Update on Ground Icing Weather

Product Development:

Liquid Water Equivalent and Check Time systems

Roy Rasmussen, Scott Landolt, Jenny Black and Andy Gaydos
NCAR
Presentation at FPAW meeting
Orlando, FL
October 22, 2009

Jim Riley
FAA COTR

National Center for Atmospheric Research

Outline

- LWE and Check Time system overview
- Plans for LWE and Check Time demonstrations
  - Chicago
  - Denver
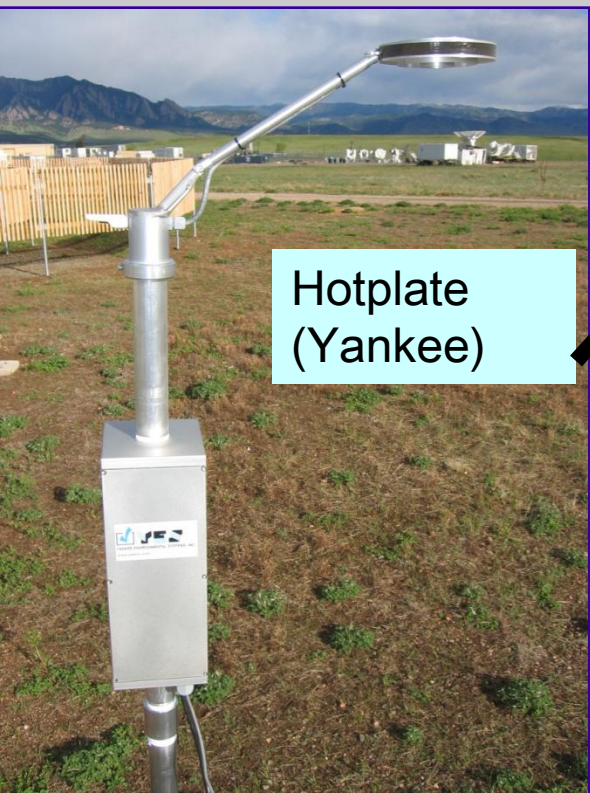 - Cleveland
- Relation to ASOS system

Precipitation Type sensor
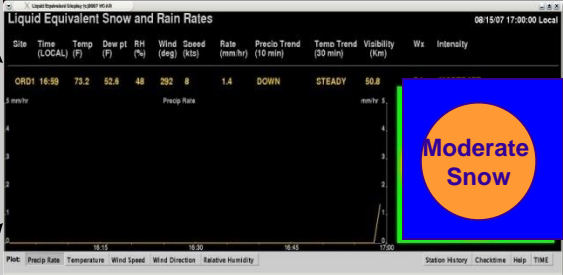(Vaisala PWD-22)

Snow Liquid Water Equivalent System

WXT temperature, humidity, and wind sensor (Vaisala)

Hotplate (Yankee)

