

High Altitude MMIC Sounding Radiometer (HAMSR)

TCSP Field Campaign

Flight Data Summary—Science Maps

24 July 2005

I. High Level Summary

Prior to flight, a repair was made to the 118 GHz receiver replacing a failed IF amplifier. After HAMSR was reinstalled into the pressure vessel and power was applied by the ER-2, the instrument exhibited intermittent problems in booting. Typical behavior was for the instrument to get partway through the boot up process and then for power to seemingly go off and then back on again. On some occasions it would successfully boot and on other occasions it would repeat this rebooting cycle many times.

There was not much time available prior to flight to fully debug the problem, but a few things were tried. At first there seemed to be some correlation of this glitch to moving the red-coded W11 harness near where it plugs into the bulkhead. Inspection revealed a broken ground wire. This was repaired; however, the problem still persisted. Next, the keyboard was unplugged and the fans turned off. For some time the instrument seemed to return to nominal operations; however, the problem again reappeared during some final pre-flight power cycles to test the ability of the instrument to properly boot.

It may be interesting to note that in preparation for this flight, the failed 118 GHz receiver IF amp was replaced with one that takes nearly twice as much current. One hypothesis to the problem that will be investigated after this flight is over is whether or not this causes a sufficient voltage drop for the computer such that it is intermittent as observed.

It was finally decided to fly as-is. The pilot was alerted to the fact that he may see the failure light for HAMSR during this flight and that he should follow the check-list instructions which are to cycle power to HAMSR up to 3 times in an effort to get it back to operational status.

In flight, HAMSR did not experience any of the intermittent power issues that were observed during pre-flight and the 118 receiver operated normally.

Following the flight, the instrument problems were debugged further. It was determined that the 118 GHz IF amps are powered from a different supply than the CPU. However, it was noted that the supply voltage was measured to be only 4.67V which is on the edge of stable operation. It was decided to take a couple of actions to improve this voltage level:

1. The patch cable (a group of 4 twisted wire pairs) that brings the “+5V” from the power supply (PS09) to the CPU area was

excessively long resulting in unnecessary voltage drop due to the high current draw. The length of this cable has been reduced by about 18”.

2. The patch cable was directed to the Wire Wrap Board (WWB). From the WWB, 2 small wires then brought the “:+5V” to a terminal strip from which the CPU receives its power. There was some voltage drop expected from this so the patch cable was re-routed directly to the terminal strip.
3. A 23 k-ohm trim resistor was added to PS09 between the “T/C” and “+” terminals increasing the power supply output voltage to +5.14V.

The end result: CPU voltage is now a very comfortable +5.03V.

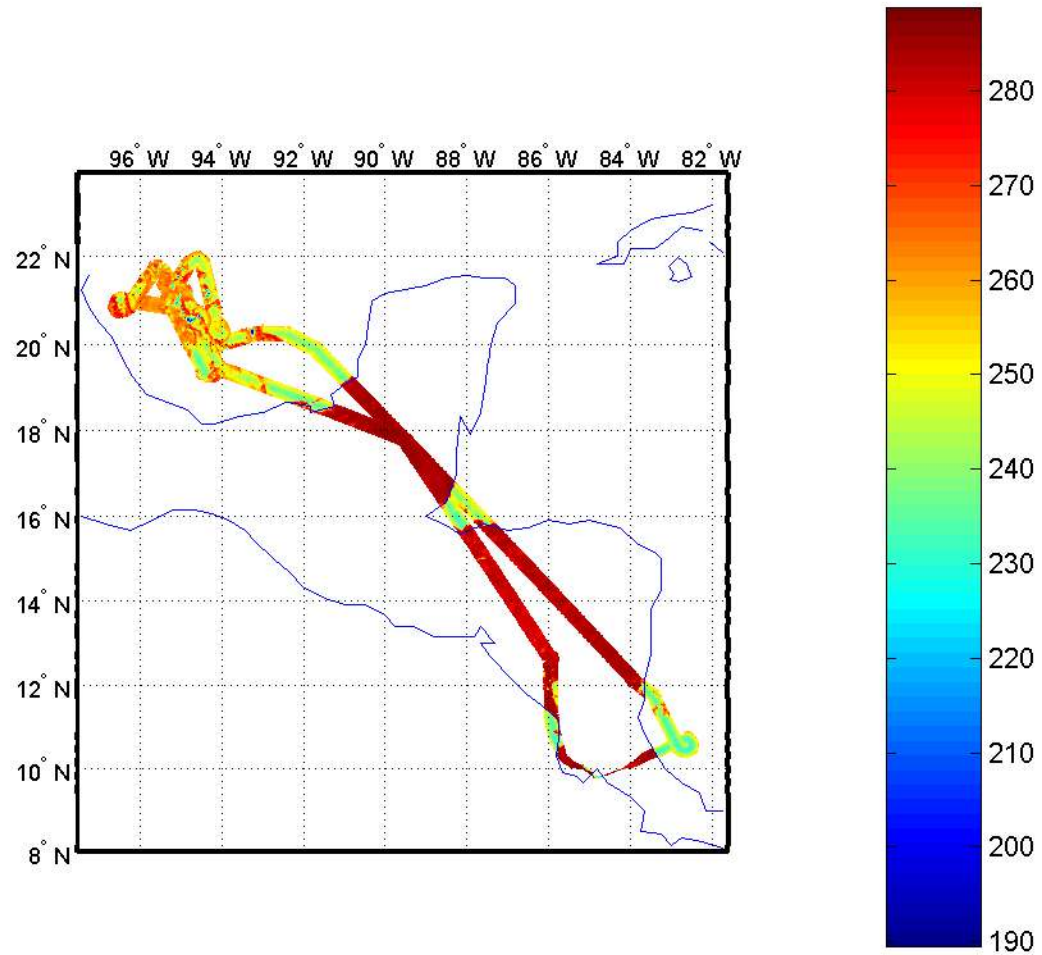
The intermittent power-on issue previously noted was not repeatable when HAMSR was powered by our own GSE.

II. Instrument State and Parameters

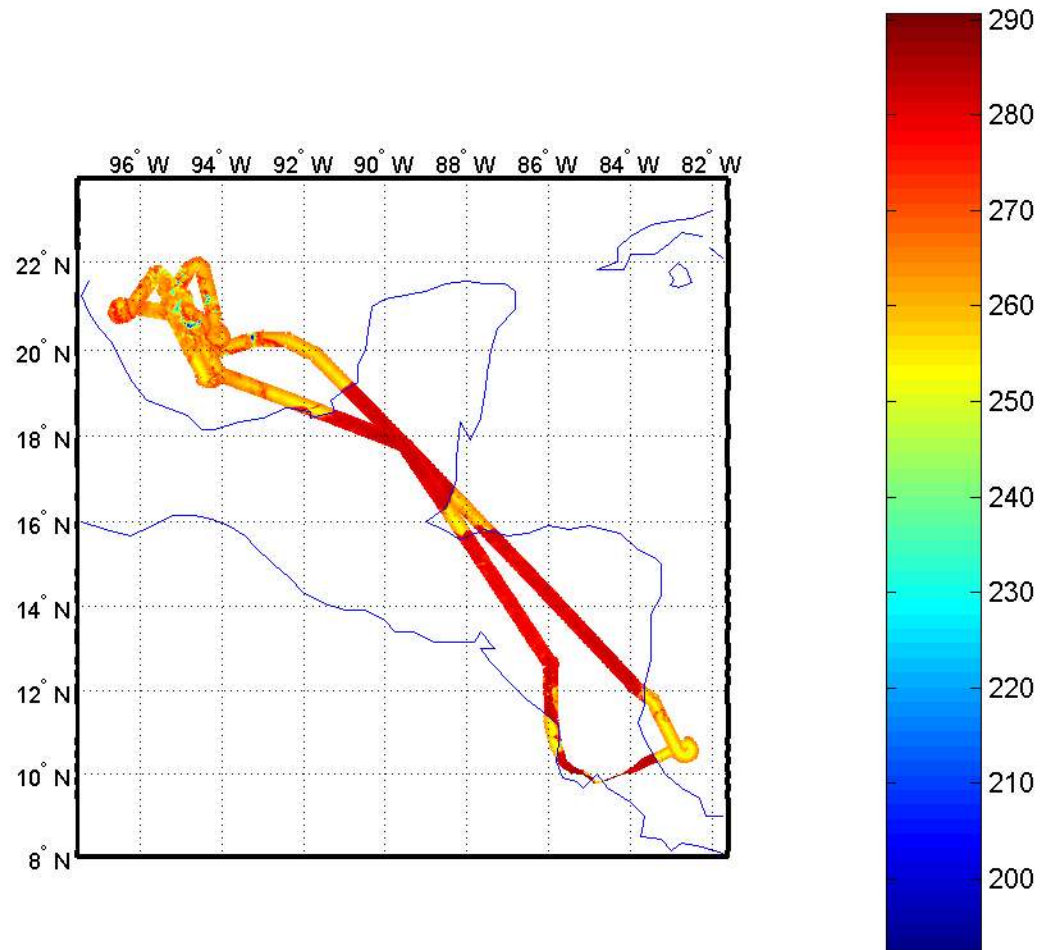
Instrument Power	ON
Fan Power	ON
Pod Heaters	ON
Seal Added Around Pod Window/Radome	NO
LN2 Load Used Pre-Flight	NO
Pre-Flight Data File Name	05072323.002
Flight Data File Name	05072401.530

