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

Friends and Partners of Aviation Weather
FPAW 2012 Meeting, Orlando, FL
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Water Vapor Sensing System (WVSS-II)

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

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

- 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

*AMDAR = Aircraft Meteorological Data Relay, a WMO program*
The Primary Components of WVSS-II

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

Typical Configuration of WVSS-II

* Photos courtesy of Southwest Airlines
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 Operations and Maintenance

WVSS-II Minimizes Operational and Maintenance Support
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
Oct 2012 Network Status

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.

* Data and Visualization courtesy of NOAA ESRL/GSD
Examples of Soundings from WVSS-II Equipped Aircraft

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

* Data and Visualization courtesy of NOAA ESRL/GSD
Thank You!

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