PIREPs for Weather Research Applications

Dan Adriaansen
Research Meteorologist
NCAR-RAL
Boulder, CO USA

What if…

- METAR:
  - DEN 010700Z 14006KT 1SM -FZDZ BR SCT008 OVC017 M10/M11 A3010 RMK SLP202

- Looked like this:
  - DEN UA /OV LMO080020 /TM 0700 /SK SCT OVC /VIS 1SM /RM SOME DRIZZLE LIGHTER NORTH

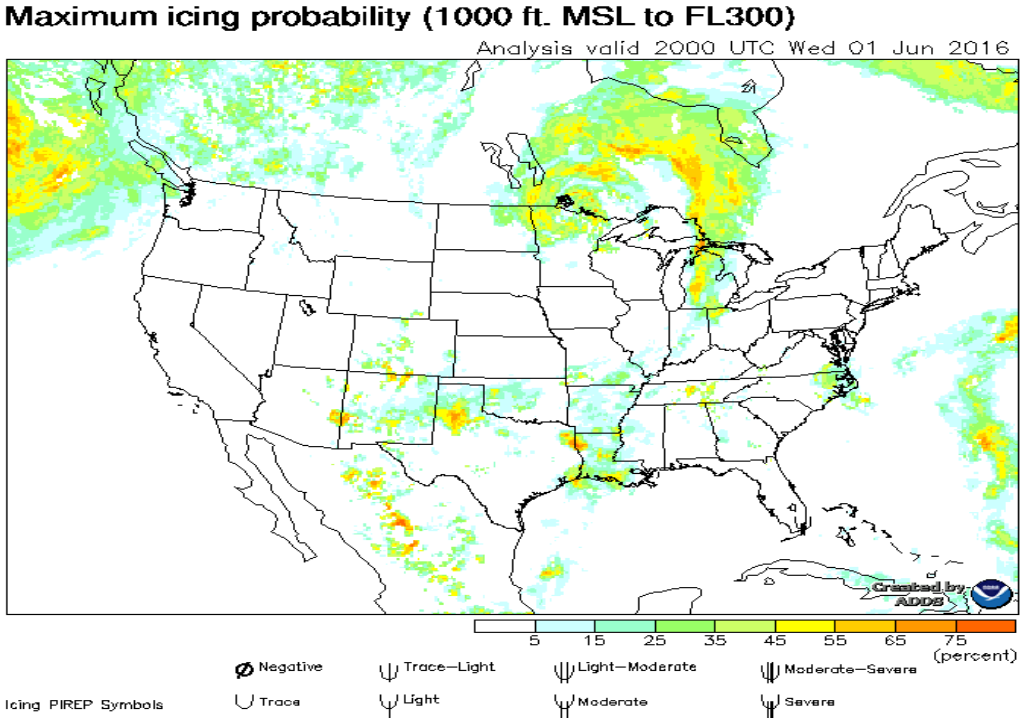
    - *Where is LMO080020?*
    - *What does “LIGHT WIND” mean?*
    - *What level is the SCT at? Is it SCT or OVC?*
    - *What does “SOME” drizzle mean? Lighter north? How far?*
    - *What’s the temperature? Is there a temperature or was it forgotten?*
    - *Was there any wind?*

Research Reality

- UA /OV TYE /TM 2204 /FL012 /TP C180 /SK OVC015 /WX FV8SM /TA M07 /RM SOME ICE NEAR BASE OF CLDS
- UA /OV LAS/TM 1624/FL230/TP B737/TB NEG/RM DURGC ACCUMULATED 1/2INCH OF RIME ICE FL235 THRU 275
- UA /OV PIA225020 /TM 0107 /FL060 /TP UNKN /TA M01 /RM ICE BTWN 060-040 ICE SLUFFED OFF AT 040 TA

