

Aircraft Flight Log for the University of Washington, Cloud and Aerosol Research Group

Date 12-15-00	Flight Number 1844	Main Goals of Flight TEST CLOUD INSTR. PACKAGE, LWC, PARTICLE IMAGING SYSTEMS, ^{350Hz} RADAR, COOL W/FAA IN USE OF WARN. AREA TO SAMPLE CLOS FOR NO MORE THAN 30 MIN IN WARNING AREAS OR BEFORE - FLYBYS AT END OF FLT PLANNED	
Project name IMPROVE Test			
Engines on time 2110 UTC	Engines off time 2300 UTC	Which of the Main Goals were Essentially Accomplished? WARNING AREA BRVD NOT FLOWN IN; INSTEAD WENT TO WARNING AREA ALPHA VCTY ULL; THIS TURNED OUT TO BE AN AREA W MORE FAVORABLE CLOUDS, THOUGH EXCLUSIVELY SC RATHER THAN CU. LOWEST TOP TEMPS ~ -7.5°C, VERY LTL ICE NOTED, MAX LWC AROUND 0.8 GM³ AND DRUP CONCS 100-150 CM⁻³. SAMPLING OF CLOS WAS BY GRAD DESCENT IN CIRCLE WHERE THICKEST CLOS APD W DESC AT 100 M MIN⁻¹ TO BA, SOME CUFA ELEMENTS W/LWR BASES PRESENT & TARGETED THOSE ON 100 M MIN⁻¹ ASCENT. FW WHITECAPS, ARID PIREP GRDIT FOL WINDS ~ 9-10 MBS, INDICATED ONLY 10 MKTS FR NORTHWEST. INV. VERY STL WITH MAX TEMP -1.5 TO -2.0 MDV	
Departure airport PAE	Arrival airport		
Flight Scientist signature C. Ravnina		Other Accomplishments CLO TOPS, LTL DR NO SIG TO PICKUP ON RADAR, SO BUST THERE. POWER SHUT OFF OCCURRED TWICE, FIRST CAUSED LOSS OF ~ 5 MIN DATA ENROUTE TO CLOS. 2ND ~ 2:30 PM, CAUSED TERMINATION OF MISSION. WINDO FURTHER DATA RECORDED. FORTUNATELY IT OCCURRED JUST AS WE WERE EXITING CLO TOP. DUE TO GENERATOR.	
Pilot signature [Signature]			
Surface met. & visual obs.		Clouds sampled in flight	Ac
a) At takeoff 1 ⊕ FW SCN CALM 50+ VSBY			As
b) In flight ① ⊕ ⊕ SC TIPS -7.5°C ACG CONST, LTL PCPN			Ns Sc
c) On landing 1 ⊕ 50+		St	
		Cu	
		Cb	
Research crew SPALBERG GRANT WILSON RABONO	Equipment failures DAT STILL NOISY 2-PP CLEAN AIR IMAGING TSTAT TOO HIGH WINDS UNRELIABLE BUT HELP ON THE WAY!	Additional Comments on Flight	

Flight 1844
December 15, 2000
Voice Transcriptions*
IMPROVE (Flight testing)

1:23 PM

DS: I just wanted to make sure it was working.

GG: I just tested it.

DS: Okay. There's no hangover.

GG: I've got a busted mike wire up here or something.

DS: The other thing I found back there is somebody had moved our intercom cable on the CAR rack to the CAR data feed, which might have grounded it to something as well.

1:24 PM

TW: Hey Don.

DS: Go ahead.

TW: Is this a good time to zero the PWM?

DS: Sure is.

1:25 PM

AR: Larry, do you copy?

LS: Art, go ahead.

AR: I have an impression back here with some of us that there is more vibration and noise than we're used to. Is the prop sync okay and all that?

LS: Well, we've got them in sync. I don't know how well we're syncing.

AR: Because I'm pretty sure it's a little more rattle than we had the last flight. We really notice it up toward the flight scientist area.

