World Meteorological Organization

TT-AVXML

GENEVA, 2011

TT-AvXML-1/Doc. 2.1

Submitted by: B-L CHOY
Date: 11-XI-2011
Original Language: English
Agenda item: 2

AVIATION'S NEED FOR WINDSHEAR INFORMATION SUMMARY

DECISIONS/ACTIONS REQUIRED:

TT-AvXML is invited to:

(a) Note that the requirements of aviation for information to be represented in XML extend beyond those currently met by TAF, METAR, SIGMET and SPECI.

REFERENCES:

Nil

CONTENT OF DOCUMENT:

Presentation by Boon-Leung CHOY, first delivered to 8th Joint meeting of RTCA SC-206 / EUROCAE WG-76, 14-18 September, 2009.

Appendices for inclusion in the final report:

A. Draft text for inclusion in the final report.

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Regulation 42

Recommendations of working groups shall have no status within the Organization until they have been approved by the responsible constituent body. In the case of joint working groups the recommendations must be concurred with by the presidents of the constituent bodies concerned before being submitted to the designated constituent body.

Regulation 43

In the case of a recommendation made by a working group between sessions of the responsible constituent body, either in a session of a working group or by correspondence, the president of the body may, as an exceptional measure, approve the recommendation on behalf of the constituent body when the matter is, in his opinion, urgent, and does not appear to imply new obligations for Members. He may then submit this recommendation for adoption by the Executive Council or to the President of the Organization for action in accordance with Regulation 9(5).

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Data Exchange and Uplink in Support of Windshear Information for the Cockpit

18th Joint meeting
RTCA SC-206 / EUROCAE WG-76
14-18 September, 2009
WMO, Geneva, Switzerland

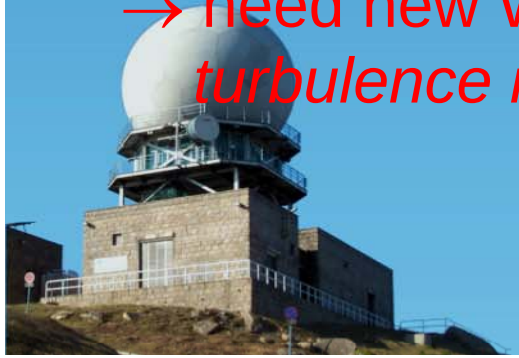
Objectives

- Need of extending WXXM to cover existing windshear and turbulence alerts to facilitate MET data exchange for CDM and uplink to cockpit
- Further work required to address the New Terminal Weather Forecast (NTF) under active development by WMO

Windshear Developments

- Jul 2006 – HKO developed **standard models** for uplink of *graphical* windshear warning, windshear alert and turbulence information (ICAO METLINKSG/9)
- Feb 2009 – HKO and FAA developed standard windshear alert phraseology for ATC (ICAO METWSG/2)
- Late 2009 – HKO to launch **LIDAR windshear alerts** for APP and DEP *separately* (FAA alerts applied to both)
- Existing WXCM – only defines **class for windshear warning in text**