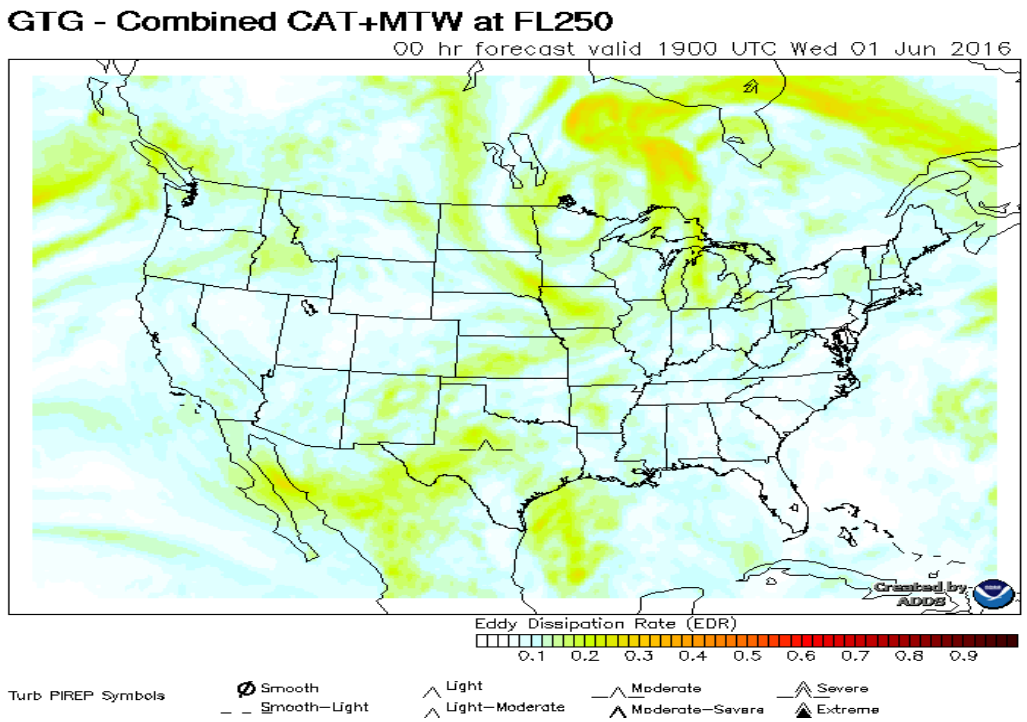
- These reports are valuable to humans
- Extremely difficult for computer analysis
- *Despite the extremely detailed information, these PIREPs are unlikely to be used in automated weather guidance tools or statistics*

Weather Research and PIREPs



ICING

PIREPs only observation source aloft



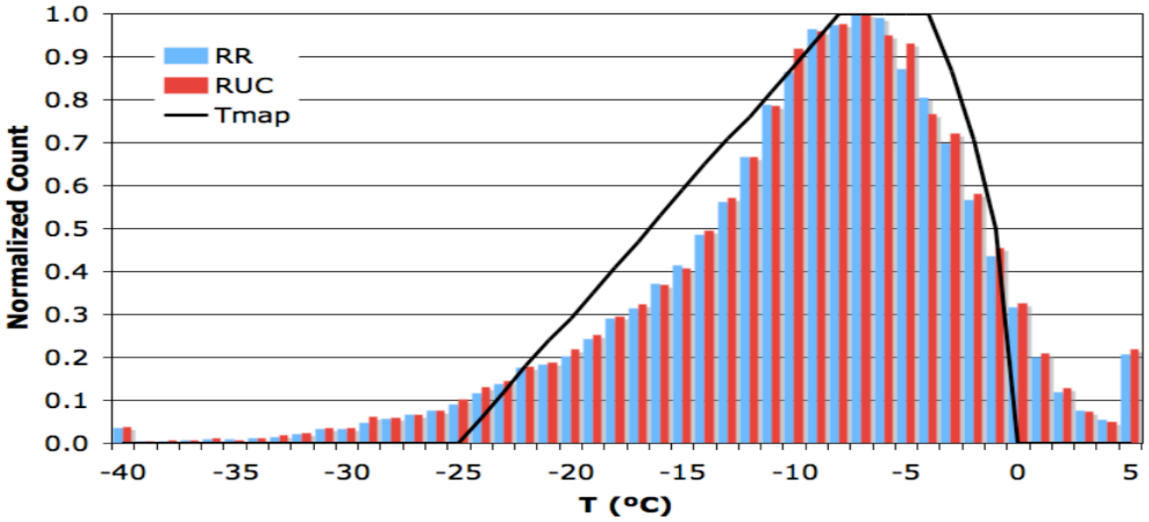
TURBULENCE

PIREPs major observation source aloft

- Runway braking action/contamination
- Weather (FZDZ, FZRA)

