

# TC4 ER-2 Science Flight: July 17, 2007

## *Flight Report*

**Flight Scientists:** P. Newman, S. Platnick

**Sortie:** 07-9019

**Pilot:** Dave Wright

**Takeoff (SJO):** 1234 UTC (6:34 AM local)

**Landing (SJO):** 1730 UTC (11:30 AM local)

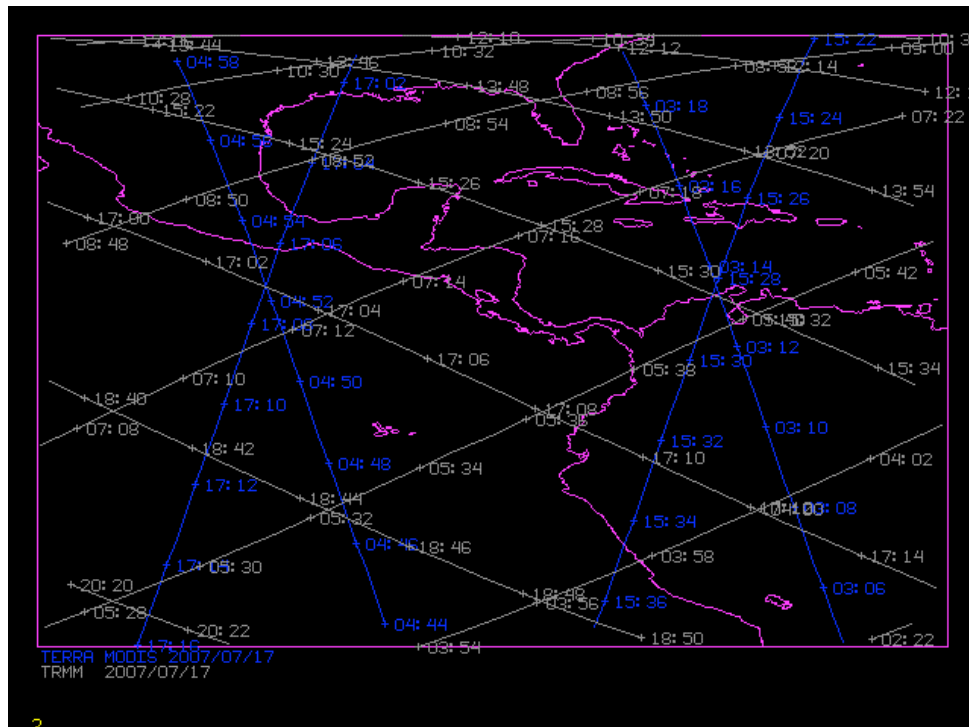
**Duration:** 4.9

### Objectives:

1. Remote sensing of convective systems to the south of the ITCZ
2. Sample ITCZ outflow & cirrus that is immediately to the south of Costa Rica
3. Coordinate with DC-8 in situ and remote measurements
4. Characterize region observed by Terra and TRMM satellites.

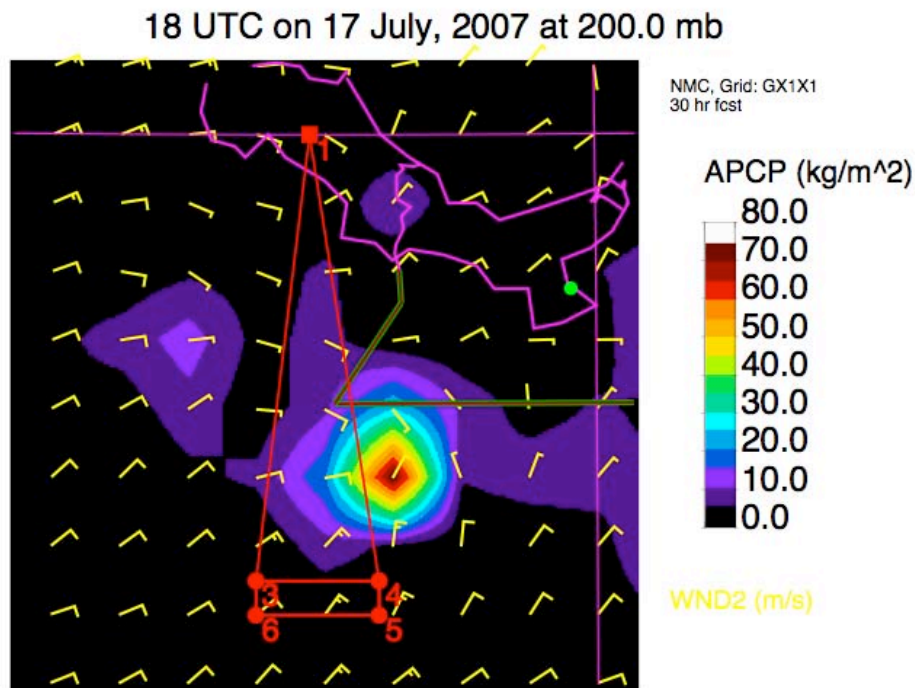
### Satellite Coordination:

