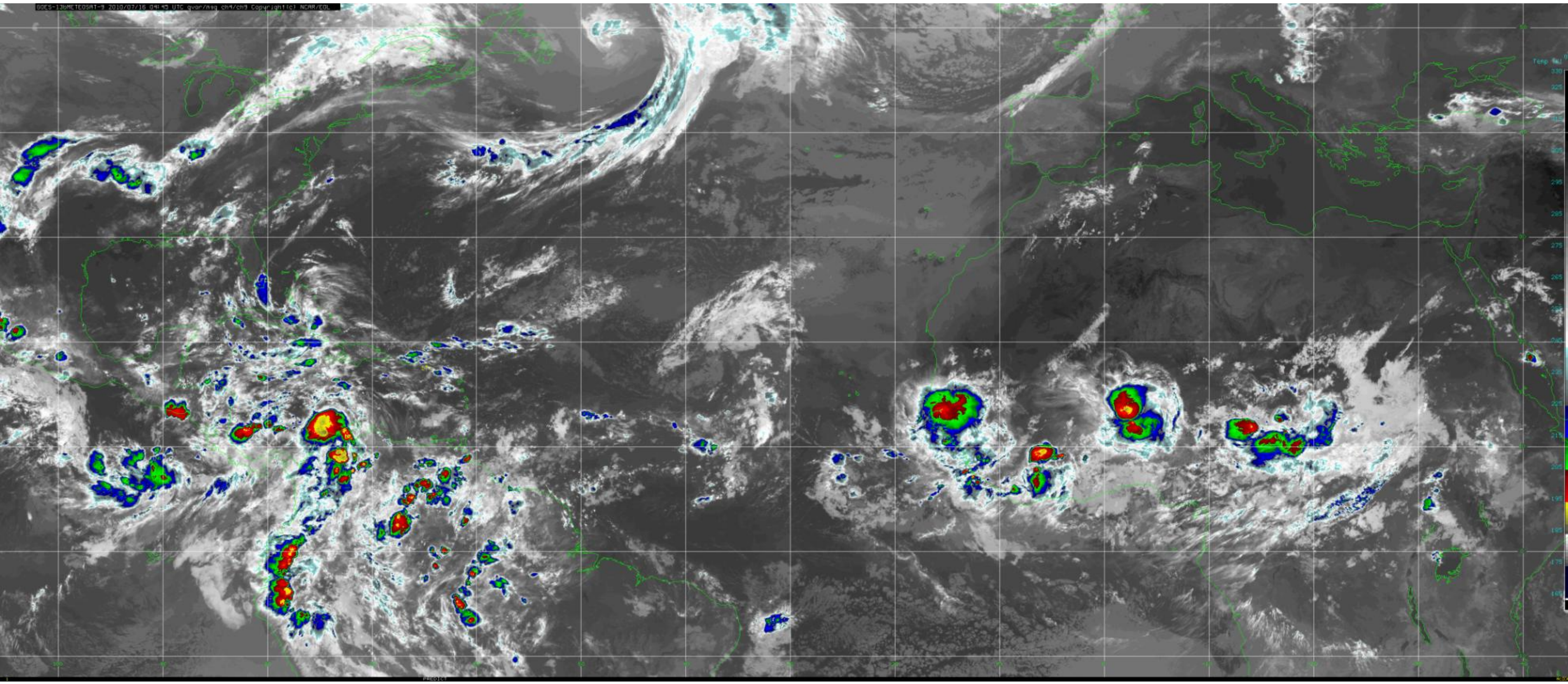
