



## *Aircraft Weather Observations with the Water Vapor Sensing System (WVSS-II)*

Friends and Partners of Aviation Weather  
FPAW 2012 Meeting, Orlando, FL  
Nov 1, 2012 - Segment 7

## WVSS-II, Using TDL for measuring Atmospheric Water Vapor for Improved Weather Forecasting

### UNIQUE

- ◆ SpectraSensors TDL Technology
- ◆ Improved Accuracy over Conventional Technology
- ◆ Compact, Flush External Air Sampler
- ◆ Fits Standard AMDAR Data Flow via ACARS
- ◆ Very low maintenance requirements

### PROVEN

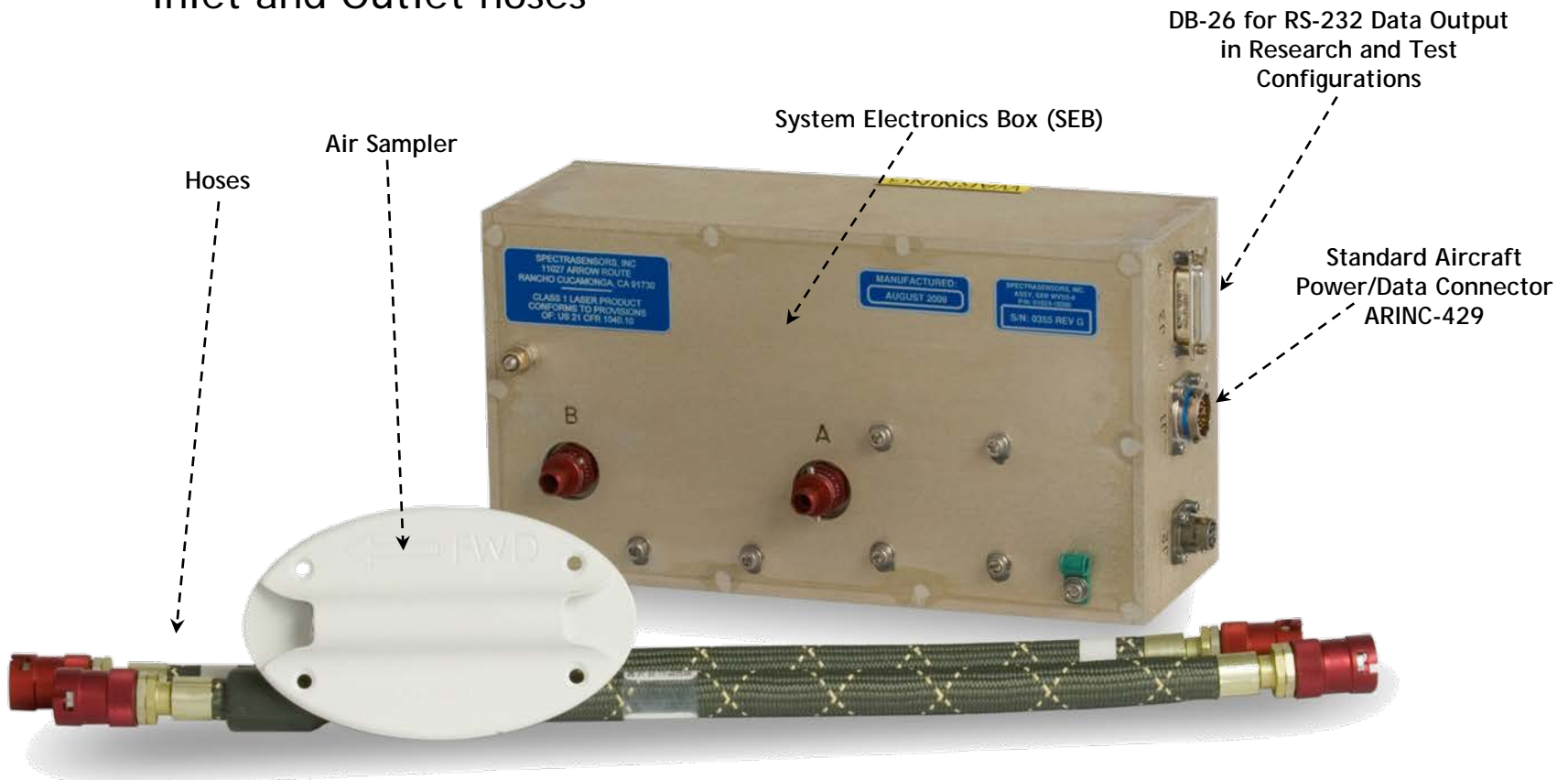
- ◆ Extensive Chamber Testing by NWS and E-AMDAR
- ◆ Extensive Flight Testing by E-AMDAR
- ◆ Over Three Years of Operational Use by the U.S. NWS
- ◆ Being Deployed on Commercial Aircraft in U.S., Europe, Australia