Terra overpass to the east of the Panama Bight at 15:30 UT, with a TRMM overpass over the flight track at ~ 17:06 UT. See image below (Louis Nguyen, LaRC).



### Flight Plan Summary (see map):

Takeoff at 1230 UT. Arrival to the south of the ITCZ ~ 45 minutes after takeoff. The flight is oriented to sample the high level cirrus outflow (@ ~ 200 hPa) to the south of the ITCZ. Approximately 3 hours of sampling E-W to see cirrus evolution. The ER-2 flies from SJO to point 3, takes a hard left and flies a 200 km x 50 km rectangle in the CCW direction for about 3 hours (approximately 4 cycles of the rectangle). On the final cycle, the ER-2 will possibly be directed over an active convective core. Return to SJO at approximately 1730 UT. The plot below shows this approximate path, with the precipitation in color, and the 200 hPa wind barbs showing the expected direction of the convective outflow.

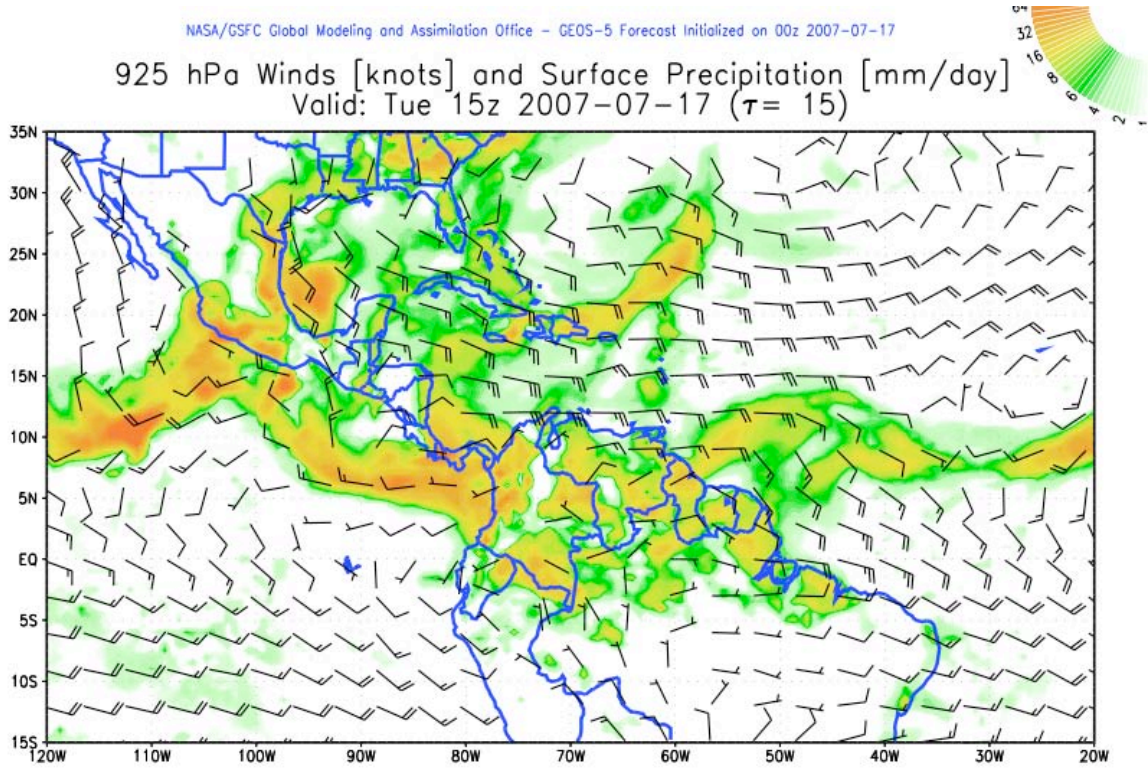


red line = ER-2 flight track  
color image: simulated precipitation  
Yellow: wind barb (m/s)

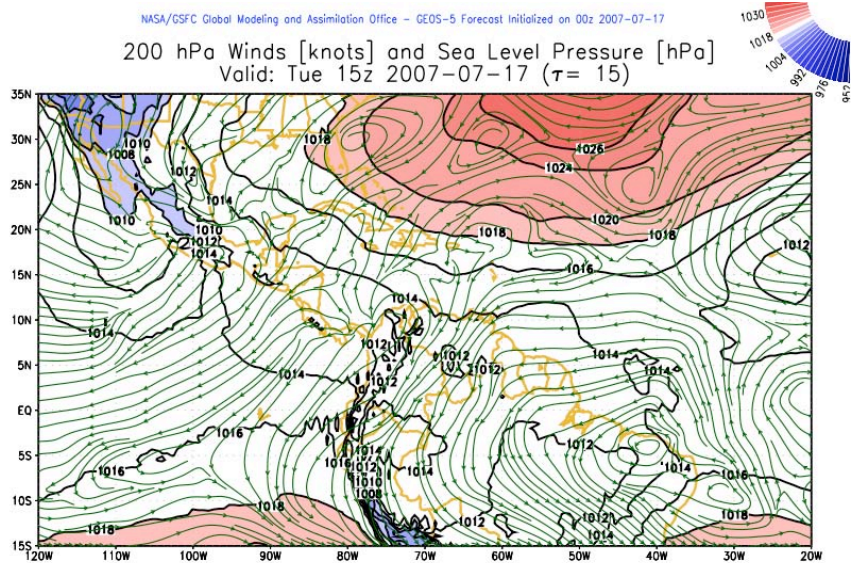
### Expected Cloud Conditions during flight:

Convective development in the ITCZ expected on Tuesday with cirrus outflow to the SW.

The 925 hPa winds (near surface) and surface precip from the GEOS-5 model. Valid at 9AM local time on Tues.

