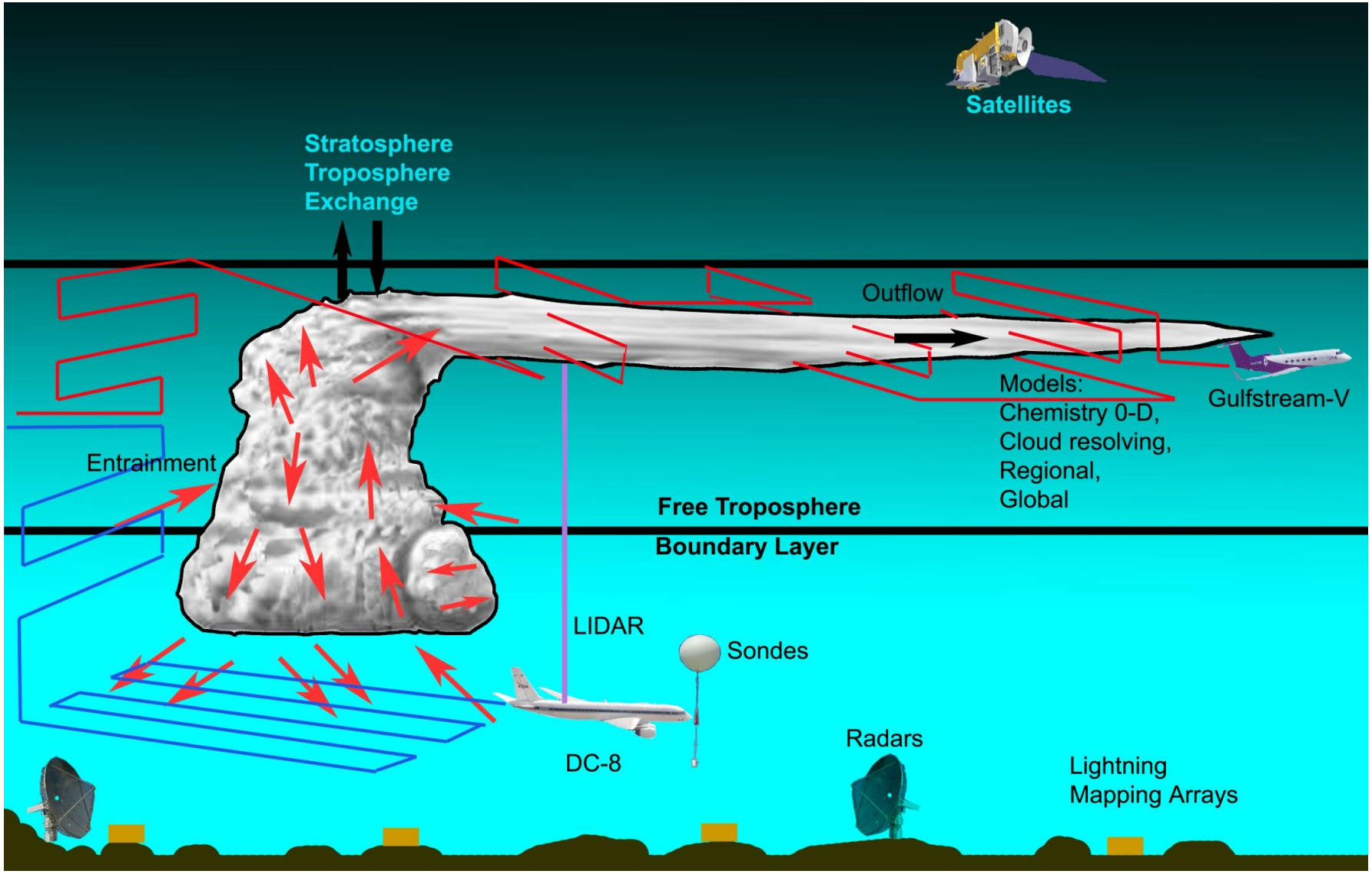
DC-8 payload and flight patterns



DC-8 payload (for SEAC4RS)