* AR = Art Rangno, DS = Don Spurgeon, GG = Grant Gray, TW = Tom Wilson

LS: Tell you what, Art, I'll go ahead and start them over again and we'll go back to standby and see how they do.

AR: I'll roger that.

DS: Say again.

TW: Do you want me to move the switch down?

DS: Yes.

1:26 PM

TW: Don, were you guys working on t-tot or t-totr?

DS: T-totr.

TW: Okay. Because t-tot is way out of whack. I think it was getting something like 160. It was hopping all over the place. It looks pretty good now. It was really hopping before. Does it take time to warm up or anything?

DS: It shouldn't take much time to warm up.

TW: It's looking good now.

DS: It was the reverse flow that we were working on to get rid of that noise from the radio transmissions.

TW: Right. I wonder what was going on with t-tot. Maybe it was something to do with the speed or something wasn't set up yet or something.

1:28 PM

AR: We're a little slow getting any word on the audio here. Flight 1844 now we're just passed Shelton actually a little bit ago. There was a little snow on the ground there and have some slash burns down there. Plumes going offshore now indicating that they're beginning to sense that next storm system. We have scattered cumulus and stratocumulus, cumulus fractus really. Cumulus humilis in more stratocumulus off in the distance, solid stratocumulus I should say with mounding tops toward the southwest and south. The excitement that we had was it seemed that there was a lot of vibration when we were taking off. On the runway, I noticed sitting in the back there was a lot of shaking I didn't remember feeling before and they said they were going to pop-sync the engines again and anyway in the last 5 min and the vibration has lessened at least touching the bubble rim here. On board are just the four of us, Tom Wilson, Grant Gray, Don

Spurgeon and myself (Art Rangno). Clouds appear to be topping out at around 8,000 ft or so judging from the tops of the Olympics and Mt. Rainier sticking out well above them. We have an advancing.

LS: Art, are you up?

AR: Yes I am.

LS: I know you wanted to go through the clouds on the way down. I think they're so low we'd be below our minimum altitude. We could go down there on the I-4 clearance.

AR: Roger. They don't look like much anyway, so we can just wait until we can get to that deck out there I guess.

LS: Okay.

1:31 PM

LS: Art, how is the vibration back there now? It seems like we're synced a lot better.

GG: He's on his way up.

1:32 PM

AR: The vibration seems to be less now, so whatever you did seems to have changed things. Our wind direction here, using Tom's method, is -61° from magnetic north, which would be about 320° true, and 34 to 35 knots. That's looking pretty good for this situation. We're just about to in the next couple of minutes begin overflying some shallow stratocumulus clouds. They look a little disappointing frankly because I was hoping for a little more liquid water content. I don't see any bubbles out this way, at least not beyond or at least to the left and right of the plane, other than straight ahead, which I can't see due to the attitude here.

LS: Art?

AR: Roger.

LS: We request I guess they gave the military was for 237 Alpha and Delta and they don't touch each other, so we've got to take one or the other, probably Alpha.

AR: That's the one off to the north?

LS: Alpha is the one right off Hoquiam.

AR: Okay. Well that's great. Let's take that one then.

1:38 PM

AR: We want to do what we did the other day in that stratiform cloud just a slow porpoise from the top to the bottom and back up again and we'll do that a couple of times and in that warning area and then we'll probably head back.

LS: Art.

AR: Roger Larry.

LS: It looks like whoever requested the warning area has requested the wrong one because we have Charlie and Delta and we don't have any way to get out there to them.

AR: It could be Mark Stoelinga. He's not real experienced in these things. When you say we can't get out there, do you mean it's too far?

LS: No, we can get out there, but we don't have clearance through Alpha and Bravo.

AR: Roger, I understand. Okay. Well, let's not do that then. Off there about 9 o'clock there are a few little turrets out there just sticking above the stratocumulus and to me those look like they are going to be the best test of our liquid water measurements because that's where the highest liquid water is going to be. They're out maybe 5 miles, maybe 8 miles, at 9 o'clock.

