

BAE 146 measurements



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The team

- Phil Brown, Andy Wilson, Dave Tiddeman, Jeff Brown, James Bowles – Met Office
- Hugh Coe, Martin Gallagher, Keith Bower, Hazel Jones, James Dorsey, Paul Williams, Will Morgan – University of Manchester
- Barbara Brooks, Angela Dean, Justin Peter, Alan Gadian – University of Leeds
- Many in FAAM, Direct Flight, Avalon

Clouds from the aircraft



A classic: 24 August



BAE 146 Measurements

Data available from:

<http://badc.nerc.ac.uk/browse/badc/faam/data/2007>

- Cloud particles: FFSSP, 2DC, 2DP, CPI, SID1/2, CIP 100
- Aerosols: Aerosol Mass Spec, CVI, VACC, PCASP; CPC 3025A, 3010A (CVI), Nephelometer, PSAP
- Bulk-cloud: Liquid and Total Water Content Probe; JW LWC; In-cloud temp (wet for $T > 0$)
- Air motion: 5-port turbulence probe
- Thermodynamics: Rosemount temperature; General Eastern hygrometer;
- Chemistry: CO; NO_x; Ozone
- Other: Heimann Downward facing radiometer

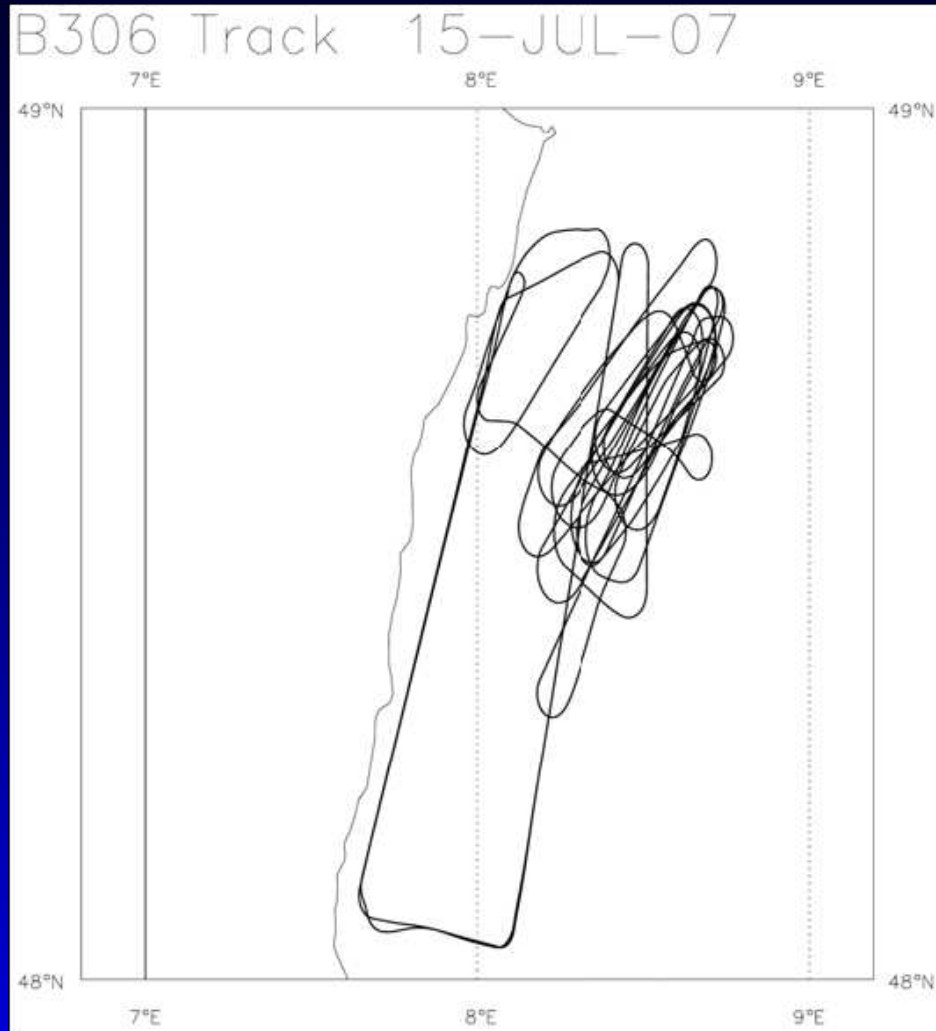
146 Flights

IOP	Date	BAe?	Summary
-	11 July	Yes	Ice initiation, but capped convection
SOP1a	12 July	No	Sc clouds
8a	14 July	No	?
8b	15 July	Yes	Isolated Cb over mts
SOP1	16 July	Yes	Too dry aloft
9a	18 July	Yes	Frontal zone; no precip during day; not quite
9b	19 July	Yes	MCS 6-12 Z; Strong cb in SE Germany; nothing in COPS
9c	20 July	No	MCS; CI in SE BF and Swabian Alps
10	23 July	No	Very weak Cu ahead of CF
SOP4	24 July	Yes	Suppressed clouds; aerosols
11a	25 July	Yes	Dry. CBL evolution
11b	26 July	Yes	No cloud; very dry; aerosols

