

# UND Citation Flight Summary

STERAO

**Date/Flight Number**

23 June 96

**Period of Flight/Total Time**

2010-2138 / 1.5

1.3  
official
**Flight Scientist**

Stith

**Crew**

Tilburn, Scherer, Zeri, Angie

**Weather Observations**
Low Clouds / Rain  
WARM RAIN PROCESS  
TODAY
**Photos taken**

VIDEO / (NO DATE-TIME)

**Purpose of Flight**


Test flight

**Malfunctions and Data Quality Observations**

No Depoint

Pitch reads negative

NO O<sub>2</sub> or H<sub>2</sub> - Power  
Cord  
ProblemCO - has had no drift  
(not adequate warm up  
here).
**Observations and Flight Description**
Check out systems / #us / New  
RADOME flow angle system

- 1 min leg pattern for  
a box  ← 1 min
2. Reverse track at 160/190 kts
3. Pitch/attack comparison - high  
low speed.
4. sidwip maneuvers.

# UND Citation Flight Summary

~~STEPAC~~  
Date/Flight Number

23 June 96

Period of Flight/Total Time

~~2300~~ 0150 / 2.4 hr

Flight Scientist

Shih

Crew

Talbury, Schuler, Fern,  
Angie

Weather Observations

Photos taken

no

Purpose of Flight

Ferry GPH - Boulder

Observations and Flight Description

check out instruments  
see flight notes

Malfunctions and Data Quality

Observations

- check probe lasers - reference  
voltage  
- ZOL end elements . read  
see  
further  
with  
of  
flight

# UND Citation Flight Summary

## Date/Flight Number

26 Jun 96

## Period of Flight/Total Time

1715 - 2050 (3.5 hours)

## Flight Scientist

Stith

## Crew

Tilbury, Scholer, Zerr,  
Ridley

## Weather Observations

Sc clouds Small Cu.

CB's building

## Photos taken

3 35mm + Video (no date time)

## Purpose of Flight

Shakedown / STERAB

Reverse Track mission

Avail flight

Citation Only

## Malfunctions and Data Quality Observations

NO O<sub>3</sub> today

Cryo ran out of N<sub>2</sub> early  
in flight

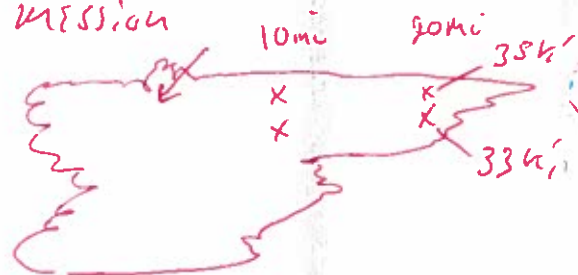
Data system set to  
PM time (not military)

CO reads ~ 50 ppb - but  
was not connected to  
the data system.

## Observations and Flight Description

Reverse tracks at 21h'  
140, 160, 190 kts 29h'

Followed by an avail  
mission



Passes at 20 mi downwind  
Very electrically active storm  
Should be good case for  
initial NO production estimates  
CO does not see much in  
storm.

# UND Citation Flight Summary

## Date/Flight Number

27 Jun 96

## Period of Flight/Total Time

1509 - 1833 (3.1 offical)

## Flight Scientist

Stith

## Crew

Tilburg, Schaler, Zerr, Redley

## Weather Observations

Bkn. Ca.

## Photos taken

35 min + Video

## Purpose of Flight

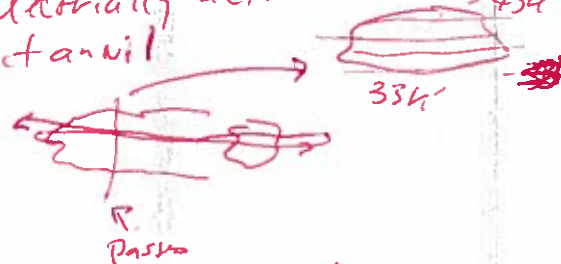
STERAO, mission with  
P-3 -  
Reverse tracks

## Malfunctions and Data Quality Observations

Cryo ran dry  $\frac{3}{4}$  into flight.  
Noise on IDP noted occasionally in notes.  
CN flow off (see notes) for a bit.

## Observations and Flight Description

First hour we went North, but found storms too far away. We then went East and sampled small electrically active storm with a distinct anvil.



