Flight Report – SEAC4RS ER-2, August 06, 2013 Science Flight 1

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Purpose of flight: 1) Measure smoke above stratus off California coast using ER-2 remote sensors with coordinated DC-8 underflights , 2) similar to 1) except measure smoke over SW Oregon close to active fires, 3) coordinate pass for air chemistry over central CA Valley

Playbook topics: biomass burning, remote sensing of aerosol in broken cloud field, air chemistry

Flight plan: Proceed up CA central valley then to rosette off the norther CA coast, execute rosette off the coast above DC-8 and smoke over stratus, then proceed to "fishbone" pattern over SW Oregon, coordinated with DC-8 over wishbone pattern with several passes, then return south over central CA valley with dip, then single leg over DC-8 wall pattern north of Fresno. CALIPSO overpass near the Oregon coast ~21:30, should be good Aqua MODIS coverage

Takeoff: 10:38 PDT (17:38 UT)

Duration: 8.4 hours

Notes: delay before takeoff due to ground powercart issues, upper hatch issues

Very successful flight. Well coordinated with DC-8 over smoke runs over CA. Rosette pattern over water had DC-8 execute wall pattern along SE-NW ER2 rosette leg (Fig. 1). Coniderable smoke observed over stratus (see CPL image in Fig. 2) as well as smoke over land from Big Windy and Douglas complex fires (Fig. 3). Smoke was thick enough over land to obscure ground from eye and lidars. CALIPSO imagery shows smoke located just off Oregon coast (Figs. 4, 5). Aqua MODIS AOT imagery shows that ER-2 flew over large AOT values (Fig. 4). Flew several back-and-forth lines over smoke coordinated with DC-5 close to fires in SW Oregon. Flew dip en route to E-W leg north of Fresno. Only flew one E-W leg over Fresno because of time limitations. This leg was colocated with DC-8 wall pattern. Excellent job was done by Stu Broce (pilot) and Dean Neeley (ground-pilot) to coordinate last minute changes to plan and in execution of plan. (Stu commented that this was the most complex flight he had performed as ER-2 pilot).

Aircraft and instruments: CPL was not able to send data in real-time due to problem interfacing with Iridium. CPL recycled power during first portion of rosette in an attempt to troubleshoot problem. Unfortunately, eMAS only gathered data during first hour of flight. Faulty status light on eMAS gave no indication that eMAS had difficulty. eMAS problems are being worked after flight but will not gather data during transit flight. All other instruments appear to have worked nomimally as far as limited in-flight and quick-look analyses showed. INMARSAT worked for first hour but dropped out gradually after that. Iridium performed somewhat better than during test flight. No aircraft issues.
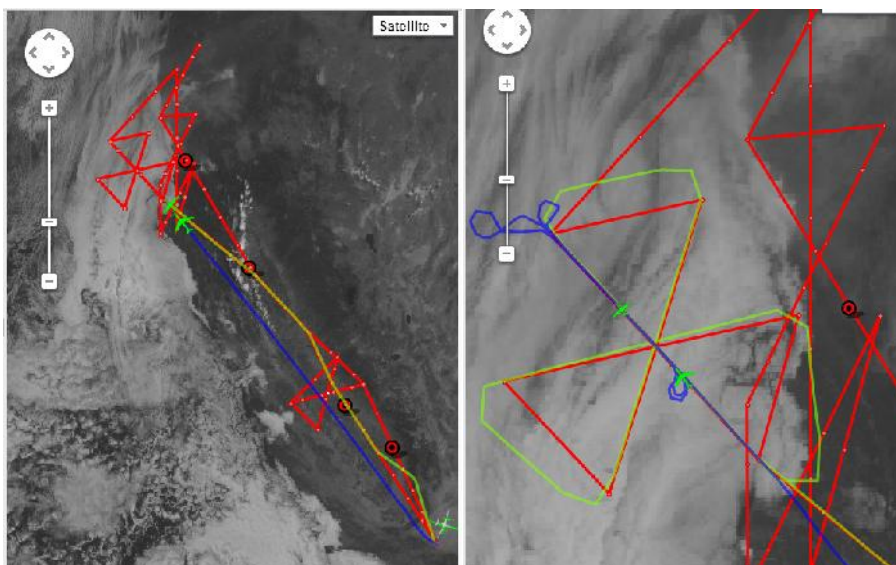