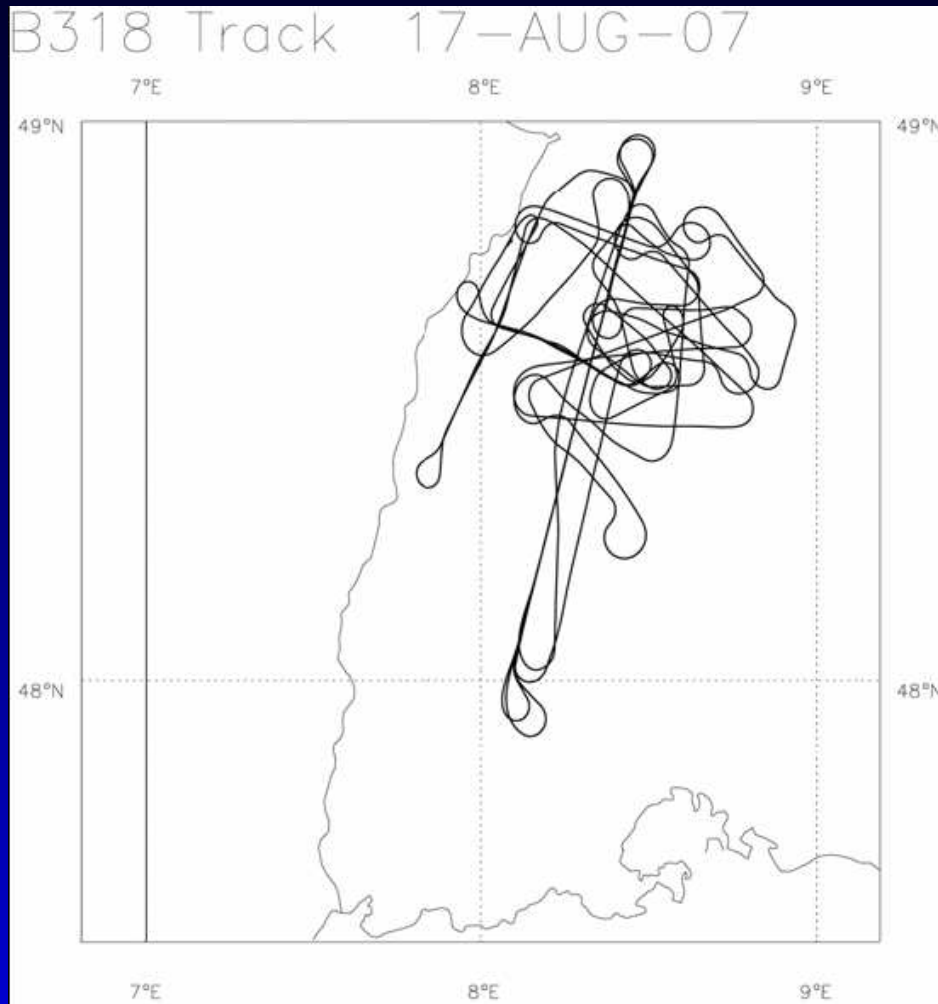
146 Flights

IOP	Date	BAe?	Summary
12	30 July	No	Shallow cu; no precip
13a	1 Aug	No	Dry; no convection in COPS region (trop fold in WALES)
13b	2 Aug	No	Saharan dust; MCS; Landspot obs by DoW; Strong Cb
14a	6,7 Aug	No	Convection cells triggered in Rhine V; Good DoW cover
14b	8 Aug	No	Stratiform rain
14c	9 Aug	No	Moderate rainfall in COPS region; not interesting
15a	12 Aug	No	HPC ??
16	15 Aug	Yes	Weak frontal convection
SOP7	17 Aug	Yes	Good clouds studied
17a	21 Aug	No	Some embedded convection with lightning; land-spout
17b	22 Aug	Yes	Suppressed convection
18a	24 Aug	Yes	Good isolated convection; good ascent
18b	25 Aug	No	HPC ?
SOP8	29 Aug	Yes	No convection; kite pattern

