AIRBORNE WEATHER DATA

Introduction

Checking with pilot his intentions and for how long will they avoid

Aiming to better prepare ATCO for WX scenarios

Knowing what to expect will better utilize ATCO’s allocated time and resources accordingly

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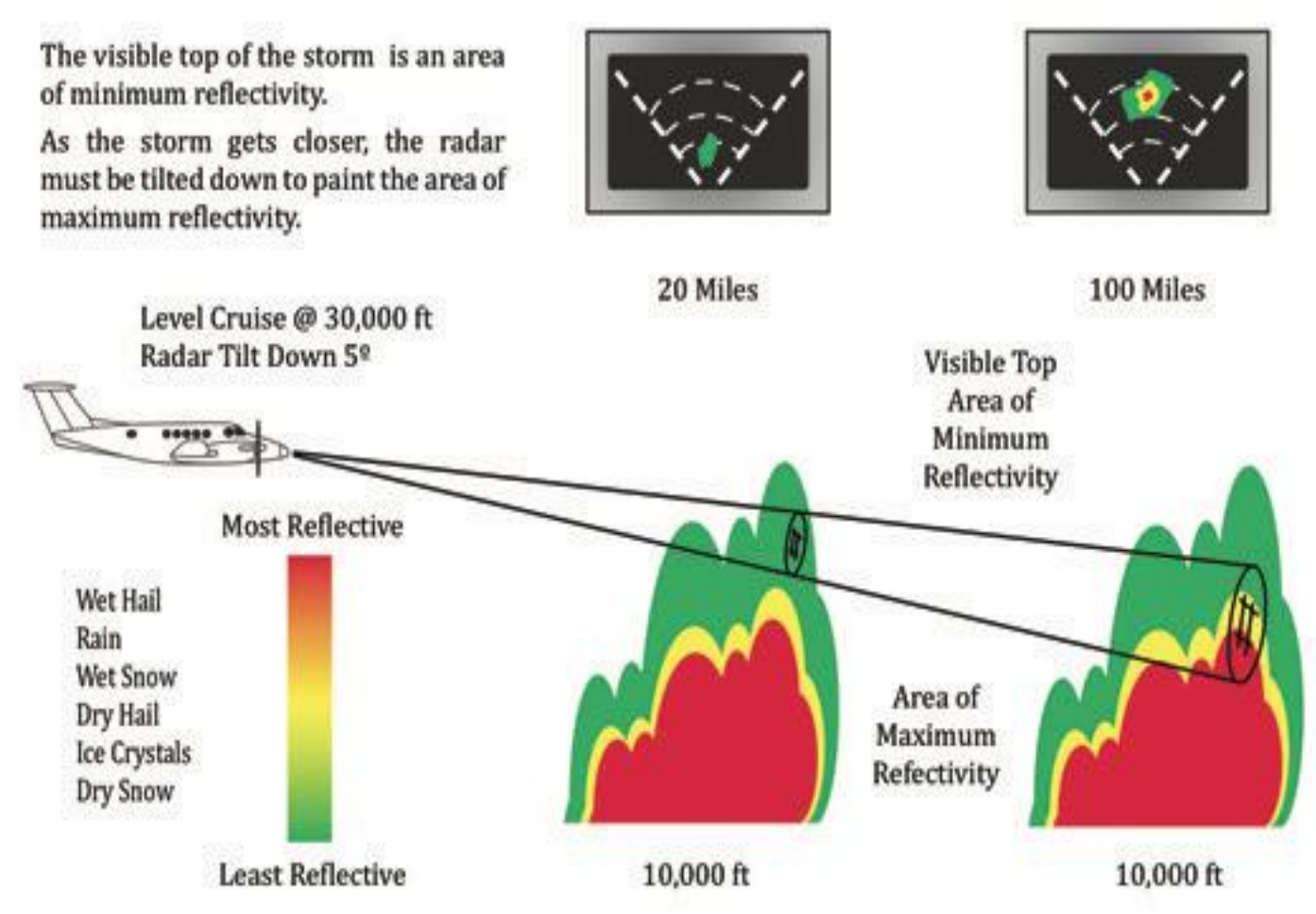
Onboard Weather Radar

