DC-8 08/23/13

Aircraft: DC-8 - AFRC (See full schedule)
Flight Number: 130611
Payload Configuration: SEAC4RS2013
Nav Data Collected: Yes
Total Flight Time: 7.4 hours
Submitted by: Frank Cutler on 08/25/13
Flight Segments:

From:	KEFD	**To:**	KEFD
Start:	08/23/13 15:02 Z	**Finish:**	08/23/13 22:27 Z
Flight Time:	7.4 hours		
Log Number:	138301	**PI:**	Kent Shiffer
Funding Source:	Hal Maring - NASA - SMD - ESD Radiation Science Program		
Purpose of Flight:	Science		
Comments:	Purpose of Flight: Science flight (convective weather inflow study) Aircraft Status: Airworthy. Sensor Status: SEAC4RS instrument payload; all instruments operated Significant Issues: None Accomplishments Round robin flight out of Ellington Airport, TX. Initial climb to FL180 headed north towards Texarkana, AR. Cross waypoint 4A at 1547Z to head east on data line. Reverse course west bound at 1600Zand descend to cross WP 4A at 1615Z at 4000ft MSL in cooperation with ER2. Maneuver along east/west line at various boundary layer altitudes in order to cross WP4A east bound at 1000ft AGL at 1636Z in cooperation with ER2. Reverse course 20 nm south of Greenville, AR to fly west and cross WP4A at 8000ft MSL at 1721Z in cooperation with ER2. Head direct to WP HEDUD arriving at 1743Z to pick location north of Vicksburg, MS to sample air mass around convective weather in cooperation with SPEC Lear. Cooperative work with SPEC Lear was during period approximately 1845Z – 1915Z. Sampling occurred at altitudes ranging from FL180 to FL370. Proceed back to WP 4A arriving at 1935Z to hold for ER2. Setup to cross WP 4A headed west at 1949Z in cooperation with ER2. Arrive waypoint 4 (Eldorado VORTAC) at 1956Z and reverse course to cross waypoint 4 east bound at 2009Z and 5000ft MSL. Proceed to waypoint 3A to arrive at 2029Z and 6000ft MSL. Proceed to waypoint 4A to cross at 2103Z and 1200ft MSL in cooperation with ER2. Proceed to Texarkana Airport to complete low approach at 2126Z. Head direct Houston in boundary layer flying altitudes od 2000ft MSL and 1500ft MSL. Climb at 2126Z to mesh with traffic for arrival at Ellington Airport. Land at Ellington Airport, Houston. Takeoff time: 235 15 02 44 Landing time: 235 22 27 03		

Flight Hour Summary:

	138301
Flight Hours Approved in SOFRS	187
Total Used	180.6
Total Remaining	6.4

138301 Flight Reports

Date	Flt #	Purpose of Flight	Duration	Running Total	Hours Remaining	Miles Flown
08/01/13	130601	Check	1.8	1.8	185.2	
08/02/13 - 08/03/13	130602	Check	4.1	5.9	181.1	
08/05/13	130603	Check	5	10.9	176.1	
08/06/13 - 08/07/13	130604	Science	8.7	19.6	167.4	
08/08/13 - 08/09/13	130605	Science	7.8	27.4	159.6	
08/12/13	130606	Science	8.2	35.6	151.4	
08/14/13	130607	Science	7.3	42.9	144.1	
08/16/13	130608	Science	8.4	51.3	135.7	

08/19/13	130609	Science	8.5	59.8	127.2
08/21/13	130610	Science	7.7	67.5	119.5
08/23/13	130611	Science	7.4	74.9	112.1
08/26/13 - 08/27/13	130612	Science	7.7	82.6	104.4
08/27/13 - 08/28/13	130613	Science	8.7	91.3	95.7
08/30/13 - 08/31/13	130614	Science	7.9	99.2	87.8
09/02/13	130615	Science	8.7	107.9	79.1
09/04/13	130616	Science	8.3	116.2	70.8
09/06/13	130617	Science	8.5	124.7	62.3
09/09/13	130618	Science	6.7	131.4	55.6
09/11/13	130619	Science	8.8	140.2	46.8
09/13/13	130620	Science	8.1	148.3	38.7
09/16/13	130621	Science	8.1	156.4	30.6
09/18/13	130622	Science	7.6	164	23
09/21/13 - 09/22/13	130623	Science	9.1	173.1	13.9
09/23/13 - 09/24/13	130624	Transit	7.5	180.6	6.4

Flight Reports began being entered into this system as of 2012 flights. If there were flights flown under an earlier log number the flight reports are not available online.