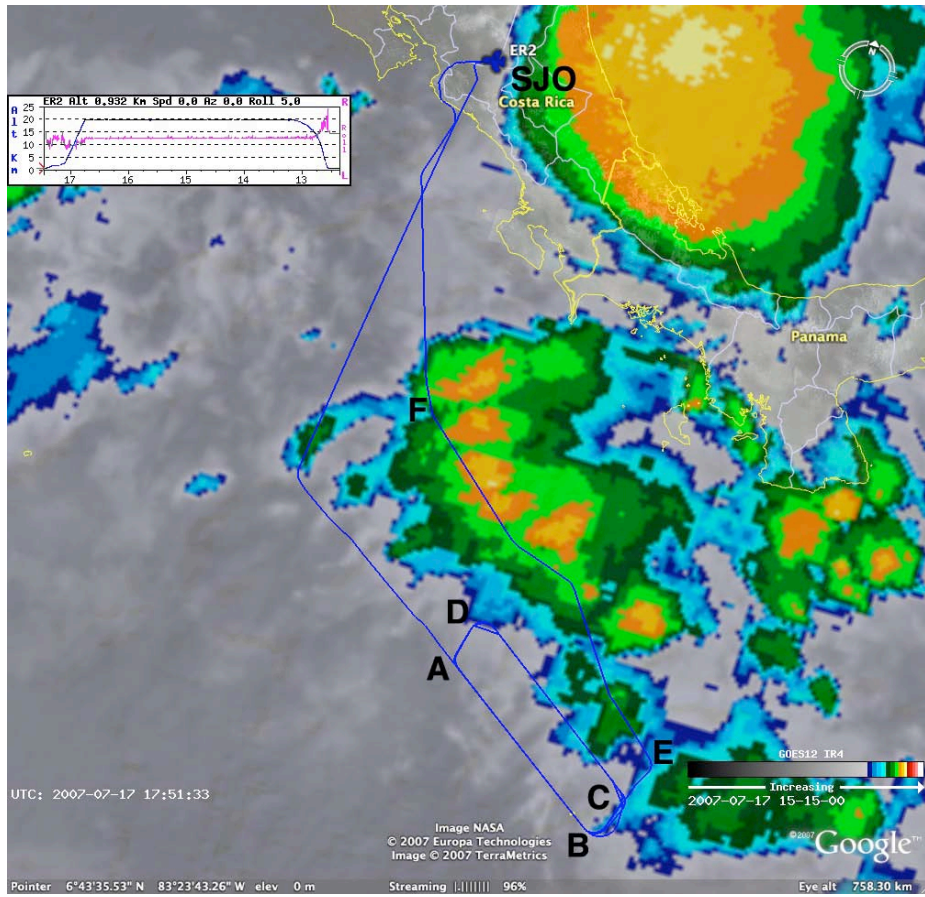


The 200 hPa (~39,000 feet) flow is a good indicator of the direction of cirrus outflow. In this forecast, the flow is mainly towards the SW on the southern side of the ITCZ.