LS: Yes, I see them. We're not going to be able to operate in them, Art, because we're in an IFL flight plan and we've got to get into that offshore to be able to. It's below the minimum altitude and the center won't let us go down that low in clouds.

AR: Roger. I understand. I was thinking they were offshore. I'm sorry I made that error. That's the kind of cloud we were looking for is some kind of mounding turret above the flat stuff and frankly I don't see much right at least in the field of clouds I can see. Do you see anything dead ahead that looks like a mounding something coming on top of the stratocumulus.

LS: No, I sure don't, Art. If I see anything out here that you're going to be able to use.

AR: We found these stratiform clouds where we can fly, which I presume will be kind of southwest of Hoquiam then.

LS: Not if we can't get into the warning area because 237 Alpha is not open to us because it was not requested.

AR: I see. Isn't there a little slot about 250 true that you can go between the warning areas?

LS: I can give the Center a call and see if they will let us do that.

AR: I know we used to do stuff like that in the early 90s, but it's been a long time.

LS: Let me check.

1:42 PM

LS: Art?

AR: Roger.

LS: They're going to let us operate in 237 Alpha with a block altitude of 18,000 to 25,000 ft and we can operate below that VFR, which means clear of clouds, but we can just dip into the tops if you want to.

AR: Roger. That seems a little different. We can't just go offshore here somewhere outside the warning areas. We're just too impacted by them is that the idea?

LS: If we had correctly asked for the right area, we could have had a blocked altitude in it I think, but obviously they don't want to release those altitudes to us and that's what they've got available.

AR: Can you do touch-and-goes in Hoquiam, would that get us in clouds? Could we do that? Because we need to get in clouds somewhere here.

LS: Well, we're just going to have to get offshore then and drop down and get into clouds for you, but I don't want to stay in them too long. I'm in violation being in these clouds on a VFR clearance is what it amounts to.

AR: Right, and I don't want you to do that.

LS: Let me check with the Center again and see what we've got out here.

AR: So there is no slot between the warning areas, I guess, any more.

LS: Let me check.

AR: This is great we're finding all this out I'll tell you.

1:46 PM

LS: Hello Art.

AR: Roger.

LS: They're going to let us into Bravo air space and we can have the whole thing, so that's up off Neah Bay up in that area.

AR: Okay. I guess we may have to go up there and it's going to be a little bit longer flight than we thought we would have, but that's great. We won't spend too much time in cloud. We do need probably 15 to 25 min, something like that, of porpoise maneuvers and that will be a good enough test for our instruments.

LS: Okay.

1:48 PM

LS: Art, what's your plan?

AR: I want to go down to cloud top as quickly as possible and do say a 300 ft/min descent to cloud base and you can continue on the same heading.

TW: Art?

AR: Roger.

TW: What do you expect me to see here on the 2-D probes?

AR: Standby 1. Larry, continue on the same heading. We want to go down to cloud top as quickly as possible. Then when you reach cloud top do a 300 ft/min descent. When we get to below cloud base, I want to take just a quick look around and see if there are any cumulus bubbles underneath that we might get a little more liquid water out of because this is going to be a little slim here.

LS: Okay.

AR: Tom, if you see any ice at all or precip it will be columns and needles, so they will be long thin ice particles. It looks like there maybe a couple here and there, but I tell you that I don't see much. It's going to be very low concentrations from what I've seen so far if any.

TW: Okay. So I'm probably more apt to see something on the HVPS more than the 2-D.

AR: Yes, with the larger sample volume that's true, but these are going to be small crystals because of the thinness of the cloud and (2) it probably won't get to the ground.

TW: Well, I'm collecting, no lack of data right now.

AR: Is the 2-D probe firing?

TW: It comes and goes. Right now it's firing, but then it will stop for like 5 min and then all of a sudden it will think it saw something and it will start firing again.

1:54 PM

AR: Grant, the radar appears to be working. Is that correct? I'm looking at a ground return.

DS: I don't think he's got his headset plugged in right now.