Investigator	Acronym	Measurement	Type	Principal, sensitivity, resolution
Ryerson	CSD CL	NO, NO2, NOy, O3	In Situ	chemiluminescence; 10 ppt; 1-s
Cohen	TD-LIF	NO2, Sum-Nitrates	In Situ	Fluorescence; 10 ppt; 1-s
Huey	GT-CIMS	PANs, SO2	In Situ	Ionization-spectroscopy; 10 ppt; 10-s
Dibb	SAGA*	HNO3, bulk aerosols	In Situ	Ion-chromatography; 10 ppt; 120-s
Wennberg	CIT-CIMS	HNO3, HCN, peroxides, o-acids	In Situ	Ionization-spectroscopy; 10 ppt, 1-s
Fried	DFGAS	Formaldehyde	In Situ	IR-Spectrometer; 10 ppt; 15-s
Hanisco	ISAF	Formaldehyde	In Situ	Fluorescence; 10 ppt; 1-s
Wisthaler	PTR-MS	Select OVOC, NMHC, CH3CN	In Situ	Ionization-spectroscopy; 10 ppt, 10-s
Blake	WAS*	Hydro and halo carbons	In Situ	Gas-chromatography; low ppt, 120-s
Diskin	DACOM	CO, CH4, N2O	In Situ	TDL-spectroscopy, low ppb, 1-s
Beyersdorf	AVOCET	CO2	In Situ	Non-dispersive IR, 100 ppb, 1-s
Diskin	DLH	Water vapor	Remote	Open-path Spectroscopy, 1 ppm, 1-s
Hair	DIAL HSRL	O3 and aerosol profiles	Remote	Up/down lidar ozone and aerosol profiles
Jimenez	AMS	TOF-Aerosol mass spectra	In Situ	Fine aerosol (SO^4/NO_3), 0.1 ng/m^3, 10-s
Gao	HD-SP2	Black carbon aerosol	In Situ	laser-induced incandescence, 1 ng/m^3, 1-s
Froyd	PALMS	Single particle composition	In Situ	ionization mass spectrometer, 0.2-3 μm, 100-Hz
Anderson	LARGE	Aerosol measurements (CN, CCN)	In Situ	Particle counters, 0.01-10 μm, 1-s
Sorooshian	DASH-SP	Aerosol hygroscopicity	In Situ	Differential mobility, growth factors, 10-2500 nm
Brock	AOP	Aerosol extinction and absorption	In Situ	Cavity ring down/photoaccoustic, 405-660 nm
Lawson	SPEC	Aerosol parameters	Remote	Particle imaging
Tanelli	APR-2	Precipitation, clouds	Remote	13.4 & 35.6 GHz RADAR
Russell	AATS-14	Aerosol optical depth	Remote	Sun photometer, 350-2100 nm; 2-6 nm resolution
Bucholtz	BBR	Broadband solar and IR	Remote	Up/down solar/IR irradiance, hemispheric, 10-Hz
Schmidt	SSFR	Solar and near IR irradiance	Remote	Up/down radiometer, 380-2200 nm, 10 nm resol.
Hall	CAFS	Actinic flux	Remote	Spectral radiometers, 280-680 nm, 2 nm resol.
Bui	MMS	Micromet (T, P, wind vectors)	In Situ	Winds, temperature, pressure, 100-Hz

Table D-2. Payload for NASA DC-8 during DC3.

DC-8 payload for DC3

DC-8 Gases	GV	DLR
NO, NO_2, NO_y, O_3 : CSD-CL	√	√
NO_2, sum nitrates : TD-LIF	√	√
PANS, SO_2 : GT-CIMS	√	√
HNO_3, bulk aerosol : SAGA	√	
HNO_3, HCN, peroxides , o-acids : CIT-CIMS	√	
HCHO : 2 ways – DFGAS, ISAF	√	
OVOCs, NMHC, CH_3CN: PTR-MS	√	√
Hydro- & halo- carbons : WAS	√	√
CO, CH_4, N_2O ; DACOM	√	√
CO_2 : AVOCET	√	√
Water Vapor: DLH	√	√
Lidar O_3, aerosol profiles : DIAL		
OH, HO_2, RO_2, OHR: ATHOS*		

DC-8 Particles and Light	GV	DLR
Aerosol chemicals & size: AMS		
Black carbon : HD-SP2		√
Single particle comp : PALMS		
CN , CCN : LARGE	√	√
Aerosol extinction, absorption - AOP		√
Hydroscopicity : DASH-SP		
Particle imaging : SPEC	√	
Aerosol optical depth : AATS-14		
Precipitation, clouds : APR-2		
Actinic flux : CAFS	√	
Solar, near-IR : SSFR		
Broadband solar, IR: BBR		
Micromet (T, p, w): MMS	√	√