146 Flight Tracks

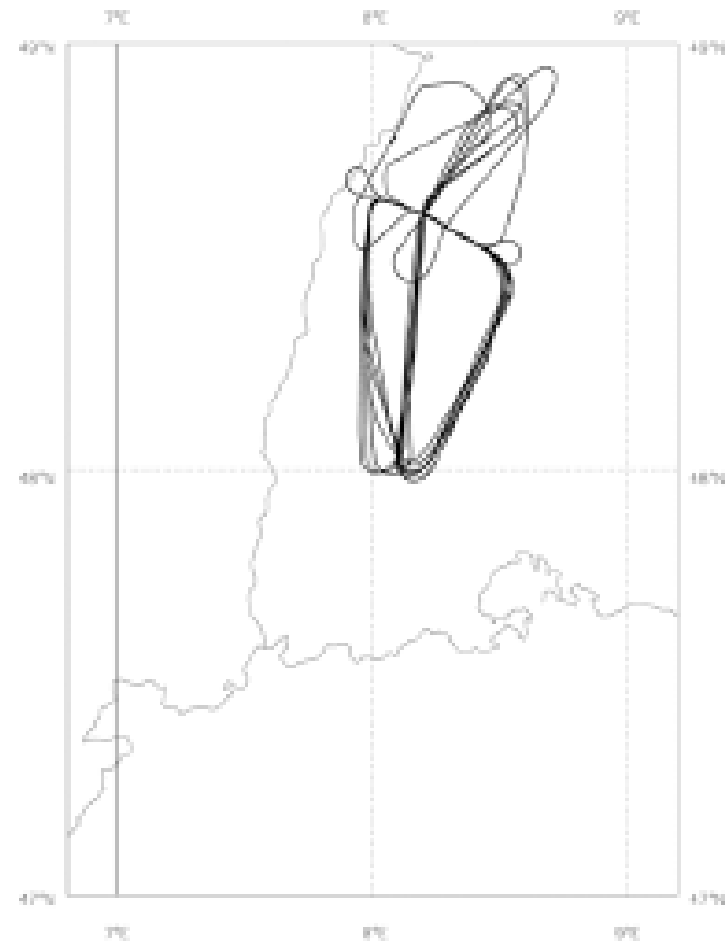


146 Flight Tracks



146 Flight Tracks

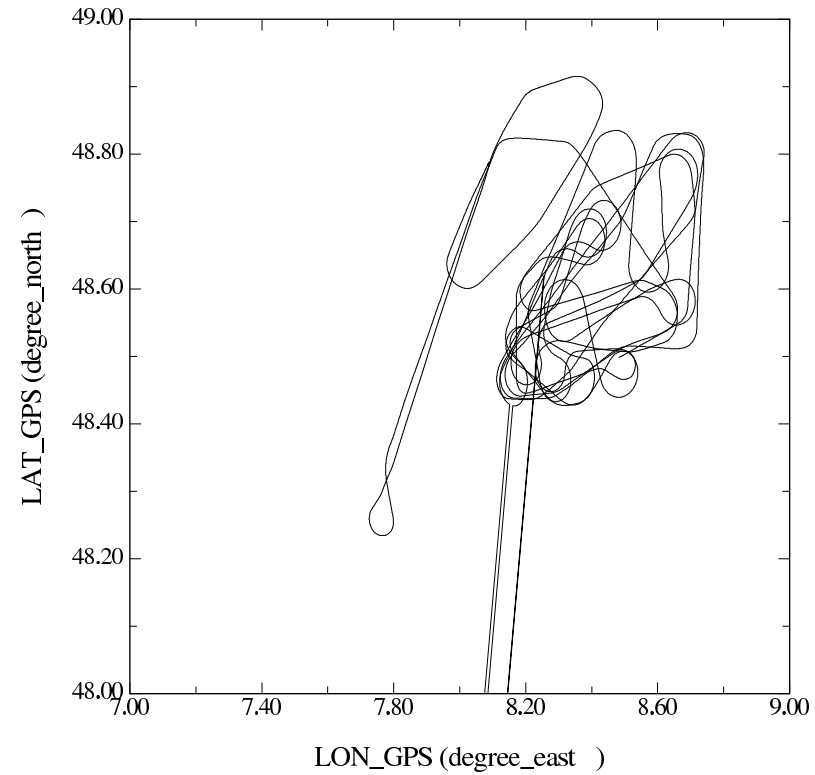
Flight Track:
B323 Track 29-AUG-07



11 July cloud

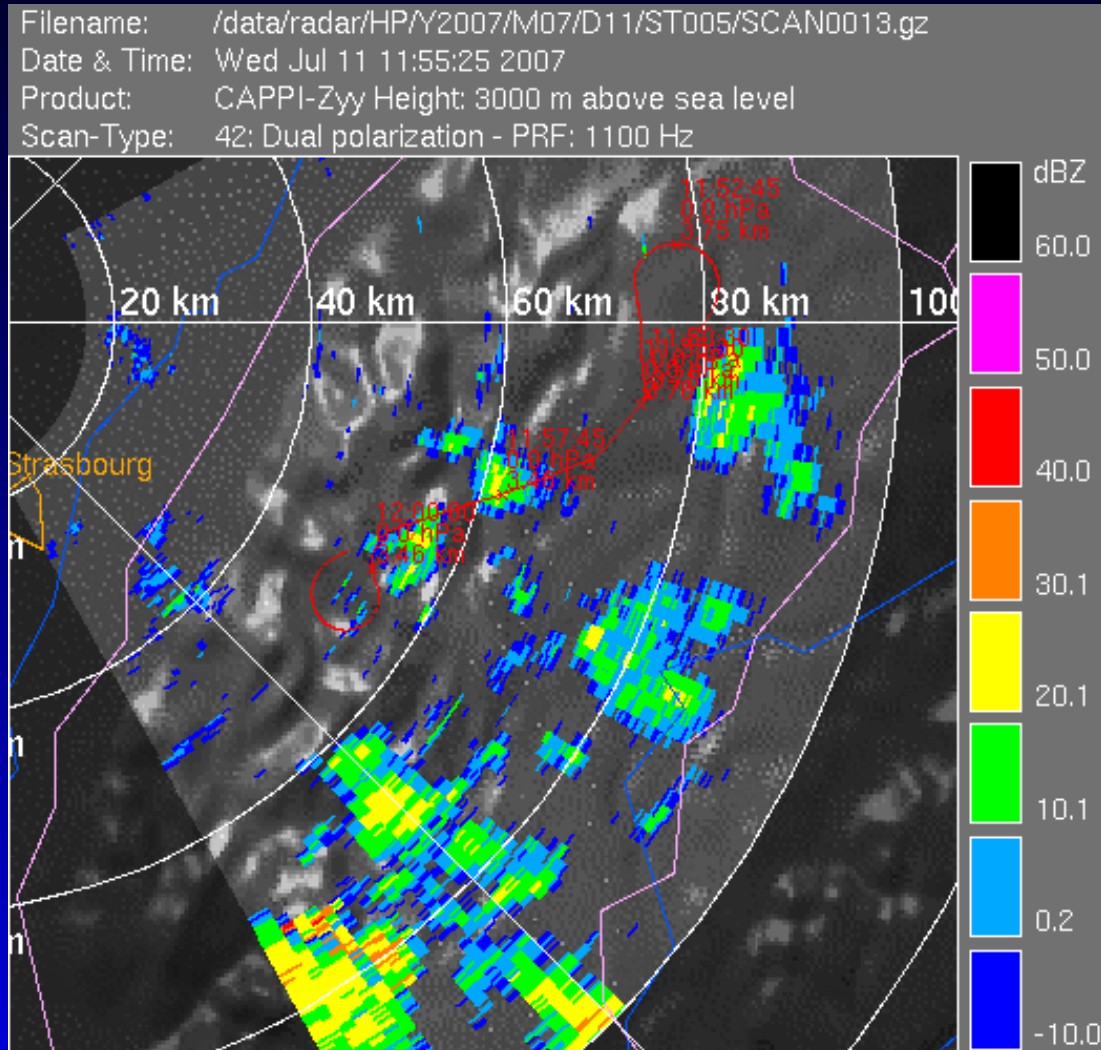
Alan Blyth - Wed Feb 27 20:29:50 2008

08:00:12-12:45:01



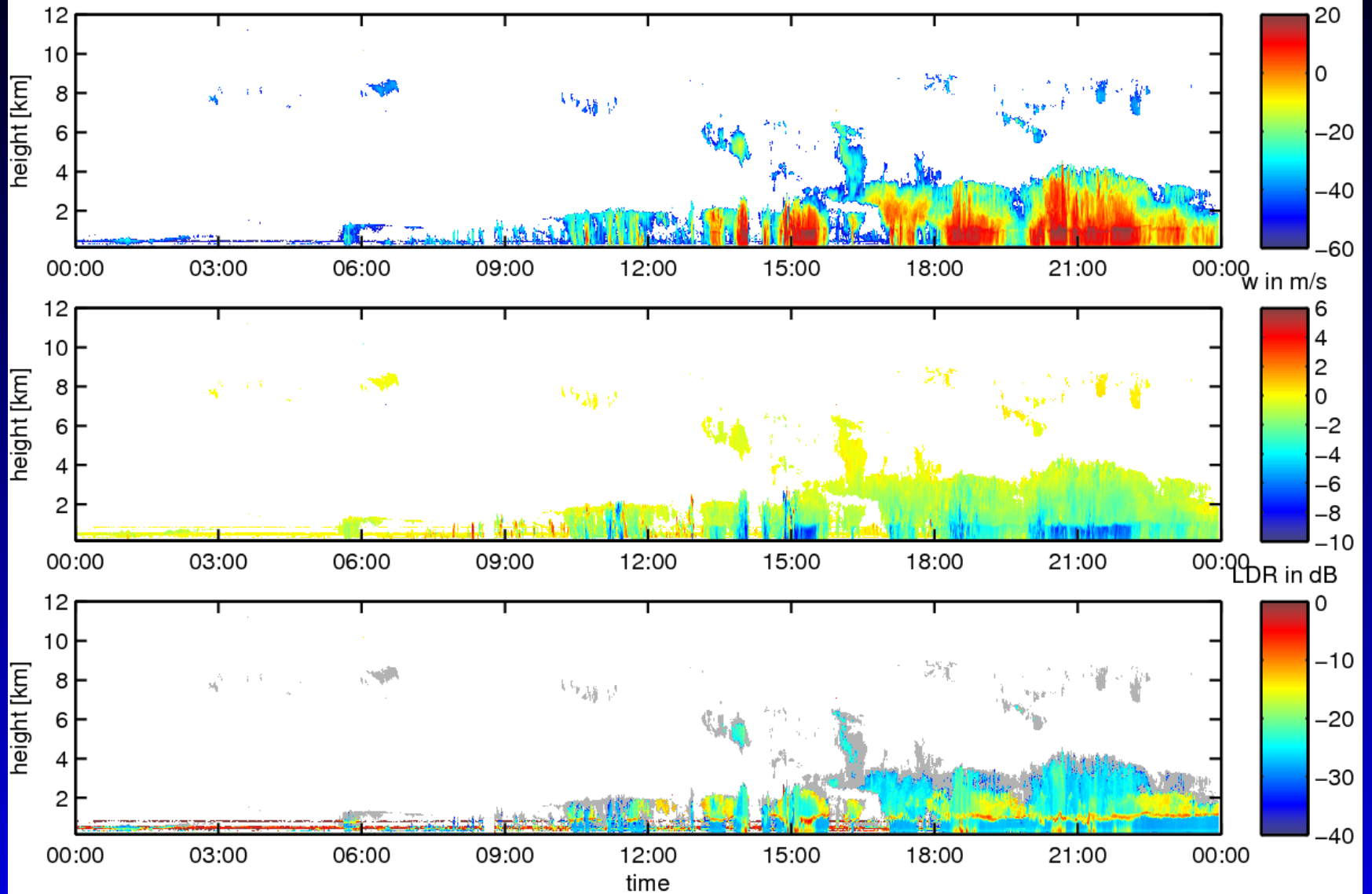
	mean	sigma	min	max
— LAT_GPS (degree_north), 1 s/sec	48.64	0.92	0.00	48.92
LON_GPS (degree_east), 1 s/sec	8.26	0.27	0.00	8.74