AR: It's no biggie.

DS: He'll come look.

AR: Larry, how long do you think it will be before we can descend into cloud?

LS: Probably 8 to 10 min, Art, until we get up in 237 Bravo.

GG: Tom, are you on?

TW: Yes.

GG: Did you say you had that desk file somewhere?

TW: It's on a floppy in my bag. Do you want me to grab it?

GG: Yes, if you would.

DS: What's our altitude, Art?

1:55 PM

AR: So we've had a bit of mix-up today that's going to cost us a little flight time.

GG: Tom, are you still there?

TW: Yes, I am.

GG: The DOS A directory doesn't seem to exist on this machine.

TW: Hold on a second, let me check.

DS: It won't exist because we took that one off on that machine, so that the 2-D card would work.

GG: Got you. Okay.

TW: I've got a floppy drive back here if you just want to hand it to me.

GG: Okay.

TW: Here you go. I'll put in on your home directory on a node 7 I guess.

GG: That would be great. Thanks. Incidentally, I just did the test with the FM transmitter. It barely wiggles the t-totr now.

DS: Yes, the aircraft when it's moving a little bit more right now, so at takeoff it must have shifted just a hair.

GG: Yes.

DS: But it's still pretty low. I've been looking at it. It's less than half a degree.

GG: Yes, we're probably going to have to put that thing inside a shielded box.

DS: Yes, and then we can also at that point try anything else we happen to use to tie it down in a little different fashion.

GG: Yes. We ought to go with shielded lead on that too and just rewire the input to that thing.

DS: Yes.

AR: Sounds pretty neat though.

GG: Definitely better.

1:58 PM

GG: Got it. Thanks Tom.

TW: Yep.

AR: Larry, do you have a feel for the winds today.

LS: I don't know if I can tell you right now, Art, but we can get a circle for you when we get setup if you want?

AR: Yes, I'd like that. Thanks.

LS: We'll do that before we penetrate clouds.

AR: Yes, that will be great.

LS: Okay.

2:02 PM

AR: Actually, there's some benefit to being this far north. We'll be close in time and space for that Quillayute sounding launch which is actually at 3:10 local time.

LS: Okay.

DS: Grant.

2:03 PM

TW: So what happened?

DS: I think the new pilot up there was reaching to adjust something and it hit the master power switch up there to some sort of bypass. Anyway he shut us off up there.

TW: Well the good news is I think my writing the files worked because the old in the data directory they were all half of them were missing and in the other one they were all pretty much there.

DS: Yes, I just checked the same thing.

TW: So now I'm appending to flight 1844. That's a good way to try my new appending to a file that already exists, so we'll see how it goes.

DS: Anyway we'll be able to recover it regardless.

TW: Art.

AR: Yes. I just heard you had an inadvertent test.

TW: So it's going to be a little longer than expected on getting the data to you today. Okay.

DS: I think we'll have to wait until we get them pulled in because we're going to have to look at the stuff and then probably rebuild it from the 5 min parts.

TW: Right.

DS: The worst thing is we might lose at most 5 min of data and that's it.

AR: Well in clear air it's no biggie. It's just the next maybe 20 min that's going to be important in this whole flight.

TW: I hope so. I hope we can keep it going.

DS: Our system is getting more and more robust, Art. Each time we put out a little bit more.

AR: This is great. It's worthwhile having it happen now than in the middle of the Pacific and a big storm that everybody is interested in.

LS: Art, we're in the zone now so we're going down.

AR: That's great, Larry. Actually the clouds look as good in here as anywhere we've been.

LS: Yes. If we've got any vertical at all it looks like it's over there at about 10 o'clock just around that hole.

AR: I'd agree, although even just below us say out about a mile or two at 10 o'clock looks pretty good considering how slim it looked about 20 min ago.

LS: Do you just want to orbit here and get down into that?

AR: Roger. It looks great. Again, once we get into cloud a slow descent to cloud base and then we'll take a look around and see if we can find some thick spots, which should be represented by lower bases.