* DC3 only, not SEAC4RS

DC-8 instrument layout for DC3

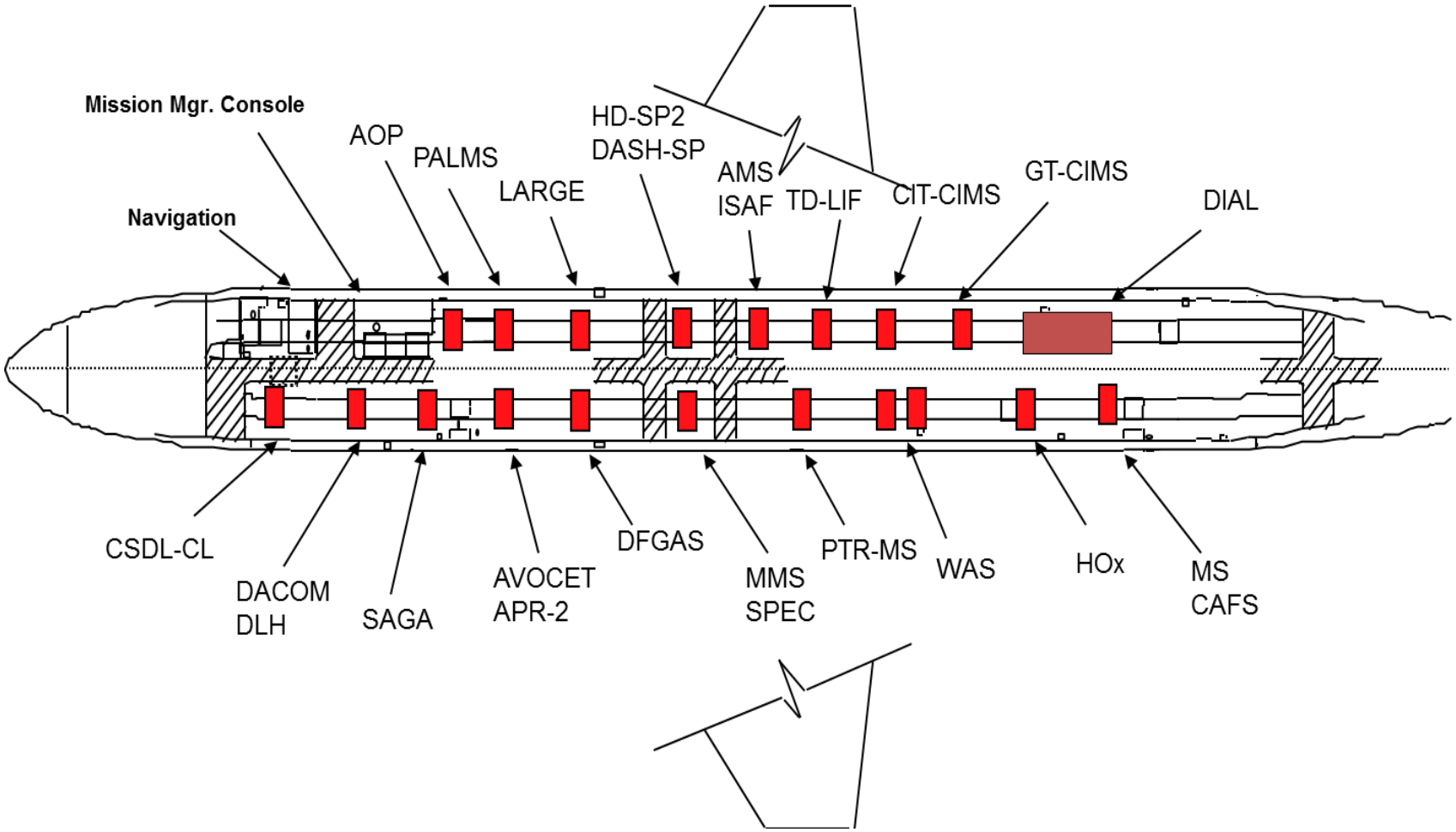
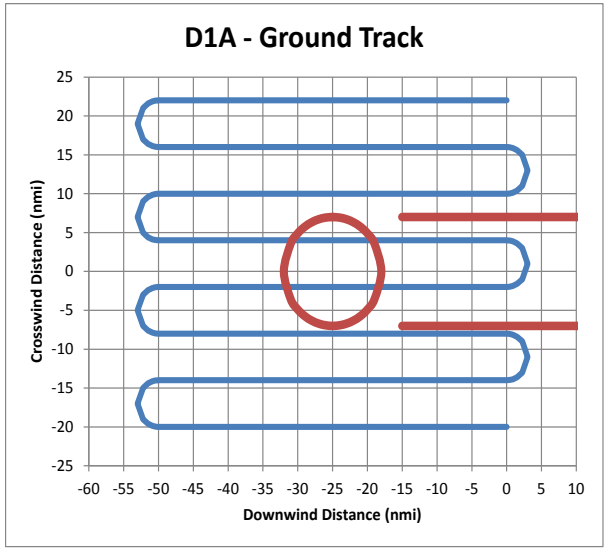


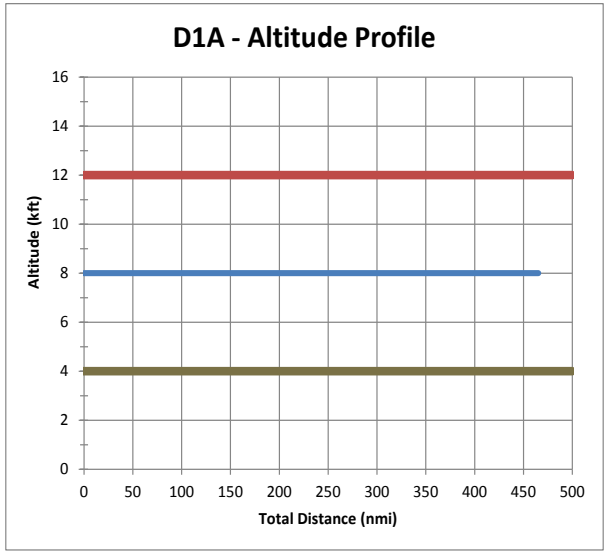
Figure D-2. Cabin layout of the NASA DC-8 aircraft during DC3.