11 July cloud



Thanks to *Martin Hagen*

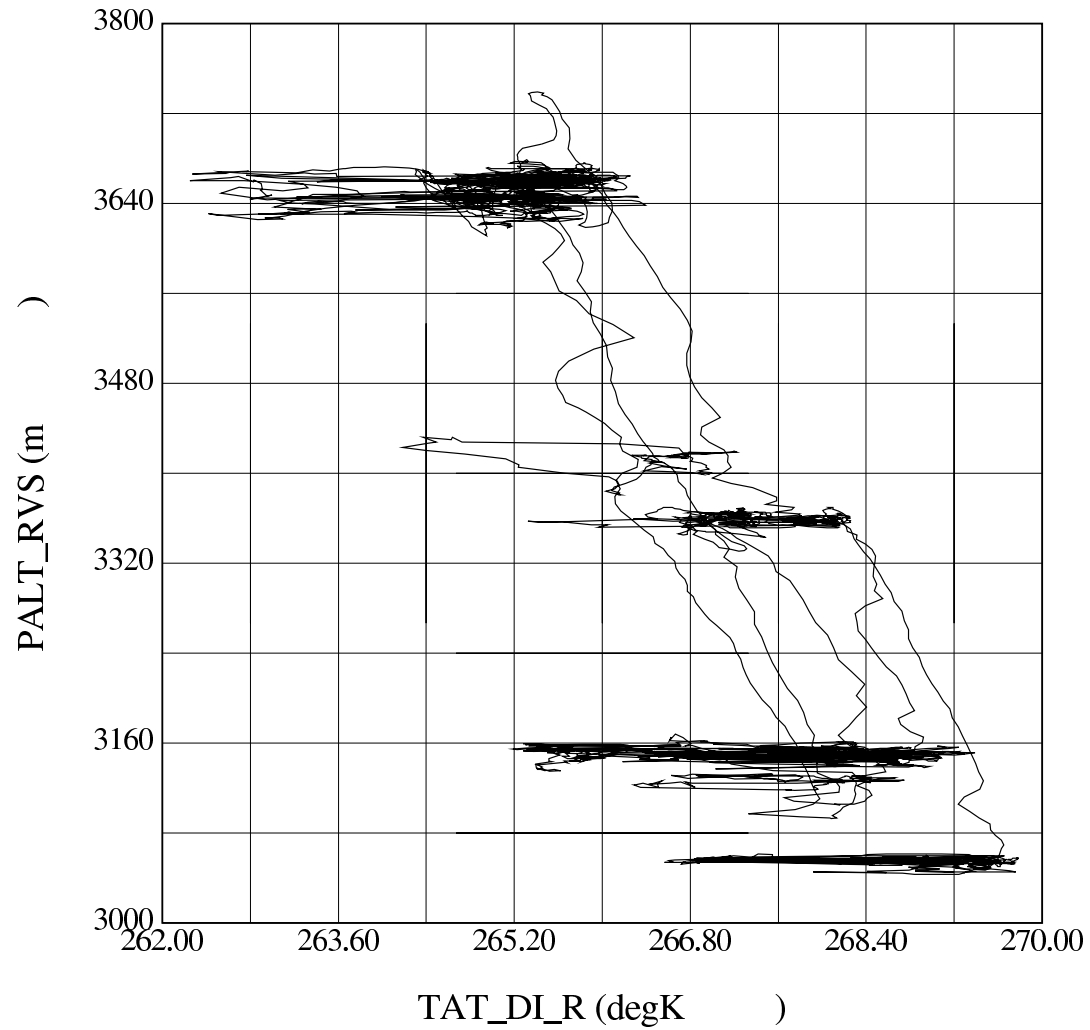
11-Jul-2007



IMK vertically-pointing cloud radar

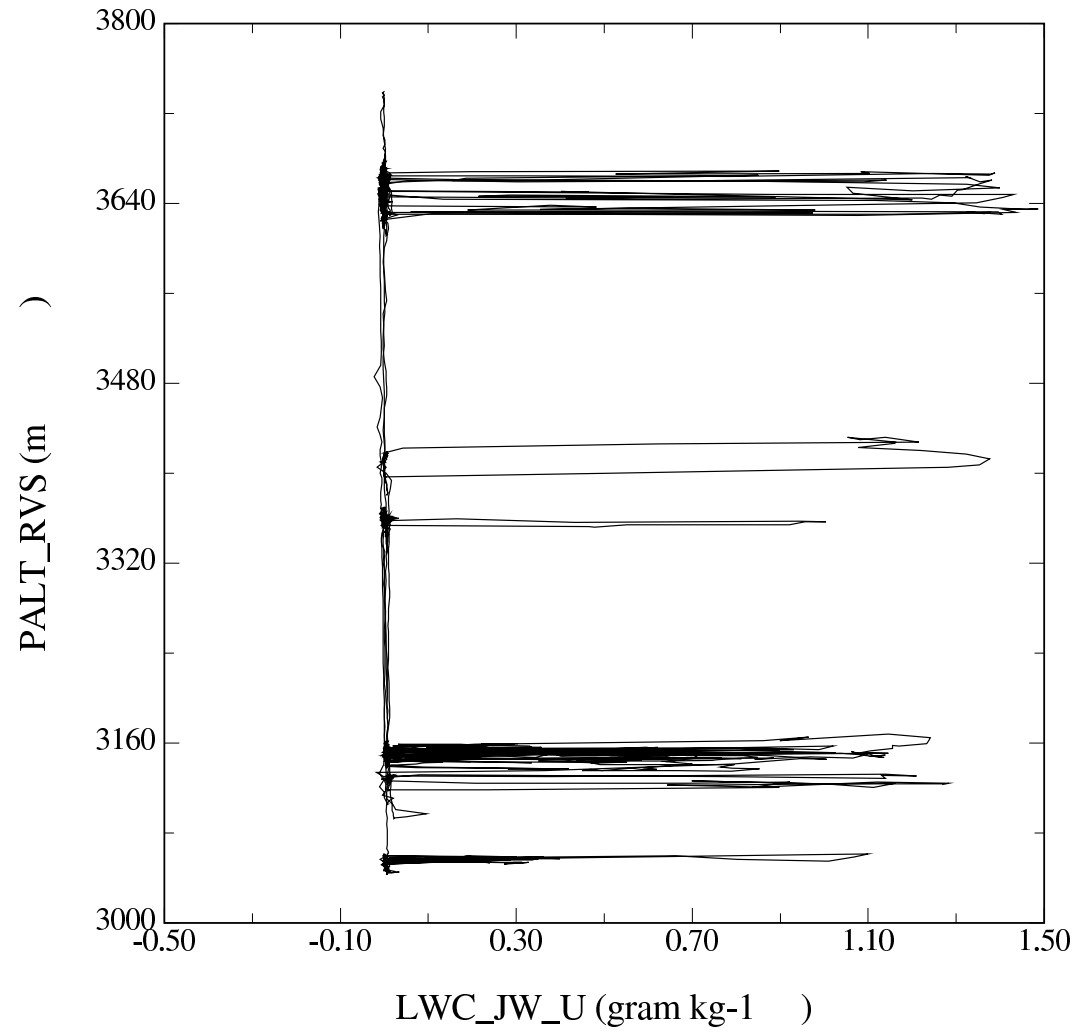
11 July

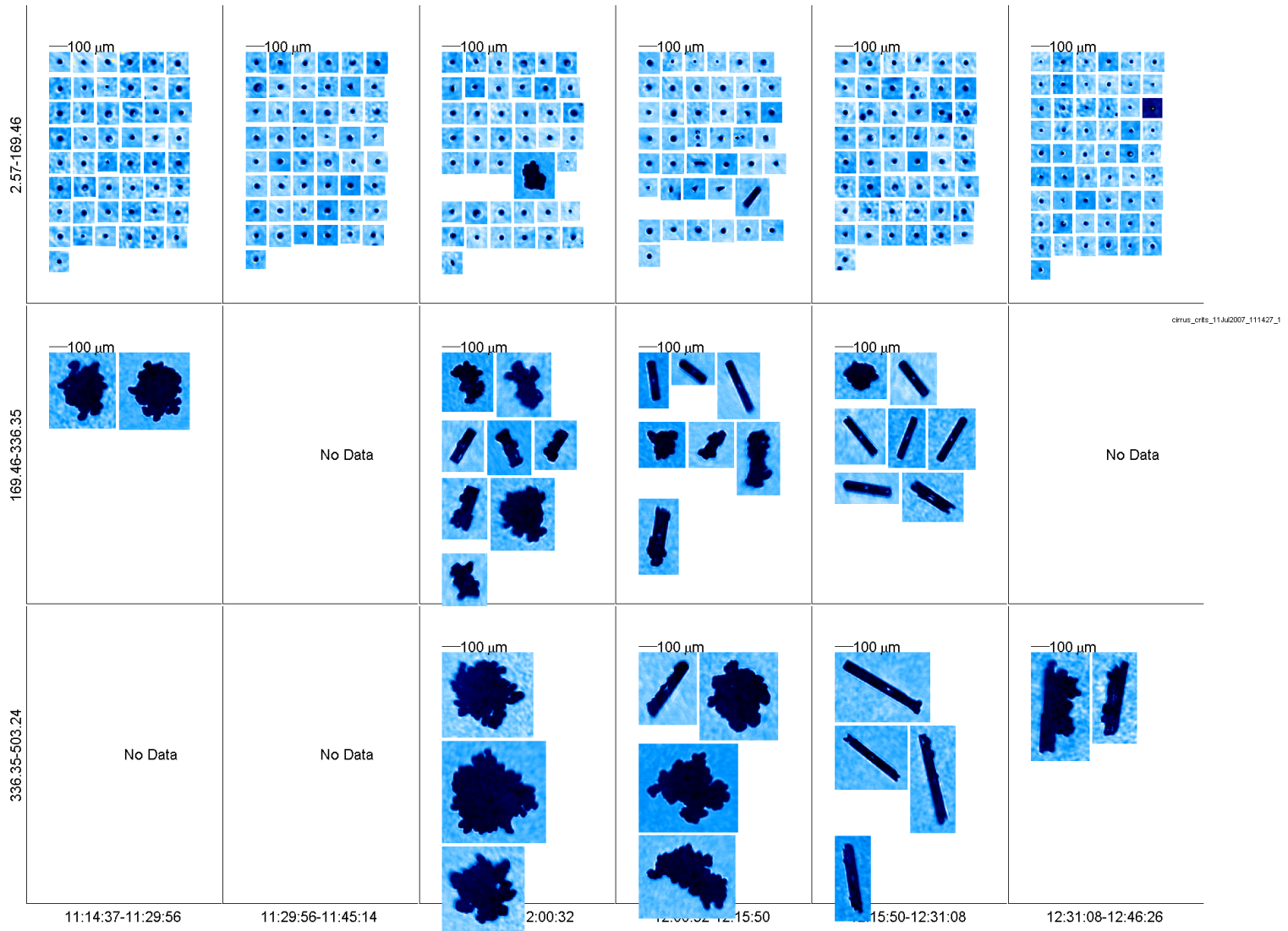
10:30:00-12:45:00



11 July

10:30:00-12:45:00



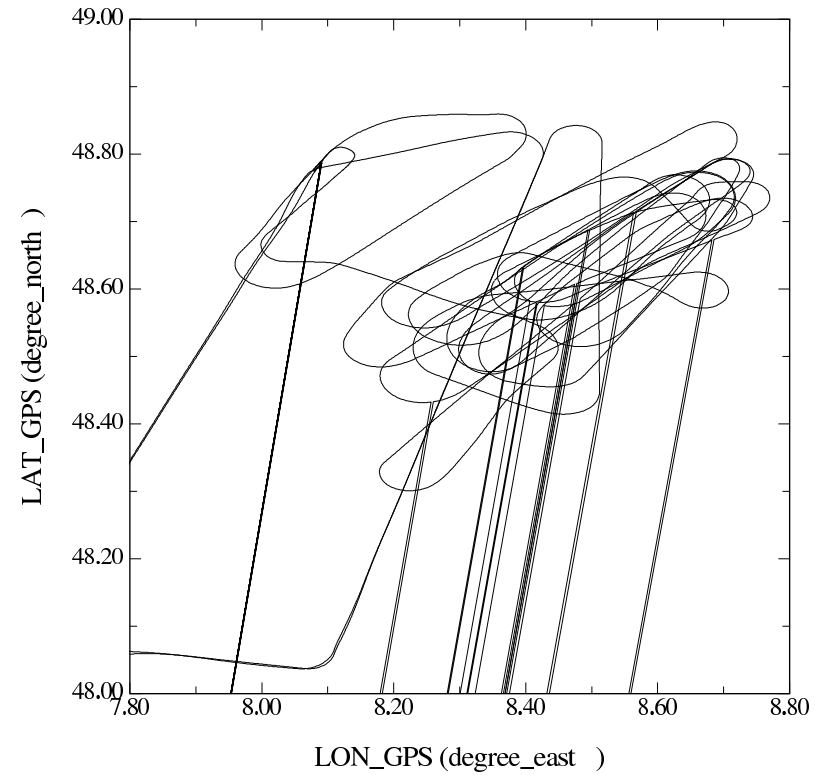


