DC8 Mission Science Report, 9/13/13

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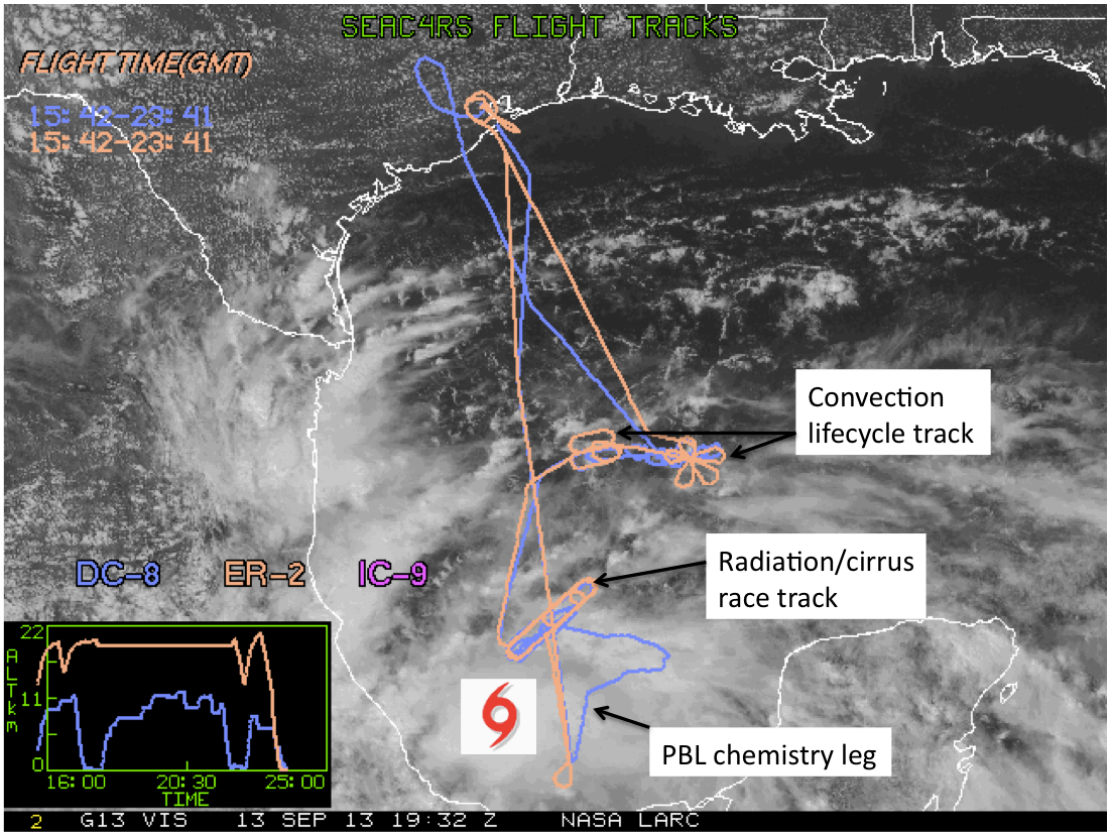
The science objectives of this flight are to:

1) Characterize the convective lifecycle of marine convection,
2) Characterize the radiative and microphysical properties of cirrus outflow from "Ingrid", and
3) Collect PBL aerosol and chemical properties in the convective region and off the coast of Yucatan (Campeche Bay).

The 8-hour flight can be divided into the following four major activities:

1) Approaching the outflow of Tropical Storm Ingrid,
2) Sampling the PBL off the coast of Yucatan,
3) Radiation/cirrus race track, and
4) Convection lifecycle study.

The following figure (courtesy of Ben Scarino) summarizes the DC8 flight on 9/13/13.