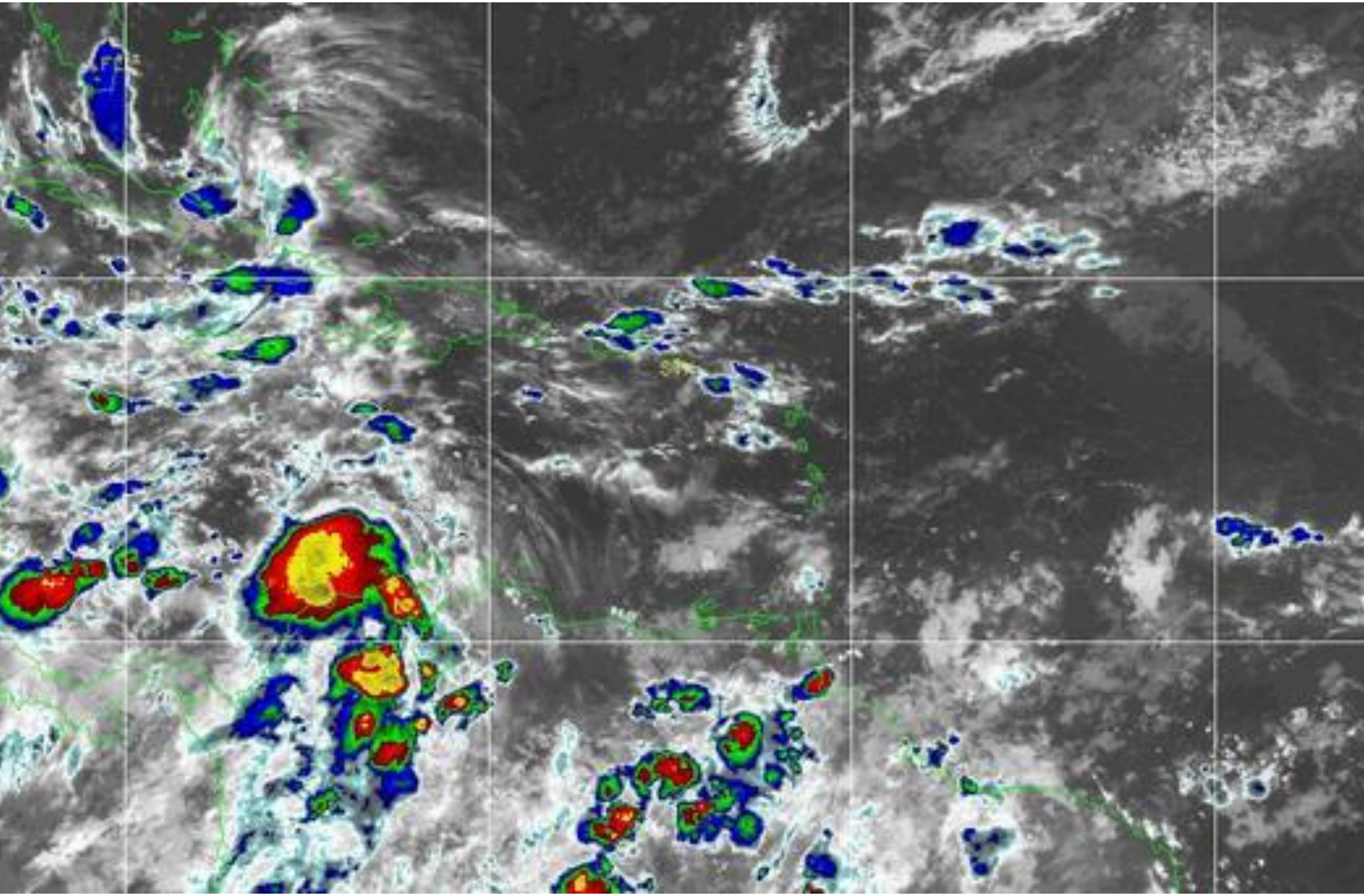
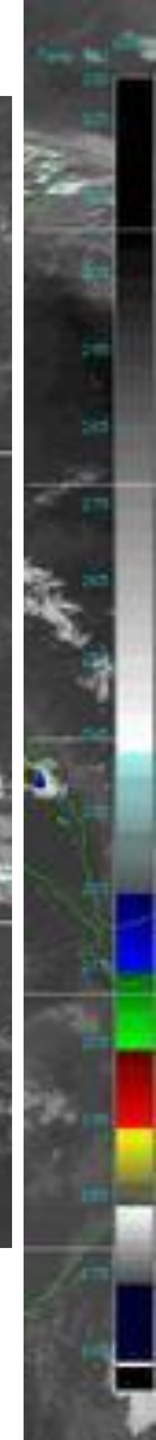
