

VOCALS-Rex Overview

Aerosol sources, properties and cloud interactions

Hugh Coe

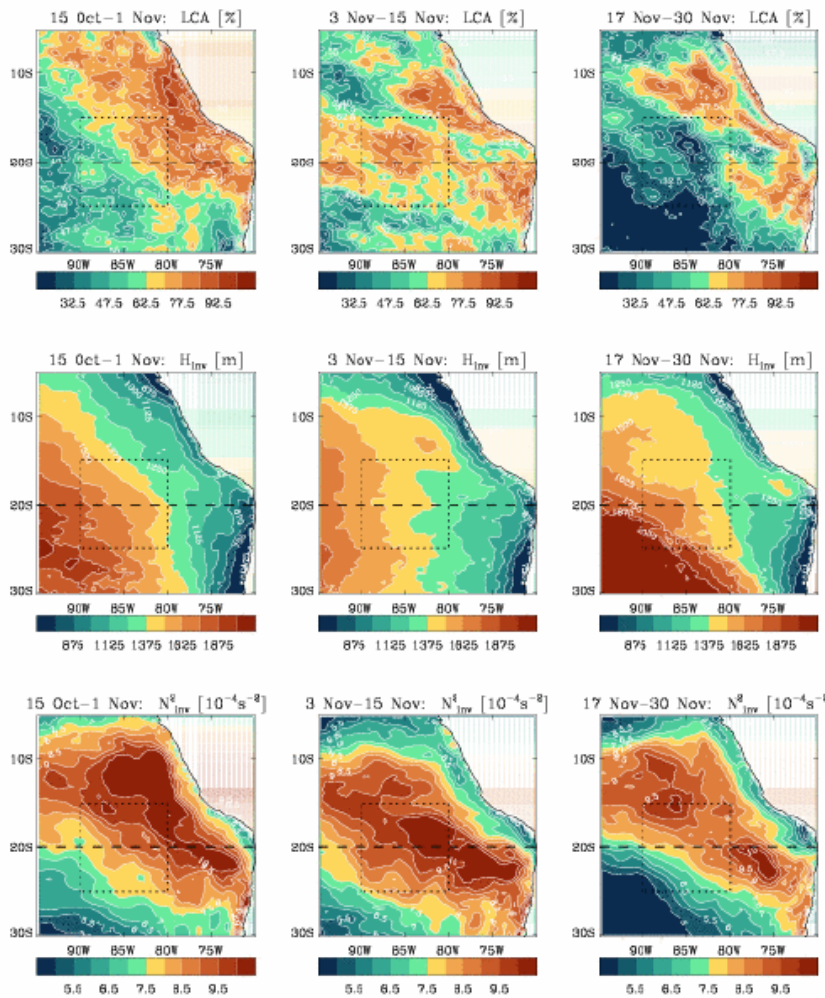
<http://data.cas.manchester.ac.uk/vocals/vocals-uk-summary.pdf>

Flight	Date	Time (UTC)*		Mission	Comments
		Take-off	Land		
B407	17 Oct	10:03:42	14:27:26	Test flight	UK
B408	26 Oct	10:05:05	15:05:44	20° S	
B409	27 Oct	19:59:24	00:29:46	POC	
B410	29 Oct	09:59:43	15:16:13	20° S	
B411	30 Oct	10:25:05	15:48:02	RHB	
B412	31 Oct	09:47:21	14:52:43	20° S, interc. C-130	7 sondes released every degree from 78° to 72°W (# 2 and 6 had no wind data)
B413	3 Nov	11:03:35	16:05:47	Ilo pollution	2 sondes were dropped from 23kft, followed by 2 more at 5-minute intervals.
B414	4 Nov	09:44:48	15:04:04	20° S, interc. C-130	7 sondes dropped from 23kft every degree from 78° to 72° W
B415	5 Nov	09:12:40	14:33:09	POC	4 sondes on the transit to (78°W 20°S), 5 more sondes released on return leg
B416	7 Nov	10:32:20	15:27:26	POC	5 sondes were dropped at 8 minute intervals, at FL230 a further 6 sondes were dropped at 8 minute intervals
B417	9 Nov	09:58:34	15:23:41	20° S	
B418	11 Nov	11:31:55 17:49:07	16:13:40 21:17:33	Coastal pollution	Landed in Antofagasta
B419	12 Nov	11:29:58	16:51:38	RHB	
B420	13 Nov	09:58:50	15:13:08	20° S, POC, interc. Do228	10 sondes dropped along 20°S line from 79°W to 72°W (2 or 3 sondes in POC region) sondes on the return leg with both C-130 and Do228 passing beneath.

	C-130	146	Do-228	RHB
15-Oct-08				
16-Oct-08				
17-Oct-08				
18-Oct-08	POC			
19-Oct-08				
20-Oct-08				
21-Oct-08	20S			
22-Oct-08				
23-Oct-08	20S			
24-Oct-08				
25-Oct-08	20S, overflight RHB			
26-Oct-08		20S	test	
27-Oct-08		POC		
28-Oct-08	POC		test	
29-Oct-08		20S		
30-Oct-08		RHB	RHB	
31-Oct-08	POC	20S	20S	
01-Nov-08				
02-Nov-08	POC		Vertical Profiling	
03-Nov-08		Ilo Smelter	Coastal Pollution	
04-Nov-08	POC	20S	20S	
05-Nov-08		POC	Vertical Profiling	
06-Nov-08	20S		LIDAR test	
07-Nov-08		POC		
08-Nov-08				
09-Nov-08	Coastal Pollution	20S	20S	
10-Nov-08			Coastal Pollution	
11-Nov-08	30S pollution plumes	Coastal Pollution		
12-Nov-08		RHB	RHB	
13-Nov-08	POC	20S/POC	20S	
14-Nov-08			Vertical Profiling	
15-Nov-08	POC			
16-Nov-08				