III-a. Selected Maps

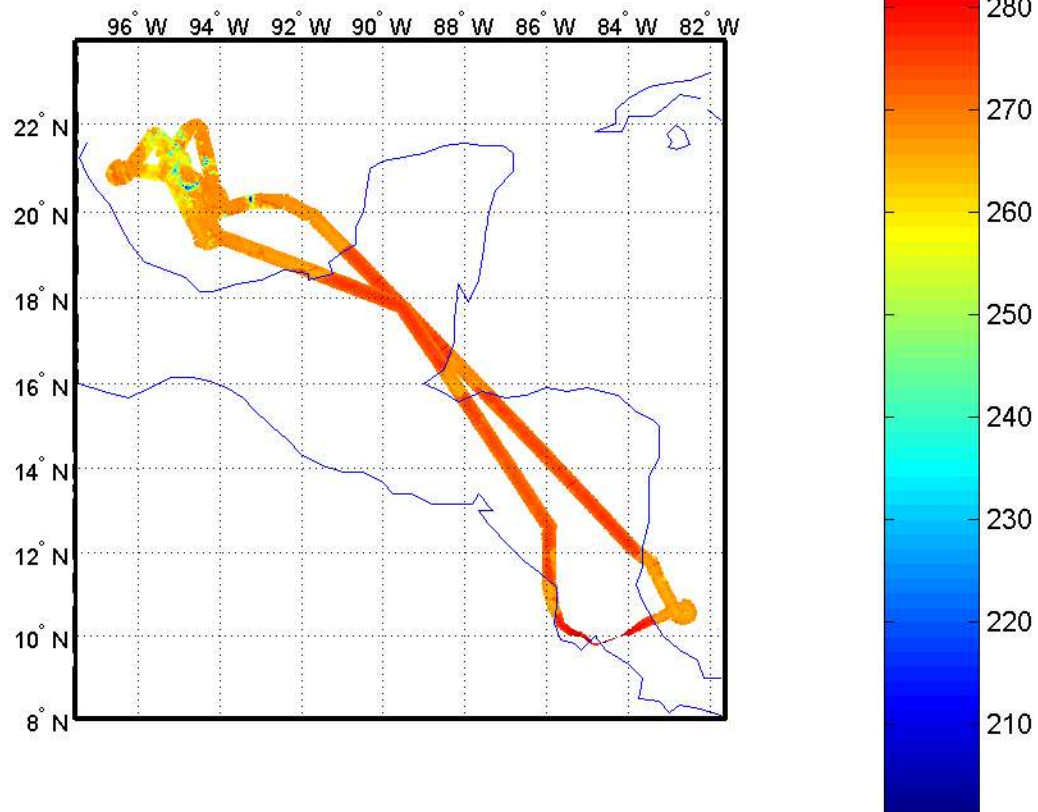
50.3 GHz brightness temperature(surface)
24-Jul-2005 01:53:47 -- 09:53:27



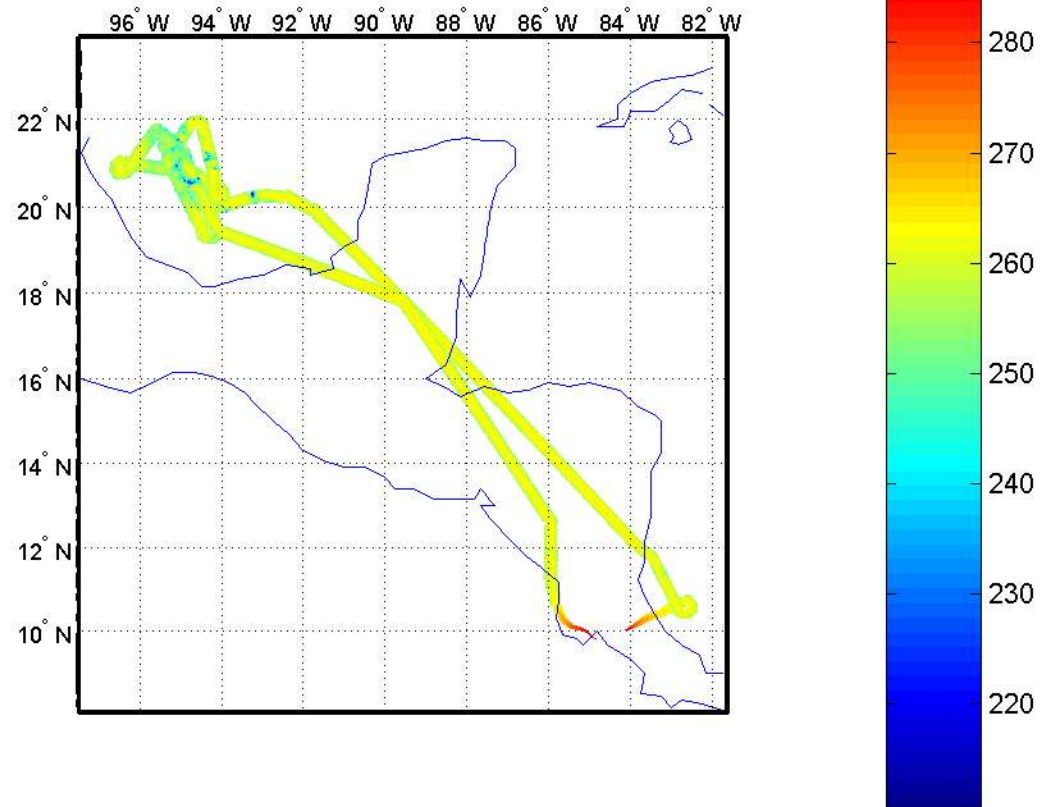
51.76 GHz brightness temperature(surface)
24-Jul-2005 01:53:47 -- 09:53:27



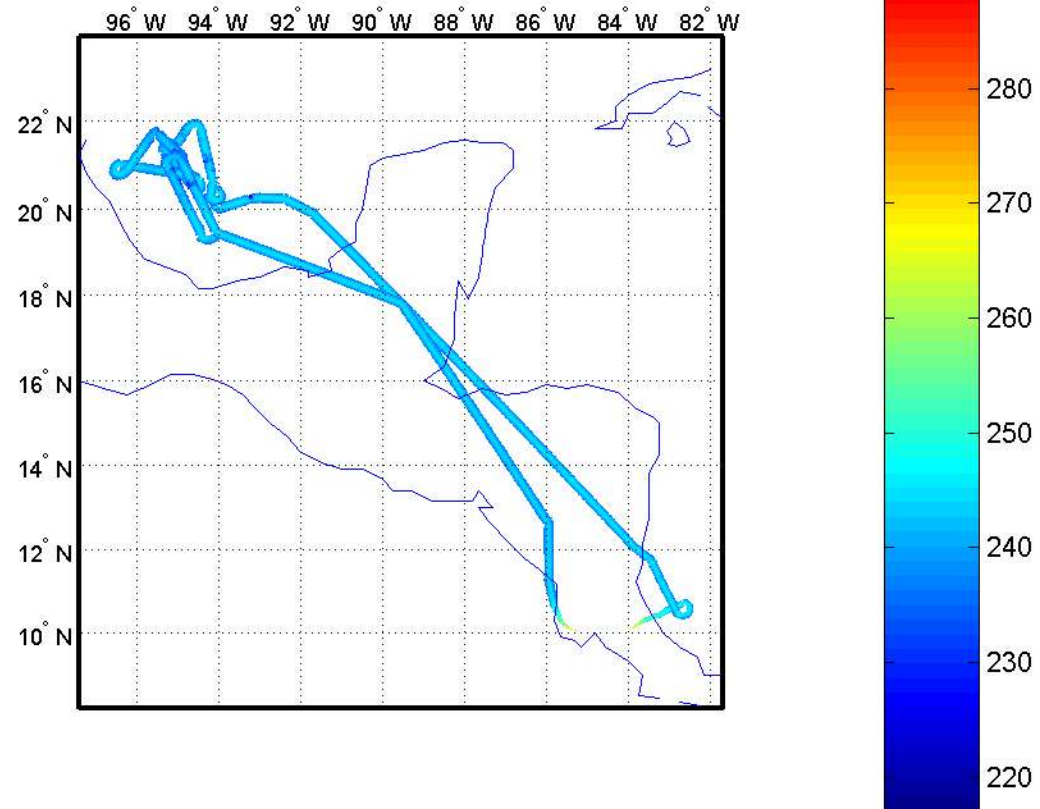
52.8 GHz brightness temperature(1000mB)
24-Jul-2005 01:53:47 -- 09:53:27