Related Science Report:

SEAC4RS - DC-8 08/23/13 Science Report

Mission: SEAC4RS
Mission Summary:

This flight targeted the chemical, physical, and radiative evolution of the atmosphere in a region with relatively high biogenic emissions and a broken field of cumulus clouds. The plan established an E-W sampling line in southern AR that extended from the Mississippi River westward into forest that was repeatedly traversed by both the DC-8 and ER-2. Close coordination of the 2 planes (vertically stacked and flying same heading) was requested for 6 crossings over a preselected point along the line. Three of the coordinated legs were planned for late morning, then both aircraft were to move south and east to join up with the SPEC Lear jet to work deep convection for approximately 2 hours. After the coordinated convection module we were to return to the line in southern AR for three more passes by both the DC-8 and ER-2 in the afternoon to assess the evolution of the boundary layer and emissions after “cooking”.

The DC-8 was supposed to arrive at the west end of line in AR and begin an HSRL curtain leg to the east before the ER-2 arrived at the east end, we were then to turn back to east while descending to BL in front of the ER-2 and lead them westward over the target point. Both planes were then to reverse course and pass over the point east bound with DC-8 just below cloud base, then reverse course for final morning pass with us just above the clouds.

ER-2 launched a little earlier than planned, and also got free of departure routing quickly, causing them to arrive at east end of the line sooner than planned. DC-8 adjusted by ending HSRL run early and starting west bound BL run before we had passed from the forest over into the farmland in the river valley, the two planes passed over target within 10 seconds of each other. Second crossing on the subsequent east bound leg was coordinated to within 30 seconds, and the third pass back to the west had us both over the point within 15 seconds.

We both headed for the Lear rendezvous point where the ER-2 set up a racetrack pattern and the DC-8 flew at cloud base waiting for Lear. Computer problem on Lear delayed their takeoff, so DC-8 selected a target cell and began working upward in a spiral that skirted the cloud and allowed APR-2 to image. Lear joined at lower level in same cloud, penetrating it at several levels. We ultimately got well above the storm and crossed over the top several times to image the system with APR2 and DIAL/HSRL. A much stronger storm developed just to north of us and began forming a nice outflow anvil, which we prepared to penetrate as many times as possible before we needed to return to the AR line for the afternoon passes. At this time we were told by flight controllers in Houston that ER-2 had finished working the convection and was headed back to AR, so we should also break off and get onto the line ahead of ER-2. We made one pass through the fresh convective outflow and headed directly to the eastern end of the line (over the agricultural fields in the Mississippi valley). Enroute it became clear that the ER-2 was actually making one more circuit over the storm that Lear was continuing to work, so we arrived back on the line nearly 30 minutes before the ER-2. We orbited at 23 kft (above the BL clouds) east of the target point until the ER-2 rejoined us on the track, and we passed over target point in close coordination. Subsequent east bound track at cloud base was extended to cross the Mississippi river, thereby sampling the contrast between farm and forest lands. Final pass on the line had DC-8 in the BL again, passing target point within a second or two of the ER-2. After finishing this second wall, DC-8 performed a missed approach at Texarkana and then turned toward Houston, staying in the BL until we had to ascend to prepare for landing at EFD.

Despite the timing challenges (early arrival of ER-2 for the AM passes, late arrival of Lear for the convective module, and then the ER-2 for the PM passes) DC-8 was able to adjust and achieve close coordination with ER-2 for 6 stacked passes over the target point. The cloud field was very similar to forecasts, so we think we captured the gradients that flight planners had targeted. It did not seem that the composition of the BL changed very much between the first and last passes (at ~ 16:30 and 20:45, respectively) though cloud base had lifted ~ 3 kft during this time.

Flight duration was 7.4 hours. All DC-8 instruments reported that they had obtained good data for most of the flight, and none reported any problems that were expected to impact readiness for the next flight on 26 August.

Submitted by: Jack Dibb on 08/25/13

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Page Editor: Katja Drdla

NASA Official: Marilyn Vasques