Found a bit of NO at upper levels of the anvil. Good x section of anvil at 10 mi range. Two along anvil passes at 394' to 414'.

Just before storm we sampled two passes through an old anvil, ~~area~~.

# UND Citation Flight Summary

## Date/Flight Number

28 June 96

## Period of Flight/Total Time

1620 - 1830 (2.0 official)

## Flight Scientist

Smith

## Crew

Tilburg, Scheler, Zerr, Ridley

## Weather Observations

Bkn cu

## Photos taken

35 min + video

## Purpose of Flight

STERAO Thunderstorm Flight

## Malfunctions and Data Quality Observations

Temp appears to read  $+10^{\circ}\text{C}$  too high, at least during the last part of the flight. on ground it checks with the Assman to within  $\pm 1^{\circ}$  for Free &  $+1.5$  of New Flow - check out

Thought I might have a problem with the TWS & was delayed for 45 min.

No GPS today

## Observations and Flight Description

Went looking for clouds, but found only weak clouds with tops around 31k'.

Got ~~3~~ tired of looking and sampled a few targets way outside of the area. Found a little enhanced NO in them and one big bump!

Not much today.

# UND Citation Flight Summary

## Date/Flight Number

29 Jun 96

## Period of Flight/Total Time

1410 - 1605 (1.9 official)

## Flight Scientist

Stith

## Crew

Tilbury, Schaefer, Zerr,  
Ridley

## Weather Observations

Sc Cs

## Photos taken

35mm + Video

## Purpose of Flight

Intercomparison with  
P-3.

## Malfunctions and Data Quality Observations

Don't see signal from Cyo?  
Check Temperature.  
Ozone had a bit of  
oscillation and a few  
spikes.

We were within  $\pm 1$  sec  
of P-3.

## Observations and Flight Description

3 intercomparison legs at  
17.5kt, 13.5, and 7.5kt  
between 150/20 and 360/30  
G.L. vortex.  
See Notes for zero times.

# UND Citation Flight Summary

## Date/Flight Number

3 July 96

## Period of Flight/Total Time

1450 - 1800 (3.2 official)

## Flight Scientist

Stith

## Crew

Tilbury, Scherer, Ferr, Ridley

## Weather Observations

Developing cb's.

## Photos taken

35mm & video

## Purpose of Flight

Anvil / STERAO

FIRST Day for Gas Cannisters

## Malfunctions and Data Quality

### Observations

NO CO

Span on O<sub>2</sub> at 6.00  
today only - see  
calibration curve.

P-3 Down today.

Cryo looks better

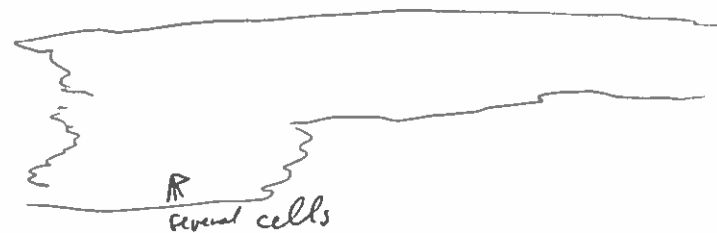
Pump for cannisters Brought  
down system twice. First for  
a few minutes, then for last  
part of flight.

IDP dropped out at highest  
altitude.

Switch → NO<sub>2</sub> operated in "NO<sub>2</sub>" mode, not "auto"

## Observations and Flight Description

Went far east to sample  
Below and 2 passes in small anvil.  
Broke off and began sampling a  
large anvil from a large multicellular  
system with several embedded ~~cells~~ cells.  
Was over much of the anvil at 434'  
Anvil covered a very large area.



Was able to cover anvil profile between  
about 214 to 434' at 35-10 mi range  
(storm drifted during sampling).

Good signal in NO observed.  
Finished run with a pass <sup>roughly</sup> along  
the anvil, but lost power during the  
run & called it quits.

# UND Citation Flight Summary

## Date/Flight Number

9 July 96 / 1

## Period of Flight/Total Time

1400 - 1600 (1.9 offload)

## Flight Scientist

Stith

## Crew

Tilbury, Schafer, Zerr, Ridgway

## Weather Observations

Several cells - ours had tops  
~ 36 to 38 kft - DIA had a  
thunder warning.

## Photos taken

35mm & video

Good view of anvil on 35mm  
and video - did 360° turn  
for better view.

