



National Weather Service Aviation Services Branch

**Impact of Meteorological Data Collection and
Reporting System (MDCRS) / Tropospheric**

**Airborne Meteorological Data Reporting (TAMDAR)
Data on National Weather Service (NWS) Operations**

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MDCRS / TAMDAR Topics

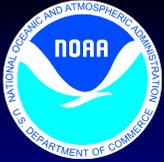


- **MDCRS Overview**
- **Value of MDCRS Observations to Numerical Weather Prediction (NWP)**
- **Value of MDCRS Observations in Operational Settings**
- **Added Value of TAMDAR Observations**
- **Recommendations**



MDCRS Overview

- **Participating airlines: United, UPS, American, FedEx, Northwest, Delta**
- **More than 80K observations daily over continental United States (CONUS)**
 - *~ 1450 Aircraft*
- **30 UPS aircraft making moisture measurements**
- **Aeronautical Radio, Inc. (ARINC) contracted by the Federal Aviation Administration (FAA) and NWS to:**
 - *Separate meteorological data from Aircraft Communications Addressing and Reporting System (ACARS) messages*
 - *Process data into Binary Universal Form for data Representation (BUFR) format*
 - *Send data to NWS and Federal Aviation Administration (FAA) via Global Telecommunications System (GTS)*



MDCRS Overview (Continued)



- **NWS / National Centers for Environmental Prediction (NCEP) uses MDCRS data for NWP**
- **NWS / Weather Forecast Offices (WFOs), Center Weather Service Units (CWSUs) and National Centers use MDCRS data in daily operations**



MDCRS Use in NWP

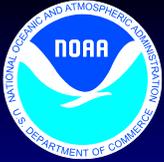
- **Accurate forecasts depend upon accurate analyses which, in turn, depend on accurate observations**
- **NCEP has been using automated aircraft observations for NWP since mid-1980s**
- **MDCRS wind / temp data included in both NCEP global & regional models since early 1998**
- **NCEP receives ~65K MDCRS reports daily**
 - *Average hourly totals of MDCRS reports range from ~1000 reports (non-peak) to ~3200 reports (peak)*
 - *45% of these reports arrive within 10 minutes of observation time*
 - *65% within 15 minutes*
 - *70% within 20 minutes*



MDCRS Use in NWP (Continued)



- **MDCRS usage in Rapid Update Cycle (RUC) model**
 - *Continuous availability of high-quality aircraft data led to development of RUC*
 - *Currently, RUC runs hourly*
 - *MDCRS data comprises up to 62% of the total observations used in an hourly RUC model run*
- **MDCRS usage in Global and Meso-eta models**
 - *Both model runs increased from twice (every 12 hrs) to 4 times (every 6 hrs) daily because of MDCRS data availability*



MDCRS Use in Operations



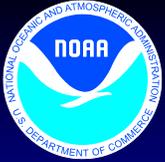
- **NWS / WFOs, CWSUs, National Centers use MDCRS data in their daily operations**
- **Real-time MDCRS data available to offices via Forecast Systems Laboratory (FSL) Web Site**
- **WFO usage includes:**
 - *Refining Terminal Aerodrome Forecasts (TAFs) & Transcribed Weather Broadcasts (TWEBs)*
 - *Monitoring initiation / intensification / suppression of convection*
 - *Forecasting precipitation type in winter storms*
 - *Issuing high wind warnings*
 - *Validating model performance*



MDCRS Use in Operations (Continued)



- **CWSU use includes:**
 - *Supporting air traffic flow to busy airports*
 - *Refining areas of icing and turbulence*
- **Aviation Weather Center use includes:**
 - *Utilizing data via RUC analysis*
- **Tropical Prediction Center use includes:**
 - *Supplementing hurricane recon flight data over land areas*
 - *Supporting marine & aviation forecasting for Gulf of Mexico, tropical Atlantic*



