving ~ 4 nm north each pass. Repeated the 3rd E-W line 4 times. On the last pass noticed that the visibility was much better on the west side so decided to do north-south passes over some smaller plumes on the west side (in between line one and two). Very quickly the visibility improved and we were able to work near the main plume which quickly went above our altitude, still targeting smaller plumes on the southwest side.

Project: RadFIRE16

Date: 30 Aug 2016

Flight: RF04

System Scientist: Nick Guy

UTC Comment

2140 Wheels up

2147 All instrument up and running.

2159 Putting WCR into idle to cool, at 36C. Before turning off the cloud layer above us was very deep, heading to 27 kft MSL.

2206 WCR back on.

2217 Stratus layer is 4-5 km thick. No visibility. Going to try E-W leg south of previous location of pyroCu.

2236 Smelled smoke at northwest extent of leg and WCR return was confusing. Don't know how to interpret.

2250 Down only WCR.

2254 Back to up-dualdown WCR mode. Didn't see too much different with previous mode.

2307 Changed to N-S line over reservoir by Pioneer fire.

2309 Descend to 25 kft MSL.

2318 New plume revealed itself, going to line up with it.

2321 Lidar may have frosted over.

2328 27 kft to try top it

2336 Main plume collapsed, there are least 4 major plumes along the south-southwest front.

0024 Switched to dualdown WCR mode.

0030 PyroCu came up to just a couple hundred meters below flight level.

0032 Observing detrained smoke from from the main core.

0106 Wheels down.

Notes:

Flight Summary:

Sampled west and south side of Pioneer fire in heavy cloud layer, observing plume development. Overpasses on quickly developing plume to west of core as stratus layer cleared.

8/30/16 RADFIRE Pilot notes (Research Flight 3)

Crew: Drew, Kingsmill, Guy, Heesen

Flight Time: 3.5

Planned: N-S oriented 5 leg pattern. Then probably a single line N-S over the growth with repeated passes.

Actual: Took off and climbed to 16,000 ft. We then climbed to FL 200 eventually working between FL 240 and FL 200. We started to fly the pattern. After line one, decided to climb to FL 240 for line two because of cumulus growth between line two and three. After completing pattern returned to line three and repeated. We flew one line one nm east of line three but then settled on one nm west of line three. We extended the north end of the line about two nm and shortened south end about two nm.

We repeated the modified line until the cumulus again climbed through our altitude. We went around the buildup (west) on the second to last pass (southbound). We repeated the line one last time, but reversed course (back to the south) prior to entering the Cu cloud which by then had grown several thousand feet above us.

Project: RadFIRE16

Date: 30 Aug 2016

Flight: RF03

System Scientist: Nick Guy

UTC Comment

1630 Wheels up

1635 Laser on, WCR powered up.

1639 All inststruments up and running. Ascending to 16 kft MSL.

1646 Ascend to 20 kft MSL. Going to point 1 on pattern.

1649 On track.

1653 Climb to 24 kft MSL, the main central plume is higher than 20 kft and growing.

1700 No WCR return at the surface.

1702 Lidar return in the upper smoky stratus layer.

1717 Strong returns from smoky stratiform layer near flight level, lower on the southern extent of track.

1719 Beginning final leg or prescribed mapping pattern

1722 From 1719 - 1722 an interesting lidar signature was observed, sloping and depolarization was unique.

1726 Seeing patchy weak return in bottom 3 km.

1738 Layer at and below flight level is higher on the north side of track. Also on north side a layer above is evident.

1748 Saw what may have been a northward tilted plume on this line. Extending northern leg 2 mi.

1758 Intense growth to our east near the end of that track.

1807 Upper level clouds are much thicker than at the beginning of the mission.

1819 Collecting some ice from probable supercooled water.

1831 On the last northward leg, the plume below was nearing merger with the thick stratus layer extending below us.

1834 Descend to 20 kft MSL.

1846 Shifting the line to the east.

1852 Penetrated a plume.

1902 Plumes merged with stratus layer, hard to tell how far they are penetrating. Some just to flight level

1909 Passing through nad near tops of plumes on southward pass. Growing fast.

1911 Ascend to 24 kft MSL for northward leg.

1918 Passed over multiple plumes? Becoming more difficult to distinguish individuals.

1924 Redirected around a nasy looking plume. We are avoiding them now.

1930 Can really see these monster plumes merging visually now.

1935 Swung directly west of the plumes. Lots of development.

1940 Stratus layer is decreasing in depth to the southern side.

1941 Will likely return to Boise following the flight.

1956 Wheels down.

Notes:

Flight Summary:

Multiple overpasses of Pioneer fire during morning and early afternoon. Sampled rapidly developing plumes over main core of Pioneer fire.