## Purpose of Flight

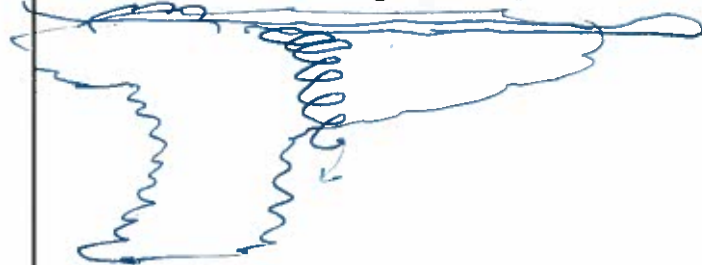
Steno / Anvil - storm in  
Eastern area of network

## Malfunctions and Data Quality Observations

WOP-3

DCASP off today due to  
extensive cloud at low altitude

## Observations and Flight Description



Pass through tops of main  
cell, then down anvil axis &  
return to ~15 mi downwind where  
we made a spiral 35k' to 25k'.  
Through most of anvil.



Should be a good core, a small  
storm, but it did have electroc  
activity which ended just before  
we started spiral. Found NOx  
in <sup>anvil</sup> region of anvil.



# UND Citation Flight Summary

## Date/Flight Number

9 July 96 / Flight 2

## Period of Flight/Total Time

1710 - 2020 / 3.2 flight

## Flight Scientist

St. H

## Crew

Tilbury, Schaler, Zerr,  
Ridley

## Weather Observations

Wide spread cl's

## Photos taken

35mm + video

## Purpose of Flight

Anvil flight - with P-3  
Below.

ATC put us through cores  
of storm as we were climbing  
out

## Malfunctions and Data Quality

### Observations

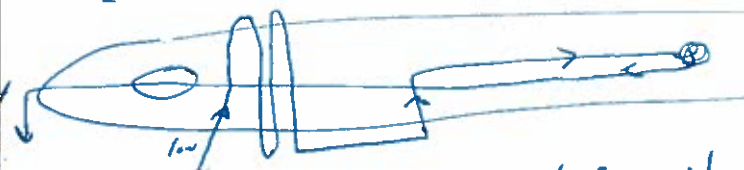
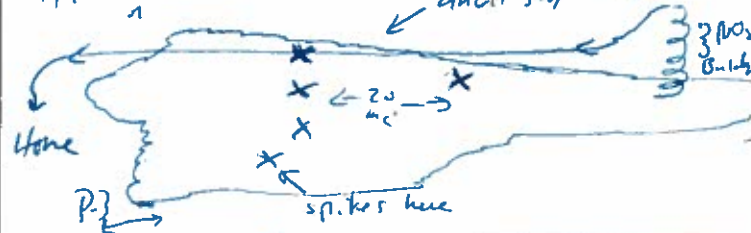
No GPS. No IAP (at least  
most of flight). Cryo blew fuse  
early in flight. Sideslip was  
wild in rain and radone <sup>data</sup> seemed  
inup in precip. Check roll data  
seemed wild on strip chart.

PCASP was on only briefly  
- pump couldn't keep up.

CU lost flow late in flight - maybe  
moisture on lens probe.

## Observations and Flight Description

The most active electrical storm  
so far. A good case with the  
P-3. Went 100 mi East to  
find <sup>remains of</sup> electrical activity  
anvil sloped <sup>higher</sup> west



Found high NOx in evaporated anvil  
at 100 mi range during 274' to 374'  
spiral ascent.

Found some strong NOx spikes  
on way to anvil.

Even hit some ragged Manning  
on way home - could ride through  
storm over airport.

# UND Citation Flight Summary

## Date/Flight Number

10 July 96

## Period of Flight/Total Time

1615-1930 / 3.2 optical

## Flight Scientist

Stitt

## Crew

Schler, Tilburn, Ferris, Ridley.

## Weather Observations

Well defined isolated storm  
North

## Photos taken

35 mm + Video + Hand Held video

## Purpose of Flight

STERAO / AMUL <sup>with</sup> P-3

Best isolated case.