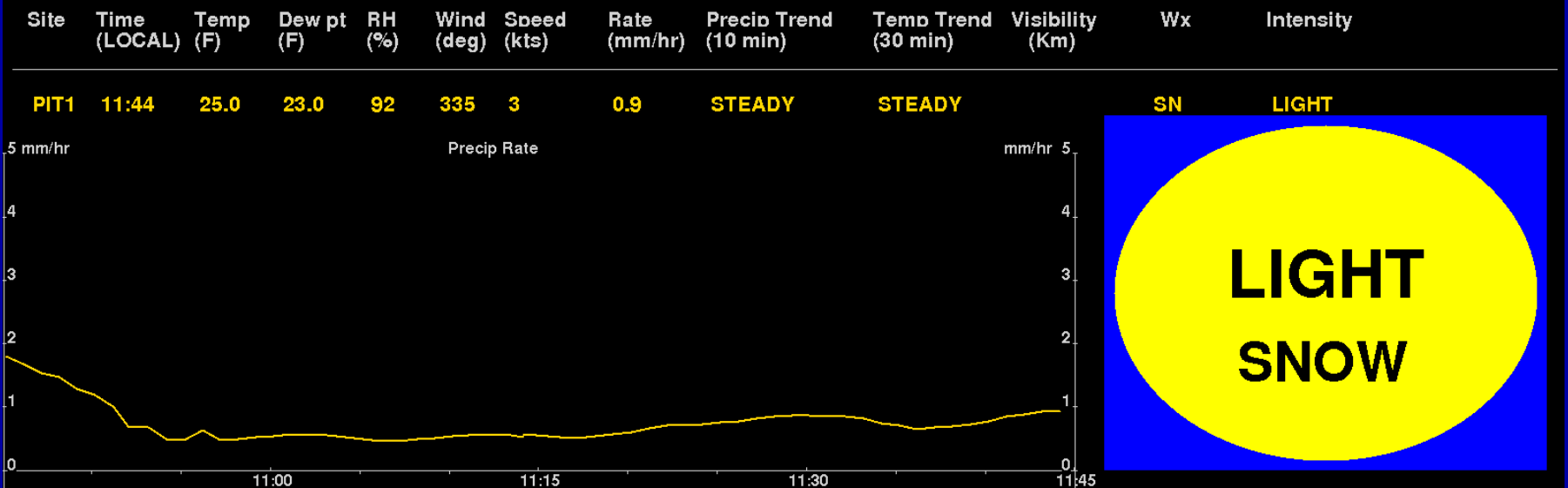Liquid Equivalent snowfall rate determination

Weighing Snowgauge (GEONOR)

Liquid Equivalent Snow and Rain Rates   08/15/07 17:00:00 Local

Site	Time (LOCAL)	Temp (F)	Dew pt (F)	RH (%)	Wind (deg)	Speed (kts)	Rate (mm/hr)	Precip Trend (10 min)	Temp Trend (30 min)	Visibility (Km)	Wx	Intensity
ORD1	16:59	73.2	52.6	48	292	8	1.4	DOWN	STEADY	50.8		

Moderate Snow

Plot: Precip Rate Temperature Wind Speed Wind Direction Relative Humidity   Station History Checktime Help TIME

LWE Display Demo

Liquid Equivalent Snow and Rain Rates and Intensities — 02/14/07 11:45:00 Local

Site	Time (LOCAL)	Temp (F)	Dew pt (F)	RH (%)	Wind (deg)	Speed (kts)	Rate (mm/hr)	Precip Trend (10 min)	Temp Trend (30 min)	Visibility (Km)	Wx	Intensity
PIT1	11:44	25.0	23.0	92	335	3	0.9	STEADY	STEADY		SN	LIGHT

Precipitation Type sensor (Vaisala PWD-22) EPI sensor

Freezing Rain sensor (Campbell)

All Precip LWE System
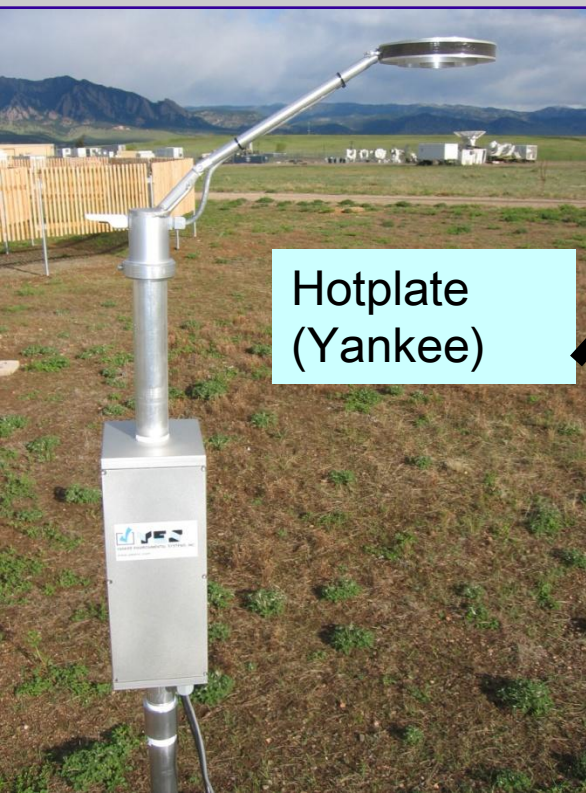
Hotplate (Yankee)

