

STS-126/ULF2 Post Mission Summary

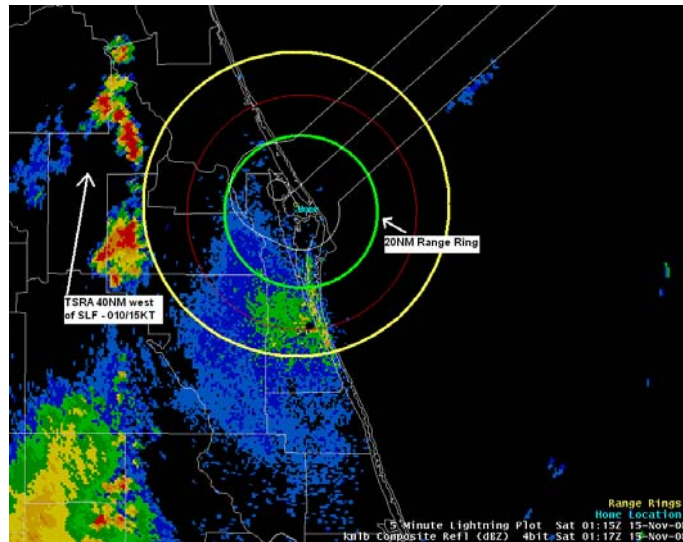


The Space Shuttle [Endeavour](#) launched from [Kennedy Space Center \(KSC\)](#) Launch Pad 39A on November 15, 2008 at 0055 UTC (November 14, 2008 6:55 PM CST) and landed at Edwards AFB, CA on November 30, 2008 at 2125 UTC (November 30, 2008 3:25 PM CST). Commander Christopher Ferguson and the [STS-126](#) crew successfully delivered [Expedition 18](#) crew member Sandra Magnus to the International Space Station ([ISS](#)) and delivered supplies and additional equipment in the multi purpose logistics module Leonardo to the ISS. Heidimarie Stefanyshyn-Piper conducted two space walks with astronaut Shane Kimbrough and Stephen Bowen. Kimbrough and Bowen completed an addition two space walks completing repairs and service work on the ISS and the Solar Alpha Rotary Joints (SARJ).

Endeavour was originally rolled to the Launch Pad 39B as the Launch on Need (LON) vehicle in support of STS-125 Hubble Space Telescope servicing mission. Last minute complications with the Hubble Telescope caused an indefinite delay for STS-125. Endeavour was rolled to Launch Complex 39A and prepared for the November launch date.

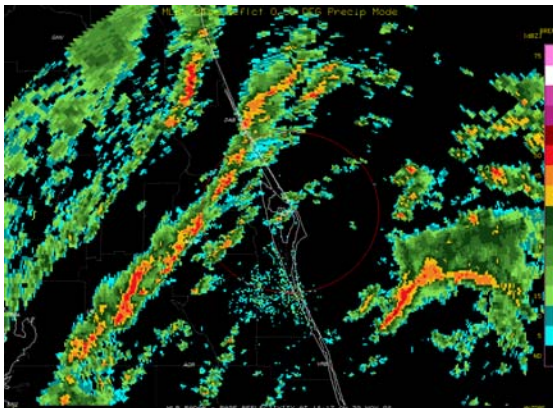
Weather on launch day was acceptable in Florida; weather at the [Transoceanic Abort Landing \(TAL\)](#) sites was forecast and observed “GO”. Isolated afternoon showers were observed at 60 miles south of KSC along the sea breeze late in the day. The showers diminished by sunset and were not a threat for the evening launch time. Additional showers developed into thunderstorms over south and central Florida during the early evening. These storms were moving generally north and did not pose a weather threat for launch or the Return to Launch Site (RTLIS). See Figure 1.

Weather for landing operations was more complex. Both KSC and Edwards Air Force Base were activated for landing operations on Sunday, November 30, 2008 as possible landing sites for STS-126. A large upper level low pressure system over the eastern United States and its associated cold front moving across Florida were concerns for landing weather at KSC on Sunday for the End of Mission (EOM) and Monday (EOM+1). [Spaceflight Meteorology Group \(SMG\)](#) weather forecasts were “NO GO” for KSC with crosswind, ceiling, precipitation, and thunderstorm flight rule violations. The Storm Prediction Center in Norman, OK began issuing Tornado Watches for Florida in the predawn hours. Tornado Watch #938 was issued at 5:00 AM EST. Watch #939 issued at 9:50 AM EST covered much of central FL.