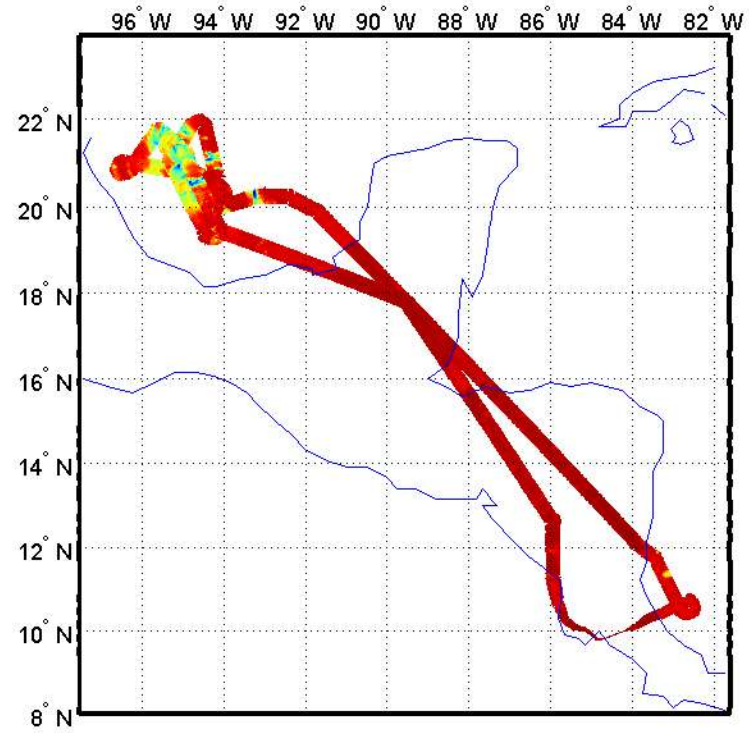
53.596 GHz brightness temperature(750mB)
24-Jul-2005 01:53:47 -- 09:53:27



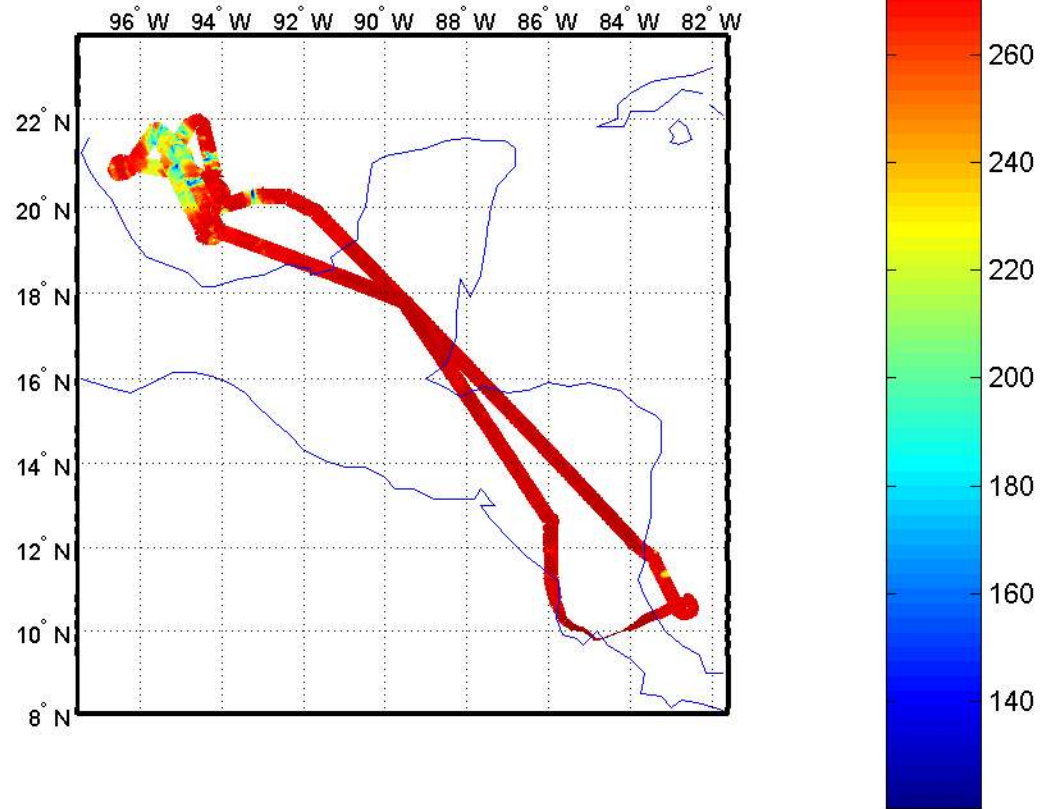
54.4 GHz brightness temperature(400mB)
24-Jul-2005 01:53:47 -- 09:53:27



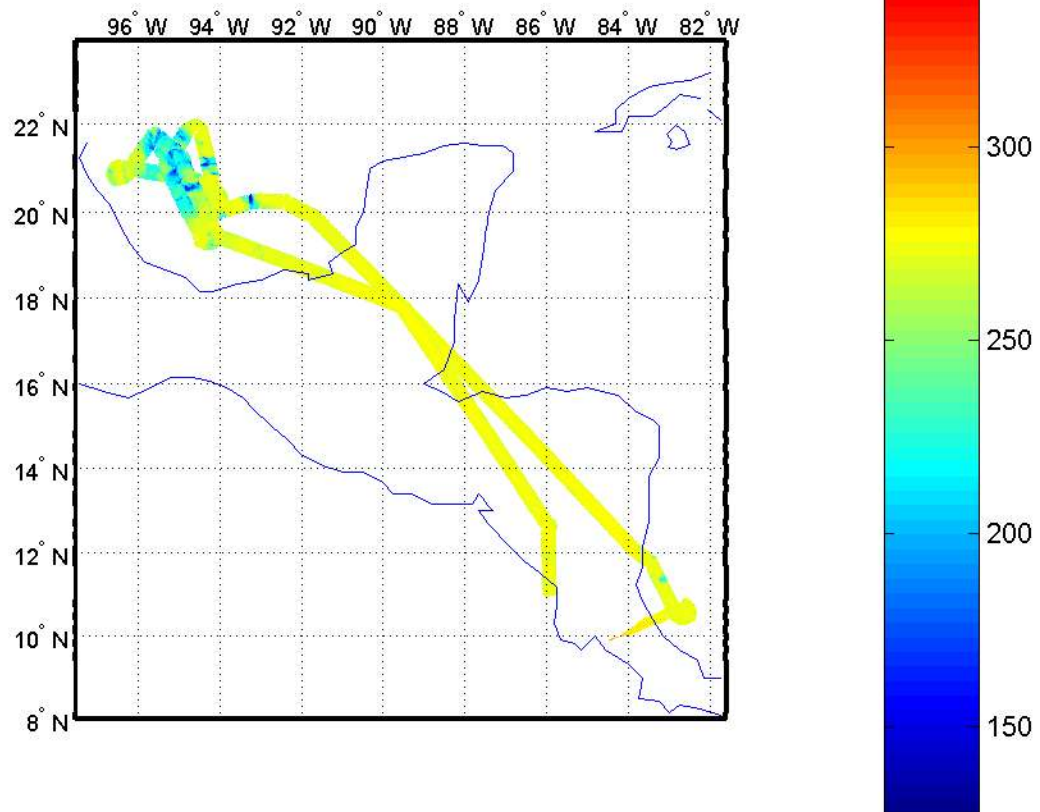
113.25 GHz brightness temperature(surface)
24-Jul-2005 01:53:47 -- 09:53:27



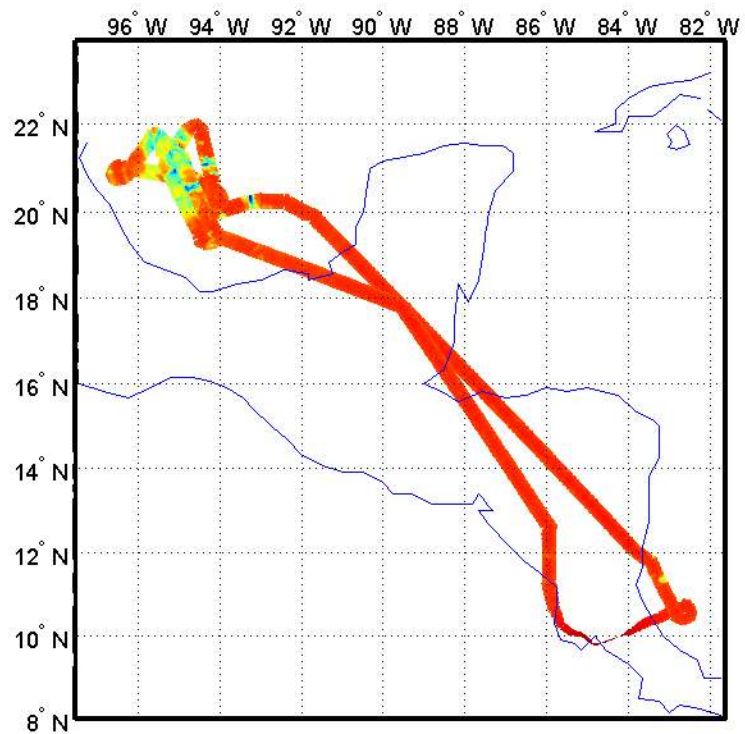
115.25 GHz brightness temperature(surface)
24-Jul-2005 01:53:47 -- 09:53:27



