



# EASA Workshop

*Weather information provided to pilots – 28-29 October 2015*  
*General Aviation Weather – Robert Grove Garmin International*

- **OBJECTIVES**
  - Provide background information on GA weather in the cockpit
  - Provide Examples of What is available today
  - What might be transferrable to Air Carrier type use?
- **LIMITATIONS**
  - Who can use it and for what?
- **HISTORY**
  - How and why has it evolved
- **SOURCES AND PROCESSING**
  - Prior to product delivery
  - Onboard the Aircraft
- **DISPLAY AND PRESENTATION**
  - Some examples
- **CONSIDERATIONS**

# OBJECTIVES

- **PROVIDE MORE INFORMATION TO PILOT**
  - Information that otherwise would not be available in flight
- **PROVIDE BETTER INFORMATION TO PILOT**
  - Keep weather information current and more complete
- **MAKE INFORMATION EASY TO USE AND INTERPRET BY PILOT**
  - Present data in a form that the pilot can interpret and get what's needed quickly and intuitively
- **ALLOW FOR MORE INFORMED PILOT DECISIONS**
  - Better Informed Allows for Better Decisions
  - Better Decisions Means Fewer Weather Incidents and Accidents
  - Improved Safety

# GA WEATHER LIMITATIONS

- **Data Source**
  - Some sources are regional or have limited coverage (FIS-B)
  - Sources not consistent in products
  - Raw data sources are what is available – not what was designed to meet the requirements
  - Source data is what is available, not what is required for application
- **Time of Applicability**
  - Time of transmission is not the same as time of observation
    - Provider must process raw data into transmit data from various sources with various time-stamps
- **Use is Limited to Situation Awareness**
  - Although some data is considered an FAA approved source – use is limited
  - Not good enough for real time weather avoidance

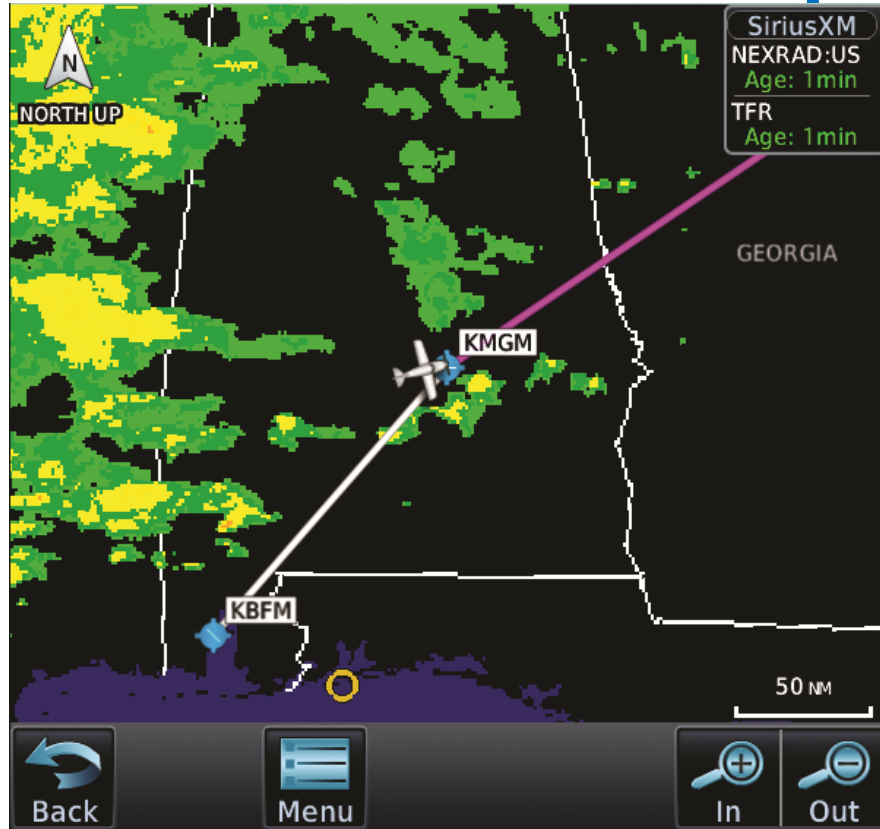
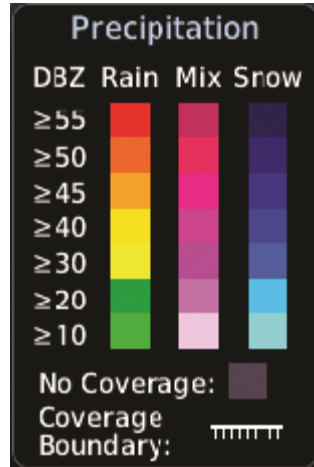
- **1990s**
  - Limited Data
    - Pre-Flight Briefing, Flight-Watch and VHF in-flight updates
    - ATIS
    - Weather Radar (on the high-end)
  - Updated data in-flight limited
    - VFR Aircraft – low altitude flights – uncontrolled destinations
- **CAPSTONE - 1999**
  - FAA Program to equip Part 135 and 121 Operators in Alaska with Traffic, Wx, and Terrain data and measure safety improvement
  - Showed significant safety improvement.
  - Enabled development of both equipment and infrastructure