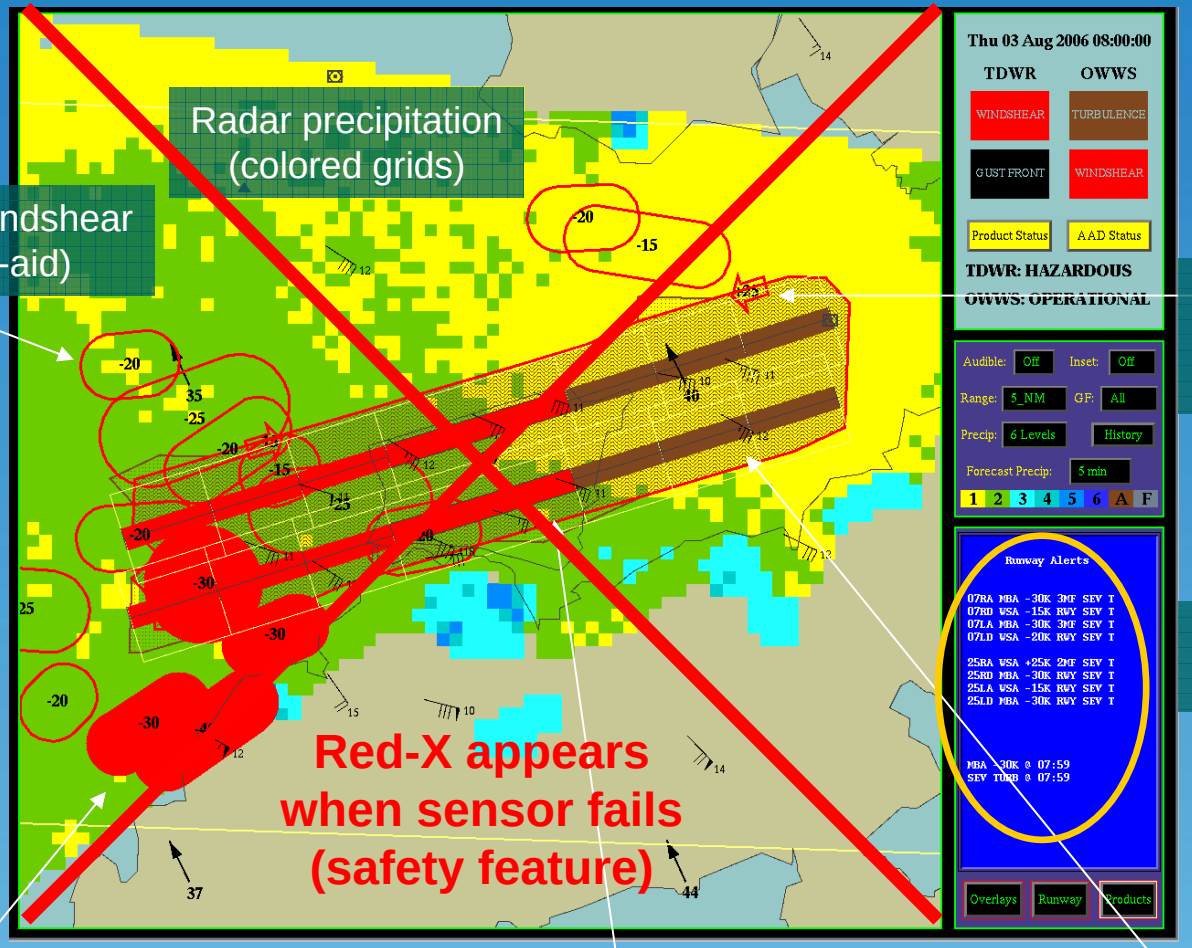
→ need new WXXM/WXCM classes for *windshear alert & turbulence information for both text and graphics*



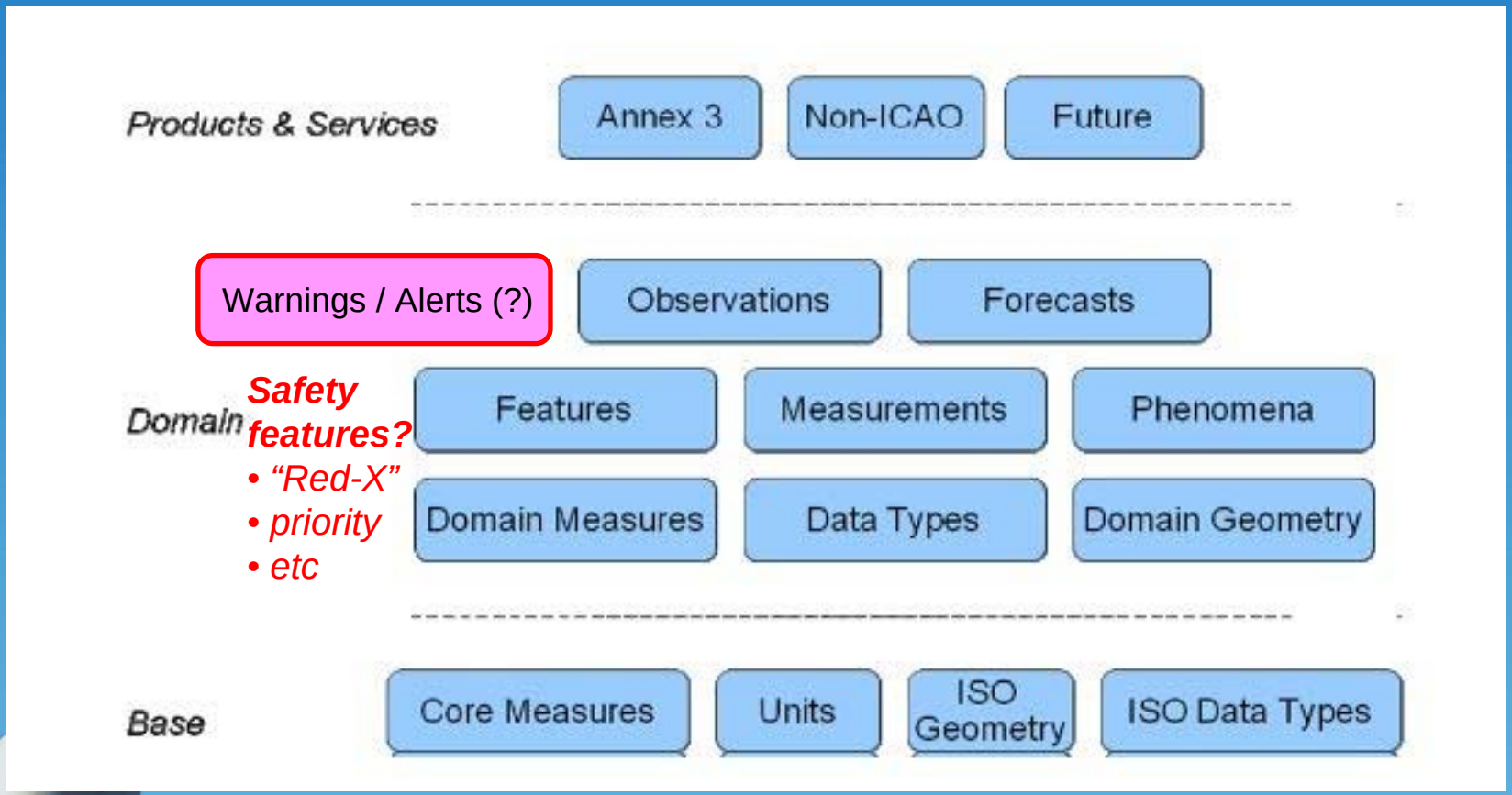
Collaborative Decision Making (CDM)