Weighing Snowgauge (GEONOR)
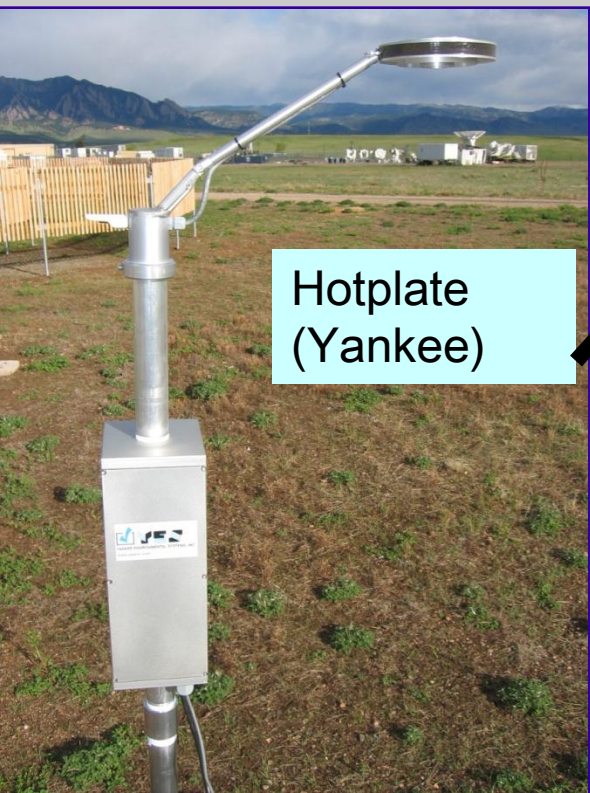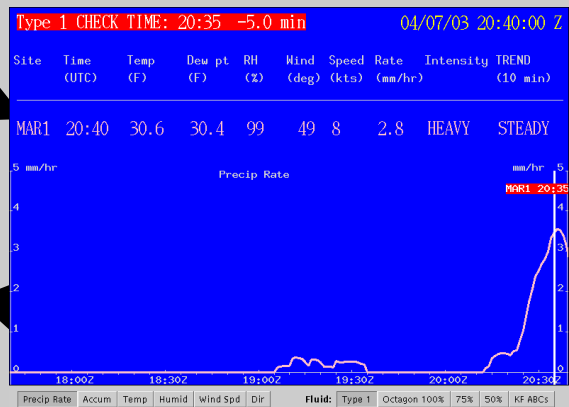
Precipitation Type sensor (Vaisala PWD-22) EPI sensor

Check Time System

Freezing Rain sensor (Goodrich)

Hotplate (Yankee)

Weighing Snowgauge (GEONOR)

• Check Time determination

What is Check Time?

A method to monitor holdover time from the last step of deicing to failure using the actual one minute liquid equivalent rate and temperature from on-field sensors.
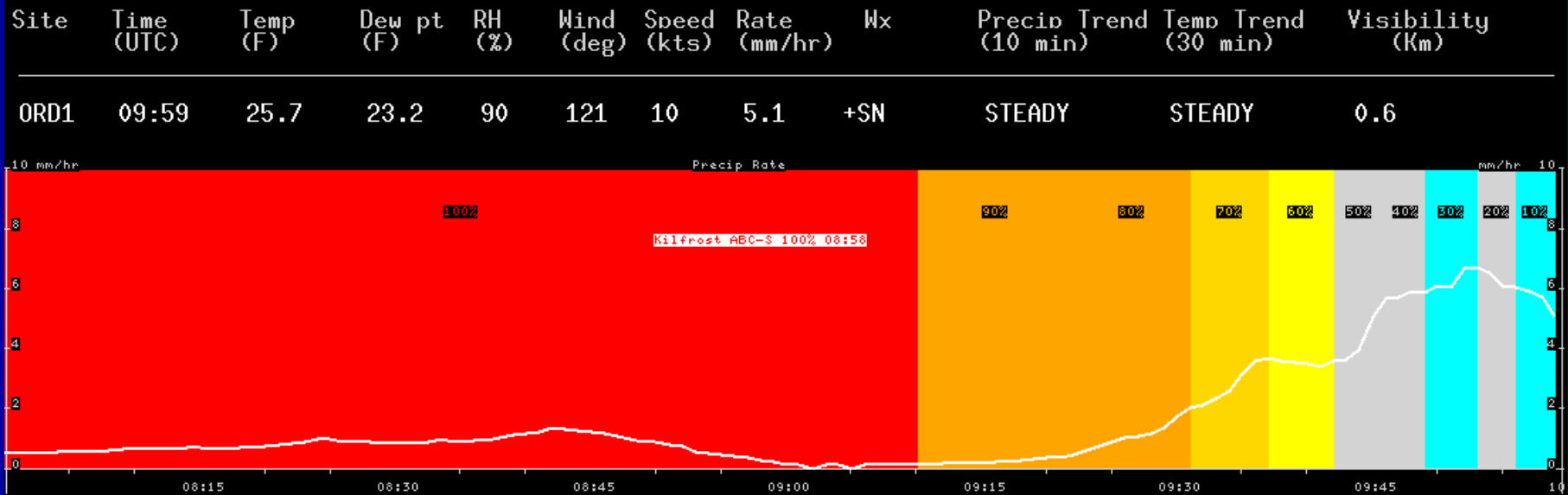
"Fluid Expiration Time"