Passed above and through  
mamma region - see notes

## Malfunctions and Data Quality Observations

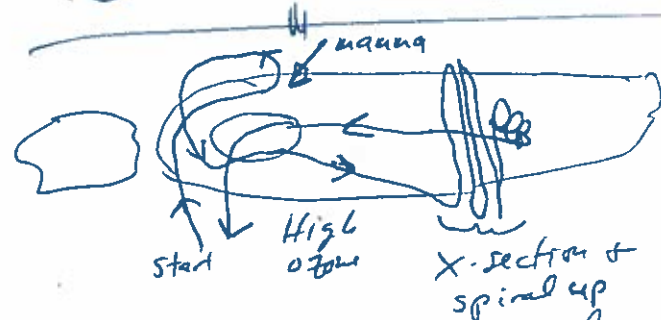
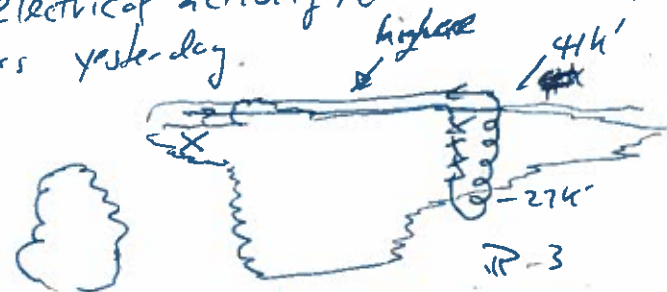
See Flight Notes

1/2 mile  
S. 97, error on Ins after landing  
ground speed 4 kts on landing

GPS observations

## Observations and Flight Description

A very "textbook" storm - steady  
electrical activity, but not as strong  
as yesterday.



Detailed x-section and spiral.  
High O<sub>3</sub> (180 ppb) above storm, especially  
on south side. Also flew above  
mamma elements.

A very good 2 aircraft case.

# UND Citation Flight Summary

## Date/Flight Number

12 July 96

## Period of Flight/Total Time

1625 - 1925 (3:00 hrs)

## Flight Scientist

STH

## Crew

Strehel, Tibbitts, Ferr, Ruder

## Weather Observations

Cb

## Photos taken

35 mm + Video

## Purpose of Flight

STERAO

## Malfunctions and Data Quality Observations

Cryo questionable - check data

Lost Power - Reset Data System

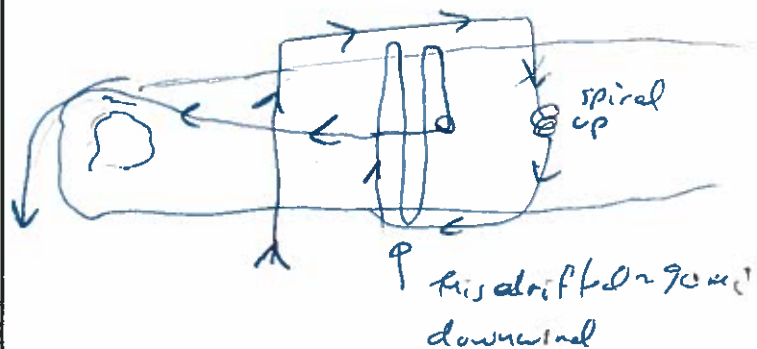
Lost Reverse Flow Temperature(?)  
- (Instr bad on data)

Continual flight with only O<sub>3</sub>,  
NO, NO<sub>2</sub> + ZDC

Blower motor on Radiance inop  
may run up.

## Observations and Flight Description

A good case, except for a power fail.  
Very large swirl with over 2 ppb NO<sub>x</sub>



# UND Citation Flight Summary

## Date/Flight Number

13 Jul 96

## Period of Flight/Total Time

1515 - 1800 / 2.7

## Flight Scientist

Stith

## Crew

Strickland, Tilbury, Ferr, Ridley

## Weather Observations

## Photos taken

35mm = 1 video

## Purpose of Flight

STERAO/Anvil

- No interferences

- P-3 below

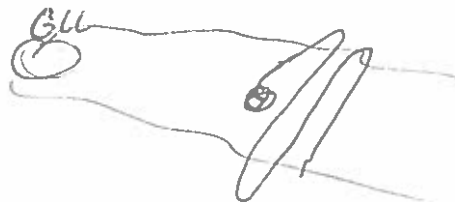
## Malfunctions and Data Quality Observations

~~Alt~~ Airspeed/wind questionable  
check fittings on wing pitot  
Lost power + reset with basic  
instruments.

Changed to nose pitot  
Descent much better after  
rebalance in the air

## Observations and Flight Description

Did a partial spiral to 33k', lost  
power, reset with basic instruments  
and did several ~~xxx~~ x anvil passes  
to 41k', then a spiral descent  
through a very active storm sampled  
by P-3. Good case, but hard to  
sample all regions of anvil due to  
large size.