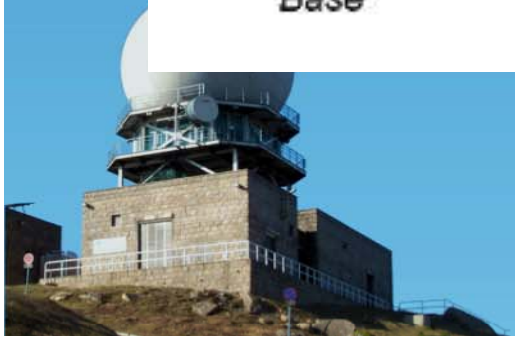
- Compared with the METLINKSG uplink models, ground personnel (MET & ATC) currently have access to more ***graphica***l information of windshear and turbulence

HKO Geographic Situation Display (GSD)

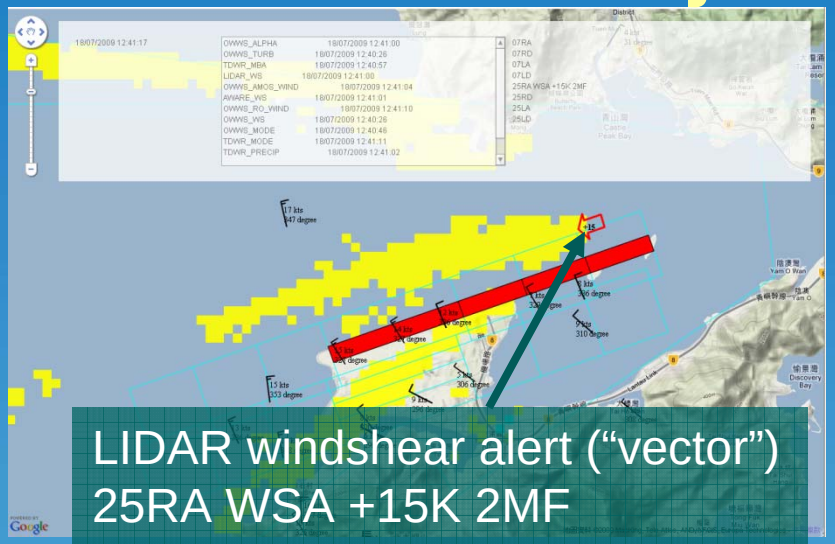


WXCM / WXXM / WXXS

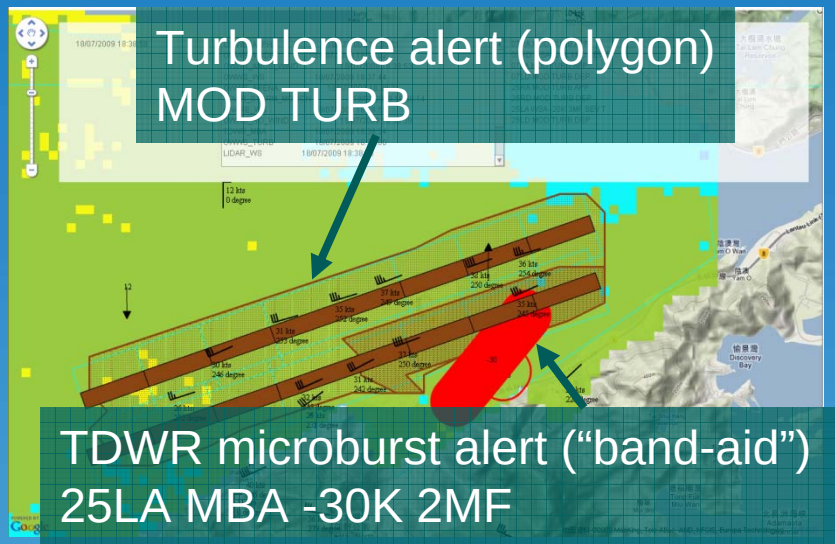




Graphical Windshear / Turbulence "Objects" for CDM



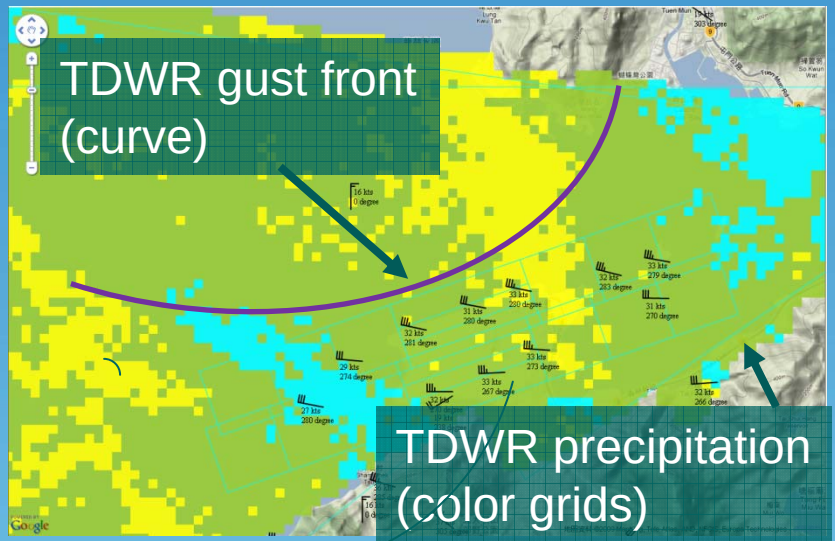
LIDAR windshear alert ("vector")
25RA WSA +15K 2MF



Turbulence alert (polygon)
MOD TURB

TDWR microburst alert ("band-aid")
25LA MBA -30K 2MF

AWARE* windshear alert (polygon)
25RA WSA +15K RWY



TDWR gust front
(curve)

TDWR precipitation
(color grids)

* AWARE – An anemometer-based windshear detection system

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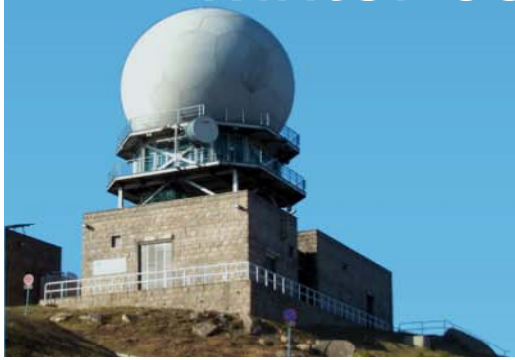
Proposed Extension to WXXM

- **New domain:** Warnings / Alerts
- **New classes:**
  - **Shapes**
    - TDWR microburst and windshear alerts (**"bandaid" – *new*: fixed-shaped polygon/ellipse + intensity**)
    - TDWR gust front (curve)
    - LIDAR windshear alert (**"vector" – *new: ??***)
    - Anemometer-based windshear alert (polygon + intensity)
    - Windshear alert (polygon + intensity)
    - Turbulence alert (polygon + intensity)
  - **Gridded products**
    - TDWR precipitation [observed / forecast] (coverage + intensity)

New Terminal Weather Forecast (NTF)

- Under development by WMO Expert Team since 2007
- Specifications for wind and convection products to be available for ICAO & WMO consideration in early 2010
- Other products being developed (e.g. winter conditions)