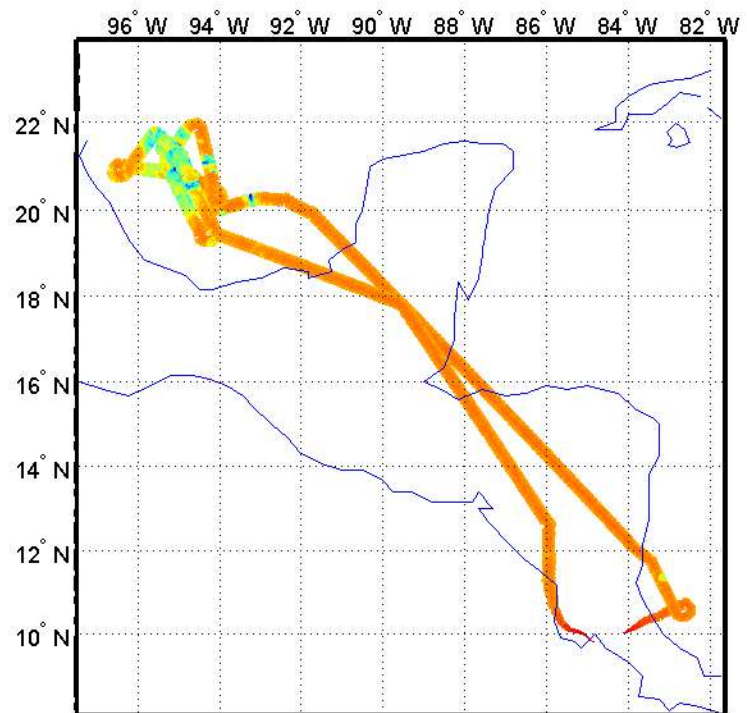
116.2 GHz brightness temperature(surface)
24-Jul-2005 01:53:47 -- 09:53:27



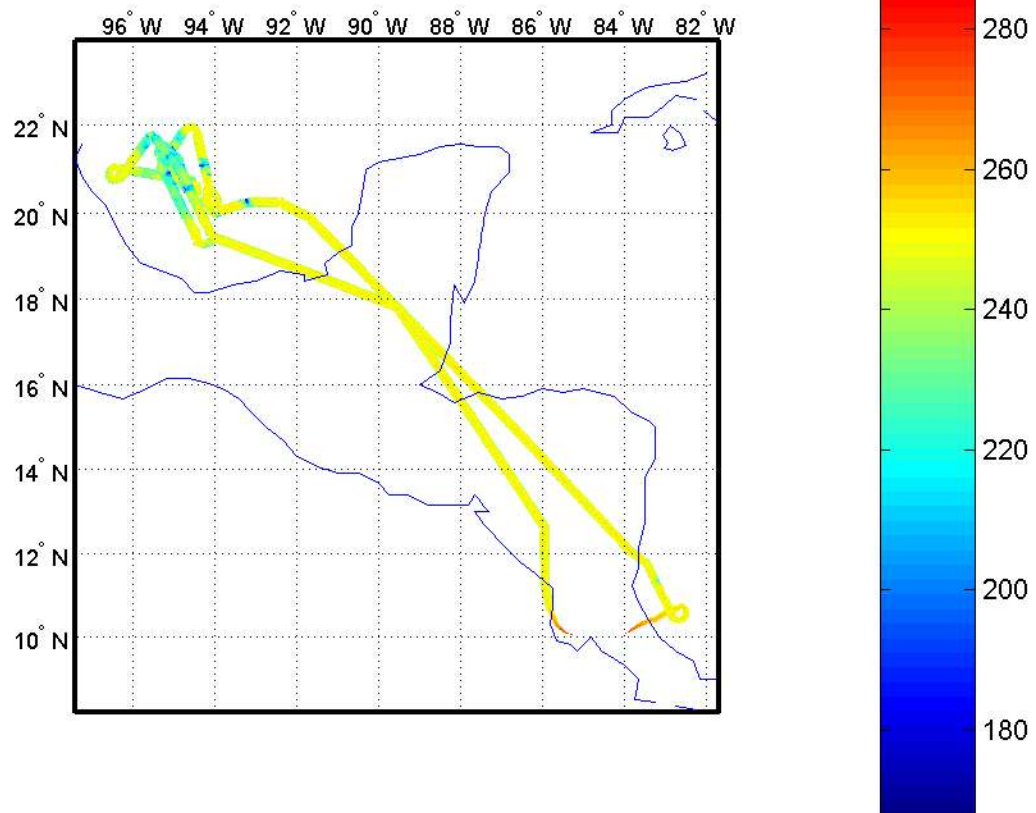
116.7 GHz brightness temperature(1000mB)
24-Jul-2005 01:53:47 -- 09:53:27



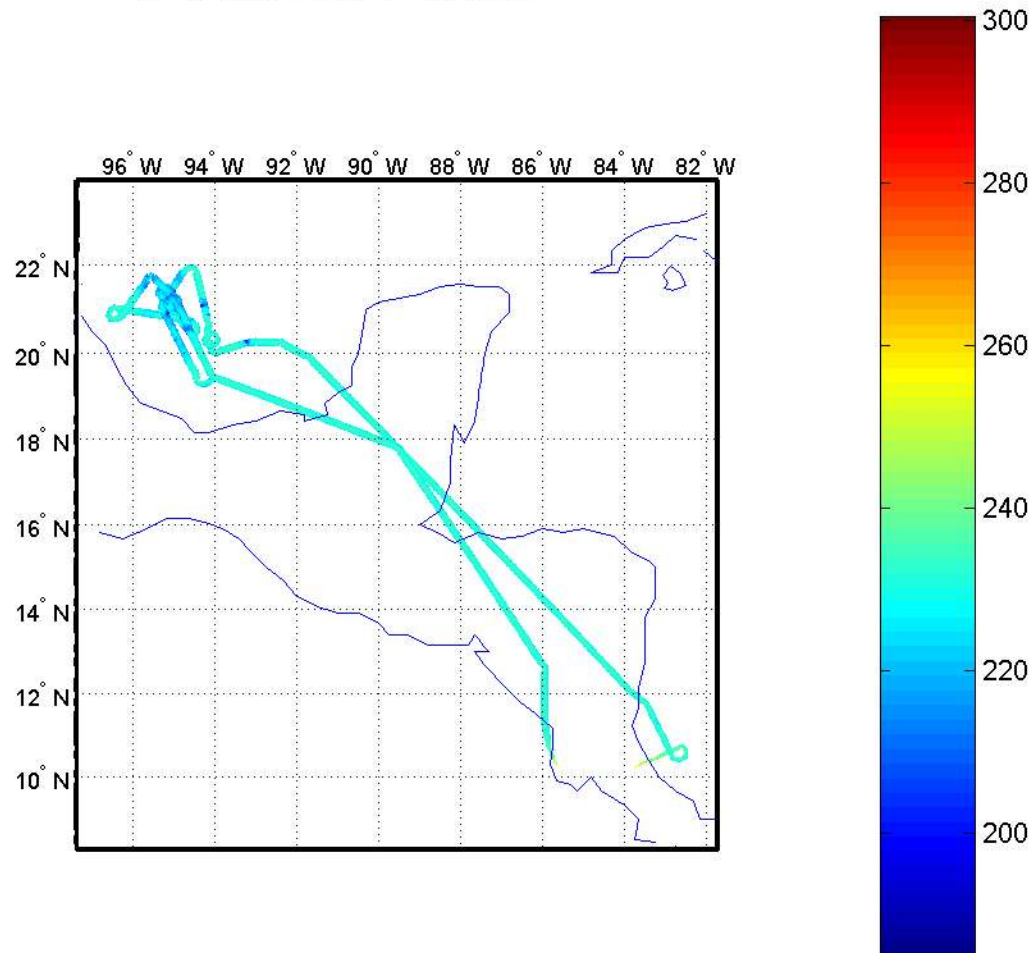
117.15 GHz brightness temperature(750mB)
24-Jul-2005 01:53:47 -- 09:53:27



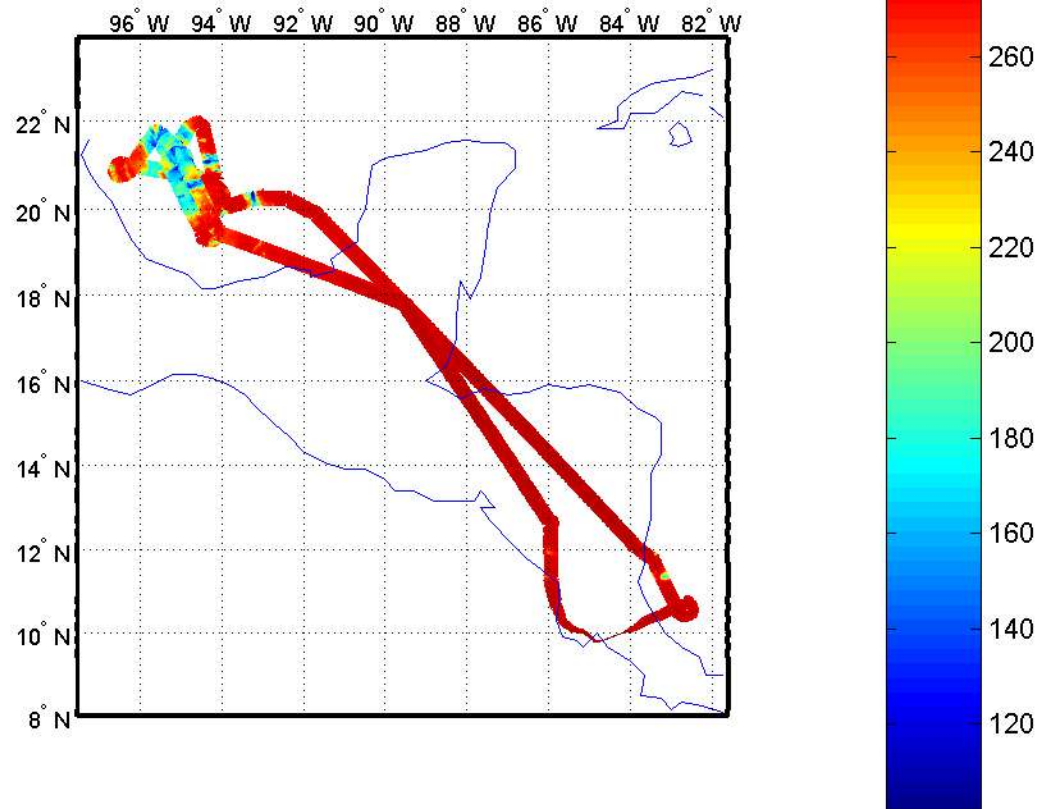
117.55 GHz brightness temperature(400mB)
24-Jul-2005 01:53:47 -- 09:53:27