# SOURCES AND PROCESSING

- **Flight Information Service Broadcast (FIS-B)**
  - Free data provided by FAA Ground Broadcast Transmitters (GBT)
    - Uses the FAA ADS-B Receiver stations to uplink FIS-B data on 966 MHz (UAT)
    - UAT, one of links used for ADS-B in the USA has the capacity to be used for uplink services.
    - US Ground station network is complete. Service only available in US.
- **Subscription Satellite Broadcast Wx Services**
  - SiriusXM®
    - Uses many of the same raw data suppliers used by FIS-B
    - Adds additional non-aviation weather products (County data)
    - Available in U.S. And Canada
    - Satellite downlink – not susceptible to limited range from TIS-B GBT
- **Subscription Request Satellite Services**
  - Garmin Flight Data System
    - Uses Iridium® Satellites
    - It is only one of the examples available in Europe

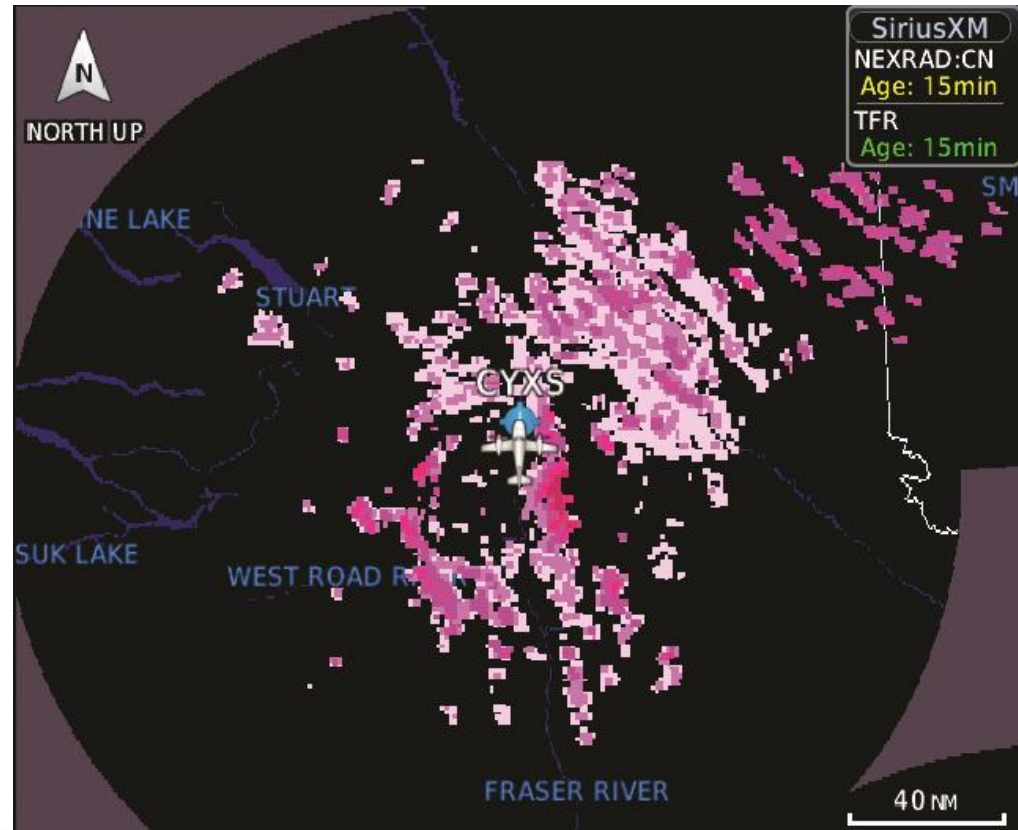
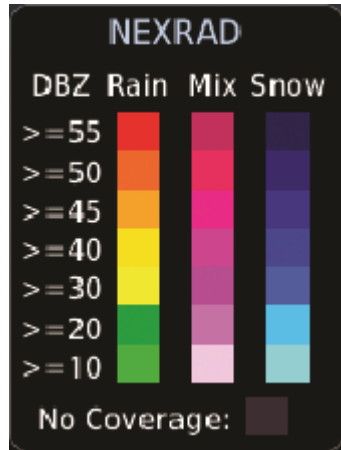
- **Garmin Flight Data System - Subscription (Satellite request system)**
  - Availability in most of Europe, Canada, and USA.
    - More coverage added as data becomes available.
  - Where available provides the following
    - Precipitation (PRECIP)
    - Lightning
    - IR Satellite (Cloud-Top Temperatures)
    - SIGMETS/AIRMETS
    - METARs
    - Winds Aloft
    - PIREPS
    - TFRs
  - Data Displayed in both Graphical and Textual Formats