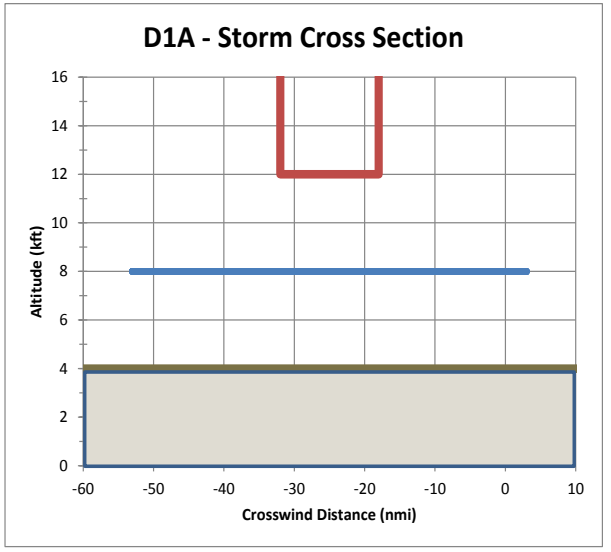
DC-8 sampling plans

- sample low-level inflow / outflow
- sample mid-level inflow / outflow
- identify outflow with lidar
- measure radicals in high-level outflow
- compare measurements with measurements on the GV and DLR Falcon

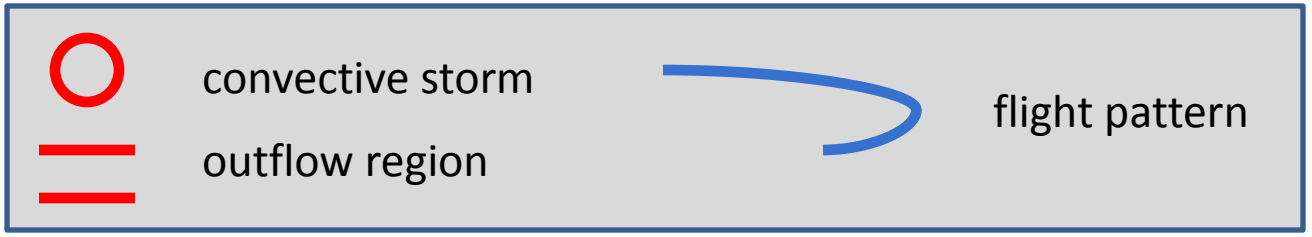
boundary layer grid



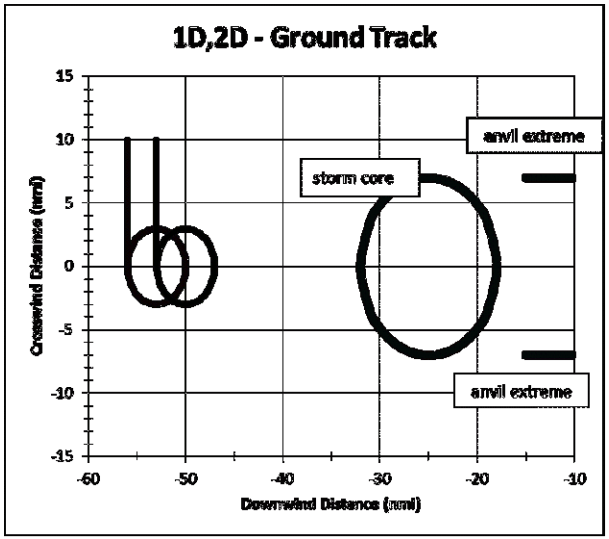


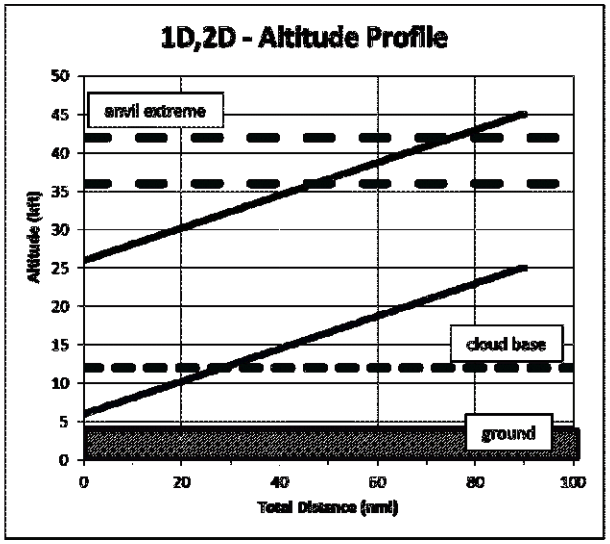


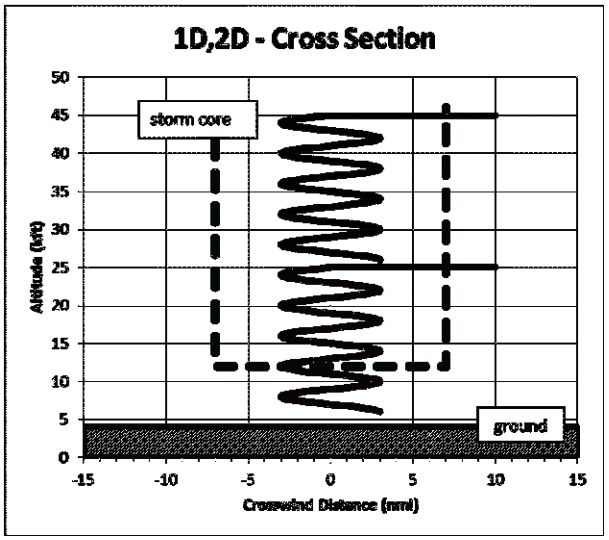
sample inflow from below storm (if possible)