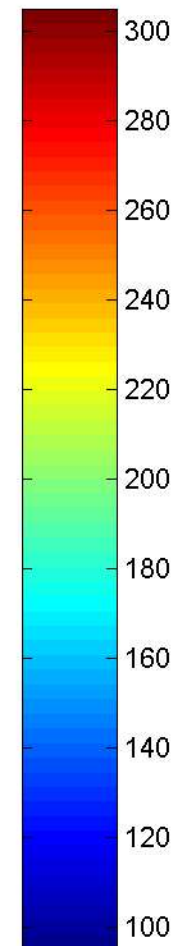
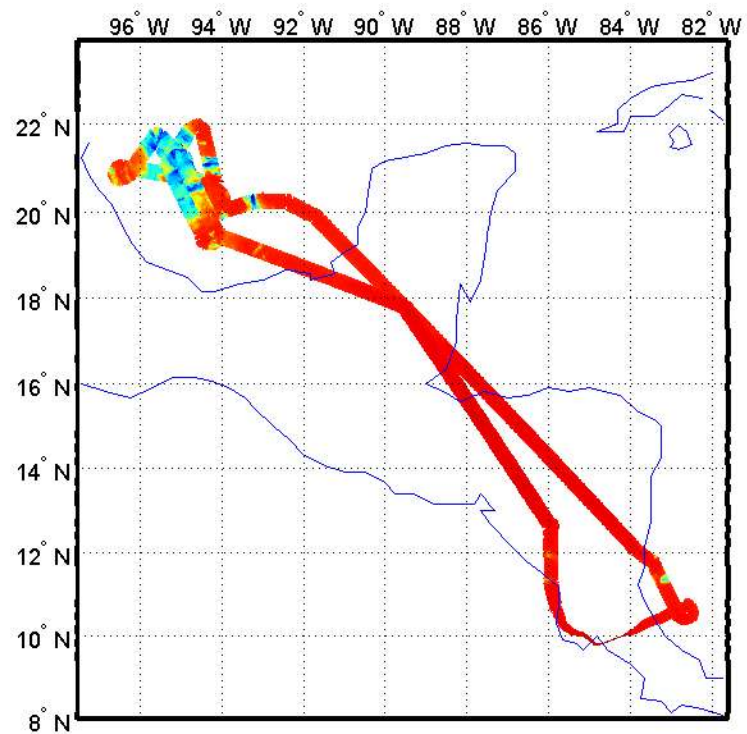
117.95/119.55 GHz brightness temperature(250mB)
24-Jul-2005 01:53:47 -- 09:53:27



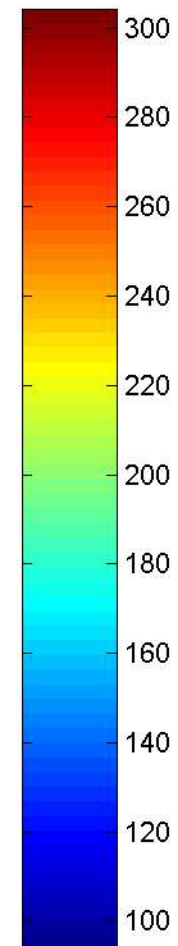
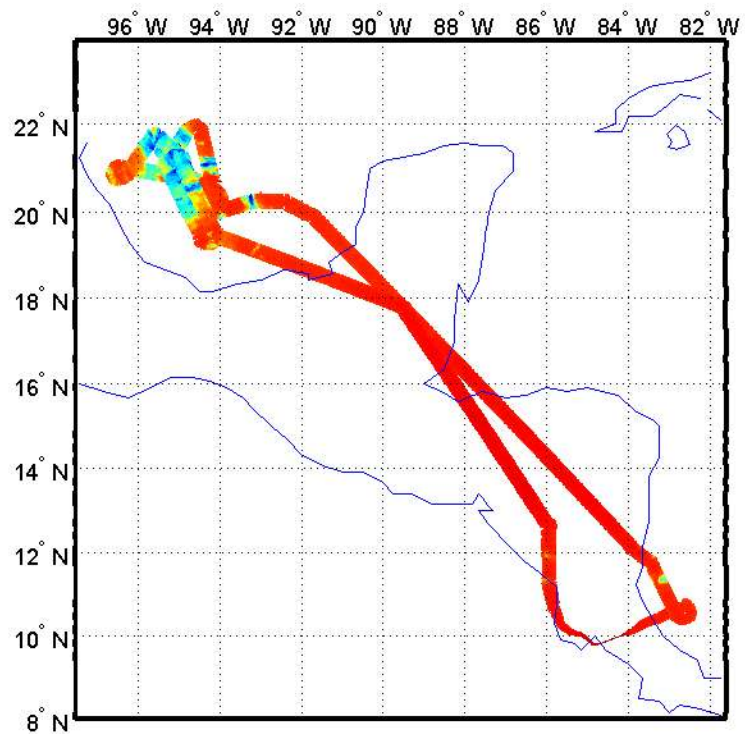
166 GHz brightness temperature
24-Jul-2005 01:53:47 -- 09:53:27



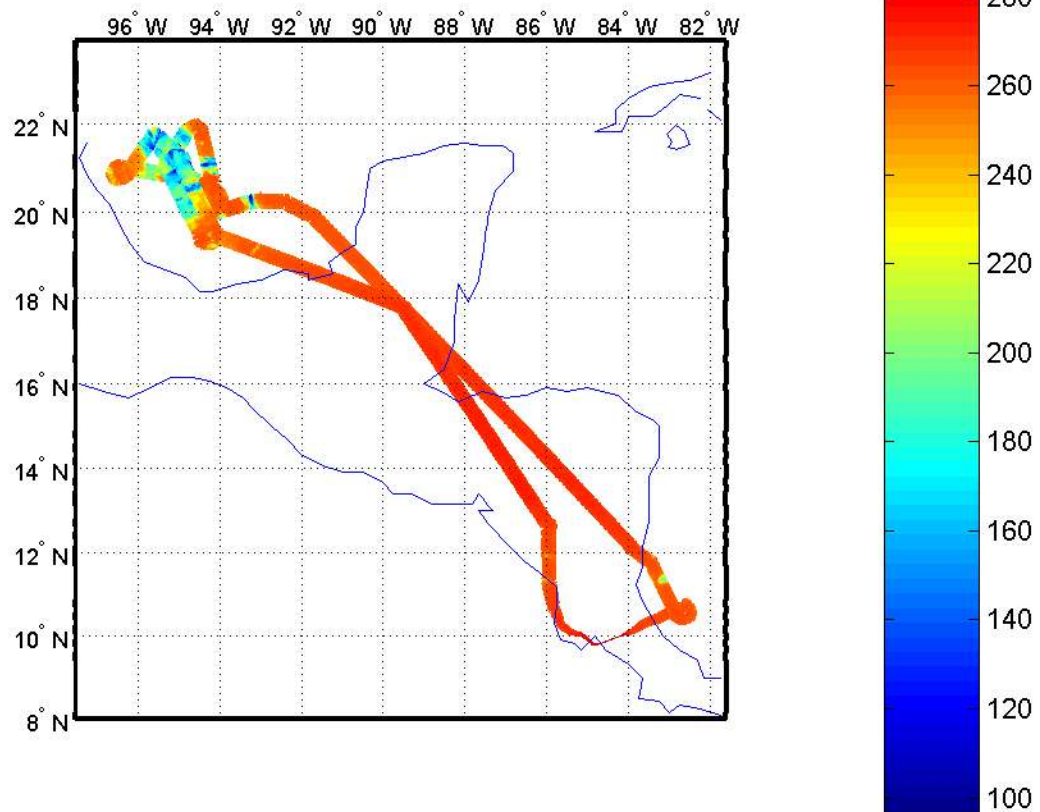
173.31/193.31 GHz brightness temperature
24-Jul-2005 01:53:47 -- 09:53:27