8/29/16 RADFIRE Pilot notes (Research Flight 2)

Crew: Drew, Kingsmill, Guy, Heesen

Flight Time: 3.4

Planned: NE-SW oriented 5 leg pattern. Then probably a single line NE-SW over the growth with repeated passes.

Actual: Took off and climbed to 16,000 ft. to cool down the radar. I later asked for 13,000 ft. but an ARTCC radar site was out of service and 16,000 ft. would be the lowest for the day.

Flew line one, penetrating the cu for a couple of miles and the turn to line two. We encountered continuous turbulence while in the cloud. After exiting the cloud we climbed around point two to FL 240 eventually working between FL 240 and FL 250. We continued the pattern shortening the north end prior to the Cu. We flew through the tops of a smaller cu (on line four?) during the turn, but noticed quite a bit of static on the radios possibly indicating that aircraft was building a static charge. Because of the possibility of a lightning strike on the aircraft and the moderate turbulence we decided we would try to avoid the Cu buildups and sample the Cu remotely with the radar/lidar.

We then flew an E-W line along the southern edge of the Cu, however, we ended up flying more of a bow around the southern edge (two relatively straight lines) for a couple of passes in order to obtain radar data. (Otherwise we would have been sampling clear air for much of the leg). At this time the Cu appeared well above FL 300.

We spotted some lower Cu growth several miles to the south west of the main plume (well below us and decided to set up a line NE-SW (along the wind) over this new growth. We flew this line repeatedly with variation to ensure the aircraft passed over the targeted growth. The northern part of the line was along the western side of the large Cu.

Project: RadFIRE16

Date: 29 Aug 2016

Flight: RF02

System Scientist: Nick Guy

UTC Comment

2223 Wheels up.

2233 At 16 kftMSL. to help cool the radar, > 36C at takeoff.

2240 WCR running, weak returns upon entering smoke column

2253 Went through updrafts greater than 20 m/s and pretty severe turbulence on line. Lidar return not very strong. It got

2259 Climbing to 18 kft MSL.. Changed to WCR dual-down mode.

2309 At 24 kft MSL.for next pass

2316 Penetrated cloud, but picking up static. Won't be penetrating any more.

2317 Heading up to 25 kft MSL.

2319 on 5/6 line.

2326 Picking up 3 layers below on WCR.

2331 Level off at 22,700 ft MSL for next passes.

2336 Switching to up-dualdown on WCR mode, climbing to 24 kft MSL.

2341 The growth rate is amazing with these clouds, after the pass through cloud, it popped up 3-4 kft .

2345 Lost XChat. We seem to have service, but failure to connect.

2345 On longer straight leg

2347 Seeing around 0 dBZ, bowing line, so big turn to follow front.

0008 Making passes over a line.

0018 Before this turn, returns of nearly 15 dBZ at surface.

0116 Made multtiple overpasses and seeing layered structure rising toward the northeast.

0132 Heading back to Boise

0142 Wheels down

Notes:

Lidar was not working at least following the turbulent portion of flight, may be misaligned.

WCR picked up strong echo return.

Picked up static in cloud, no return to cloud was made.

Flight Summary:

Penetrated pyrocumulus cloud with two passes, very turbulent environment. Flew along the south/southeast edge of the Pioneer fire pyrocumulus complex.
Also made several overpasses of a growing plume on the south-southwestern front.

8/29/16 RADFIRE Pilot notes (Research Flight 1)

Crew: Drew, Kingsmill, Guy, Heesen

Flight Time: 2.8

Planned: Fly to the Berry Fire make a pass to observe the activity and then continue to KBOI.

Actual: Took off and climbed to FL 240. Descended to 16,000 ft. and flew to legs over the Berry fire.

Continued to KBOI at FL 240.

Project: RadFIRE16

Date: 29 Aug 2016

Flight: RF01

System Scientist: Nick Guy

UTC Comment

1806 Wheels up

1830 A/V computer is ghosting.

1840 Turned on WCL and WCR, operating fine.

1844 No change in A/V computer, rebooted again with no effect.

1849 Stopped Lidar data collection and WCR radiat until closer.

1901 A/V computer back up after long shutdown.

1918 Descending to 16 kft toward the Berry Fire. Good plume coming out.

1920 Lost AV computer connection

1924 Images and Licor still working.

1928 Nothing on the first two passes over Berry fire

1943 Got the front screen back up and running. KA Monitor corrupted the limits file.

2004 Shut down WCL and WCR and Nezverov.

2028 Descending into Boise for refuel.

2044 Wheels down.

Notes:

A/V computer experiencing "ghost mousing", unable to start the Licor or down/fwd cameras.

Had to shutdown the A/V for an extended period (10 min?) and brought back up without USB. Seems to be working.

Flight Summary:

Mainly a ferry flight to Boise, ID airport with brief detour over the Berry Fire.