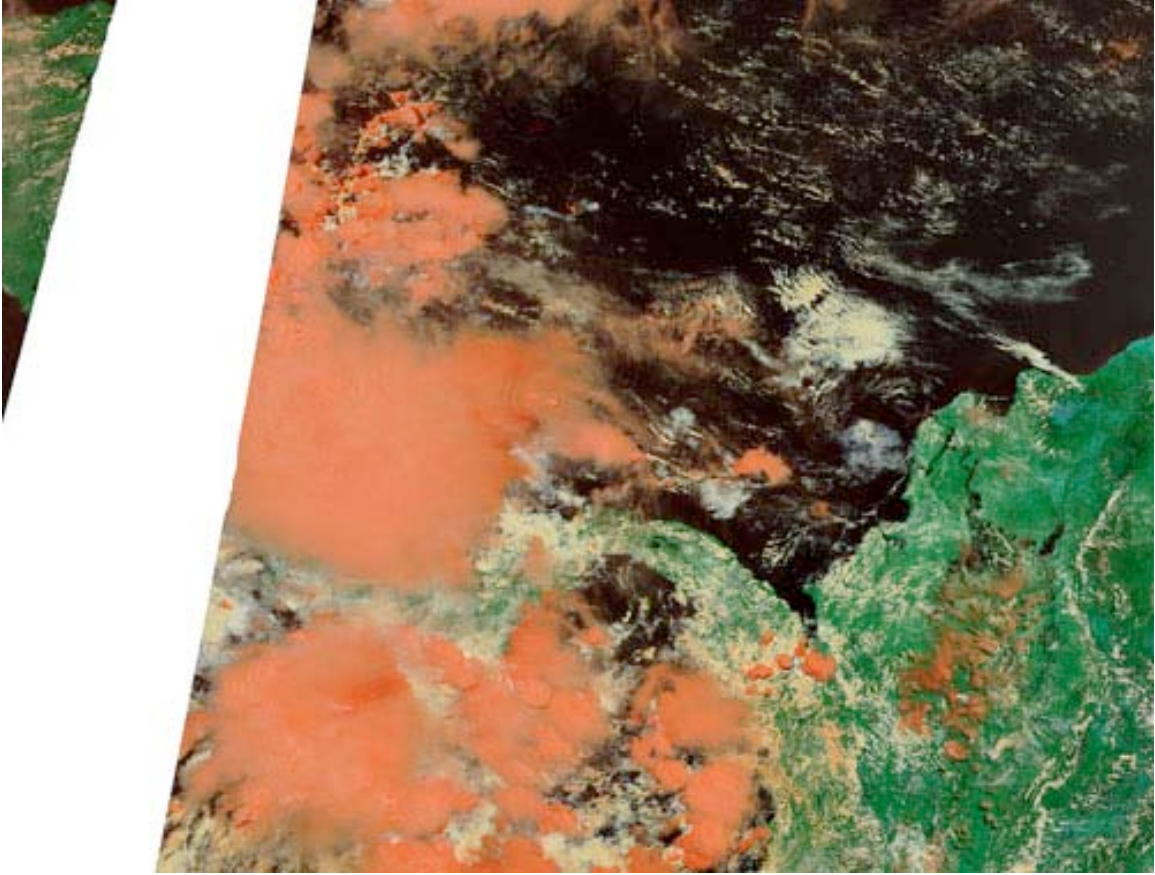


## Flight Description:

The ER-2 took off at 1235 UT (6:34 AM local). The instruments were all on shortly after takeoff at 1300 UT above 40 kft. The ER-2 proceeded along the original designed flight path (see above). Because of the evolving convection, the ER-2 was diverted to a new set of way-points shortly after takeoff by the mission scientists at the missions operation center. In general, the convection (ITCZ) was relatively well forecast, such that the ER-2 was directed into a reasonable location for sampling cirrus outflow. The plane turned SE and then flew 3 circuits around the points designated A-B-C-D on the map below. This "racetrack" circuit was immediately downstream of a line of convective systems, and was coordinated with the DC-8 flying directly below the ER-2 over the same course. The IR imagery showed the air streaming SW from these convective systems onto the A-B-C-D racetrack. After the completion of the 3 circuits, the ER-2 was directed to complete a track from A-B-E and then turn NW, while the DC-8 turned SE towards Ecuador at point B. The path from E-F was set over a set of convective cores that could be seen in the visible imagery from the GOES-10 super-rapid scan mode. The pilot was directed to overfly convective