From Commercial Aircraft

## • The Primary Components of WVSS-II

- System Electronics Box (SEB)
- Air Sampler (UCAR Patented)
- Inlet and Outlet hoses

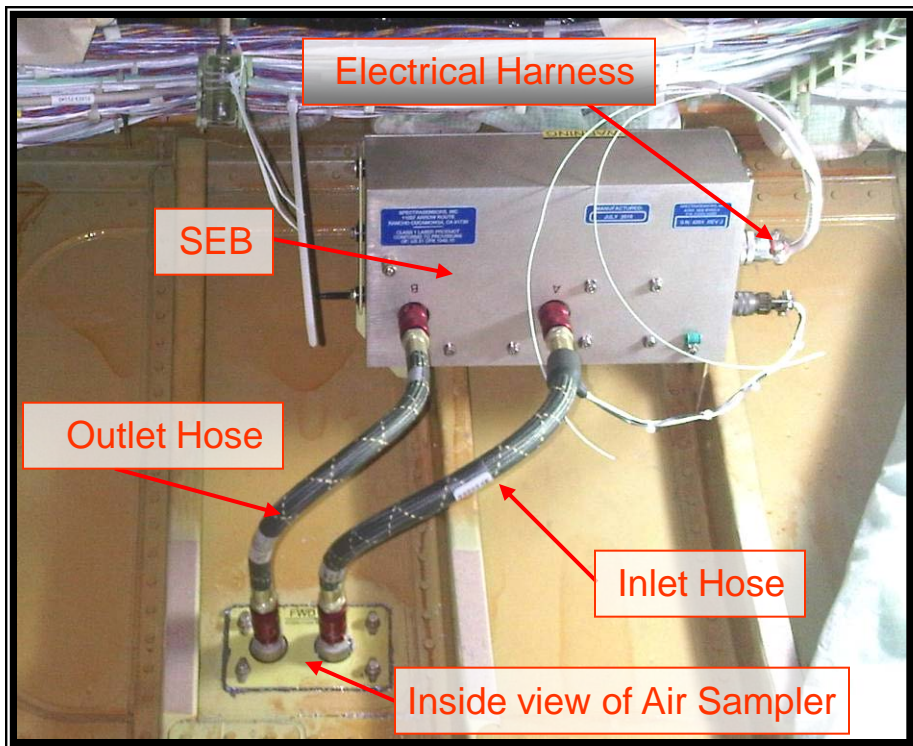


## WVSS-II Developed for AMDAR

- WVSS-II was specifically developed to support AMDAR needs for a high accuracy, high reliability, low maintenance Water Vapor sensor
- WVSS-II adds Water Vapor (i.e. humidity) to traditional Wind, Temp, & Pressure data from AMDAR/MDCRS, making a complete Upper Air meteorological observation
- WVSS-II uses Tunable Diode Laser Absorption Spectroscopy (TDLAS) to continuously measure Water Vapor concentrations during flight
- WVSS-II has undergone significant Engineering Testing, and Scientific Evaluation, and Certification over the last 7 years
- WVSS-II sensor design features provide very stable operation over several years with no regular maintenance

