CL31 Ceilometer Meteorological Comparison Evaluation Plan

Presented to the

ASOS Test Review Board

NWS/OPS24

September 4, 2008

OUTLINE

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PURPOSE

- Assess functional comparability of ASOS algorithm output from CL31 and CT12K in weather conditions critical for aviation safety

Evaluation Objectives

- ensure cloud reports (heights and amounts) from CL31 are similar to CT12K in conditions critical for aviation safety
- document any significant differences in cloud reports between the CL31 and CT12K.
- significant differences will be included in a Technical Information Notice (TIN) for distribution to the user community.
- TIN will be distributed in advance of each switchover of the CL31 as the primary sensor on ASOS

Evaluation Criteria:

- Acceptable Height Range (feet) for CL31 Comparison with CT12K
- Acceptable Sky Coverage Amounts

Acceptable Height Range (ft) CL31 and CT12K

AVIATION FLIGHT CATEGORY	HEIGHT (ft) (Cloud or Ceiling)	ACCEPTABLE HEIGHT DIFFERENCE (ft)
LIFR	$H < 500$	± 100
IFR	$500 \leq H < 1000$	± 100
MVFR	$1000 \leq H < 3000$	± 100
VFR	$3000 \leq H < 5000$	± 500
VFR	$5000 \leq H \leq 12000$	± 1000

Acceptable Algorithm Cloud Amount

ALGORITHM CLOUD AMOUNT (OPERATIONAL)	SKY COVER (OCTANTS)	ACCEPTABLE ALGORITHM CLOUD AMOUNT (TEST)
CLR	0	CLR-FEW
FEW	1/8 - 2/8	CLR-FEW-SCT
SCT	3/8 - 4/8	FEW-SCT-BKN
BKN	5/8 – 7/8	SCT-BKN-OVC
OVC	8/8	BKN-OVC
VV	8/8	OVC-VV

Assumptions and Limitations:

- No reference or “truth”
- “Confidence building” not extensive evaluation
- Cl31 and CT12K may produce different cloud reports in similar conditions due to the improved sensor design of CL31
  - Data Analysis team will evaluate and explain differences on an as needed basis
  - Example: VV conditions

Evaluation Management:

- The ASOS Test Review Board (ATRB) will:
  - Oversee and evaluate the plan
  - Make decisions on the Evaluation of the Data and Data Analysis performed
  - Make a recommendation for KDP on expanding the evaluation to a limited number of OT&E sites if not enough cases are obtained during the winter of 2008-2009.
  - Review and approve the final report

Roles and Responsibilities

- Sterling Field Support Center (SFSC)
- Jennifer Dover OPS22 NWS Focal Point (coordinate with support contractor):
  - Data acquisition and data processing
  - Development of Spreadsheet for metrics and graphical output
  - Development of graphical output
- NWS OPS24 (Joseph Fiore):
  - Test Plan
  - Data analysis (lead) and interpretation of results (with team)
  - Interim Status Meetings
  - Final report

Roles and Responsibilities

- Data Analysis Team
  - Joseph Fiore (lead) OPS24
  - Richard Parry, Chester Schmitt, Jennifer Dover OPS22
  - Richard Lewis OST11
  - Aaron Poyer SAIC
- Ensure number cases (table matrix) are validated
- Analyze in depth “special cases” significant cloud report difference (height/amount)
- Explain differences
- Recommend criteria change (if needed)

Evaluation Methodology

- Conducted using SFSC ST1 ASOS
- One half of test CL31 Primary CT12K Test
- One half of test CT12K Primary CL31 Test

Data Collection

- SFSC ST1 ASOS
  - SFSC and WSH (OPS24-back up)
- DCM script:
  - 5 MIN archive, 12HR archive (1,2,4,5)
  - including visibility, present weather, temperature/dew point
  - ceilometer – primary sensor, ceilometer – test sensor
  - SYSLOG and EDITLOG

Data Processing:

- Macro to strip off unneeded data and produce a test file that compares
  - sky condition algorithm output from 5 MIN archive (primary sensor)
  - sky condition algorithm output from 12HR archive test ceilometer page every 5 minutes

Evaluation Metrics: # Desired Cases (Matrix):

Height Range	Aviation flight rule	CLR	FEW	SCT	BKN	OVC	VV
CLR	VFR	16					
H <500	LIFR		5	5	15	15	10
500 ≤ H <1000	IFR		5	5	15	15	10
1000 ≤ H< 3000	MVFR		5	5	15	15	10
3000 ≤ H < 5000	VFR		4	4	10	10	
5000 ≤ H ≤ 12000	VFR		3	3	10	10	
TOTAL (220)		16	22	22	65	65	30

Evaluation Metrics and Analysis (Precipitation Types):

Heights: <3000 FT Amounts: BKN, OVC, VV	RAIN	RAIN	SNOW	SNOW	FOG MIST Drizzle	No Precip (NP)
Precip Type	RA/+RA	-RA	SN/+SN	-SN	FG BR DZ FZFG	NP
# CASES (40)	4	6	2	3	5	20

Schedule:

- Data collection began on August 25th
- Evaluation will officially start when ST for Ceilometer Replacement starts
- End: Spring 2008 (Final Report)
- KDP (January 2009): expand to limited # OT&E sites?
- End: Conclusion of OT&E