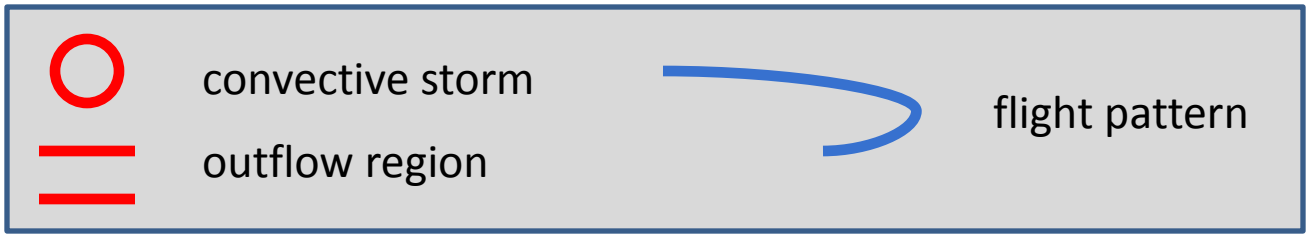
upwind profile (works for downwind too)



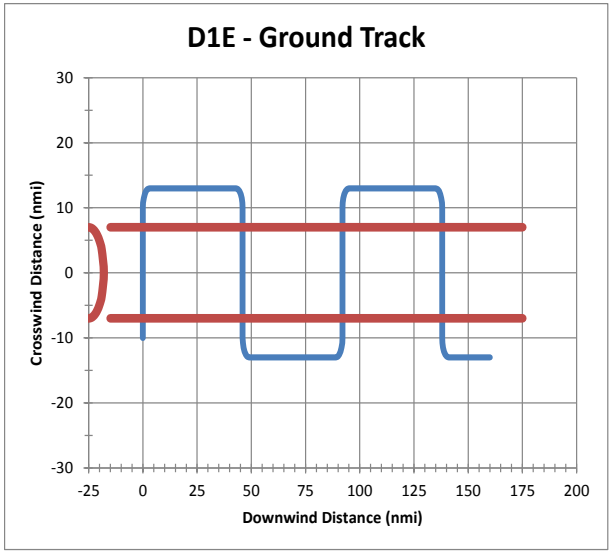


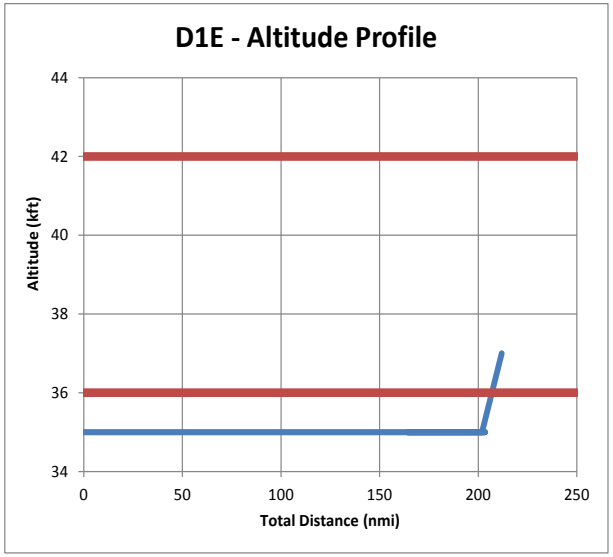


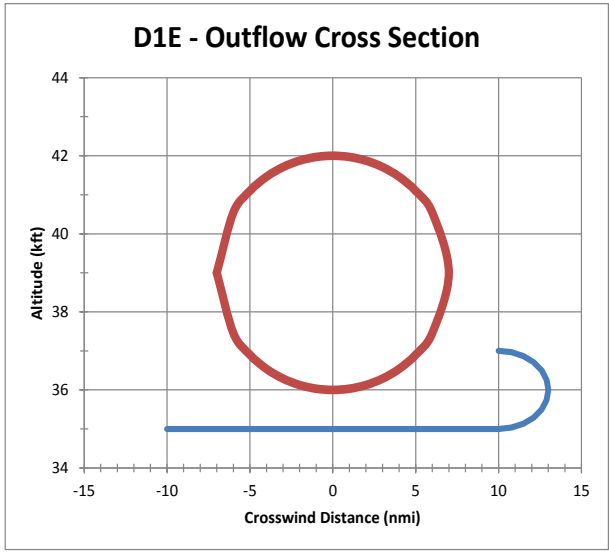
sample upwind– coordinated DC-8 and GV



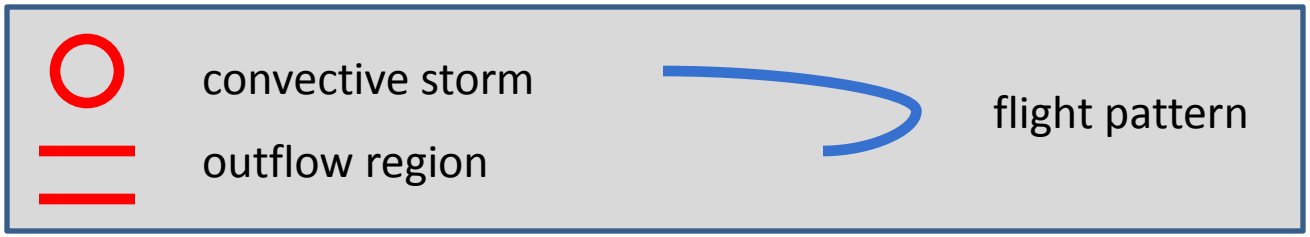