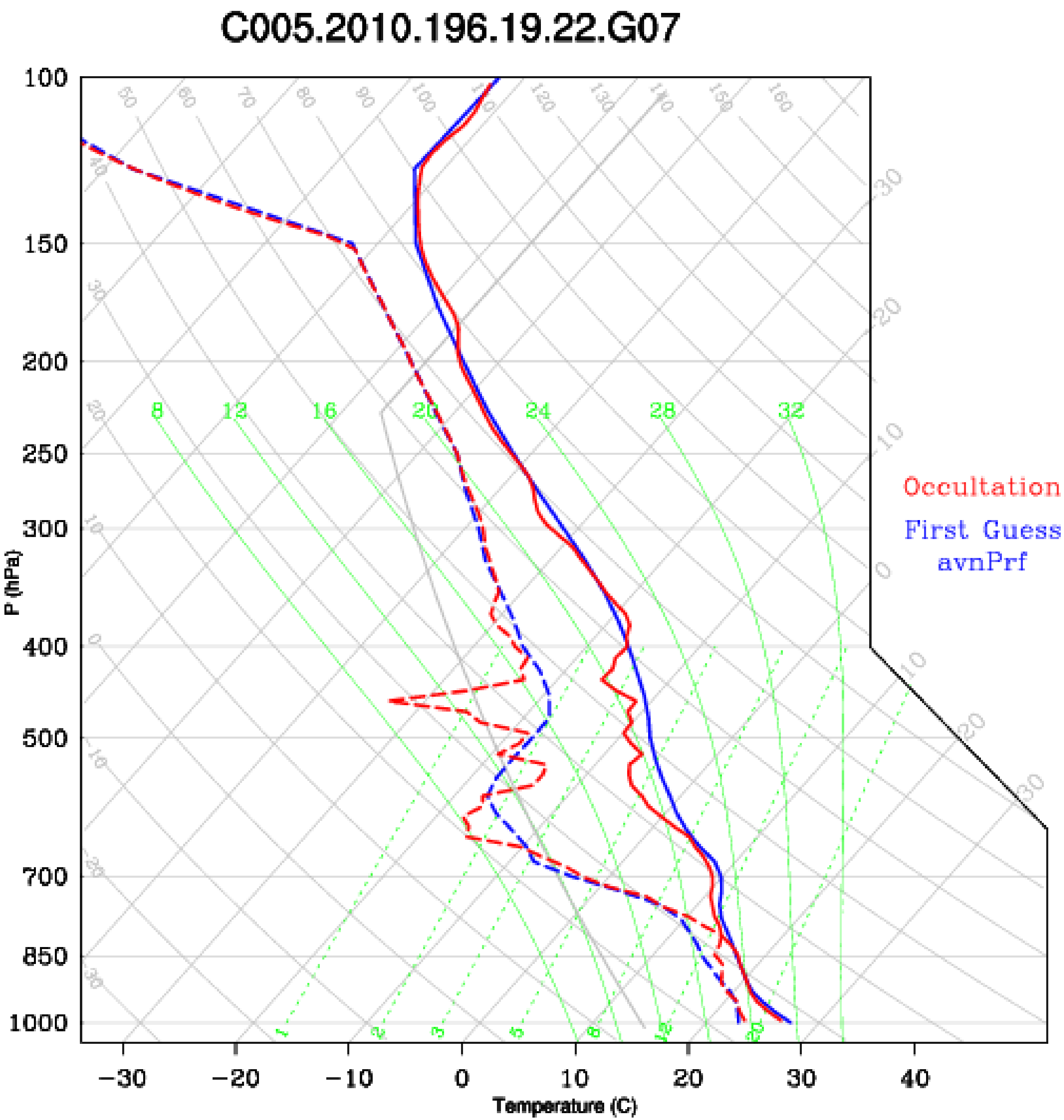