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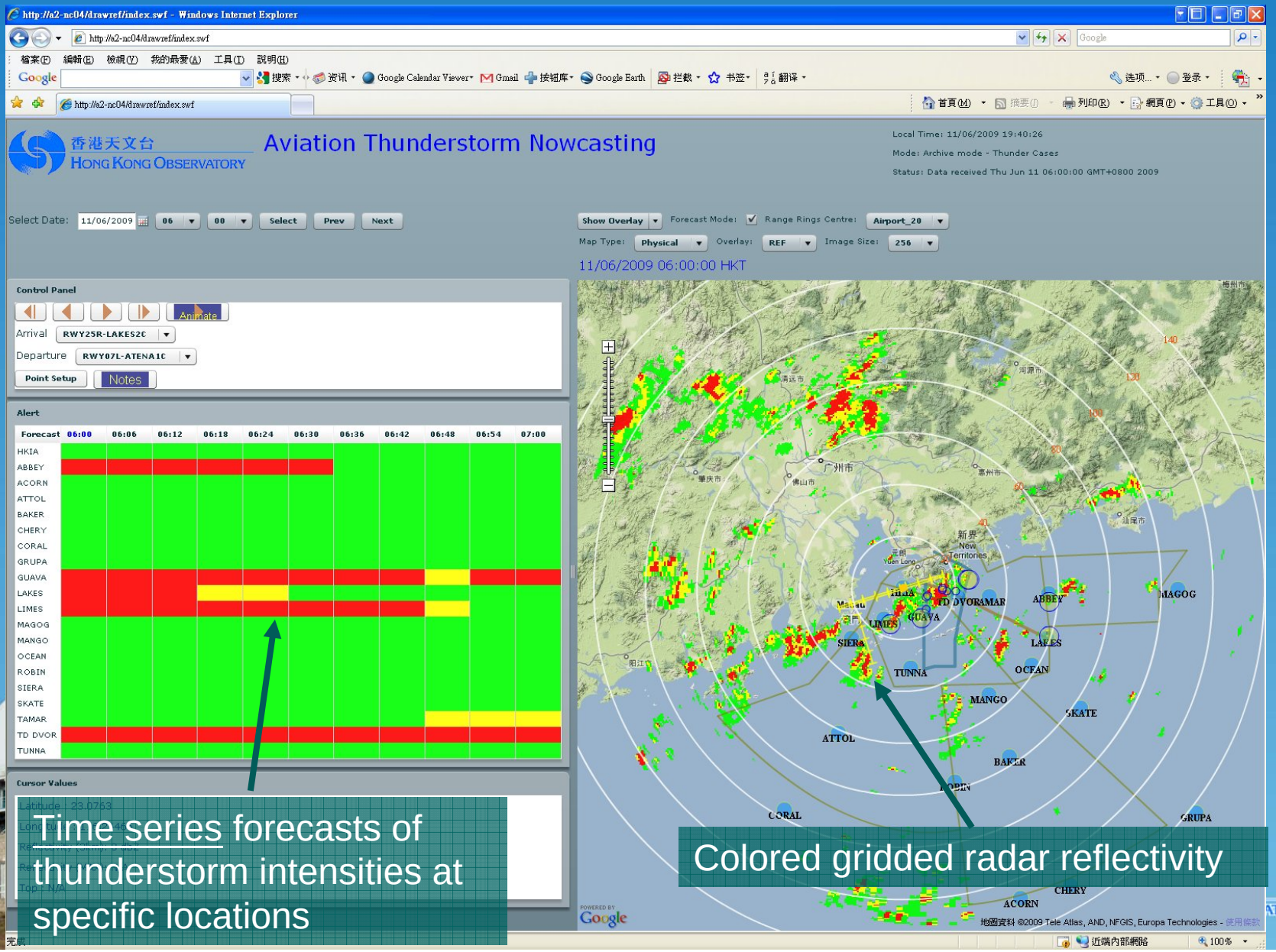