Hard to get out of anvil.

# UND Citation Flight Summary

## Date/Flight Number

15 July 96

## Period of Flight/Total Time

1615-1850 (2.6)

## Flight Scientist

Stith

## Crew

Streckel, Schuler, Ferr,  
Ridley

## Weather Observations

Very intense storm

## Photos taken

3 Sum + Vrcds

## Purpose of Flight

StenAo/Anvil + Below  
Cloud Base - NRP-3.

## Malfunctions and Data Quality Observations

No CO  
IDC m only part of  
flight.

## Observations and Flight Description

Tried to work a strong storm,  
but was blocked by a/c.  
Eventually managed to get to  
storm. did a below base pass  
& climbed a bit to get in some  
feeder cells. Did spiral through  
lower portion of upshear anvil  
27 to 33 k' & also hit lower part  
of anvil on western upshear side, including  
area just above mamma.

# UND Citation Flight Summary

**Date/Flight Number**

16 July 96

**Period of Flight/Total Time**

1155 - 1420 / 2.3 hr

**Flight Scientist**

Stiller

**Crew**

Streifel, Scherer, Jen,  
Kiddley

**Weather Observations**

Scattered

**Photos taken**

Video

**Purpose of Flight**

P-3 intercomparison

3 legs

**Malfunctions and Data Quality Observations**

Temp, TAS problems noted  
See flight notes  
No CN,

**Observations and Flight Description**

3 legs with P-3 210 kt  
each at 9.5, 13.5, + 4.6 MSL  
(1000 AgL).

# UND Citation Flight Summary

## Date/Flight Number

16 July 96 / 2

## Period of Flight/Total Time

1545 - 1825 / 2.5

## Flight Scientist

Shih

## Crew

Streibel, Shaker, Zen, Ridley

## Weather Observations

Isolated Moderate CB

## Photos taken

35 mm + hand held

## Purpose of Flight

Stew/Anvil

Citation Alona

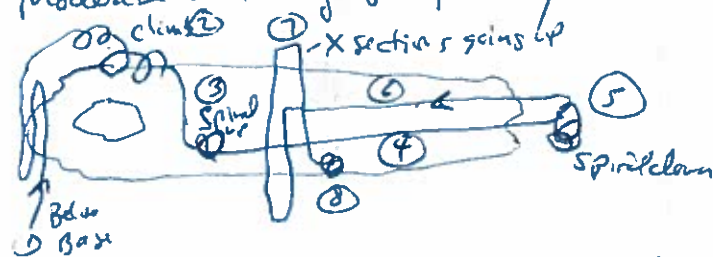
## Malfunctions and Data Quality Observations

No Cryo

35 mm may not have had date/time on, except last frame of first panel.

## Observations and Flight Description

An ideal sized storm to work.  
Moderate activity of lightning.



① Below base sampling (power plant nearby)

② Climb on north side - halfway up

③ Move to main part of anvil and spiral up 21k to 35k'

④ Along axis pass near top at ~35k'

⑤ Spiral on downwind edge 35k' to 25k'

⑥ head along axis towards cell at 25k' (anvil nearby).

⑦ X section 25k' to 35k' (25+35k' new half legs)

⑧ Spiral down 35k' to 23k'

A good case.

# UND Citation Flight Summary

**Date/Flight Number**

19 July 96

**Period of Flight/Total Time**

0750 - 0845 / 0.9

**Flight Scientist**

Shiff

**Crew**

Stuebel, Shofar, Zeh

**Weather Observations**

Clear

**Photos taken****Purpose of Flight**

Tower Flyby with  
BAO tower

**Observations and Flight Description**

10 passes 3 - 140 kts  
4 - 160 kts  
3 - 170 kts

BAO tower

**Malfunctions and Data Quality****Observations**

good we have 10-20'  
high not passes - hard to  
see strobe (room marker), however  
ground speed 1 kt on landing



# UND Citation Flight Summary

**Date/Flight Number**

19 July 96

**Period of Flight/Total Time**

1245 - 1500 (MOT) / 2.0

**Flight Scientist**

**Crew**

**Weather Observations**

**Photos taken**

**Purpose of Flight**

Ferry to GKH

**Malfunctions and Data Quality  
Observations**

**Observations and Flight Description**