Figure 1. (left) Final flight plans for August 06, 2013 (red) overlaid on GOES visible imagery from Aug. 6. (right) showing rosette leg where ER-2 flew over DC-8 wall pattern.
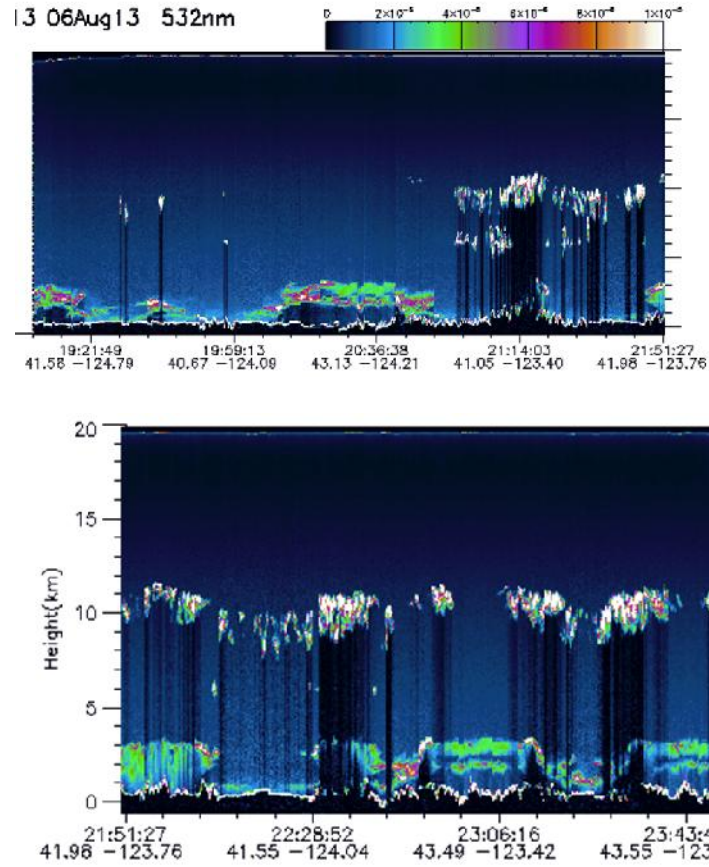
Figure 2. CPL imagery shows locations of smoke and clouds. Smoke over stratus is at far left in top image. Smoke over SW Oregon is shown in bottom image.