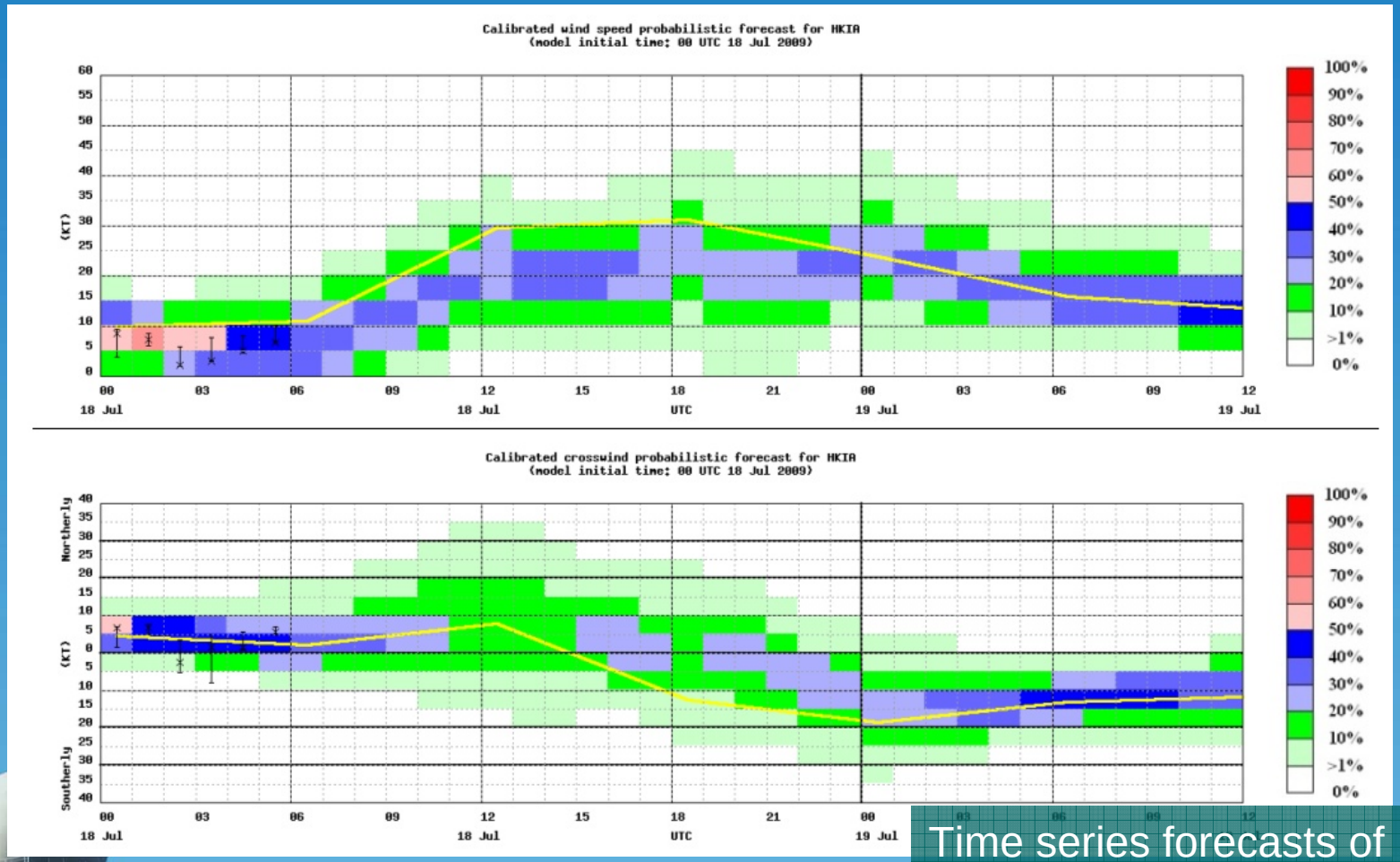
A Prototype Convection Product