Located under the nose of an aircraft, can be tilted up or down 15 degrees

Ranging from 40 to 100nm depending on tilt

Wind and turbulence must be interpreted from moving patterns

Onboard Weather Radar



Tight beam of radio waves sent in atmosphere

Returning signals displayed in different colors

Directional antenna receives signals and process accordingly

Onboard Weather Radar Limitations

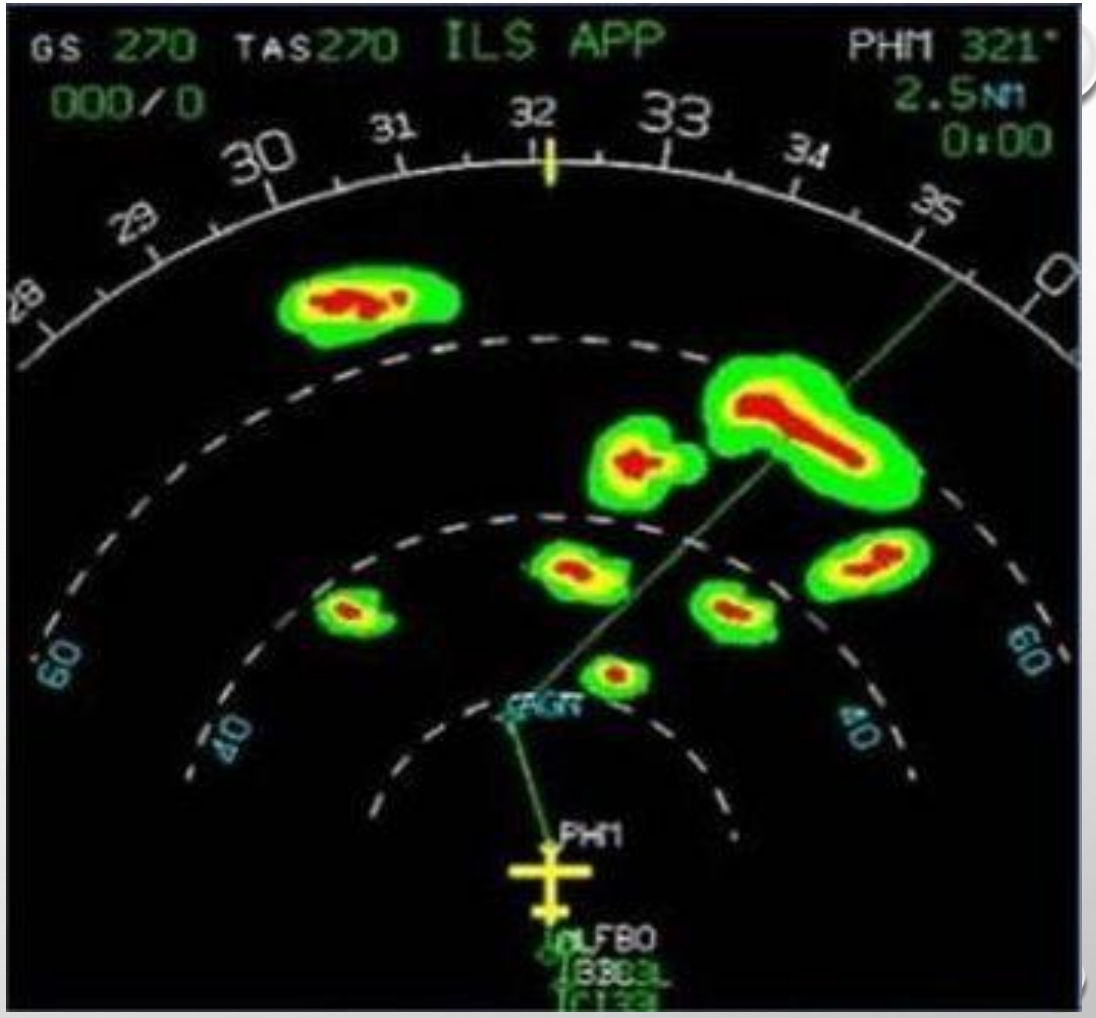
Reflectivity of precipitation depends on type of particles, wet hail more reflective than dry hail, ice or dry snow

