

DCOTSS week #4 report  
July 31, 2021

Science Summary. DCOTSS flew two research flights this week, RF04 and RF05, on 7/26 and 7/29, respectively. Increased convective activity forced by outflow boundaries and weak frontal boundaries led to two very successful flights to sample overshooting convective outflow.

The two principal science objectives of RF04 were (1) to sample a convective outflow plume over the TX panhandle and (2) to survey the the stratospheric background surrounding the plume and between the plume location and Salina, KS. Real-time data collected during the flight shows clear evidence of convective outflow with water vapor reaching 25 ppm, against a background of ~10 ppm at similar altitudes. The enhanced water vapor was evident as high as the 400 K potential temperature surface, which is ~2 km above the tropopause.

RF05 was designed to sample outflow in the stratosphere from a strong squall line that originated in MN and WI. The proximity of the squall line to the jet stream meant that overshooting material would move relatively quickly eastward and away from Salina. To improve the likelihood of intercepting the outflow, an early takeoff was scheduled, with sampling along stacked flight legs oriented north to south over western IN. Water vapor enhancements of as much as 4 to 5 times over background stratospheric levels were found in very good agreement with the forecast plume location. As expected, water vapor enhancement appears to decrease with altitude above the tropopause. Preliminary data analysis indicates that all of the instruments are currently working well.

-Ken Bowman

ESPO Summary. DCOTSS has flown 35.8 science flight hours out of a planned 85 hours of science flights in Salina. We are progressing with an average of two 7-hr flights per week. With about 50 hours and 3.5 weeks left, we can continue at the current pace. We have found that the 60 hour-per-week work limit for the ER-2 crew kicks in. After two 14-hour flight days we are left with 32 hours for the remaining 5 days in that week.

The flight on Monday, July 26, was interesting logistically because the possibility was raised that the aircraft might need to divert. The aircraft was due to land around 1600, but there was a storm cell over Salina, with lightning. This had been considered unlikely during the early morning meetings, but the storm did materialize. If you look at the flight track, on MTS2 (it is hard to distinguish one track from the others), you will see that the science of interest, overshooting tops, was southwest of Salina in northern Texas. On the return, the pilot flew well past Salina to the northeast, to allow the storm to dissipate. Meanwhile, Dan and others had determined that they could re-deploy the needed equipment to a nearby airport if needed (Hutchinson was one airport I heard about). In the end it was not necessary to divert but it was a good exercise. Salina is a well-equipped and supportive airport.

The flight on Thursday, July 29, was interesting because it required an early takeoff. Show time was 0200; takeoff was 0600. Everyone adapted pretty easily, considering that the first meeting of that day (forecasters) began at 0030. Such troopers.

July 27 was Media Day. It was all virtual, over Webex. Attendees included ABC, NPR, NYT, and news outlets from Salina and Wichita. Several articles have resulted so far. I am sharing a few links below.

<https://abcnews.go.com/US/nasas-mission-studies-intense-thunderstorms-influence-climate-change/story?id=79101071>

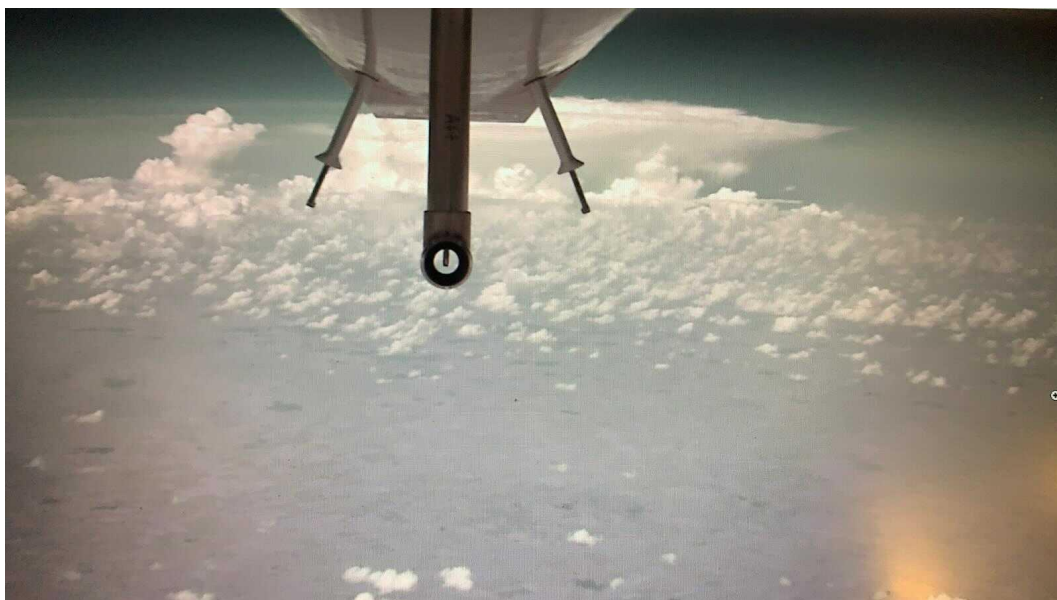
<https://www.ksal.com/nasa-mission-basing-in-salina/>

<https://www.kansas.com/news/state/article253057833.html>

We are at the 3-week point for many, so we've had some rotations. Ken Jucks was here for a few days. He departed Friday along with Dan (four weeks for Dan!) and Ju-Mee from Ames. (Ken J will show at ACCLIP in the near future.) Jim Elkins departed Thursday; Fred Moore will drive to Colorado today, Saturday; Rei Ueyama will return to CA next week. Chuntao Liu and his students arrived recently; AWAS added Leslie, and Tom Hanisco and Jin Liao arrived for CAFE/CANOE. You may know some of these people.

Today temperatures were supposed to reach ~105°F, and there was a small chance of hail. Tomorrow it should begin to cool off. We are looking forward to science flight #6 on Monday.

That's it for now. Attaching a video of the balloon launch on July 26, if my attachments aren't too large.



View of the storm cell over Salina on July 26, that delayed landing by ~45 min.



Rei Ueyama has been leading the Forecasting and Flight Planning efforts, which persist even on down days, and at some very early morning hours. Pictured above l to r: JP Cole, Rei Ueyama, Chuntao Liu and Ken Bowman.



A couple of spectacular photos of overshooting tops, taken by pilots.