GOES-13&METEOSAT-9 2010/07/16 04:45 UTC gvar/msg ch4/ch9 Copyright(c) NCAR/EOL
PREDICT





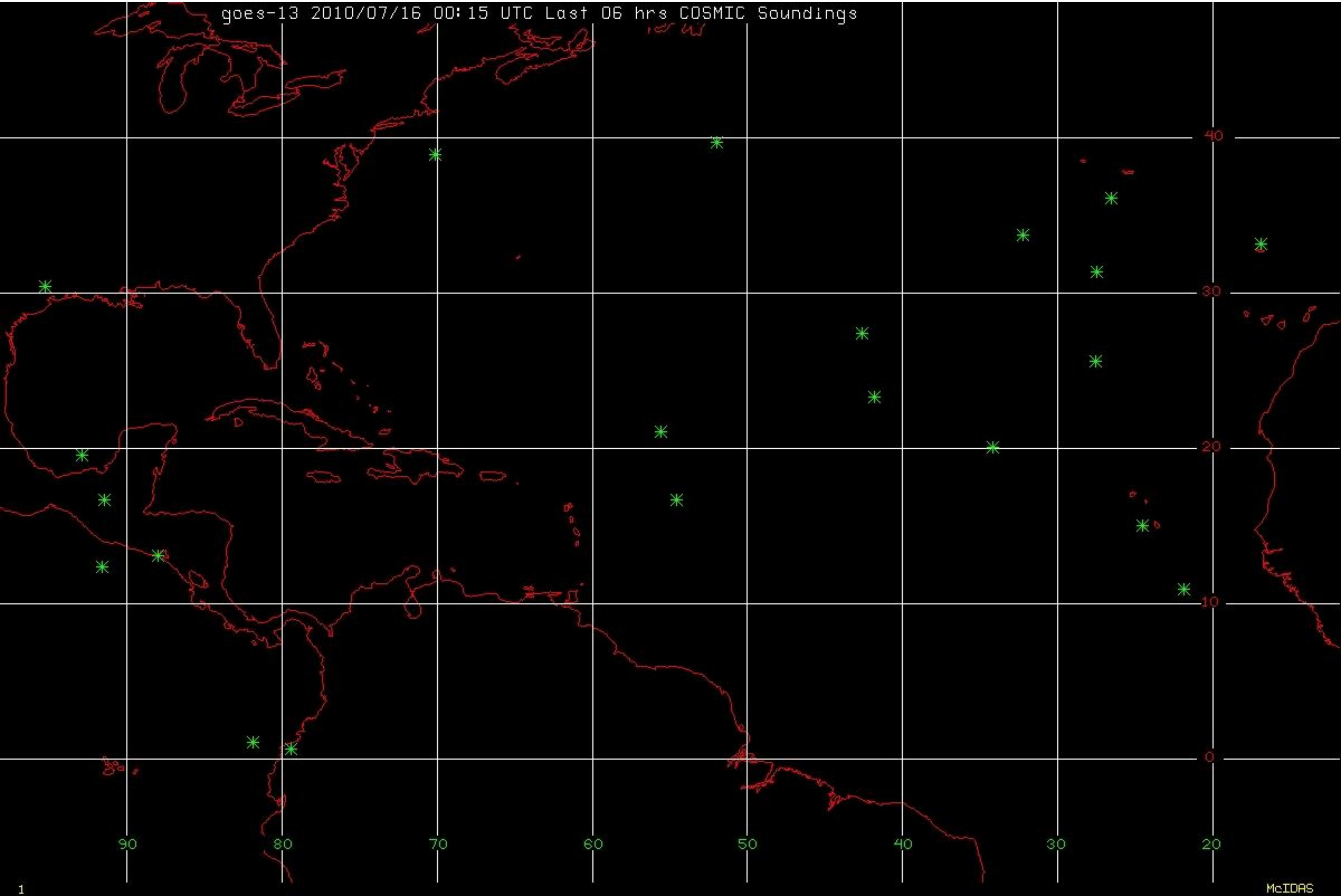


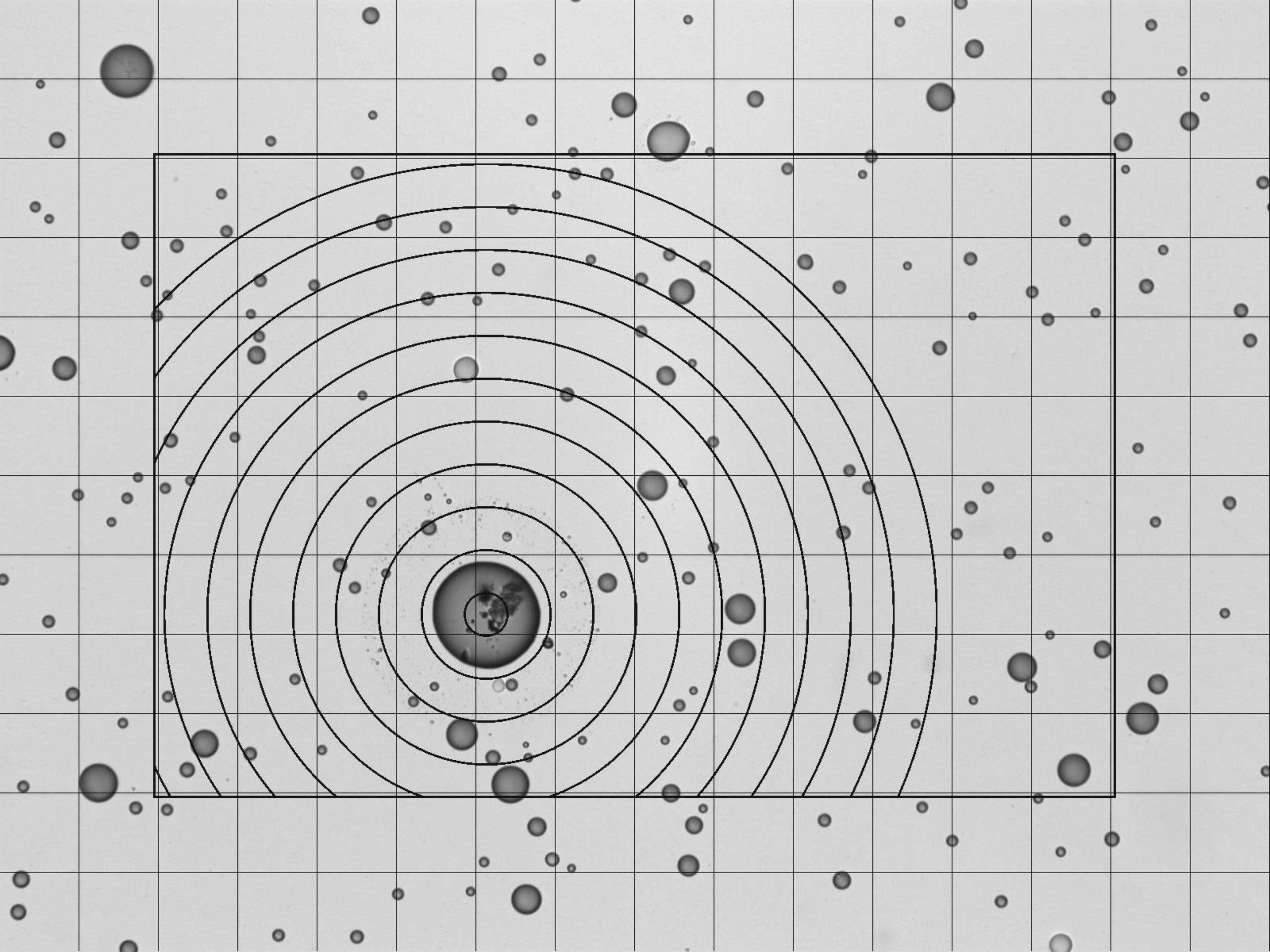