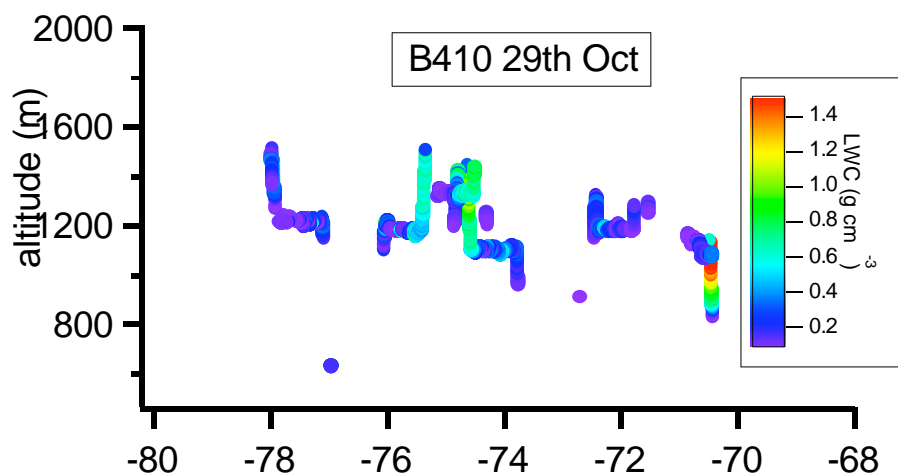
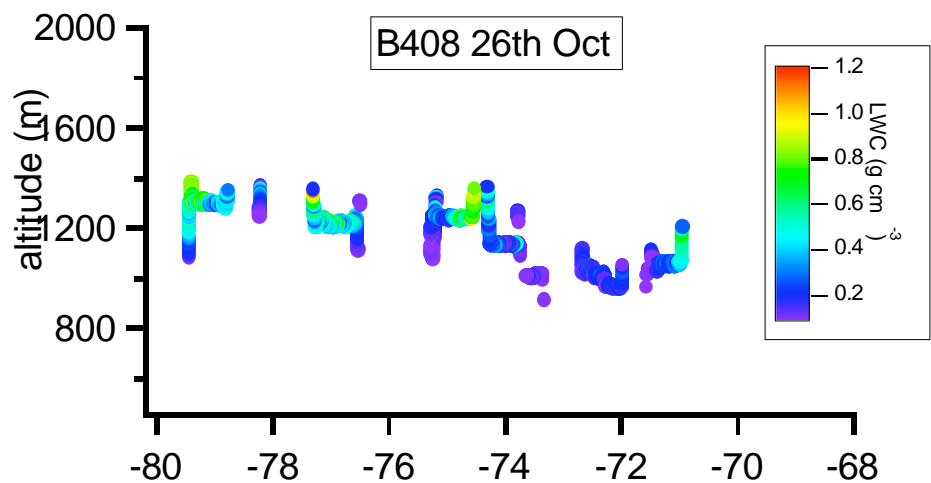
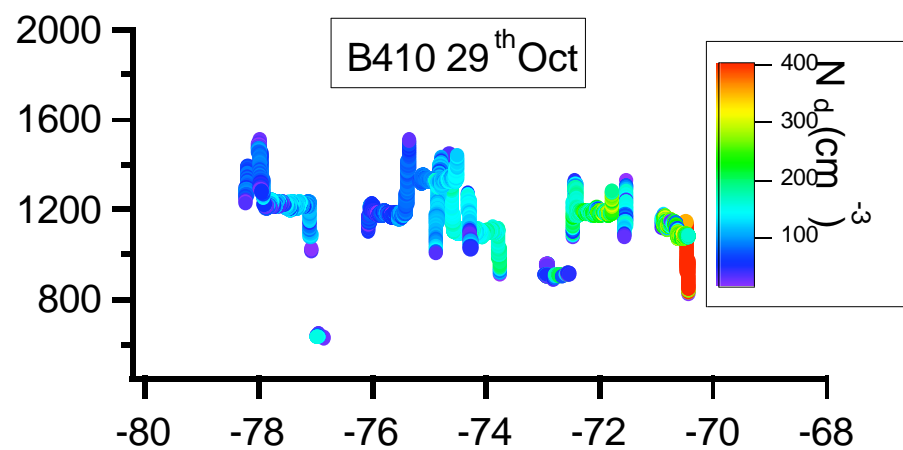
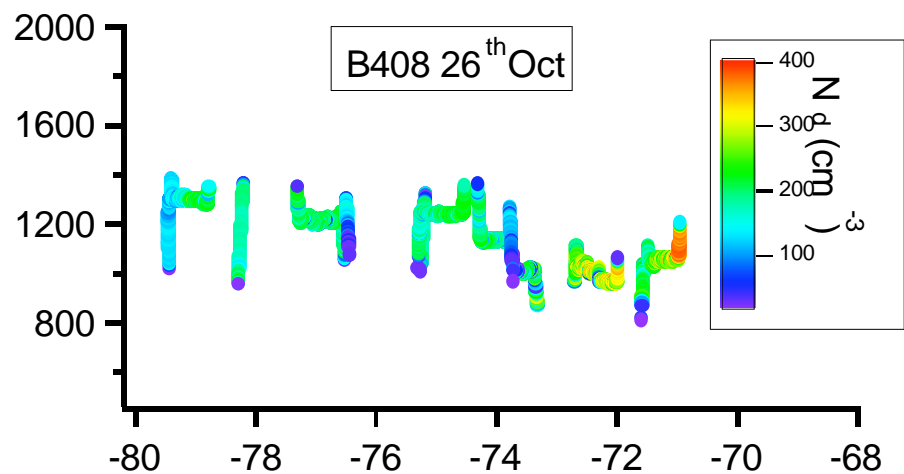
indicates comparison flights