A Prototype Wind Forecast



Time series forecasts of probabilities of surface wind speed and crosswind

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WXXM Extension for NTF

- Forecasts in time series
- Other parameters (e.g. probabilistic forecasts, forecast uncertainty)
- WMO, supported by Expert Team, stands ready to provide additional inputs to RTCA/EUROCAE

Thank You

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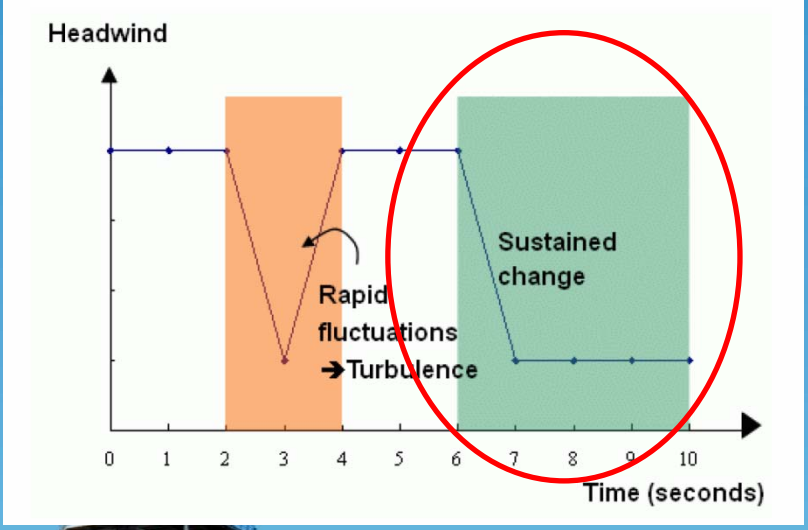
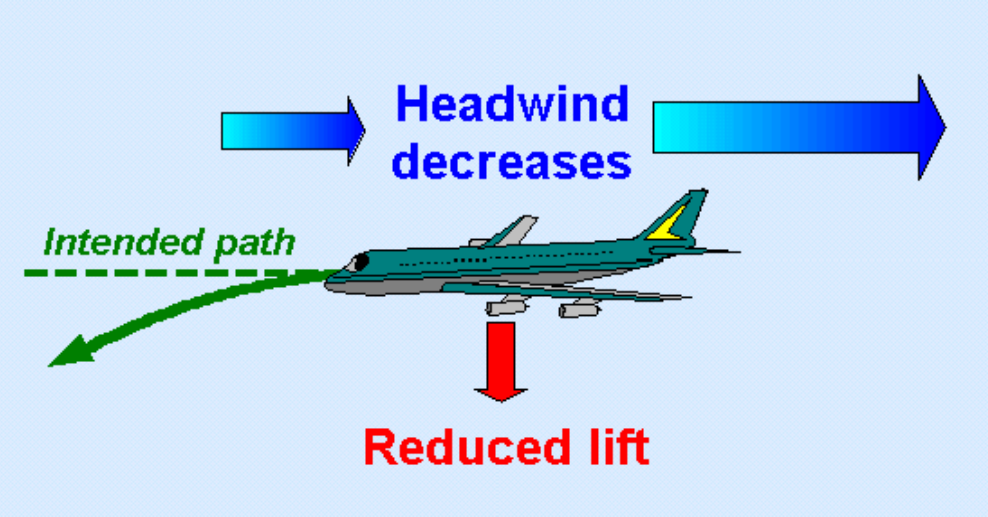
What is Windshear?