Shadowing – radio wave can not make two way trip trough the weather. More intense the precipitation, the less distance radar sees

Tilt settings extremely important, leaving it on auto can be very dangerous

Limited range can potentially lead to a “blind alley”

Cockpit weather display showing four strong cells 25-35 miles ahead of the aircraft.



Shown is the same display but with the range increased from 40 miles to 80 miles.

Onboard Weather Radar Limitations

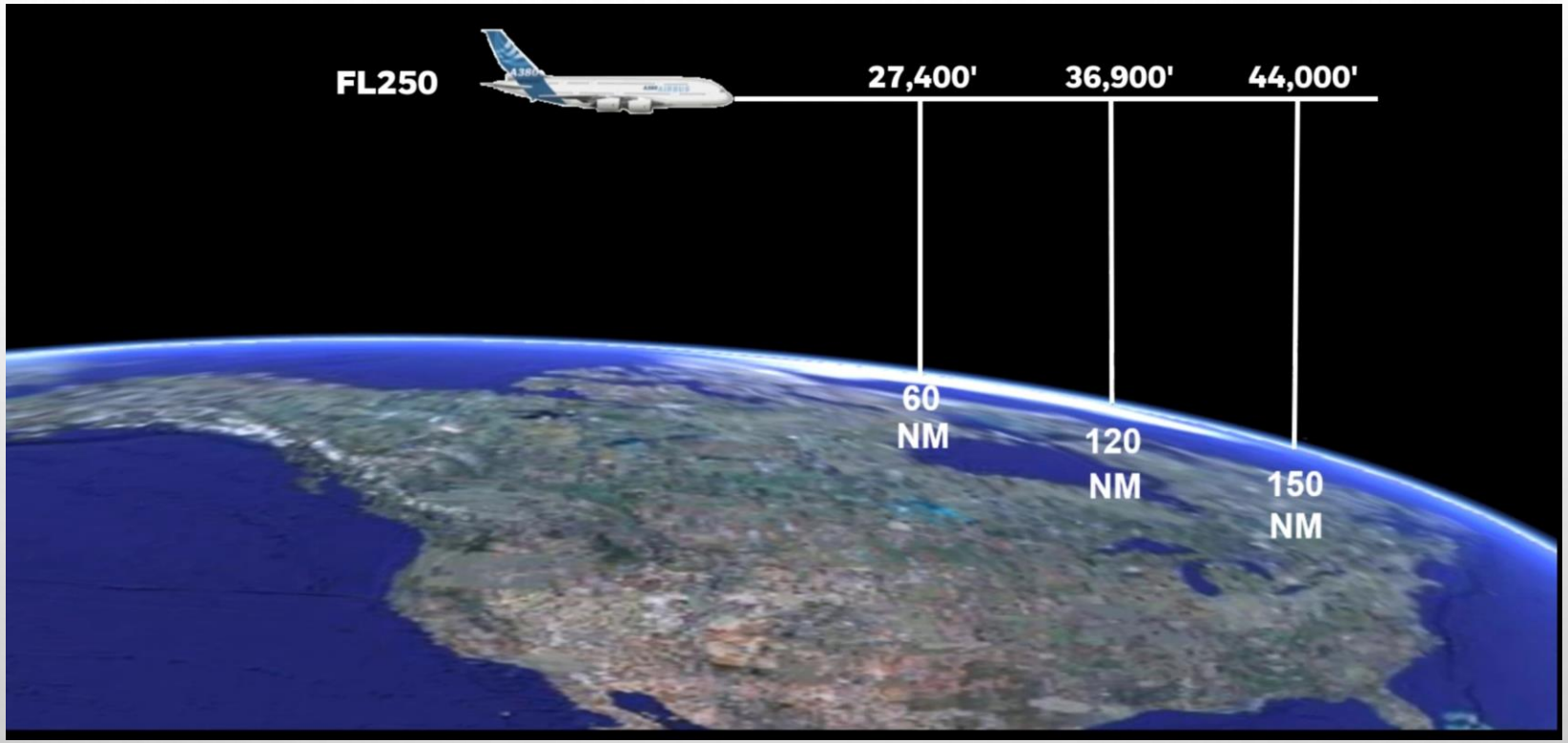
Reflectivity of precipitation depends on type of particles, wet hail more reflective than dry hail, ice or dry snow