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ORD Check Time display 2/21/09

FAA Evaluation of System

- The FAA (Jim Riley, lead) is developing a specification for the performance of LWE, HOT, and Check Time systems that vendors of such system will need to demonstrate compliance to.

- Key features of the system needing validation:
  - Comparison to the 10 degree snow pan data
  - Precipitation type (snow, freezing drizzle, freezing rain, ice pellets)

- Working on Safety Assessment

- Hope to approve snow LWE by next winter season

2010 Real-time Demonstration of the LWE and Check Time Systems

- Denver International Airport
- Chicago O'Hare International Airport
- Cleveland International Airport

- LWE and Check Time systems at each site
  - LWE for snow, freezing rain, freezing drizzle
  - Check Time for snow only
- LWE and Check Time web display provided to users
- LWE and Check Time message provided to pilots via radio frequency (AA) or ACARS message (United Airline)
- Feedback via ACARS or AA Pilot web site

Demonstration Participants

- Chicago O'Hare
  - United Airlines, American Airlines and City of Chicago

- Denver International Airport
  - United Airlines and City of Denver

- Cleveland International Airport
  - Continental Airlines and Aeromag (contract deicer)

Dissemination to the Flight Crew

- Broadcast via radio frequency every minute using voice synthesizer in Chicago for both United and American Airlines

 Agreed upon message (Airlines, FAA, and NCAR):

WSDDM system sixteen thirty local, temperature -3 Celsius, light snow, Check Time for Kilfrost ABCS+100% Type IV is sixteen ten.

Comparison to current ASOS system

- Current ASOS system does not report snowfall or freezing drizzle rate using liquid equivalent (visibility)

- AWPAG weighing precipitation gauge on ASOS does not report rate and does not report every minute (accumulation sensor, reports tips)

- Only snow, rain and freezing rain precipitation types reported

- Wind accumulation correction for ground deicing not included

Relation to Initiative to Upgrade ASOS system to Meet Ground Deicing Needs
Craig Goff, AvMet

- ASOS Initiative
  - In development the past year, Craig Goff from AvMet spearheading the effort, supported by Rick Heuwinkel's office
  - Designed to upgrade the current ASOS system to report information critical to ground deicing decision making:
    - LWE
    - Precipitation Type

  Upgrades needed:
    - Improve the AWPAG gauge to report LWE rate every minute
    - Implement upgraded precipitation type sensor
    - Upgrade software

Relation of ASOS Initiative to NCAR system Development

- Current LWE and Check Time system are complementary to upgraded ASOS system
  - Upgraded ASOS system will likely be available in 6 -7 years
  - Current commercial system likely available in 1-2 years.
- Current system can provide LWE and Check Time information for non-ASOS airports
- Current system will also provide coverage for airports with large distance between location of deicing operations and ASOS system (key for NextGen)

Thank you!

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