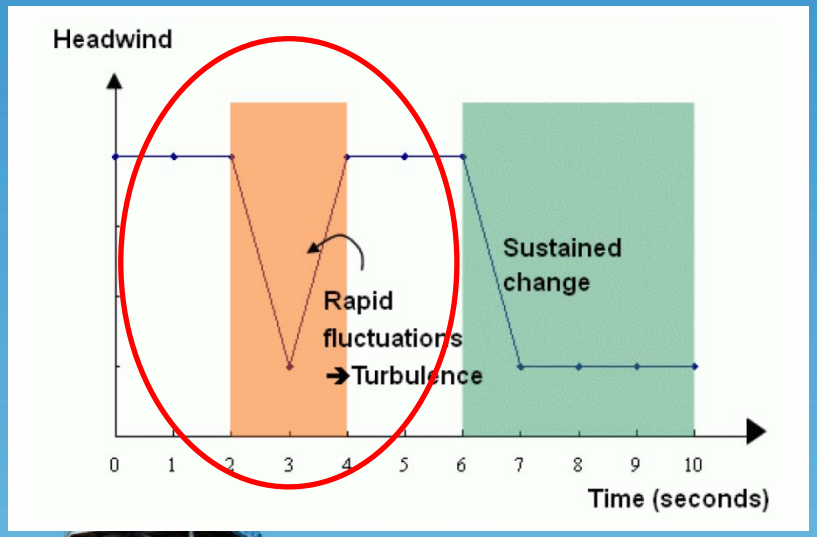
- A sustained change in the wind direction and/or speed, resulting in a change in the headwind or tailwind encountered by an aircraft. A decreased lift will cause the aircraft to go below the intended flight path and vice versa

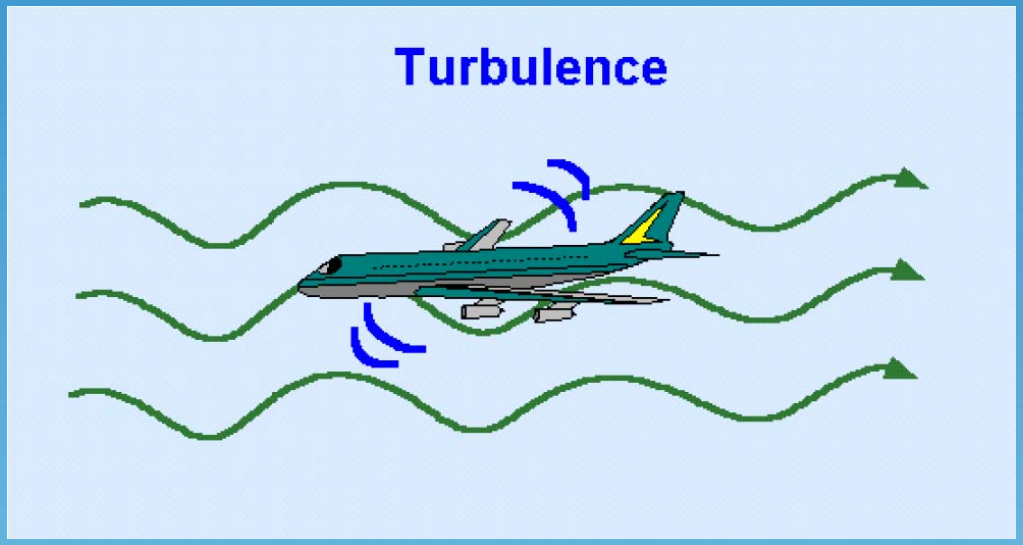




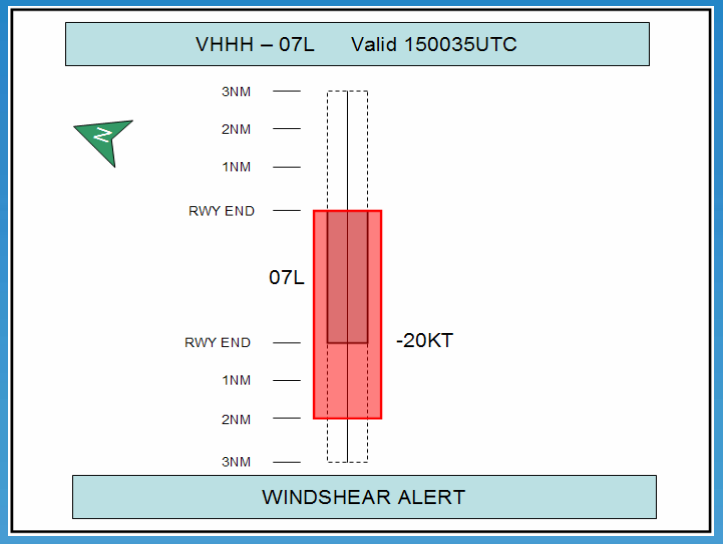
What is Turbulence?