PBL top characteristics in the three „regimes“

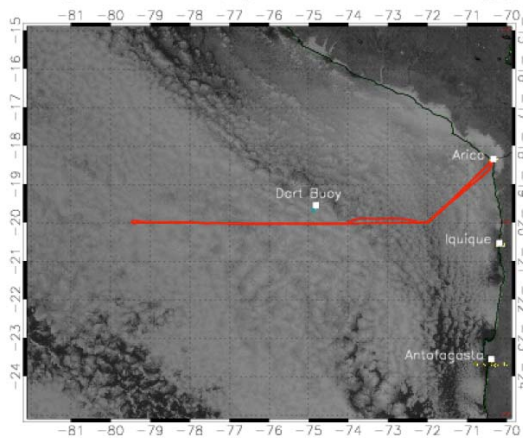


- Period I: high mean cloud cover near the coast, moderate to low in the maritime area (80W-90W, 15S-25S, used as a reference also in subsequent plots). The height, slope and strength of the inversion is moderate.
- Period II: very high cloud cover over maritime area and near the Chilean coast; low, flat, strong inversion.
- Period III: low c.c., and progressively less later. Weak inversion, and high, with large SW-NE gradient.

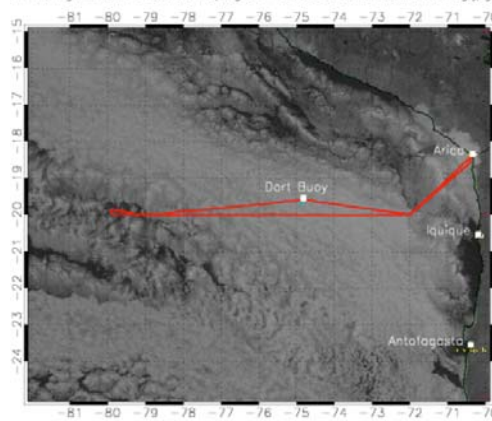
ECMWF re-analysis
From T. Toniazzo

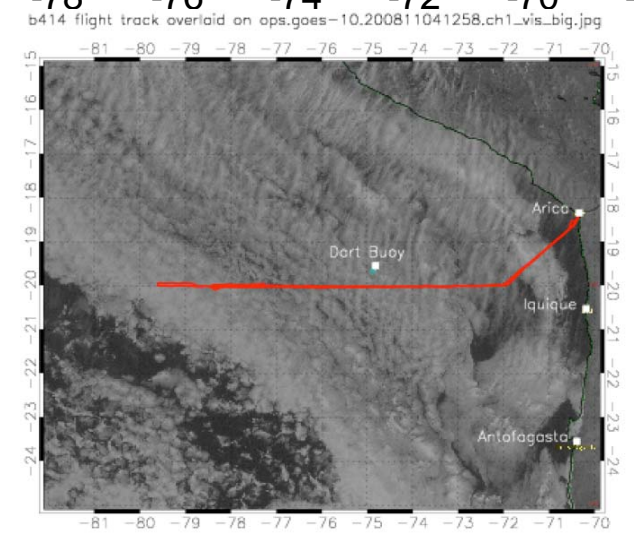
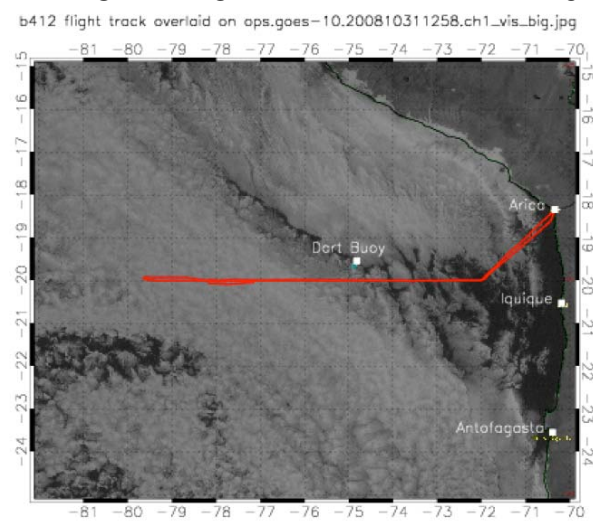
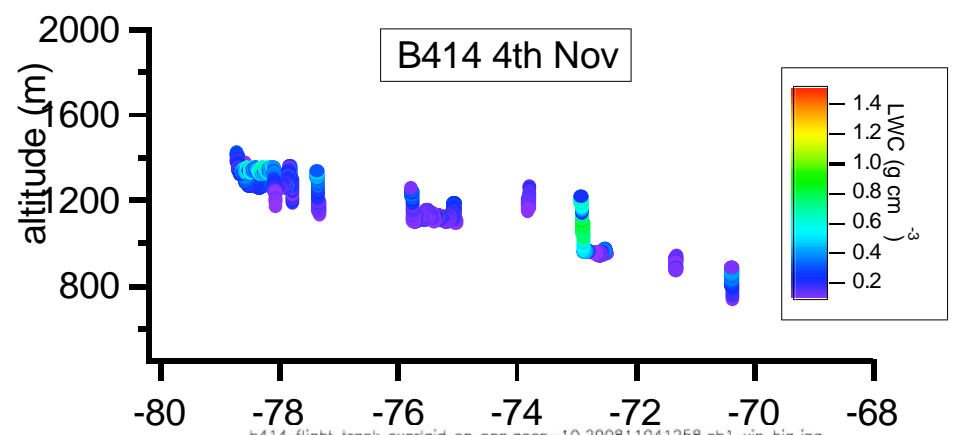
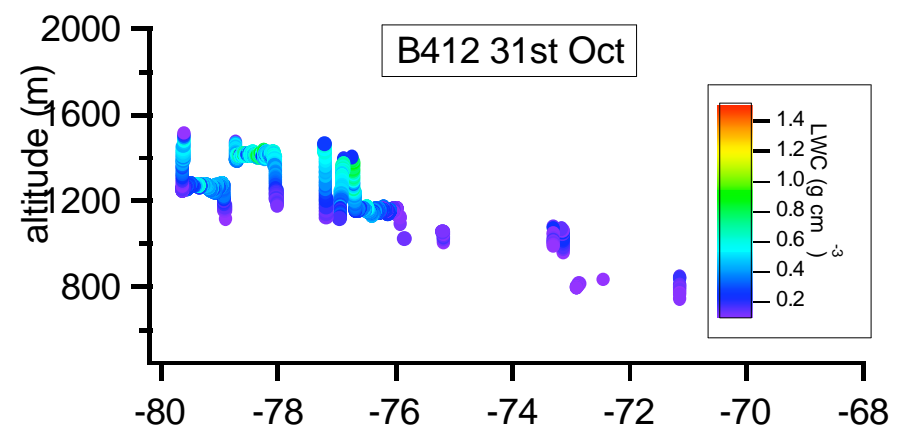
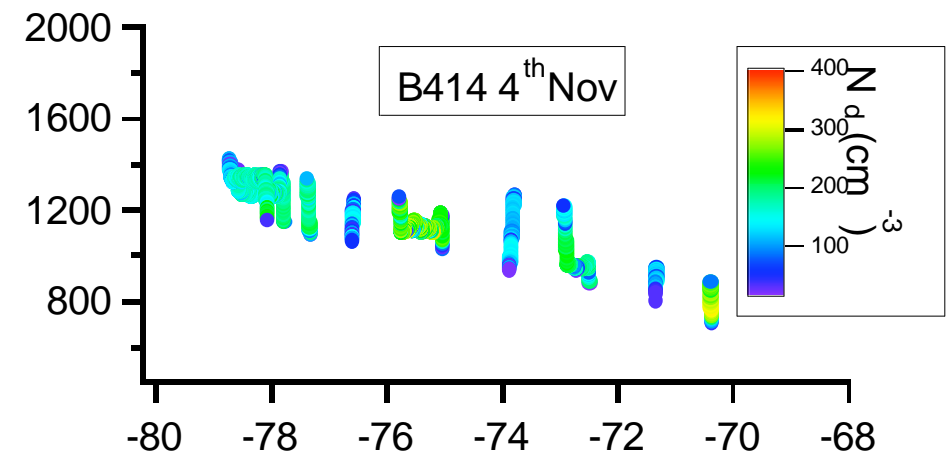
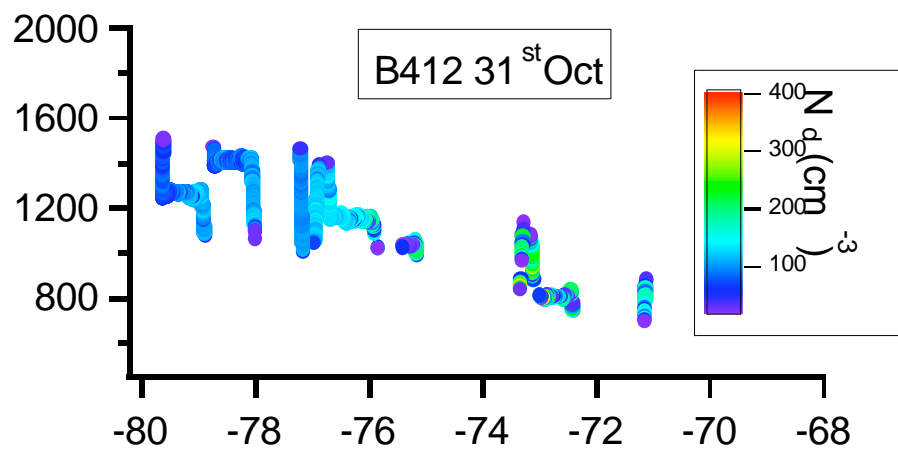