Cloud Particle Imager Images 11 July *Thanks to James Dorsey*

15 July cloud

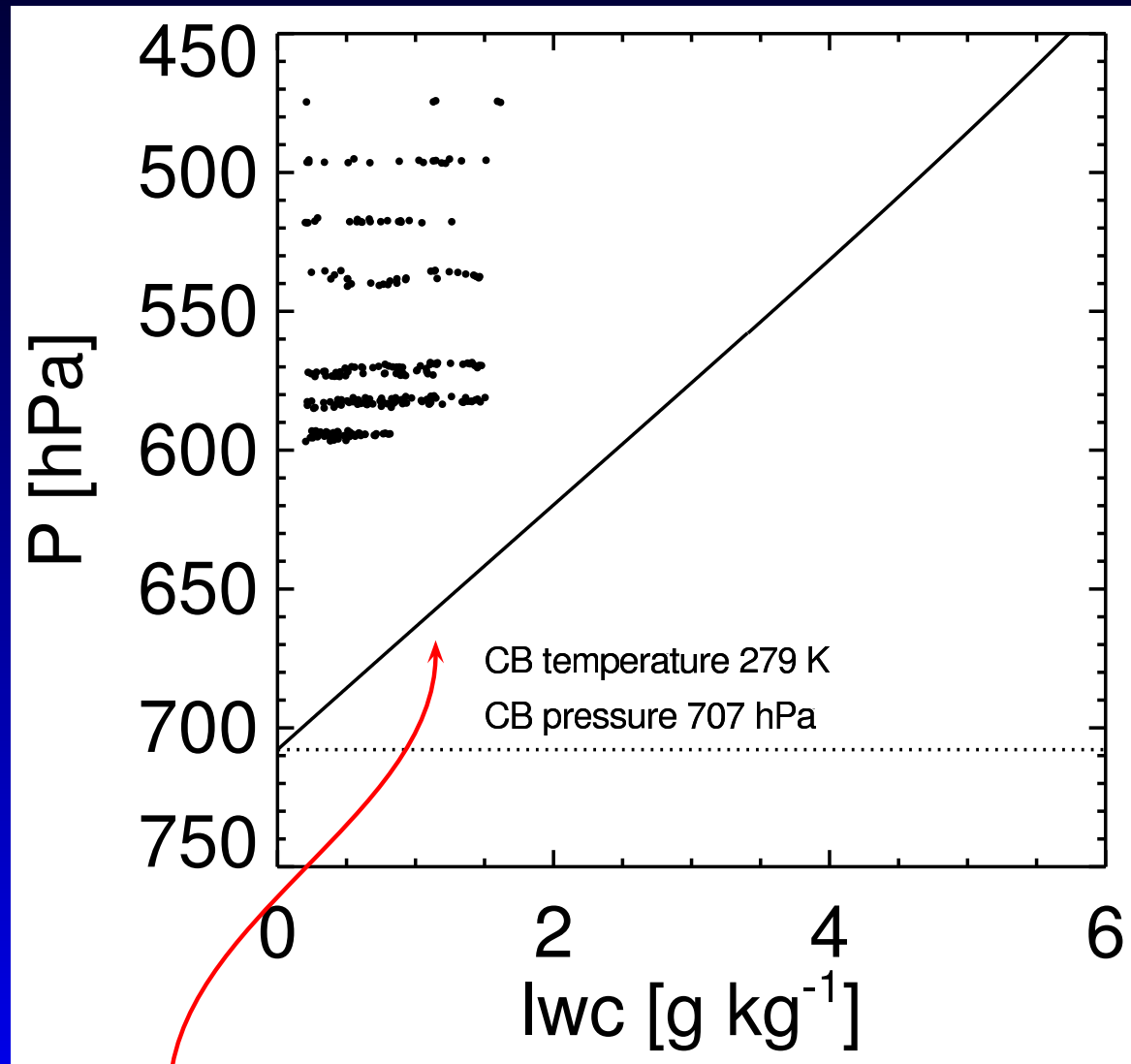
Alan Blyth - Wed Feb 27 20:46:55 2008

10:04:03-17:09:32



	mean	sigma	min	max
— LAT_GPS (degree_north), 1 s/sec	48.15	5.00	0.00	48.86
LON_GPS (degree_east), 1 s/sec	8.14	0.88	0.00	8.77