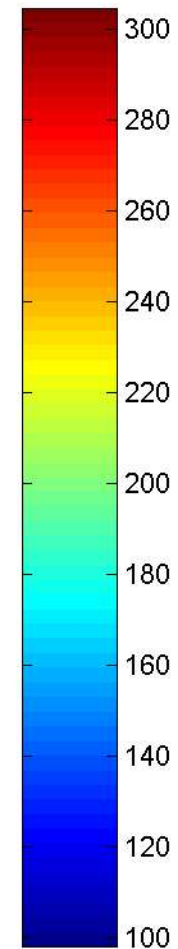
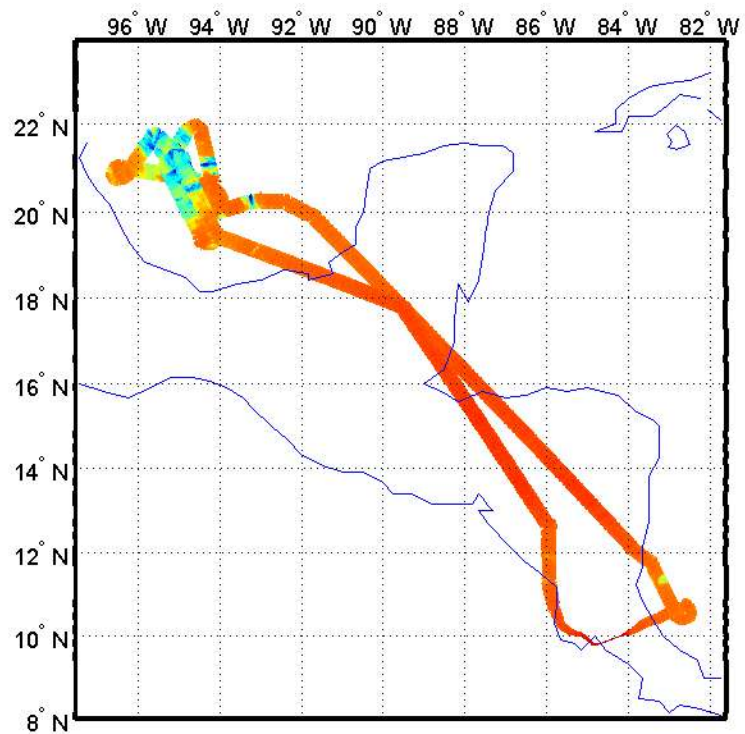
186.31/190.31 GHz brightness temperature
24-Jul-2005 01:53:47 -- 09:53:27



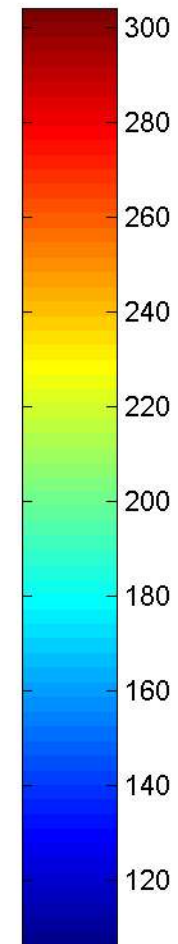
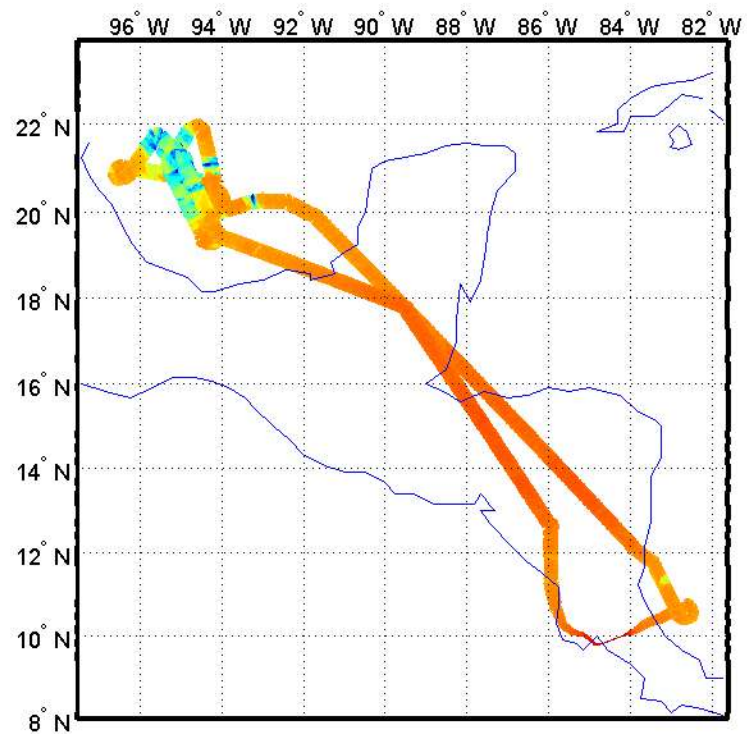
178.81/187.81 GHz brightness temperature
24-Jul-2005 01:53:47 -- 09:53:27



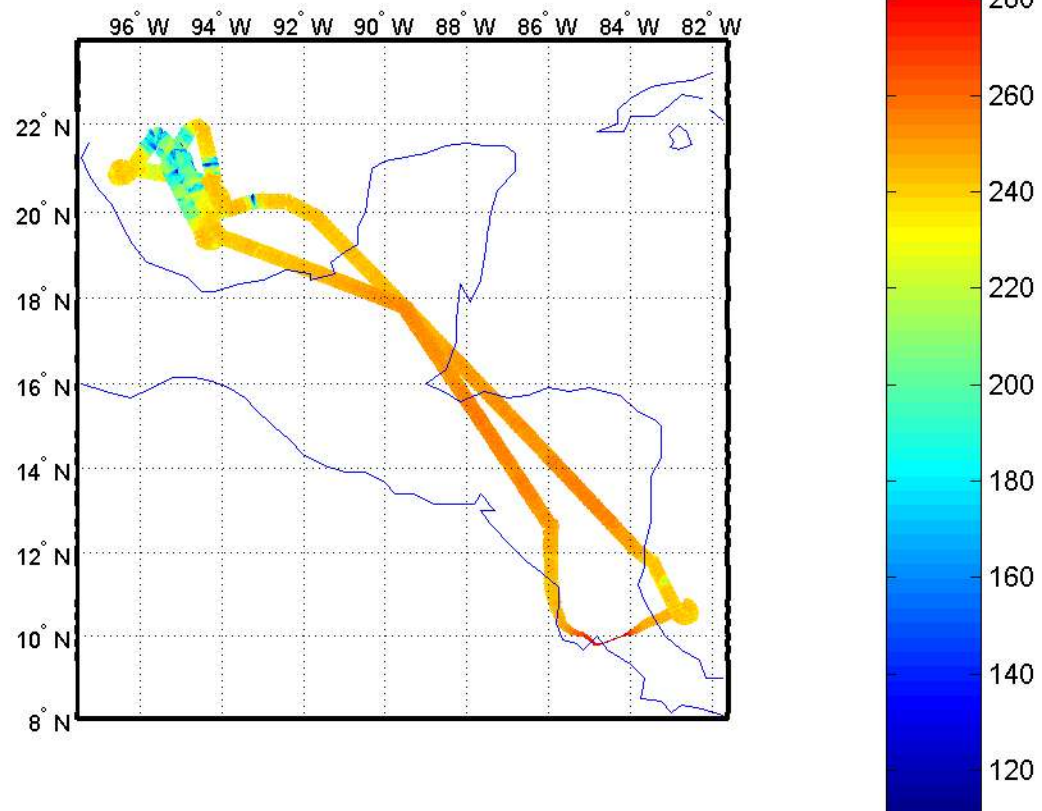
180.31/186.31 GHz brightness temperature
24-Jul-2005 01:53:47 -- 09:53:27