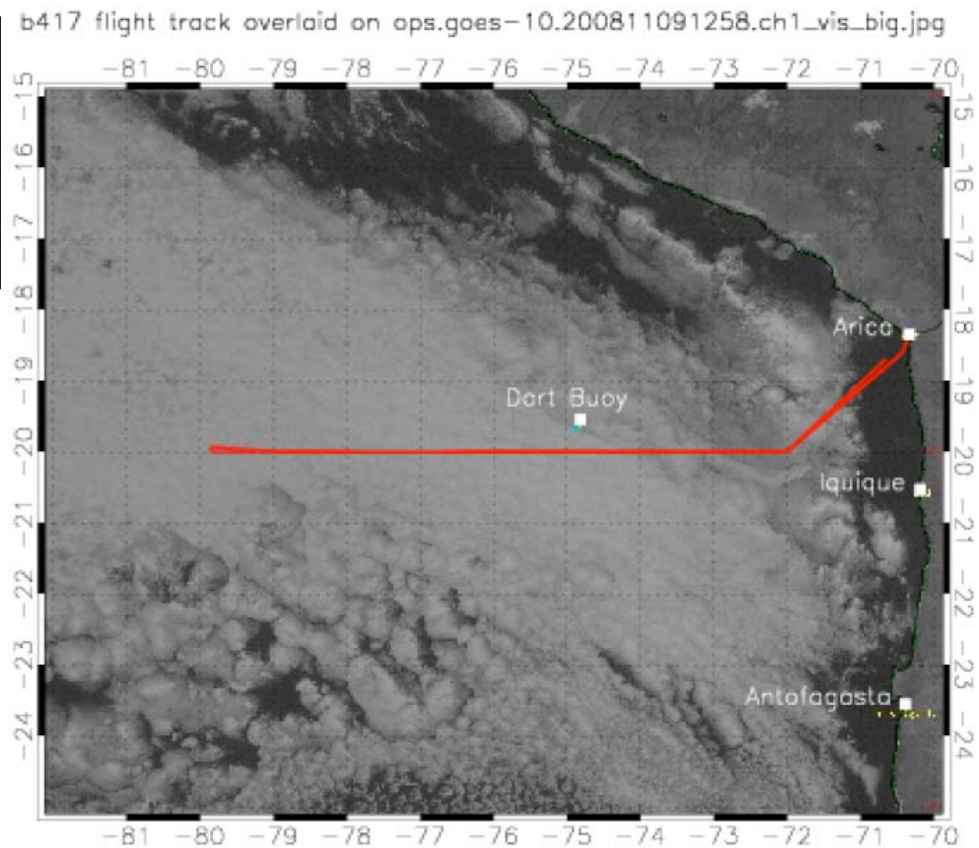
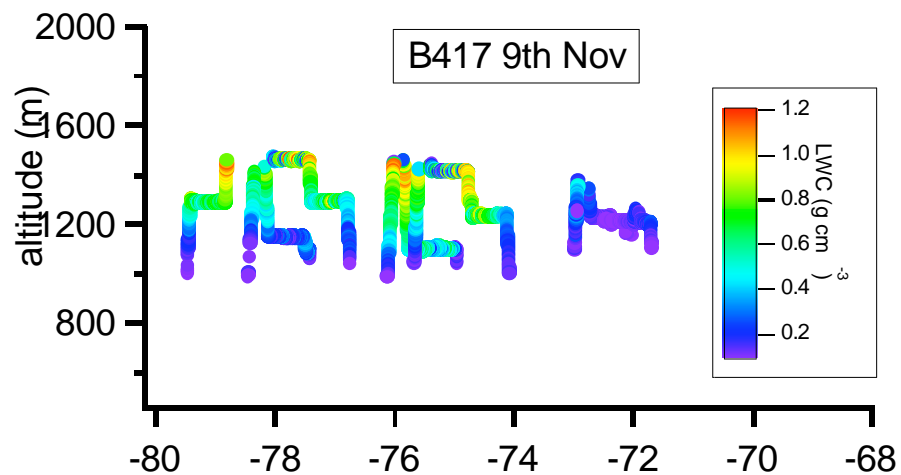
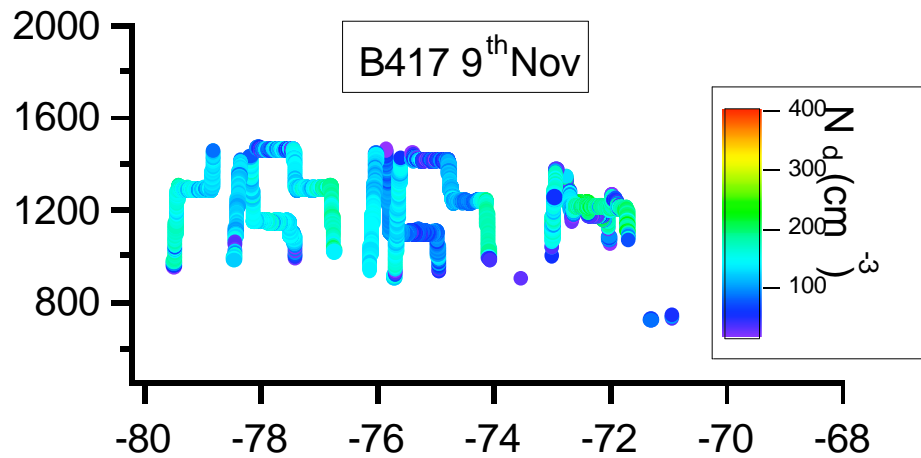
b408 flight track overlaid on ops.goes-10.200810261258.ch1_vis_big.jpg