*WVSS-II is Specifically Designed for AMDAR Use*

## Typical Configuration of WVSS-II



**Interior**

**Exterior**



**Air Sampler Installation**



## WVSS-II Operations and Maintenance

- Operation of the WVSS-II is 100% Automatic
  - No adjustments or settings necessary by airline partners
  - Data is continuously transmitted from the SEB to the ARINC-429 Interface
  - Transmission of data via ACARS is independent of WVSS-II operation
- No Routine Maintenance Necessary
  - No consumable components to be exchanged
  - Sensor maintains calibration for years at a time
- Minimal Long Term Maintenance
  - Only General Visual Inspection required at regular Aircraft Heavy Check
  - Recalibration only if performance monitoring indicates the need
  - Air Sampler skin penetration inspected per standard aircraft procedures

*WVSS-II Minimizes Operational and Maintenance Support*

## U.S. WVSS-II Implementation



- ARINC is the Prime Contractor for NOAA/NWS WVSS-II Programs
  - Southwest Airlines
  - UPS Airlines
  - SpectraSensors
- Current U.S. Installations
  - 25 Aircraft at UPS Airlines (757-200)
  - 32 Aircraft at Southwest Airlines (737-300 and 737-700)
- Existing Contract in Place to Expand to 92 Total Aircraft
  - An additional 35 Aircraft at Southwest Airlines by Early 2013
- Recent Contract Awarded to ARINC for Continued Expansion
  - Reaches 112 Total Aircraft by Mid-Late 2013