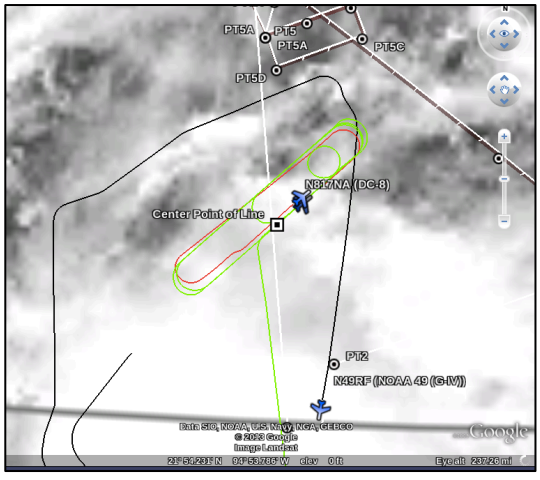


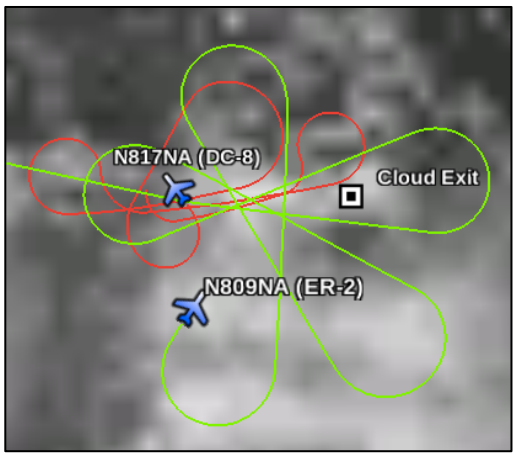
The sequence of the DC8 Mission on 9/13/13 is as follows:

1. Approaching Tropical Storm Ingrid: DC-8 took of at 15:35 UTC (10:35 CDT) from the Ellington Airport, climbed up to around 33 kft, flew south to near the Tropical Storm Ingrid (it was still called 93L when we got on board DC-8 and was named Ingrid when we were ready to take off). Although not in the immediate influence of Ingrid, DC-8 encountered some high cirrus clouds on the way south. This photo on the right was taken from the front camera on DC-8 and nicely describes the scene we flew into. One can clearly see the cirrus clouds blown off from Ingrid.

2. Sampling the PBL off the coast of Yucatan: as we got close to Ingrid, DC-8 slowly descended to the PBL. It arrive at the south most point of the flight at an altitude of ~ 500 ft. Then, DC-8 cruised in the PBL for 30-40 min sampling chemical species blown from Yucatan. Yucatan is a known source for isoprene, which is of great interest to the chemists. The photo on the right shows how the PBL looks like in the Bay of Campeche.

3. Radiation/cirrus racetrack: after the PBL leg, DC-8 ascended to above 30 kft to run two full-circle, 150-km long racetracks (at different levels between ~27-33 kft) to study radiation and cirrus microphysics. DC-8 and ER-2 were very well coordinated during the two racetracks, with the two airplanes appearing on top of each other on googlemap most of the time. The figure shows the racetrack. One surprise along the racetrack was a convective "bump", which we ran into twice and can feel its evolution (getting weaker).





<u>4. Convection lifecycle track</u>: After the radiation/cirrus racetrack, both DC-8 and ER-2 moved to a new position full of marine convection cells (as selected by Henry Fuelberg from analyzing satellite images) to study convection life cycle. The first a few cells we penetrated (called Henry I, II and III) were disappointing because by the time we got there, they've already started to die. But in the area we found a decent one (called Henry VIII). We decided to stay focused on this one and penetrated it for a total of seven times, witnessing much of its life stages. ER-2 and DC-8 were once again very well coordinated revisiting the same cell over and over (see the figure above). After this, DC-8 descended to the PBL in the same neighborhood to sample composition and microphysics of the lower levels.

This completed the mission and DC-8 headed home. As usual, DC-8 conducted a DIAL run near Houston in support of DISCOVER-AQ before it landed at the Ellington Airport. The landing time was 23:43 UTC (18:43 CDT).