anvil cross-wind constant altitude legs



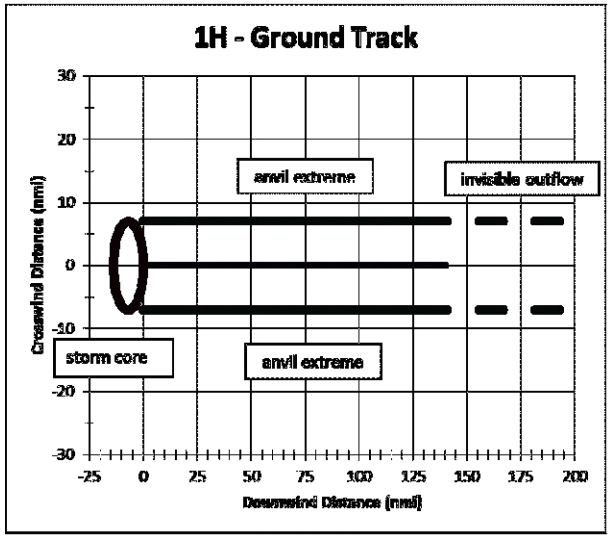


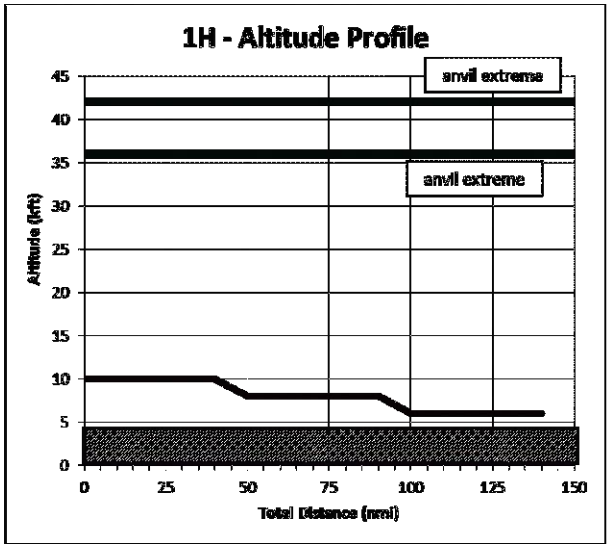


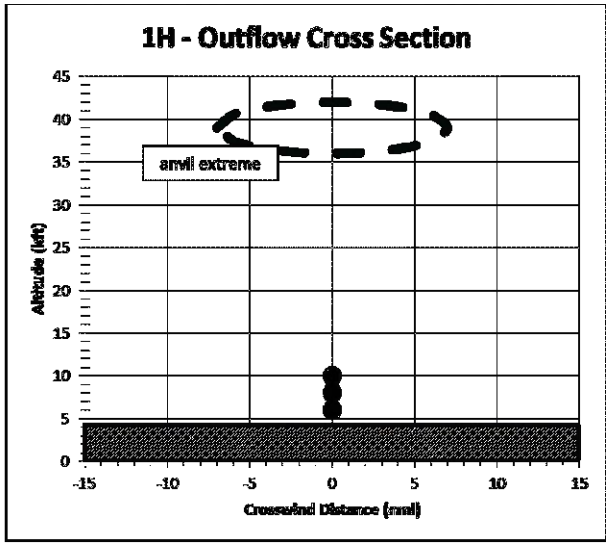
identify outflow with lidar;
sample downwind at low-to-mid levels in and out of convective influence