- Mountain wave turbulence
- LLWS

Weather Research and PIREPs



Wolff and McDonough 2010

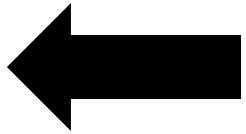
- For icing, PIREPs are the only source of observations aloft
- Extremely valuable for algorithm development for icing diagnosis and forecast products

- Turbulence has the benefit of EDR, however the non-proliferation of these data is such that PIREPs are still used
- Distance errors associated with PIREPs present challenges when relating them to datasets used by algorithms

Weather Research and PIREPs

- PIREPs provide the ***only*** observations of icing and supplement EDR for turbulence aloft
- The non-systematic nature of PIREPs presents challenges for computing traditional statistics
- Subjectivity and inconsistent sampling are inherent- controlling content is paramount!

PIREP – YES FCST - YES	**PIREP – YES** FCST – NO
PIREP – NO FCST – YES	**PIREP – NO** FCST - NO

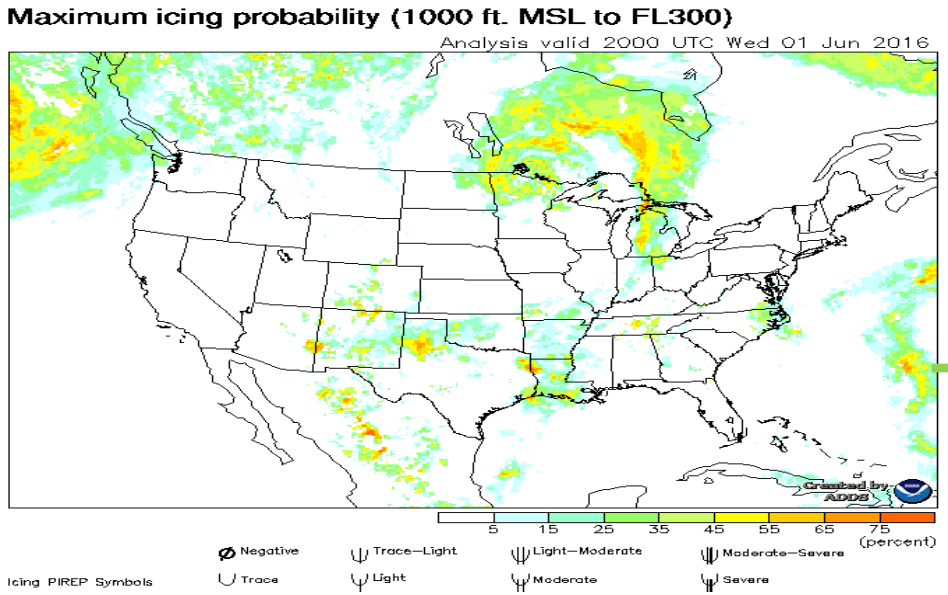


50% of data used for certain forecast statistics comes from no or “NULL” PIREPs!

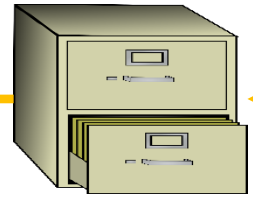
A Tale of Two Needs

NOW

Input Observations



Install New Algorithm



LATER

Closing Thoughts

- PIREPs are a huge benefit to aviation weather research
- Accuracy of time, location (latitude, longitude, flight level) is absolutely critical
- PIREPs provide value immediately but also hold a tremendous value in the long run
- Free form text is valuable to humans but using remarks to convey critical information (e.g. icing, turbulence) is not useful to computer processing
- Reports from transition zones most helpful (icing/no icing cloud/no cloud)

Thank You

E-mail:
dadriaan@ucar.edu

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The views expressed are those of the authors and do not necessarily represent the official policy or position of the FAA.