b410 flight track overlaid on ops.goes-10.200810291258.ch1_vis_big.jpg

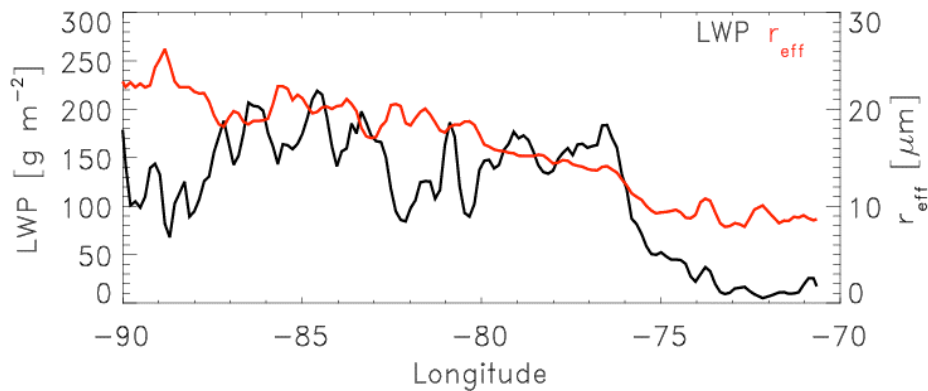
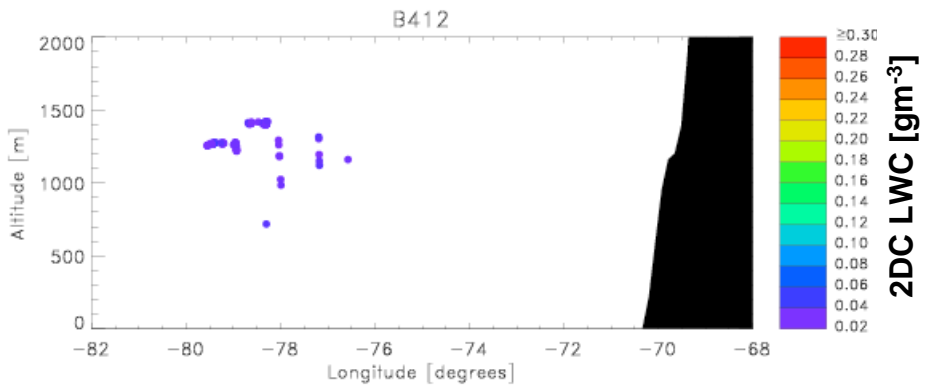
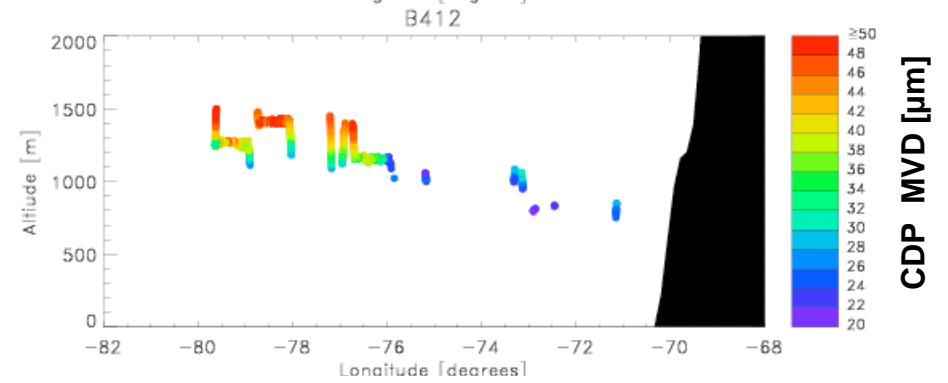
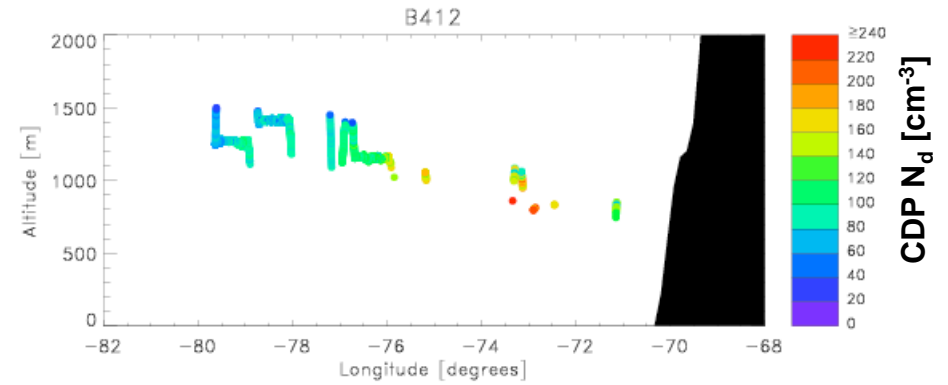
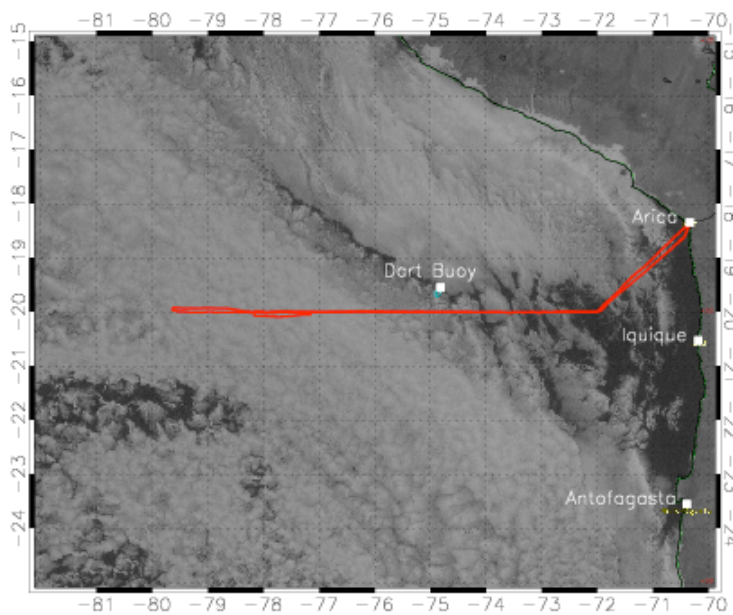