181.51/185.11 GHz brightness temperature
24-Jul-2005 01:53:47 -- 09:53:27

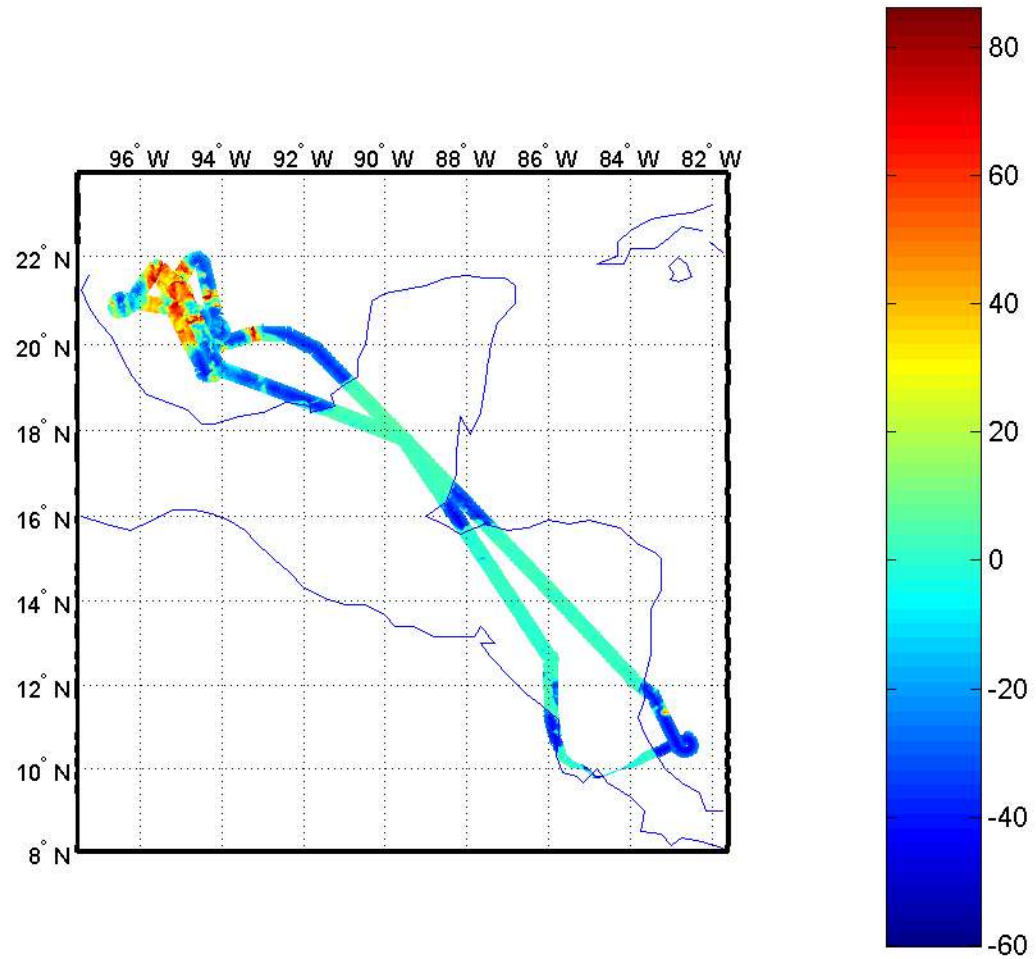


182.31/184.31 GHz brightness temperature
24-Jul-2005 01:53:47 -- 09:53:27

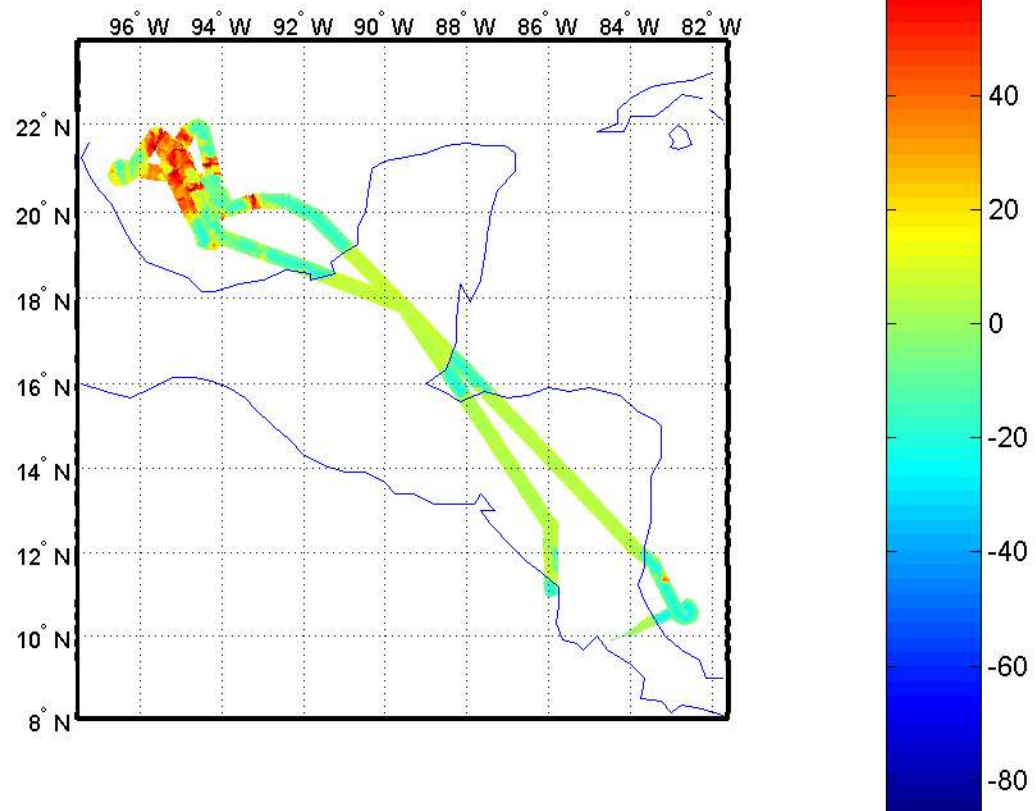


III-b. Selected 55-118 GHz Radiometer Difference Maps

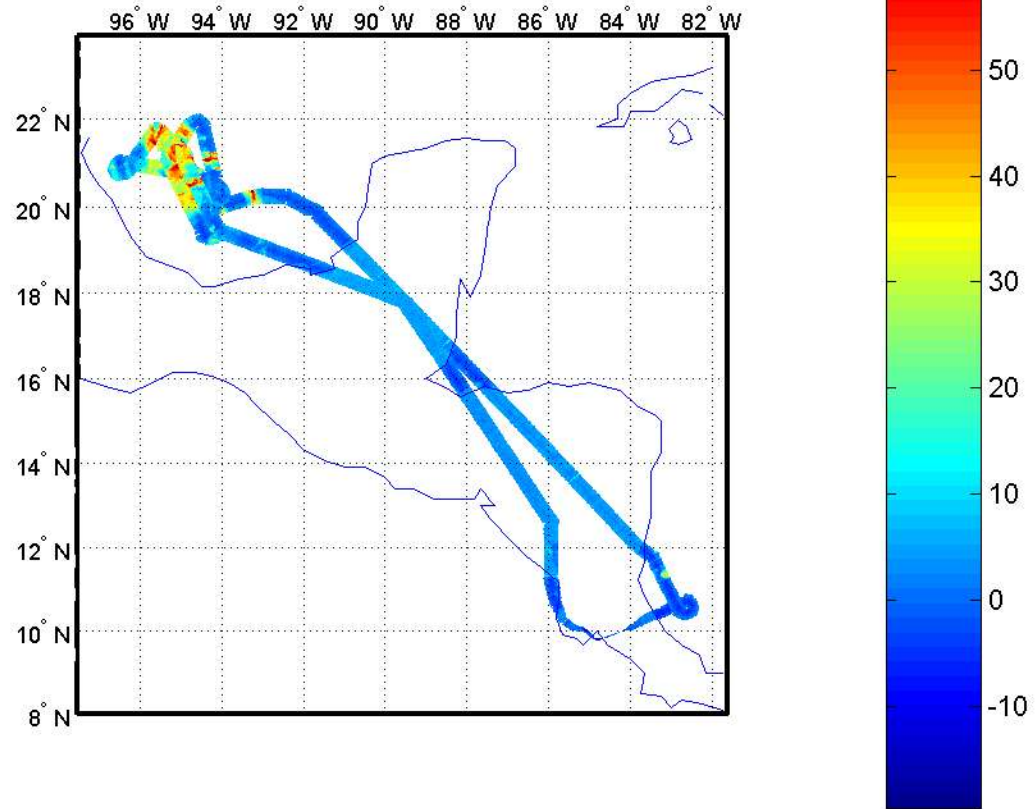
50.3-115.25 GHz brightness temperature difference(surface)
24-Jul-2005 01:53:47 -- 09:53:27



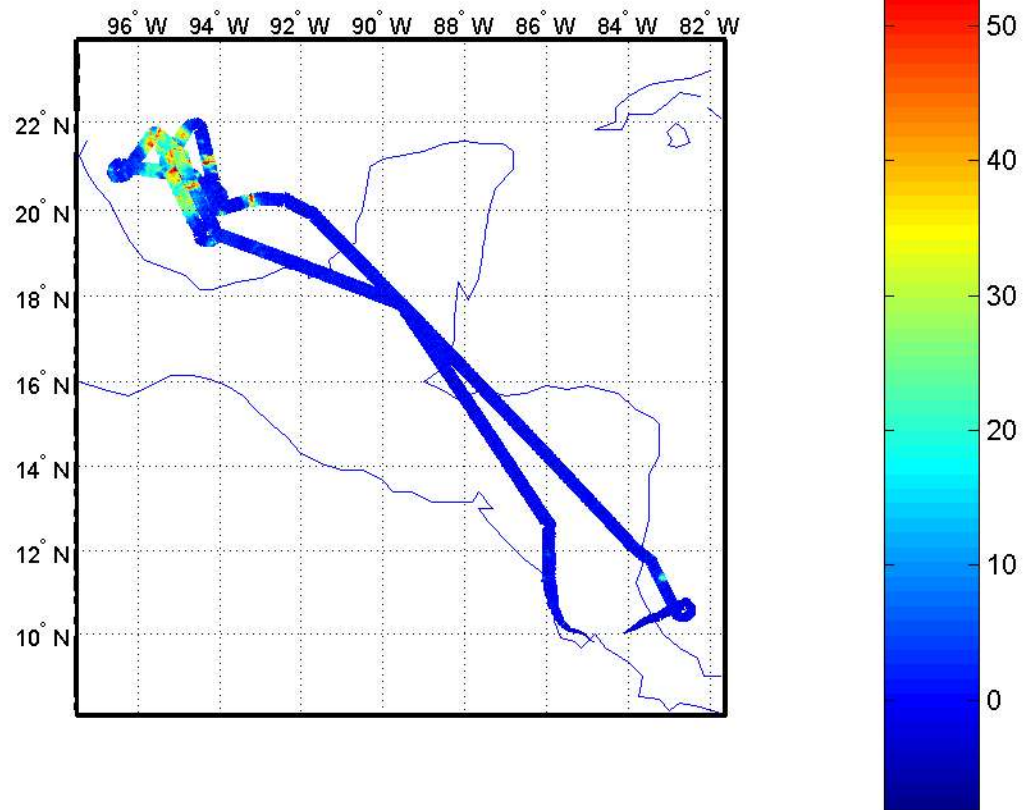
51.76-116.2 GHz brightness temperature difference(surface)
24-Jul-2005 01:53:47 -- 09:53:27