20,000 ft

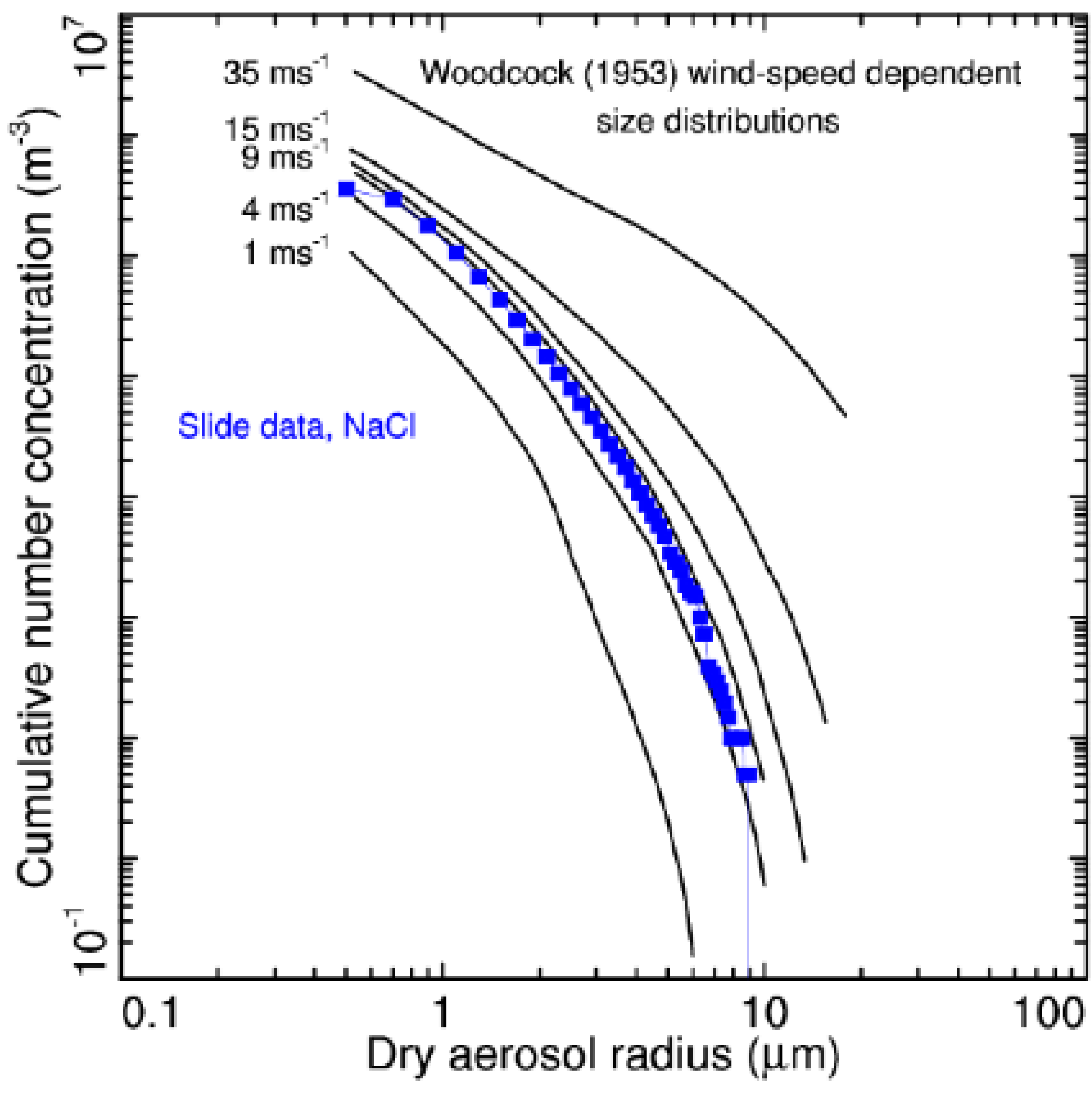
= 460 hPa

~ -12 C

Locations of COSMIC soundings, 16 July 2010, 00:15 UTC.   10-degree grid







Woodcock (1953) wind-speed dependent
size distributions
35 ms-1
15 ms-1
9 ms-1
4 ms-1
1 ms-1
Slide data, NaCl
Cumulative number concentration (m-3)
Dry aerosol radius (µm)
10^7
10^-1
0.1
1
10
100