turrets approximately along the E-F line. The pilot reported a large turret (estimated to extend up to 45-50 kft) that he overflew at approximately 1615 UT. The ER-2 landed at 1730 UT. The pilot reported no fail lights, zero turbulence, but some communications problems.



REVEAL IR image GOES-10



MODIS Terra False Color Composite (RGB= 0.47, 1.6, 2.1  $\mu\text{m}$ )  
~1530 UTC, MODIS Rapid Response subset  
(<http://rapidfire.sci.gsfc.nasa.gov/subsets/index2.php?project=test>)

## ER-2 Science Instrument Payload and Status:

Instrument	Status	Notes
<b>CPL</b> Cloud Physics Lidar	<b>G</b>	
<b>CRS</b> Cloud Radar System	<b>G</b>	
<b>EDOP</b> ER-2 Doppler Radar	<b>G</b>	
<b>AMPR</b> Advanced Microwave Precipitation Radiometer	<b>G</b>	<b>good scene data, but losing warm BB cal data due to scan-related issue</b>
<b>CoSSIR</b> Compact Scanning Sub-mm wave Imaging Radiometer	<b>G</b>	
<b>MAS</b> MODIS Airborne Simulator	<b>G</b>	
<b>S-HIS</b> Scanning High Resolution Interferometer	<b>G</b>	
<b>IR Radiometer</b> Broadband flux radiometer (nadir & zenith)	<b>F</b>	
<b>SSFR</b> Solar Spectral Flux Radiometer (nadir & zenith)	<b>G</b>	
<b>MVIS</b> video camera	<b>G</b>	
<b>MTP</b> Microwave Temperature Profiler	<b>G</b>	

**G = good; P = partial data collected; F = failure, no data**