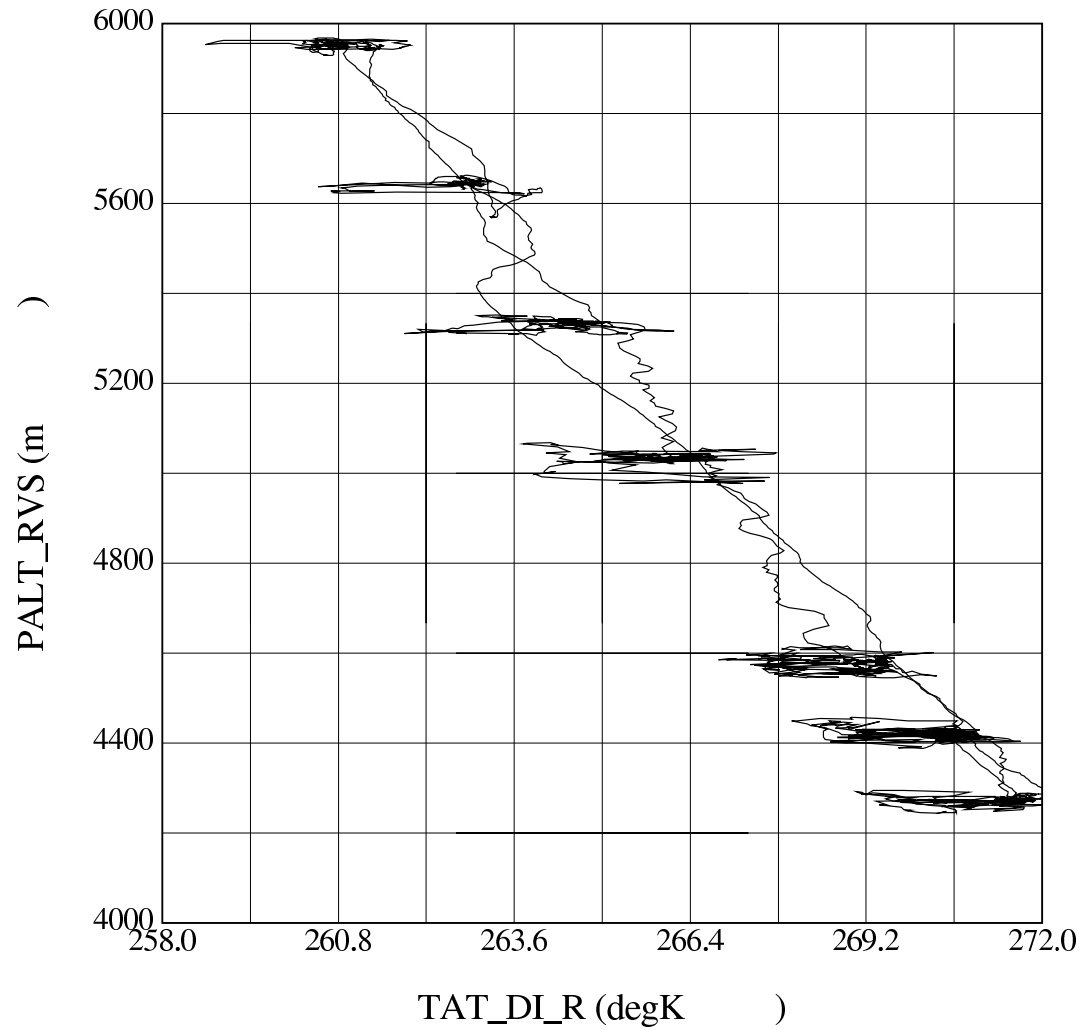
15 July: LWC



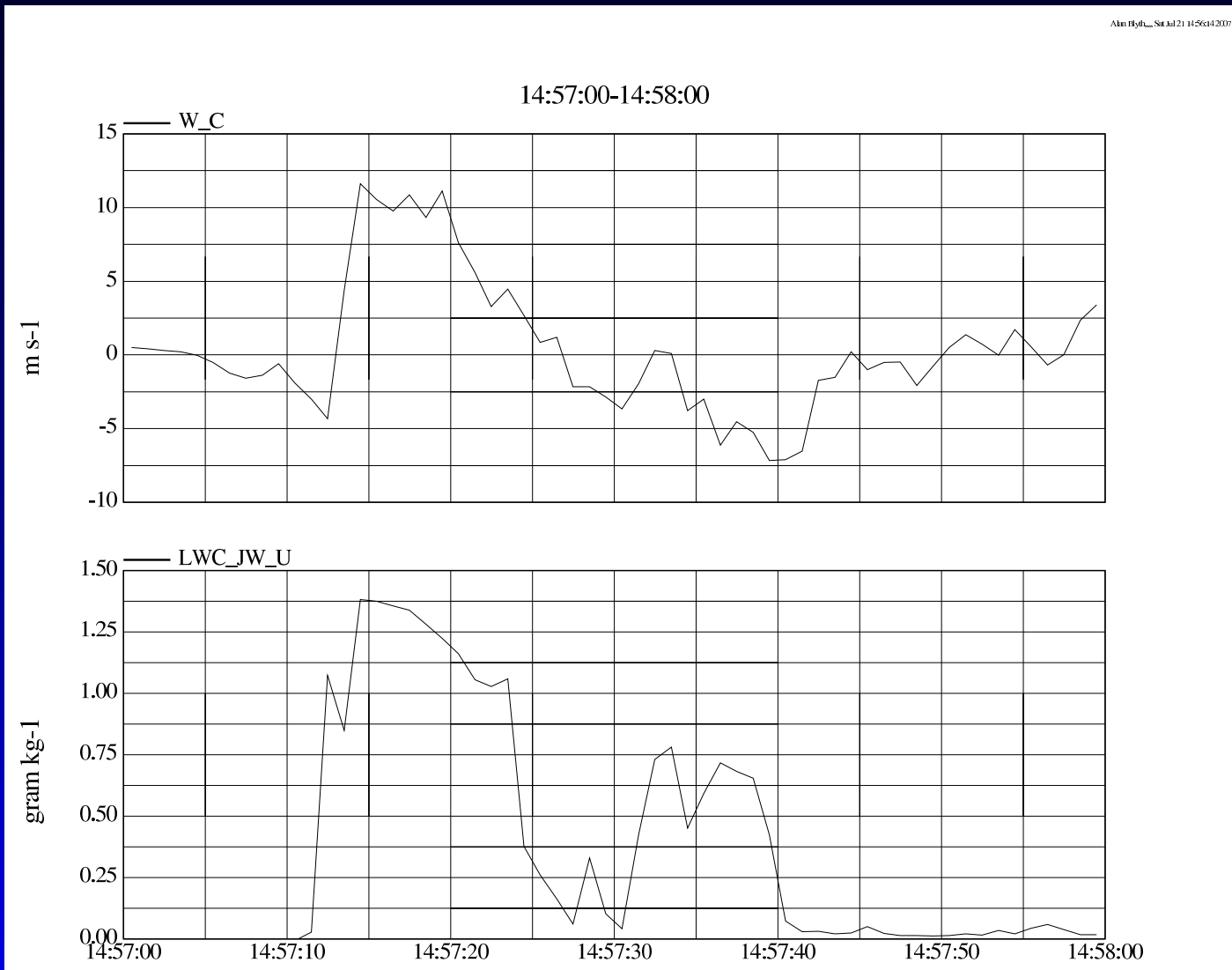
Adiabatic LWC

15 July

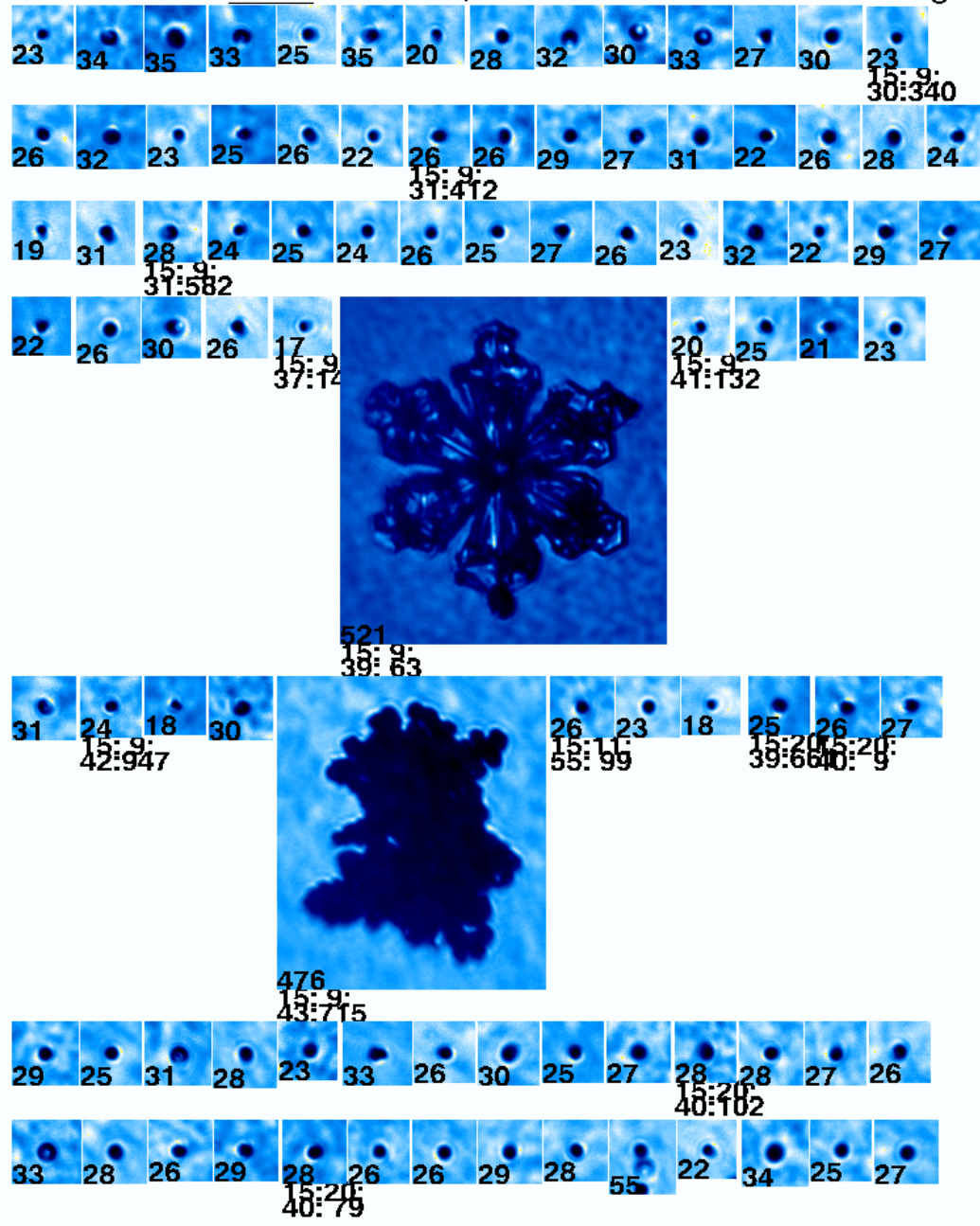
14:30:00-16:30:00



15 July: Max vertical wind

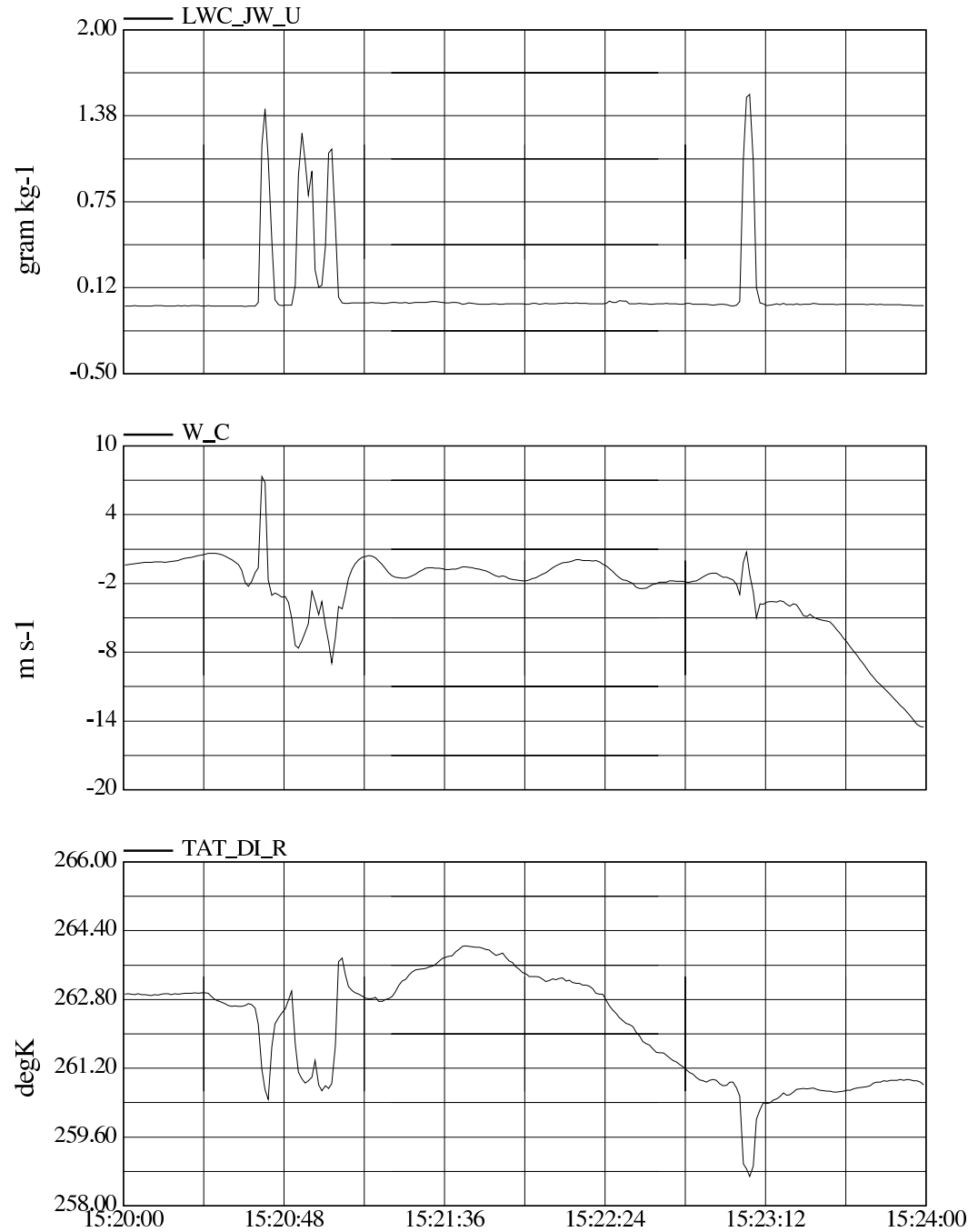


$$w_{max} \approx 12 \text{ m s}^{-1}$$

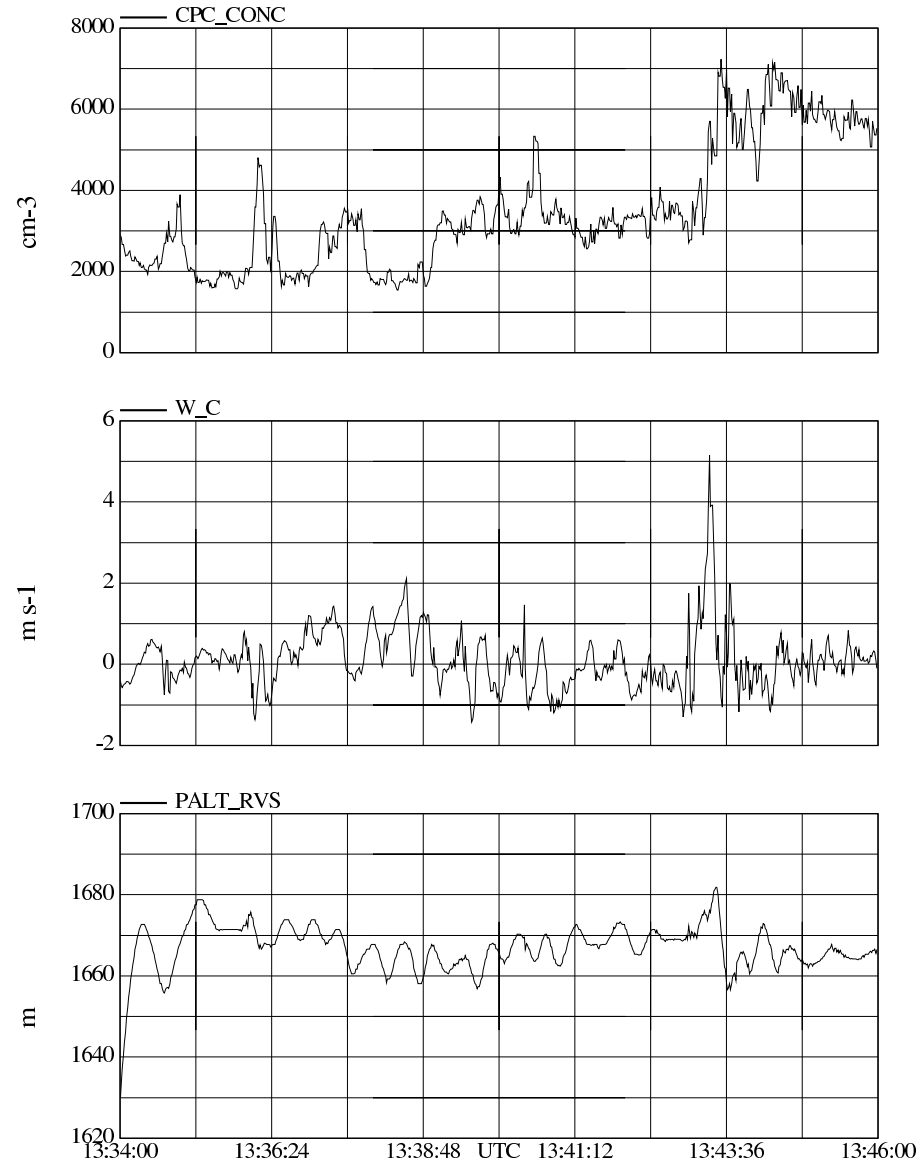