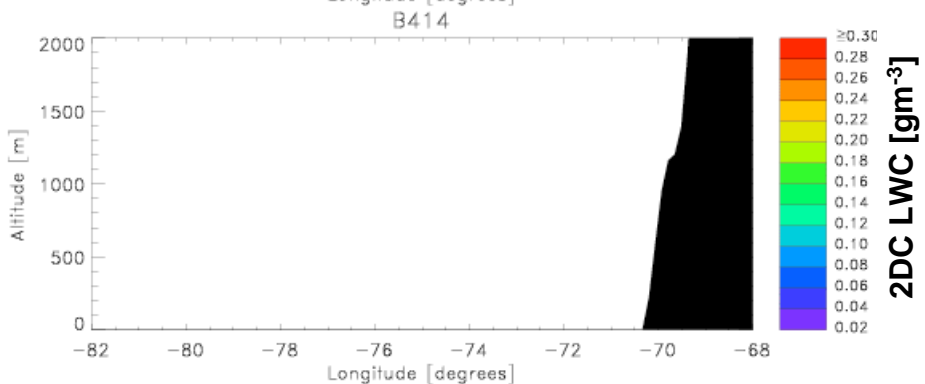
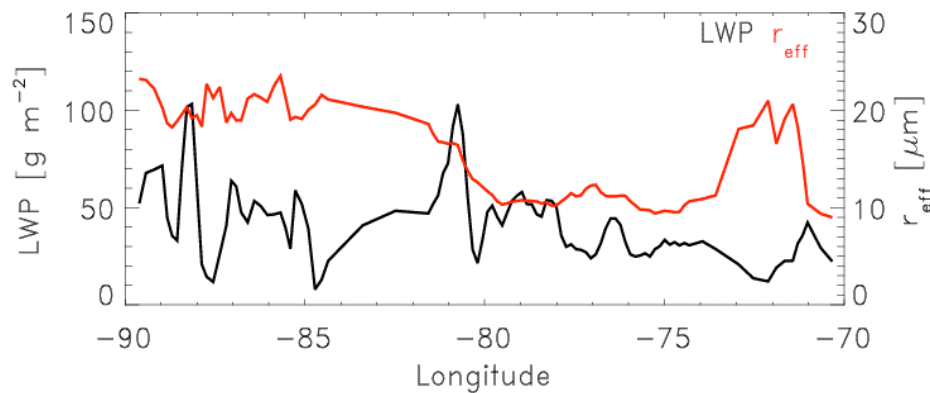
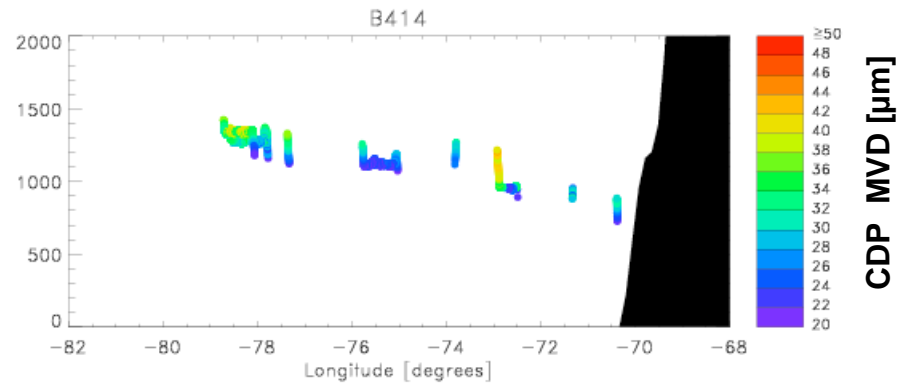
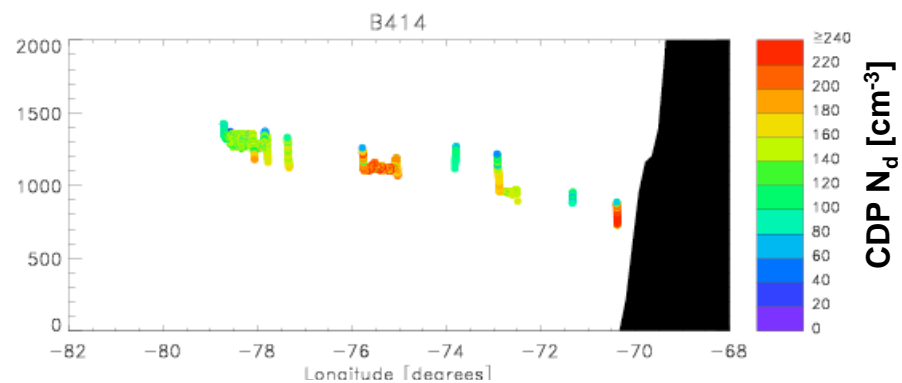
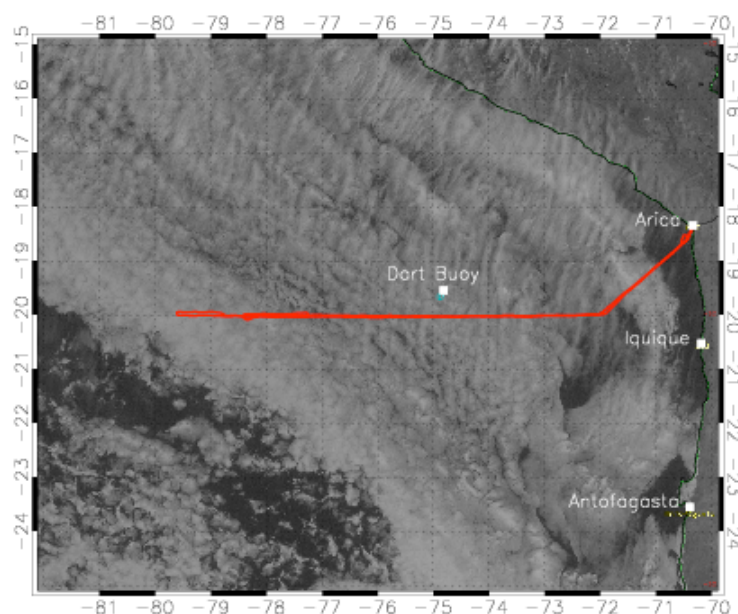
Data Examples: 20S cross section 31/10/08