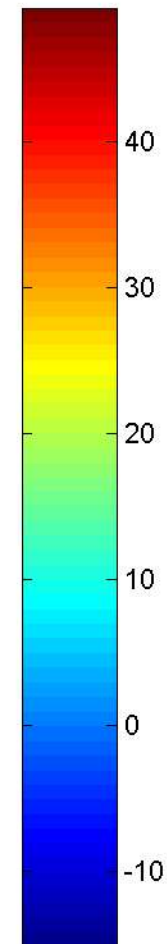
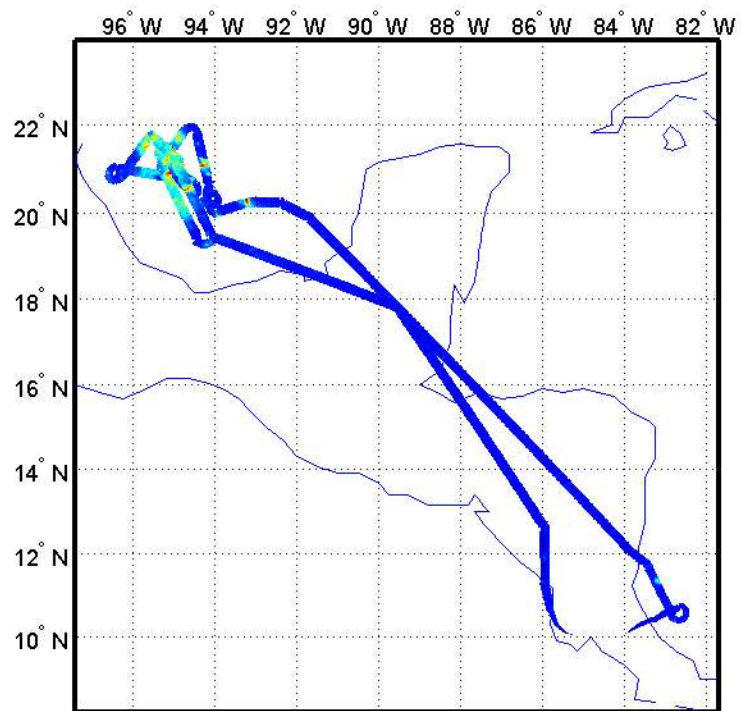
52.8-116.7 GHz brightness temperature difference(1000mB)
24-Jul-2005 01:53:47 -- 09:53:27



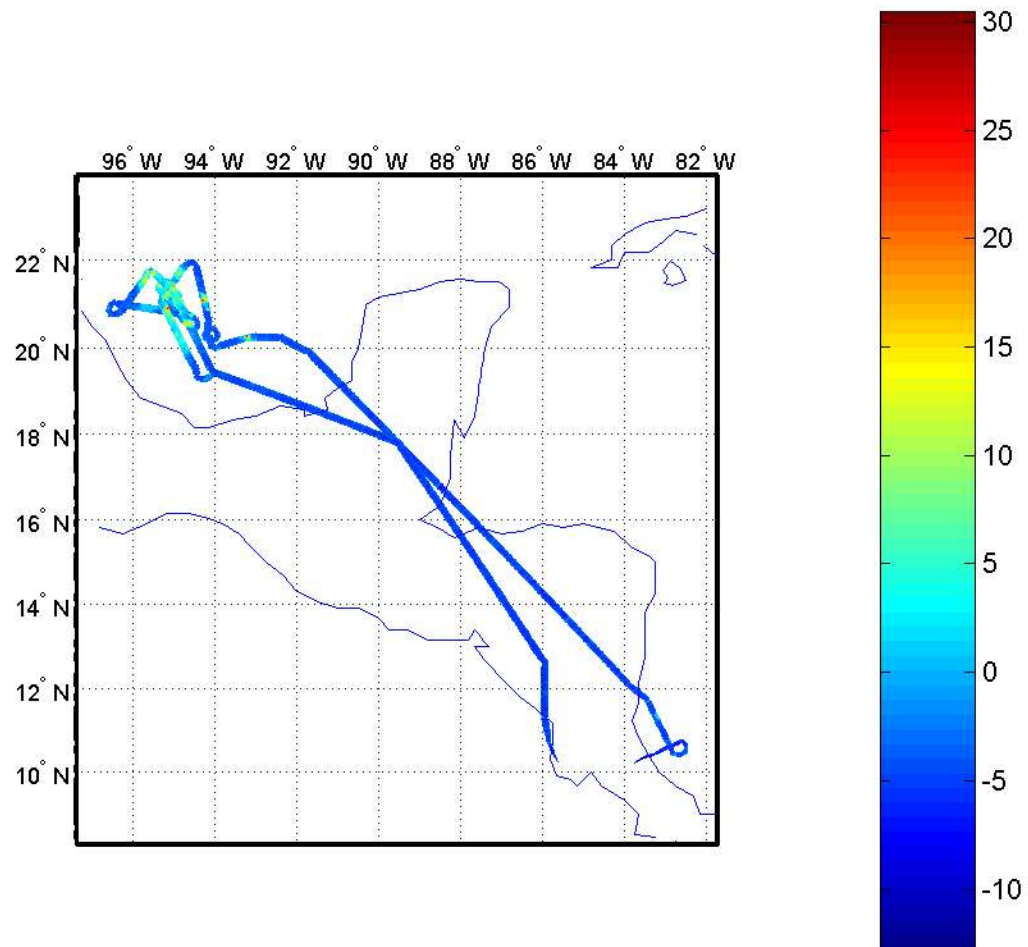
53.596-117.15 GHz brightness temperature difference(750mB)
24-Jul-2005 01:53:47 -- 09:53:27



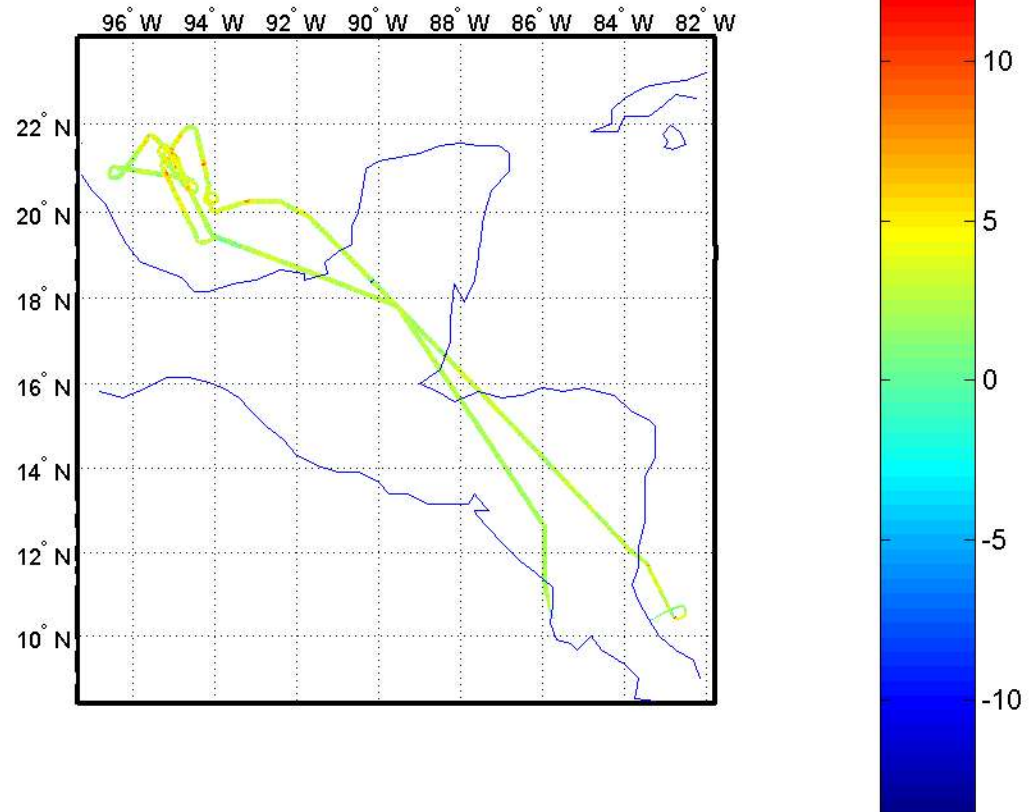
54.4-117.55 GHz brightness temperature difference(400mB)
24-Jul-2005 01:53:47 -- 09:53:27



54.94-117.95/119.55 GHz brightness temperature difference(250mB)
24-Jul-2005 01:53:47 -- 09:53:27



55.5-118.3/119.2 GHz brightness temperature difference(150mB)
24-Jul-2005 01:53:47 -- 09:53:27



56.02/56.67-118.515/118.985 GHz brightness temperature difference(80mB)
24-Jul-2005 01:53:47 -- 09:53:27