15:20:00-15:24:00

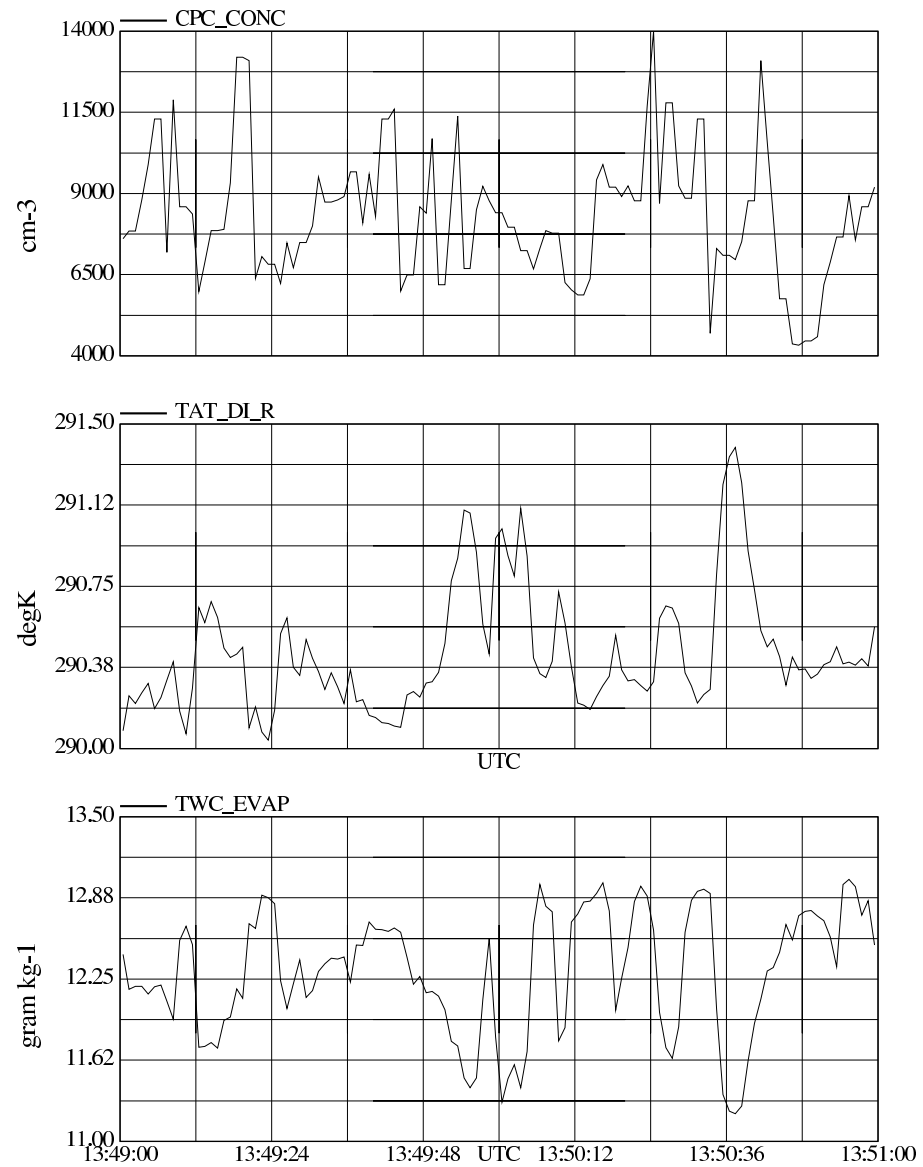


13:34:00-13:46:00



Possible venting of aerosols?

13:49:00-13:51:00



Preliminary thoughts for analysis of 146 data

- Ice seemed to form at higher T than in England?
- Is H-M process as important as in England and NM?
- What is role of aerosols?
- Characteristics of aerosols; venting and transport of aerosols
- Turbulent entrainment and top of BL
- Convective initiation and development - follow through from BL to convective clouds
- Comparison with radar data
- Models: WRF, MAC3, EMM and new LEM, UM
 - Compare model results with each other and observations
 - Sensitivity studies varying aerosols
 - Sensitivity of UM to microphysics