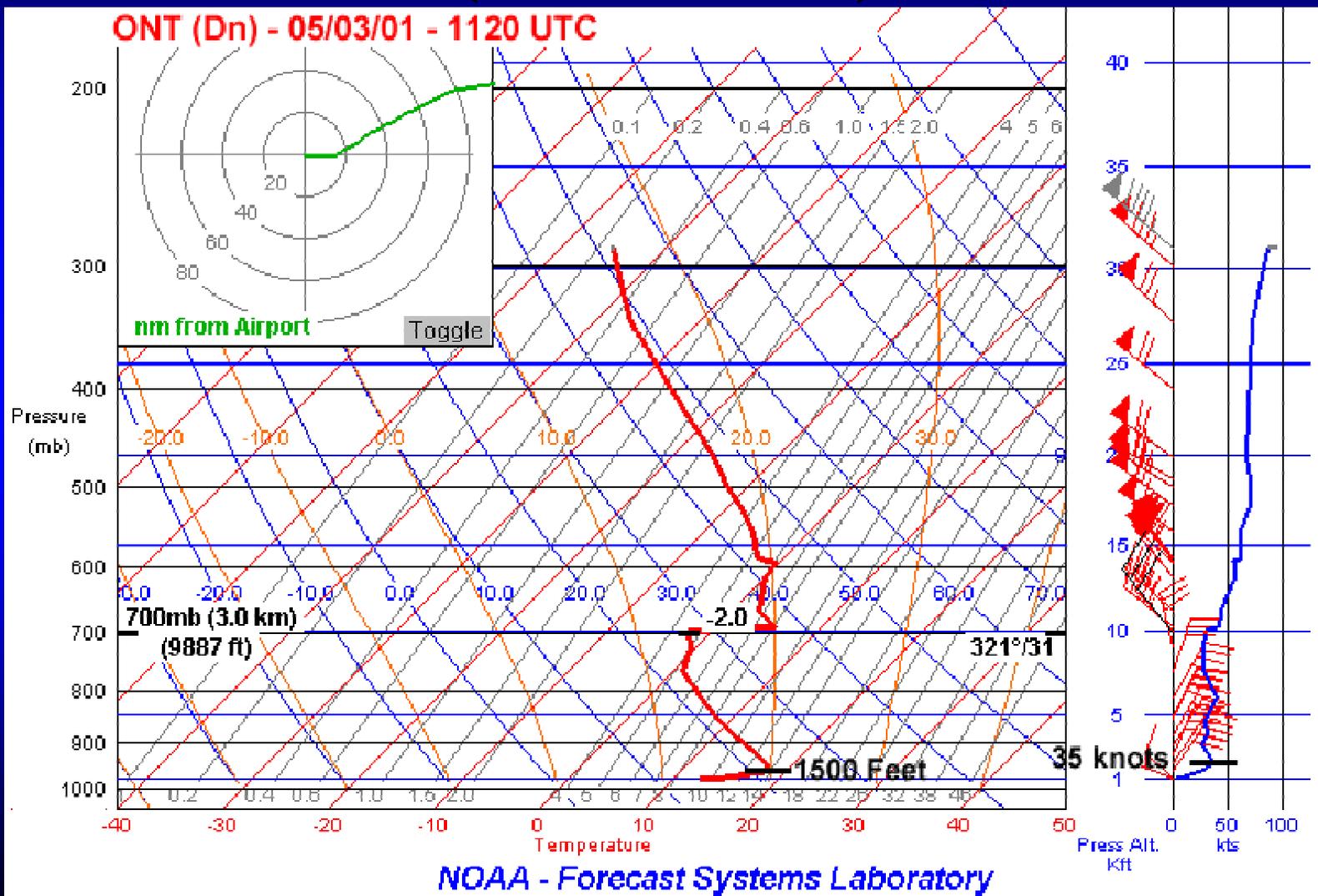
MDCRS Use in Operations (Continued)



- **Storm Prediction Center use includes:**
 - *Determining stability for convective events*
 - *Determining precipitation type in winter storms*



May 3, 2001 TAF Example (Continued)





May 3, 2001 TAF Example (Continued)



TAFONT

TAF

KONT 030556Z 030606 VRB03KT P6SM SCT030

FM0900 03007KT P6SM SKC TEMPO 1418 05015G25KT

FM2100 30011KT P6SM SKC

FM0300 VRB03KT P6SM SKC=

TAFONT

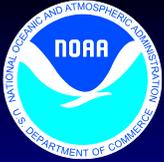
KONT 031125Z 031212 VRB03KT P6SM SKC WS010/06025KT

TEMPO 1215 04015G25KT

FM1500 05020G35KT P6SM SKC

FM2200 30011KT P6SM SKC WS020/06025KT

FM0400 VRB03KT P6SM SKC=



May 3, 2001 TAF Example (Continued)



SPECI KONT 031108Z COR VRB03KT 6SM.....

METAR KONT 031153Z 06018G32KTS 7SM CLR....

METAR KONT 031253Z 06023G31KTS 10SM CLR....

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METAR KONT 031453Z 06018G27KTS 10SM CLR....