(Fig. 1) Showers and Thunderstorms from south and central FL 15/0117Z, moving north at 15 knots.

Watch #940 issued at 1:05 PM EST covered the remainder of central FL including KSC. A squall line moving east at 20 knots combined with a warm and unstable air mass across south and central Florida generated numerous thunderstorms, strong winds and isolated tornadoes by mid day (Fig. 2).



(Fig. 2) TSRA/squall line over central FL 30/1819Z. Movement was northeast at 30 knots.



(Fig. 3) TSRA/squall line over KSC 30/1955Z.

The weather continued to deteriorate across central Florida, prompting NASA's Flight Control Team in Houston to assess the possibility of staying on orbit and attempting Monday, December 1, 2008 landing at KSC. The SMG Upper Wind Forecasts for Monday indicated marginal conditions for Endeavour and her crew to return safely to KSC.

After waving off the first opportunity to KSC and with weather conditions deteriorating through the day at KSC, the Flight Director made the decision to land at Edwards AFB, CA (EDW). Weather conditions at EDW were nearly ideal with light northeast surface winds and mostly clear skies. Endeavour touched down November 30, 2008 at 2125 UTC (3:25 PM CST) on temporary runway 04. This runway was built due to construction and resurfacing of the primary runway at EDW.

For this 124th Shuttle mission, Spaceflight Meteorology Group (SMG) lead forecaster Kurt Van Speybroeck provided launch abort landing forecasts and analysis to the Mission Control Center. STS-126 Assistant Lead/TAL forecaster Tim Oram issued weather forecasts for the Transoceanic Abort Landing (TAL) sites at Zaragoza, Spain; Moron, Spain; and Istres, France. Techniques Development Unit meteorologist Paul Wahner issued upper air forecasts for launch, RTLS, and landing opportunities at KSC, monitored weather computing systems, provided graphics support and general forecast aid. Brian Hoeth provided TDU training oversight.

Submitted by: Kurt M. Van Speybroeck Lead Meteorologist

Table 1. Launch, RTLS, TAL and Landing Observations

Launch

KTTS 150055Z 16009P12KT 10SM BKN320 75/73 A2993 RMK DA +1388FT (RWY15)

Return-To-Launch Site abort (RTLS)

KTTS 150120Z BKN320 7SM 16009P14KT 75/73 A2993 RMK SLP135 5CS /2/ N1509/14 C1510/15 S1510/15 DA +1388FT

TAL

ZZA 150130Z SKC 7SM 28011P13KT 46/41 A3028 DA -92FT
MRN 150130Z SKC 7SM 07003P06KT 41/36 A3023 DA -1113FT
FMI 150130Z SKC 7SM 35005P08KT 46/39 A3021 DA -1011FT

End-of-Mission (EOM) 1st Landing Opportunity

KTTS 301819Z FEW025 **OVC035 3SM –SHRA** BR 75/72 **18012P23KT** A2958 RMK SLP017 ISC 8CU (N) **1812/23** (C) 1816/28 (S) 1821/28 **TSRA WI 30NM**

End-of-Mission (EOM) 2nd Landing Opportunity

KTTS 301955Z **BKN020CB OVC035 1 1/2SM +TSRA** BR 68/68 **26023P43KT** A2958 RMK PK WND 26043/53 WSHFT 15 OCNL LTGICCG TS OHD MOV NE SLP017 6CB 2SC

End-of-Mission (EOM)

KEDW 302125Z FEW300 7SM 68/39 04004P06KT A3018 DENSAL +3234 FT

Notes: Temperatures in Fahrenheit. ZZA = Zaragoza, Spain; MRN = Moron, Spain; FMI = Istres, France; KTTS = NASA Space Shuttle Landing Facility, Florida. KEDW = Edwards AFB, CA. Shuttle flight rule violations are in **bold**.