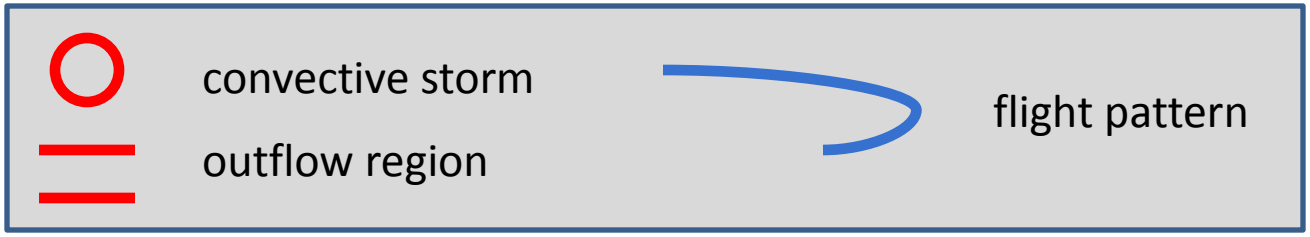
anvil axial constant altitude leg



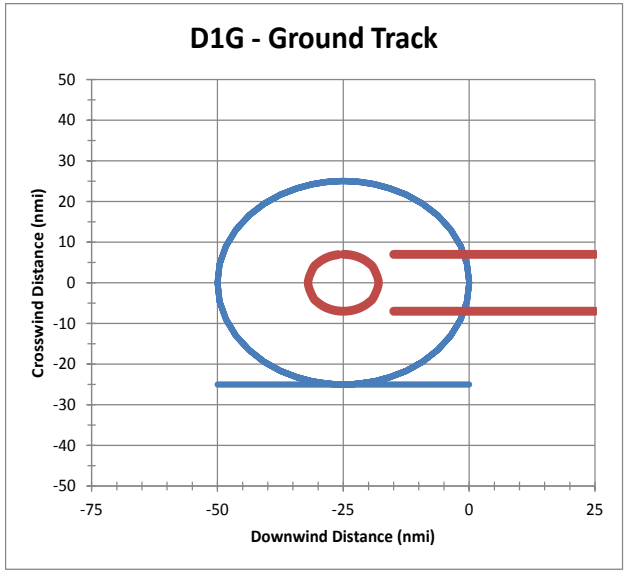


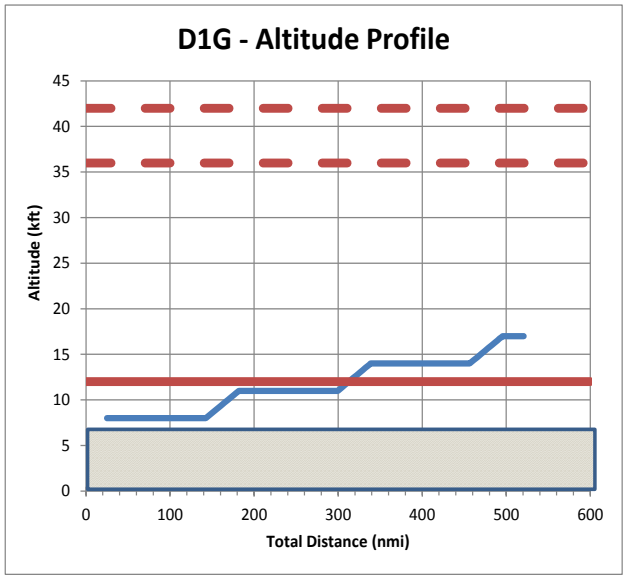


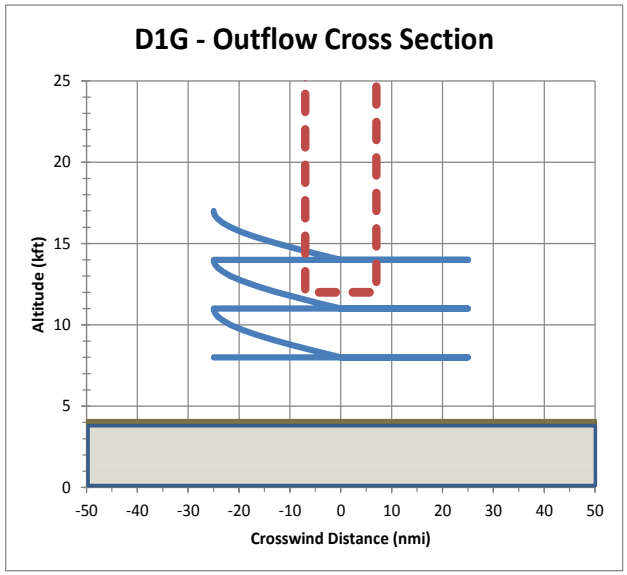
sample downwind at low-to-mid levels



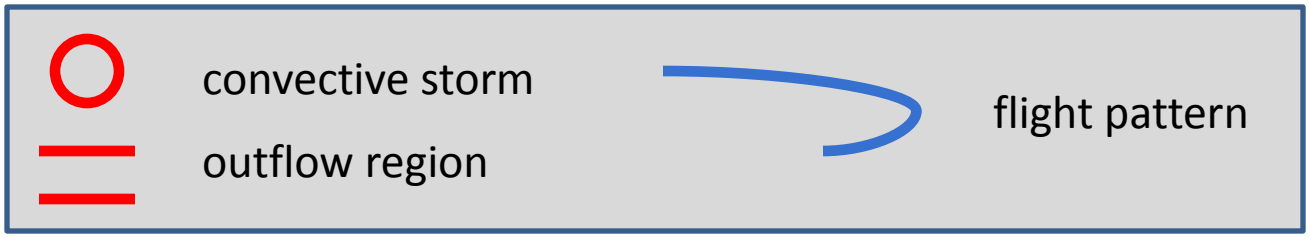
storm circles



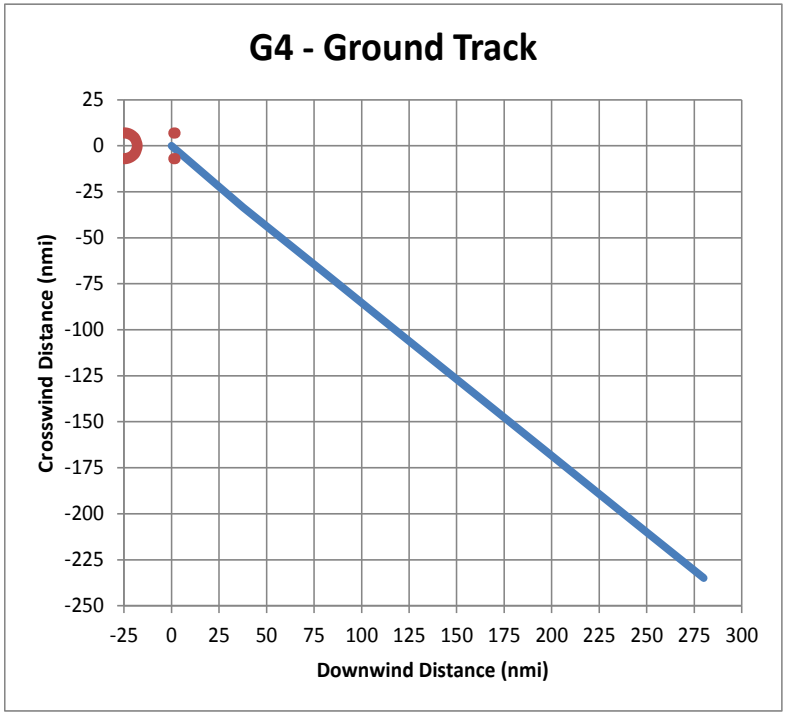