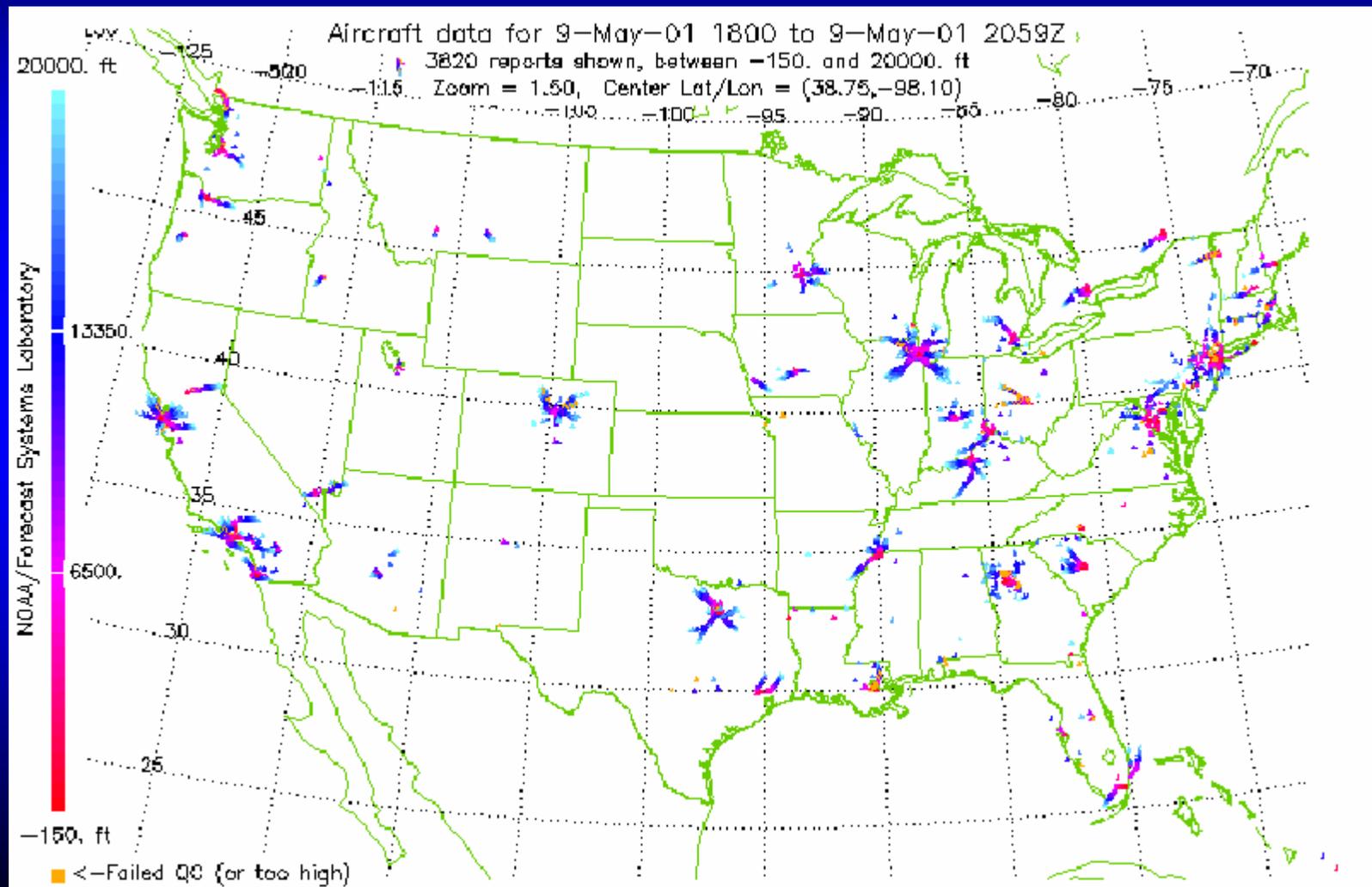
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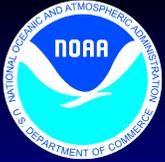
METAR KONT 031653Z 06022G37KTS 10SM CLR....

METAR KONT 031753Z 06027G40KTS 10SM CLR....



MDCRS Ascent / Descent Coverage

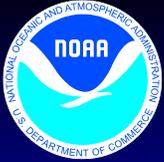




Value Added by TAMDAR Observations



- TAMDAR observations will be a valuable complement to MDCRS
 - *“Gap filler” (especially during ascent / descent)*
 - *Soundings will be available at airports other than major hubs*
 - *Enroute data will be in mid-troposphere, where the weather “is”*



Recommendations



- **Data must be of comparable quality to MDCRS**
- **Data must be timely**
- **Data must be reliable**
- **Moisture component is crucial**
- **High resolution reporting format (ascent / descent) is critical**
- **Initial focus to be on regional carriers & high-end general aviation**