Figure 3. MODIS imagery from Aug. 5 shows smoke from fires in SW Oregon.
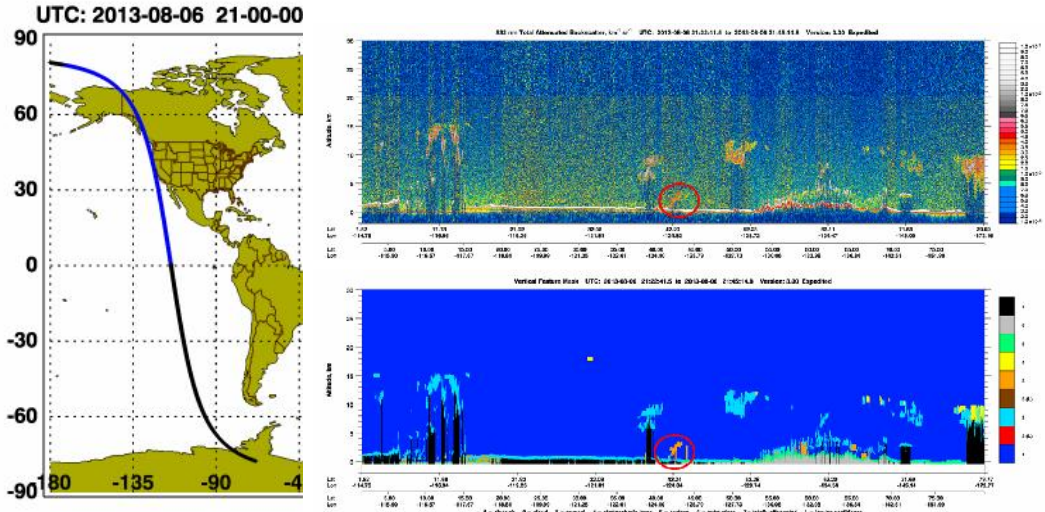
Figure 4. CALIPSO expedited imagery shows smoke off the Oregon coast (N42.2, W124.82) at ~21:30 UT on Aug. 6. See circled region.
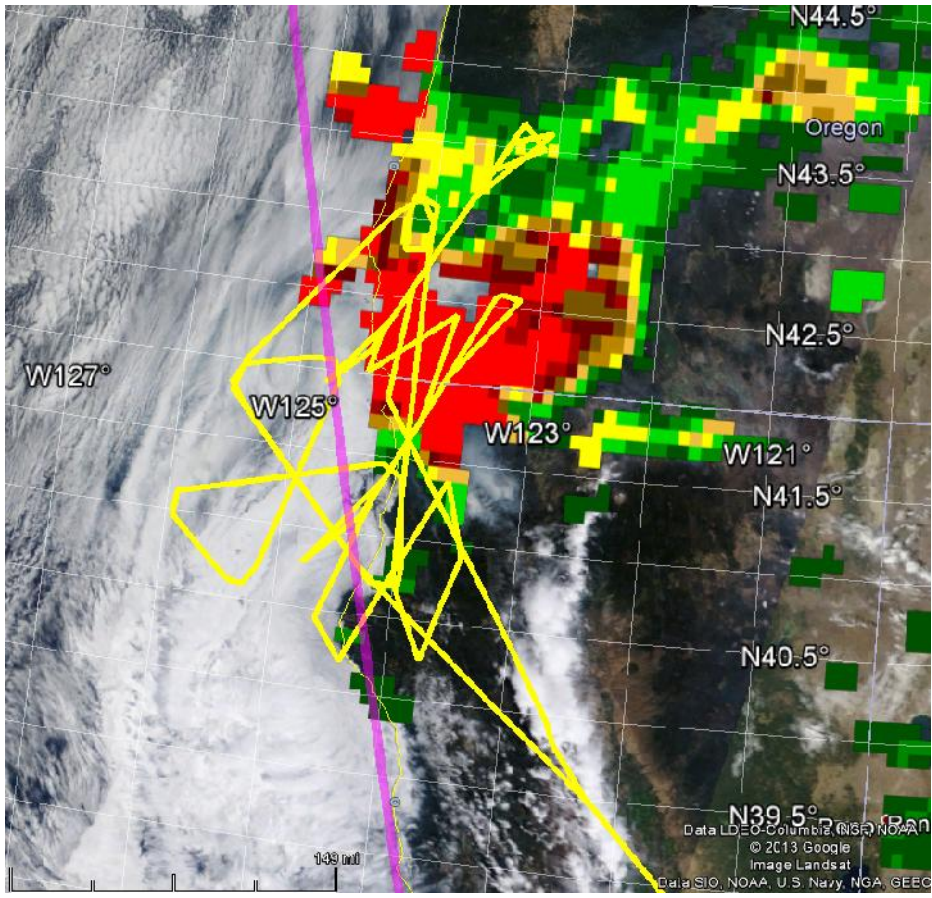

Figure 5. Aqua MODIS imagery at ~21:30 UT on Aug. 6 showing AOT (color), ER-2 track (yellow), and CALIPOS track (purple).