Shadowing – radio wave can not make two way trip trough the weather. More intense the precipitation, the less distance radar sees

Tilt settings extremely important, leaving it on auto can be very dangerous

Limited range can potentially lead to a “blind alley”

Not taking into account Earth’s curvature


FL250
27,400'
36,900'
44,000'
60
NM
120
NM
150
NM

Lightning Radar

A particular type of receiver fitted on an aircraft is used to figure out lightning's strength depending on respective radial

Storm scope has a dedicated display fitted in aircraft that is able to plot lightning strikes

Lightning strike close to aircraft is considered a threat, on the other hand the faraway one is not, can be easily navigated

Summary

Onboard weather radar is located under the nose of an airplane

Range 40 – 100nm

Operation challenging and time consuming

Wind and Turbulence not shown

Limited range tight beam if not used properly can cause more harm than good

Lightning radar is able to plot lightning strikes

Satellite Weather Radar Feed

Uses a satellite systems orbiting space so aircraft can receive general weather information and enabling pilots to make informed navigation decisions

This real-time weather information can be viewed on an aeroplane’s navigation displays

Modern aircraft are fitted with antennas and associated transceivers to enable them to receive satellite weather services

Satellite Weather Radar Feed Limitations

Availability of supplemental data about weather conditions from the National Weather Service (NWS) is different from actual conditions

10-15 min late

Displayed data has to be filtered by the pilot before making a navigation decision

Has to be combined with satellite imagery and real time onboard weather radar data in order to make informed decision about aircraft movement

Future Technology

IntuVue RDR-7000 Weather Radar System

A fully automated, higher resolution weather radar system with airborne ground/sea mapping system.

Advanced features including:

- ✓ turbulence detection
- ✓ advanced mapping
- ✓ target detection and additional hazard features (lightning and hail detection)
- ✓ forward looking (predictive) windshear

Automated 3D volumetric scans up to 60,000 ft and 320 NM ahead

First weather radar to detect turbulence within 60 NM

Predicts wind shear out to 10 NM, critical on final approaches

Future Technology

Reduces pilot interactions needed to manipulate the radar and interpret the data

Enhances safety and passenger comfort by avoiding turbulence

Saves pilots time and reduces workload

Compatible aircraft

- ✓ Leonardo Helicopter W139
- ✓ Dassault Falcon 900A/B
- ✓ Citation XLS
- ✓ Citation Bravo
- ✓ Bombardier Challenger 600
- ✓ Lockheed Martin C-130

Summary

Onboard Weather Radar currently used in aviation has a limited range 40-100nm and puts a lot of pressure and workload on pilots

Lightning scope has a dedicated display fitted in aircraft that is able to plot lightning strikes

Satellite weather radar feed 10-15 min late than real time weather and has to be combined

RDR-7000 Weather Radar System has 3D volumetric scans up to 60,000 ft and 320 NM ahead

First weather radar to detect turbulence within 60 NM