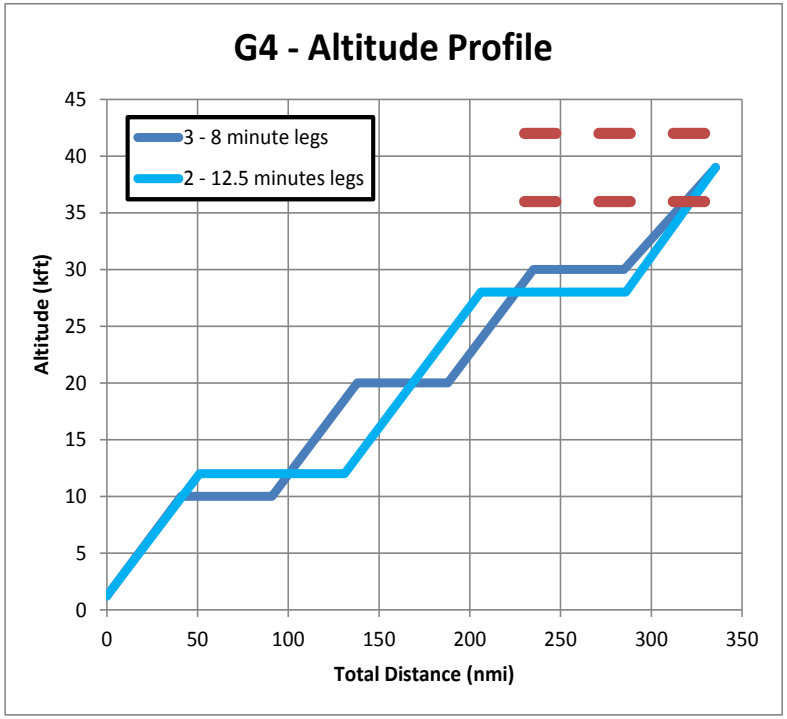


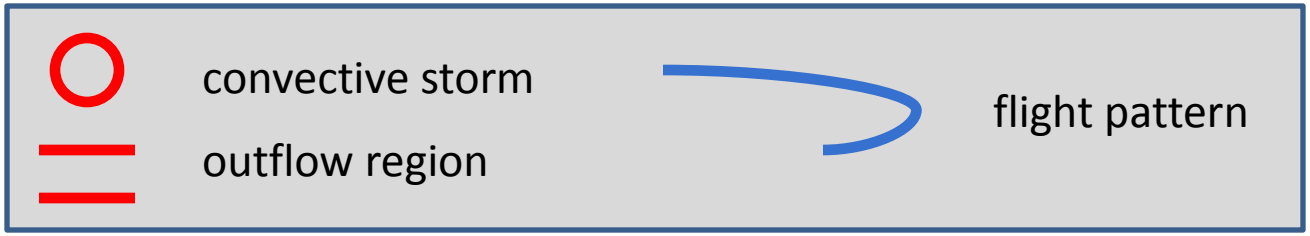
sample air surrounding isolated storm at low-to-mid levels



wingtip-to-wingtip or near-simultaneous comparisons







next steps

- match coordinated, achievable flight patterns to science goals
- work through payload issues
- upload
- calibration and testing
- gas n’ go