TABLE 4. Random sizing uncertainty terms[1], e_{si}

Term	$r_d = 0.7\ \mu m$ (% uncert.)	$r_d = 1\ \mu m$ (% uncert.)	$r_d = 2\ \mu m$ (% uncert.)	$r_d = 4\ \mu m$ (% uncert.)	$r_d = 8\ \mu m$ (% uncert.)	$r_d = 16\ \mu m$ (% uncert.)
Focus[2]	1.7	1.7	1.7	1.7	1.7	1.7
Bead size comparison	7.2	5.4	2.7	1.4	0.7	0.4
Spherical cap ratio[2] (h/r_h)	5.8	5.8	5.8	5.8	5.8	5.8
Chamber temperature (T)	0.2	0.2	0.2	0.2	0.2	0.2
Surface tension (σ)	0.0	0.0	0.0	0.0	0.0	0.0
Water activity (a_w)	0.3	0.3	0.3	0.3	0.3	0.3
Combined sizing uncert. (e_{size})	9.4	8.1	6.6	6.2	6.1	6.1
Impaction breakup	Small	Small	Small	Small	Small	?

[1] Coalescence on slides is treated as a concentration uncertainty. [2] Assumed size invariant.

Table 5. Random concentration uncertainty terms, ϵ_{cc}

Term	$r_d = 0.7\ \mu m$ (% uncert.)	$r_d = 1\ \mu m$ (% uncert.)	$r_d = 2\ \mu m$ (% uncert.)	$r_d = 4\ \mu m$ (% uncert.)	$r_d = 8\ \mu m$ (% uncert.)	$r_d = 16\ \mu m$ (% uncert.)
Slide exposure time[1] ($0.35/t$)	7.0	7.0	7.0	7.0	7.0	7.0
Air speed (U)	0.9	0.9	0.9	0.9	0.9	0.9
Conc. enhancement factor[2] (F_{enh})	0.2	0.4	0.6	0.9	1.5	3.0
Ambient saturation ratio[3] (S)	3.4	1.6	0.4	0.1	0.0	0.0
Combined conc. uncert. (ϵ_{conc})	7.8	7.2	7.1	7.1	7.2	7.7
Collision efficiency (E)	-	-	-	-	-	-
Handling contamination[4]	-	-	-	-	-	-
Impaction breakup[5]	Small	Small	Small	Small	Small	?
Counting uncertainty[6]	$\sqrt{N}/N$	$\sqrt{N}/N$	$\sqrt{N}/N$	$\sqrt{N}/N$	$\sqrt{N}/N$	$\sqrt{N}/N$

[1] Timing exposure assuming a 5 s exposure time. [2] The numbers refer to sampling at 70% relative humidity and an airspeed of 105 m s^{-1}; for higher relative humidity, the values increase. [3] This is the effect of saturation ratio on ambient equilibrium solution drop size, as this drop particle size affects collision effect (E). Calculations assume a pressure of 1004 hPa, a temperature of 288.5K, and a relative humidity of 70%. The temperature and dewpoint perturbations reduce the relative humidity to 66.6%. [4] Handling contamination was insignificant, see Part 1. [5] As no aerosol particles with r_d=16 μm were observed, no estimate can be provided for the impaction breakup error of such large particles. [6] Counting uncertainty depends on the number of particles in a size bin; i.e. on the conditions during sampling and on the sampling duration.

Jorgen Jensen – Goals for ICE-T

1. Provide GCCN size distributions (sea-salt)
2. Extend to provide giant dust particle size distributions
    - Normal polycarbonate slides (sea salt, optical)
    - Oil-coated polycarbonate slides (dust; sticky slides, optical)
    - Carbon-tape polycarbonate slides (all; Anderson analysis)
3. Sampling below cloud base, profiles outside cloud
4. Coalescence model, maybe extend with ice phase
5. Aerosol processing through cloud
6. Entrainment analysis (thermodynamic, ozone, CO, CO_2)
    - Thermodynamic variables do not work well at low altitudes
    - Chemical tracers (ozone) do not work well at low altitude

        Reason: long life times, quick (~12 hrs?) turnover of sub-cloud and out-side trade cumulus clouds => small vertical gradients in comparison to measurement variability/uncertainty.
    - Thermodynamic and chemical tracers may work much better for deeper clouds

        Reason: Turnover time is much longer

7. Instrument modifications required:
    - Weld on a 6-mm x 6-mm cap to hold slides (simple, broke)