LS: We're going to get down right above cloud tops and get you a wind circle and then we'll penetrate.

AR: Roger. Thank you.

2:06 PM

AR: Tom, there is a strip on here for the liquid water contents and I can't seem to find it. Do I have to generate the file for that over again?

TW: You shouldn't. Hold on. I'll be right back there.

AR: In fact, Larry, if you want to orbit as we descend through these clouds, that might even be a little better because it seems to be kind of thick spot in this area.

LS: Okay.

2:07 PM

AR: It doesn't look like there's any echo from this stuff, Grant.

GG: The receiver is not operating too well. You probably wouldn't see much anyway. We have a busted mixer.

AR: Roger.

GG: It apparently sees the ground.

AR: We're in the inversion right now, only -1.5° , so we wouldn't expect any ice at that temperature. But it ought to take a real nose dive here. If we get to -5 , we would have a pretty good chance of seeing some columns and needles.

2:09 PM

DS: So, Art, do you expect the temperatures to start dropping again?

AR: Roger. It should plunge, I'm guessing, -5° to -6° here in this stuff as we get into the clouds.

DS: Yes. It's starting to drop again on the reverse flow.

GG: Something that's kind of interesting is the noise on the pyrometers and the UV radiometers is gone away.

DS: Yes, I noticed that. I think it might be temperature dependent. When it's real cold out things seem to be real quiet.

2:10 PM

TW: My HVPS program did not like losing its file whatsoever.

DS: It's a good thing we're going back.

TW: Yes, because the file was on the network and so when the network went away it was all of a sudden I was like on strip number 4,000,000,600. I'm like wow.

DS: So they just kept trying to read something.

TW: Yes, and got all confused. I think the proposition became -1.

DS: So you had to restart it, I assume, after you started getting a file again?

TW: Yes. Everything got wacky because it opens the file and it leaves it open all along. Hopefully, this won't happen too often.

DS: No, it shouldn't. We have one more thing that Grant and I are probably going to get down here pretty soon, which will keep the computers up when something like that happens. We've got the component for it now. Grant got that the end of last week.

2:12 PM

DS: It looks like all your other programs recovered pretty nice as well.

TW: Today they all ran. There's nothing we need to reset on the liquid water probes, is there?

DS: No.

AR: Larry, did you get a wind out of this yet?

LS: Give me about another 30 s, Art.

AR: That's all right. It's -7° there, -7° . We went through that cloud top.

DS: Are we in cloud, Art?

AR: We're in and out now. The very, very tippy tops. A little bit overshooting tops in the main stratiform layer. This is great. About -7.5° there for just a second. If the t-stair still has a 10° bias it maybe only -5.5° , -7.5° should be usually pretty cold enough for quite a few noticeable ice crystals anyway out of the stratiform layer in this region. It looks like the drops are pretty bit.

LS: Art, about 250 at 10 knots.

AR: So they've lightened up a bit. Okay.

LS: Art, we're going to start down now at 200 ft/min in this area.

AR: Okay. Thank you, Larry.

2:14 PM

AR: After getting FSSP rate on line, I didn't notice that it was missing and now have a 130 to 140, 115 looking down the wing. It seems okay. There's some opacity there down the wing. Clear icing back here. I'm looking at the big black rod we

now have where the Pilewskie radiometer sat. Looking for ice crystals on the black rod.

2:16 PM

AR: Getting any in this Tom?

TW: Far and few between.

AR: What do they look like?

TW: Actually they're a little elongated, but they are kind of oval.

LS: Art, when we come out the bottom, what do you want?

AR: I'm going to look around and give you another spot because the lower cloud bases we might be able to pick up a little more liquid water than we're getting here.

LS: It's looks kind of dry.

DS: Tom, was that on the new 2-D probe or the HVPS?

TW: That was on the 2-D. I'm not picking up anything on HVPS really.