# Precipitation

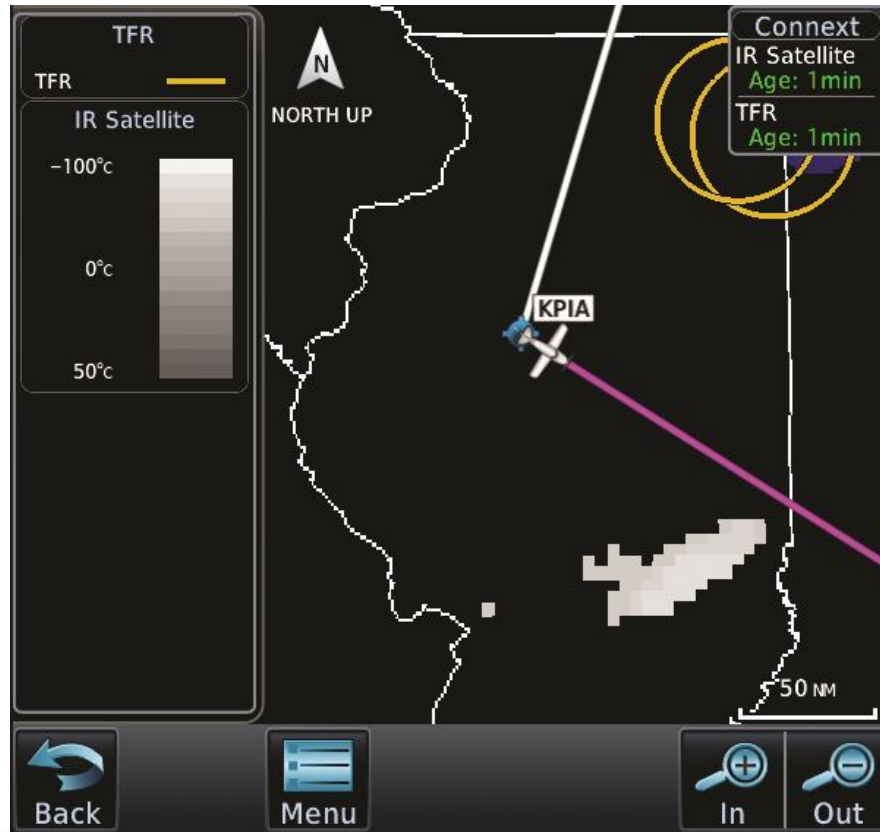




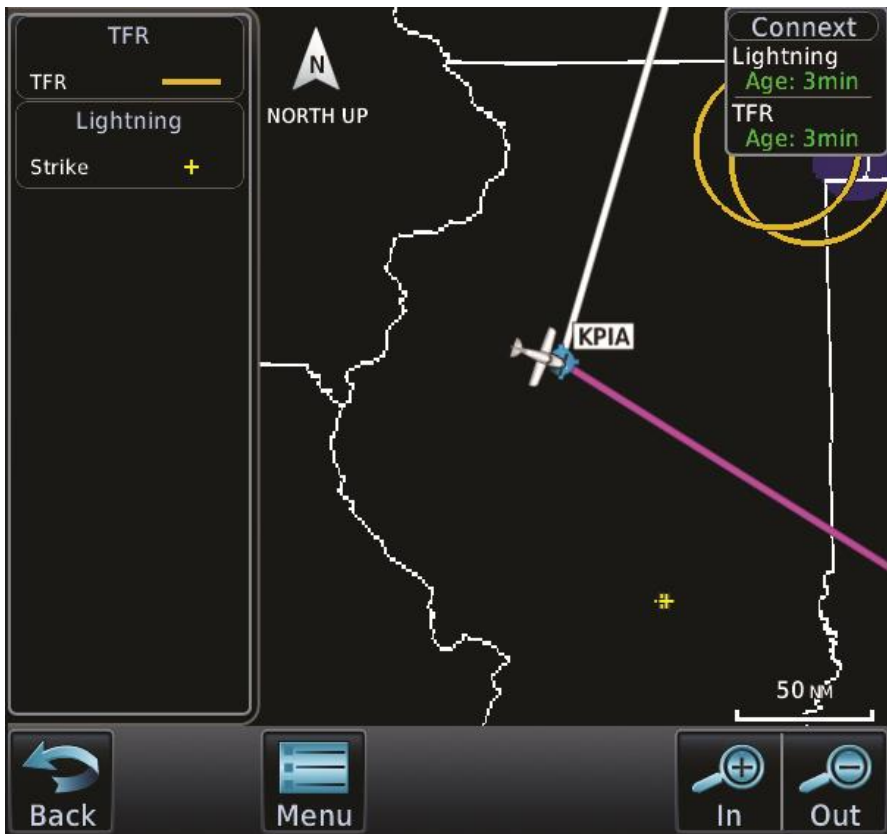
# Mixed PRECIP (Canada)



# IR Cloud Top Temperatures



# Lightning Strike



**Connex**  
TFR  
Age: 1 min

**TFR:**  
Type: VIP (FAR 91.141)  
Active Date: 03/16/2012 16:00:00 UTC  
Expire Date: 03/16/2012 17:00:00 UTC  
Min Alt: Ground Level  
Max Alt: 17999 FT MSL  
Notam: ZAU 2/5824

**TFR:**  
Type: VIP (FAR 91.141)  
Active Date: 03/16/2012 19:30:00 UTC  
Expire Date: 03/16/2012 20:30:00 UTC  
Min Alt: Ground Level  
Max Alt: 17999 FT MSL  
Notam: ZAU 2/5824