b412 flight track overlaid on ops.goes-10.200810311258.ch1_vis_big.jpg



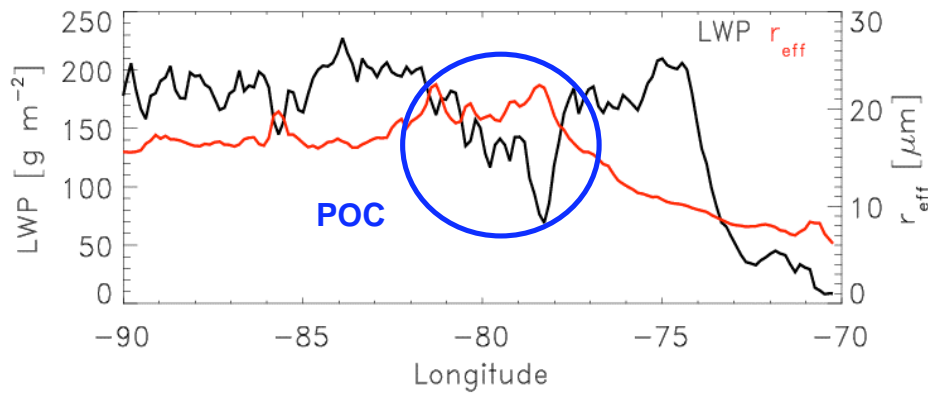
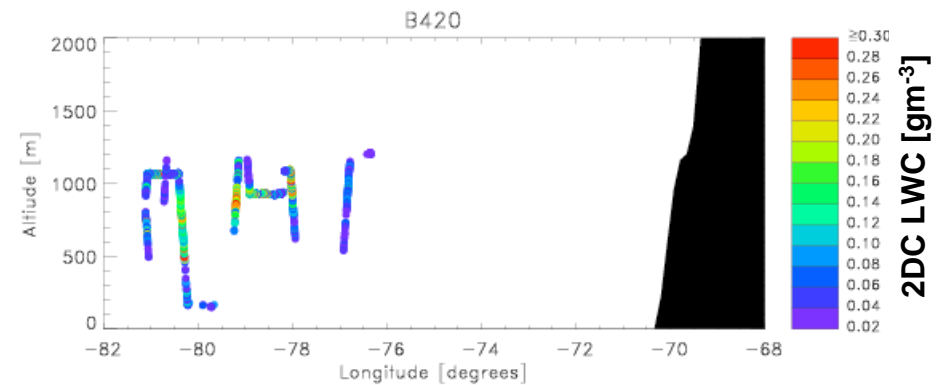
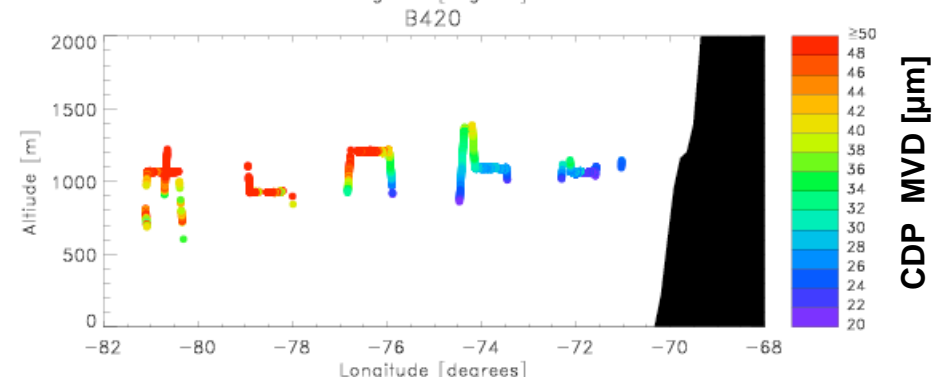
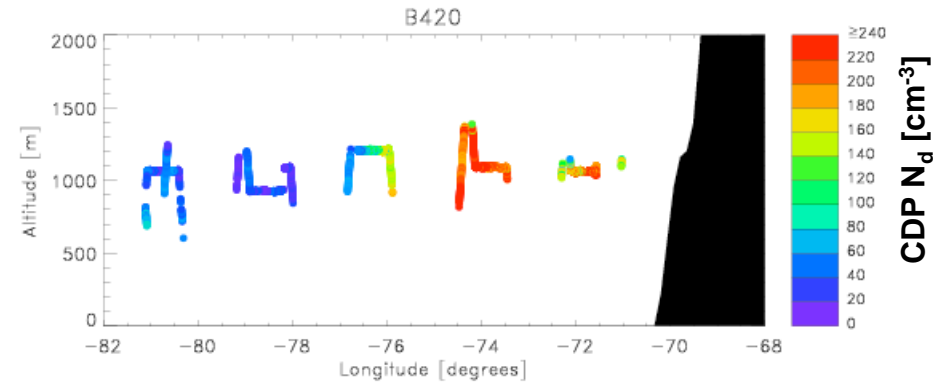
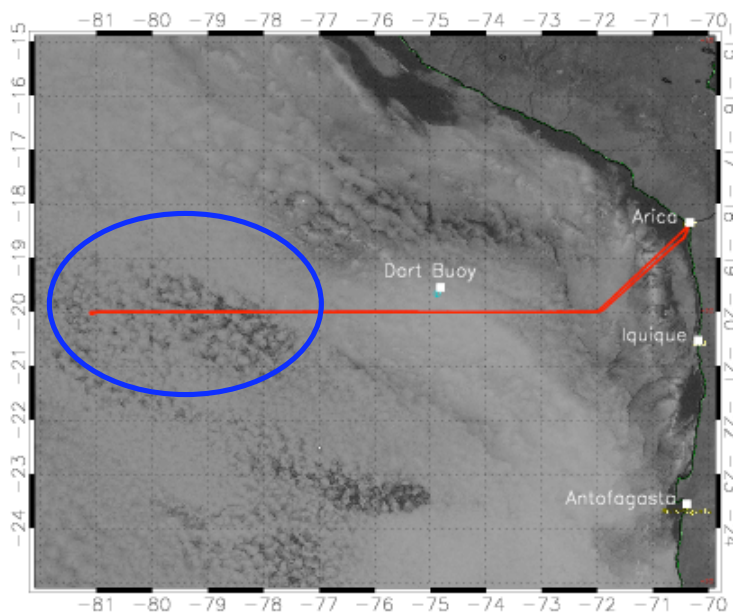
Data Examples: 20S cross section 4/11/08

b414 flight track overlaid on ops.goes-10.200811041258.ch1_vis_big.jpg



Data Examples: 20S cross section 13/11/08

b420 flight track overlaid on ops.goes-10.200811131258.ch1_vis_big.jpg



Summary :

- The FAAM aircraft completed 6 20S missions, approximately one every 3-4 days
- There is considerable day to day variability in boundary layer structure; cloud cover and cloud microphysics.
- Initial flights show cloud tops around 1200 m near the coast, rising to 1500 m at 80W. At the end of Oct and start of Nov, the cloud cover reduced and the cloud tops showed a greater gradient with longitude: 900 m near the coast to 1500 m at 80W.
- Cloud droplet numbers varied from 250-350 cm^{-3} near the coast
- N_d between 75 and 80 W was variable from 50 (B410 and B412) to 200 (B408) cm^{-3} .
- Cloud LWC was also variable from day to day
- regions of high LWP are correlated with in situ observations of drizzle
- A POC was observed on the 20S cross section on 13th November (B420).

An example of a 20S track 31 Oct 2008