## 24 Hours of WVSS-II Data from the U.S. NWS Network from 57 Aircraft

UPS: 25 A/C

SWA: 32 A/C

**Total: 57**

# Oct 2012



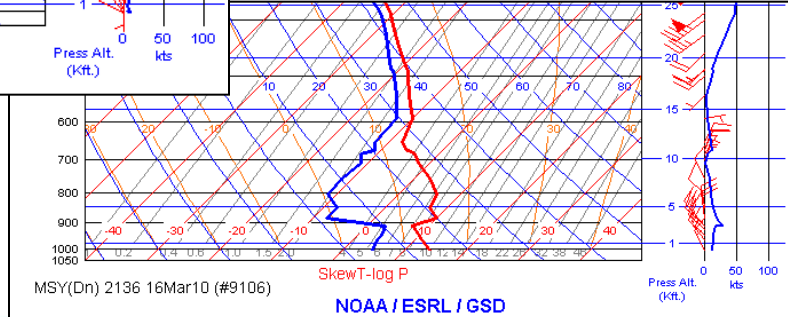
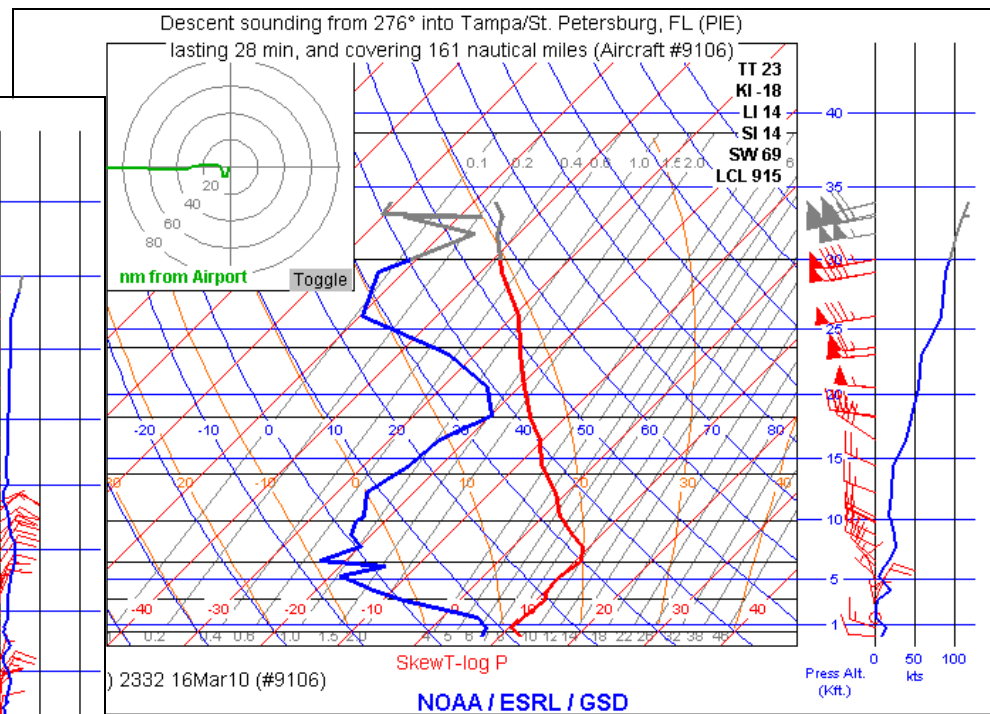
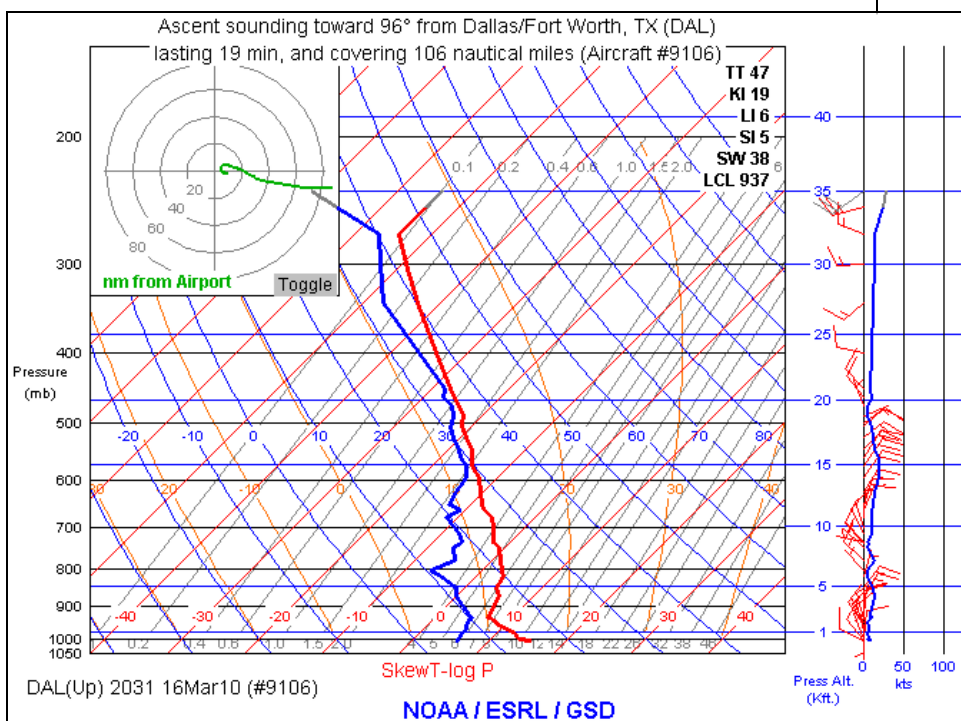
09-Oct-2012 18:00:00 -- 10-Oct-2012 18:13:00 (27266 obs loaded, 26933 in range, 11960 shown)

NOAA / ESRL / GSD Altitude: -1000 ft. to 45000 ft.

vapor



- Use of WVSS-II Data by Meteorological Operations is no different than traditional sounding data, once processed into standard format



**Thank You!**

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