AR: It might be too small. A lot of times in clouds like this you'll get columns and needles only a couple hundred of microns long and until we get down toward the bottom then they tend to get a little bit bigger. So toward the top you might not see anything in the HVPS because the pixels, I think, or the diodes are 200 microns in size.

2:18 PM

AR: Now that we're coming out of cloud base, Larry, can you give me about say 500 ft below cloud base so I can look down a little bit.

LS: Okay.

2:18 PM

DS: The FSSP looks good, Art, the PCASP looks good and the OAP-200X or the one, well, I've bot to do more work it still.

AR: You think so.

2:19 PM

AR: Larry, are we cramped here in the warning area? What would be our radius of sampling clouds from this point right here.

LS: Well, we could go east 25 miles and we could go west probably 40 miles out there and north another 20 miles.

AR: Roger. Do you see this lower, this darker base up there about 2 o'clock?

LS: Yes.

AR: Can you do an ascent in that kind of give me a 300 ft/min and go down that darker base that extends off to the right.

LS: Affirm.

AR: That's probably about as good as liquid water is going to get is in that thing there, or what there is anyway.

2:21 PM

AR: Once we pop up the top here, Larry, you'll just head on back to Paine Field.

LS: Okay.

AR: Thanks. Grant, are you on the headset?

DS: Standby for a second, Art. He'll be putting it on in just a moment.

AR: Yes, I was going to ask him whether he wants any more time after we do a slow ascent through this. That's about all.

GG: What did you say?

AR: I was just telling Larry that we're going to do another slow ascent through this stuff, through the thickest stuff we can find and I told him after we popped out the top we could head back to Paine Field, but I want to run that by you in case there's something you want to look at in clouds for a little longer.

GG: Actually, I think I've learned what I needed to learn on the radar. I think it would be okay to head back to Paine Field. How about Tom and Don?

DS: The t-totr looks pretty darn good this flight. I'm satisfied with that. Right now if we do a few clouds it will do me up because I want to get a good look at the 1-D. I've looked at the FSSP and stuff over there and I also want to look at the 2-D while we're going through it. So I probably won't need any more time after this either. How about you, Tom?

TW: I will not need any more time.

AR: Okay. It sounds like a consensus, so I'll just leave it at that then. We'll do our slow ascent here and hoping some more precip shows up. I didn't see any real sign of precip other than the minimal amounts, a few ice crystals here and there.

DS: Yes, they're pretty small.

LS: What do you think, Art, do you want to reverse and go back the other way?

AR: Yes, right Larry. I kind of popped up out of that a little too quickly. This is another little rivulet of liquid water there about 11 o'clock. I guess you're heading for that. If you can stay on top of the darker base there, that's where the higher liquid water contents will be find and then sort of ascent up through that. I don't know if you can go down the line or not. It's kind of small.

LS: I'll just keep turning in it.

AR: That would be all right. You were heading back to that area we were just in, the spiral?

LS: Yes.

AR: Okay. Roger. I understand. Then maybe as we get toward the top I may pick out a couple of tops or some heavier regions that look like they might have a little more liquid water and we'll pound those for a couple of minutes and then take off.

LS: Okay.

2:35 PM

DS: How small does the 2-D probe go down to, Art, now that that's out there? Do you recall?

AR: It should be about 100 to 200 microns. The diodes are 100 microns square.

TW: I have all the manuals in my backpack if you want to peruse.

DS: I was just trying to get an idea if we should be seeing anything in it. The largest active channel on the FSSP is channel 9, which is just under 40 microns, and some activity in channel 10, so we may not be getting stuff big enough to activate the 2-D probe.

AR: Roger. That's possible because there are so few ice crystals if any. I can't say I've seen any on the Pilewskie black rod here.

DS: I've seen occasional something that might be a particle, but it's awful small.

TW: I've seen the very occasional big blup, like a big blob, but they are very rare.

DS: A snowflake in the act of creation. Well, one nice thing is that the 2-DP has not got 30,000 records after a couple of hour flight.

Summary of Flight 1844 (Test Flight)

No summary recorded.