**TFR:**  
Type: VIP (FAR 91.141)  
Active Date: 03/16/2012 16:15:00 UTC  
Expire Date: 03/16/2012 20:00:00 UTC

NORTH UP

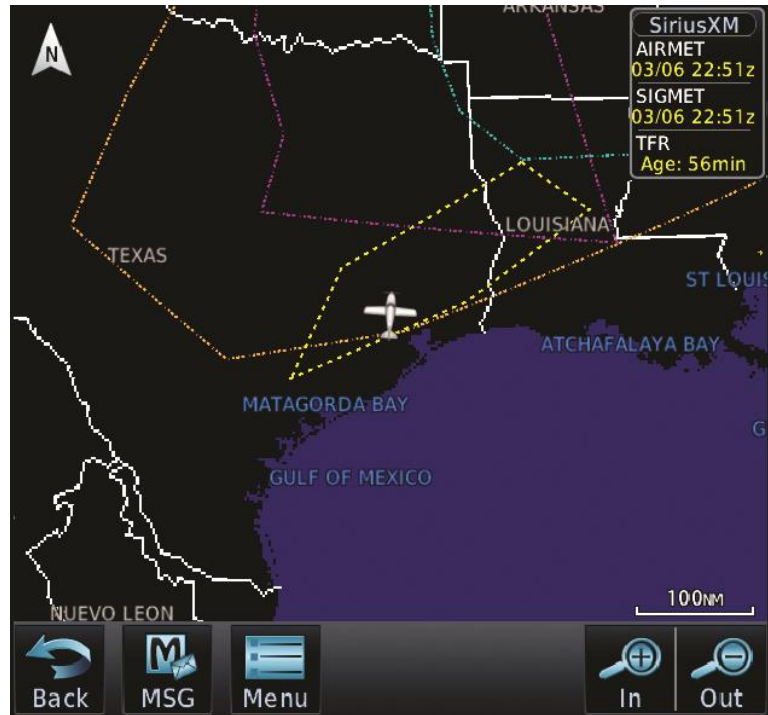
INOIS

75 NM

057° 86.6 NM

Back Up Down

# AIRMET SIGMET



| SIGMET / AIRMET |     |
|-----------------|-----|
| SIGMET          | --- |
| Localized       | ◆   |
| SIGMET          | ◆   |
| Icing           | --- |
| Turbulence      | --- |
| IFR             | --- |
| MTN OBSCR       | --- |
| SRFC Winds      | --- |



# METARS

The image shows a Garmin METARS screen with a dark background. A central white box displays the following information:

**METAR: KCM Observation**  
15-Mar 17:53 UTC  
Wind from 220° at 13 KT  
Wind gusts at 19 KT  
Visibility 10SM  
Scattered clouds at 4500 FT, broken clouds at 6000 FT  
Temperature: 26°C / Dewpoint: 14°C  
Altimeter: 30.05"  
Source: Connex

**METAR Text:**  
KCM 151753Z 22013G19KT 10SM  
SCT045 BKN060 26/14 A3005 RMK AO2  
SLP172 T02560144 10267 20150 58009

**TAF:**

On the left side, there is a vertical menu with options: METAR, VFR, MVFR, IFR, LIFR, Unknown, TFR, and TFR. On the right side, there is a 'Connex' button and a 'METAR' button, both with 'Age: 4min' displayed below them. At the bottom left, there is a 'Back' button with a circular arrow icon. At the bottom right, there are 'Up' and 'Down' buttons with arrow icons. The bottom status bar shows '119°' and '20.5 NM'. A map in the background shows a location marked 'KCM' with a blue circle and a red line indicating a path or boundary.

# CONSIDERATIONS-CONCLUSIONS

- **WHAT IS USED TODAY in GA DOES NOT DIRECTLY TRANSFER**
  - Limited Use – Situation Awareness
    - Raw data is what is available not what is required (data “quality”)
  - Objectives transfer-
    - Objective of providing better useful information in the hands of the pilot and allowing the pilot to make better informed piloting decisions and resulting in fewer weather related incidents or accidents is the same
- **WHAT NEEDS TO BE DIFFERENT**
  - Determination of how the information can be used and for what – solid defined CONOPS
    - CONOPS would drive definition of what data is needed.
    - This would drive the FHA and help establish criticality of malfunction or loss of function
    - Criticality would drive the requirements for how good the data needs to be: Accuracy, Integrity, Availability, etc.
    - Criticality would drive the requirements for the pre-delivery processing.
      - Time of applicability (raw data can come from various sources with varying time stamps)
      - Clear indication when data is missing or expired.
    - Criticality would drive the requirements for the onboard processing
      - Receiving Decoding
    - Criticality would drive the display and human factors requirements
      - Requirements for consistent or intuitive use of colors, selection, legends...
      - It is vital that the pilot know exactly what the data is and what it means.
- **EVERYTHING DEPENDS ON SOLID AND COMPLETE CONOPS**
  - Who gets to use it? What do they get to use it for? What Credit can they take for using it? What happens if its wrong? What happens if they don't have it?
  - Is any of the GA data usable?
    - It depends on the requirements.
    - Currently the GA “CONOPS” is defined by the characteristics of the data rather than the data requirements being driven by the intended use.

# Contact Information

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# QUESTIONS??