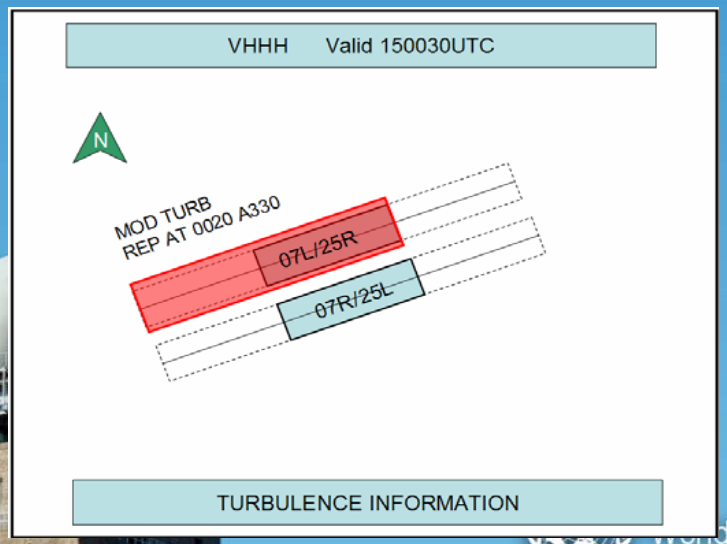
- Caused by rapid irregular motion of air and brings about rapid bumps or jolts but does not normally influence the intended flight path of an aircraft significantly





Model Charts for Graphical Windshear Alert and Turbulence Information



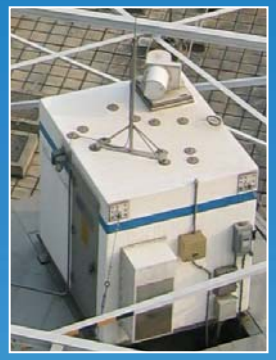


Key features:

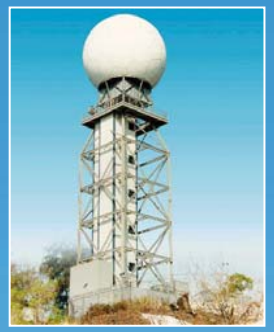
- Affected runways and portions of corridors are highlighted in red
- Information on windshear/turbulence are marked close to the affected runways/corridors

BACK

Automatic Windshear and Turbulence Alerts at HKIA



LIght Detection And Ranging (LIDAR)

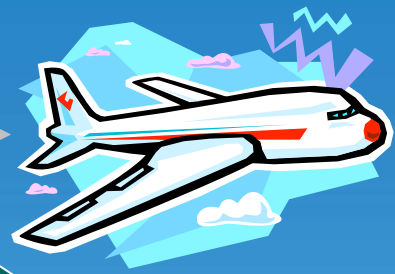


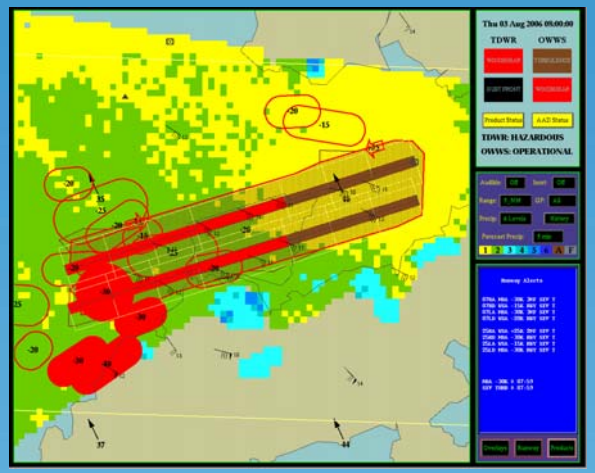
Terminal Doppler Weather Radar (TDWR)

Anemometer network

Air Traffic Controller

Voice





The Windshear and Turbulence Warning System (WTWS) consolidates alerts from different sensors

(APP) "Caution. Microburst minus 30 knots and severe turbulence on final approach"

(DEP) "Caution. Windshear minus 15 knots and moderate turbulence on departure"

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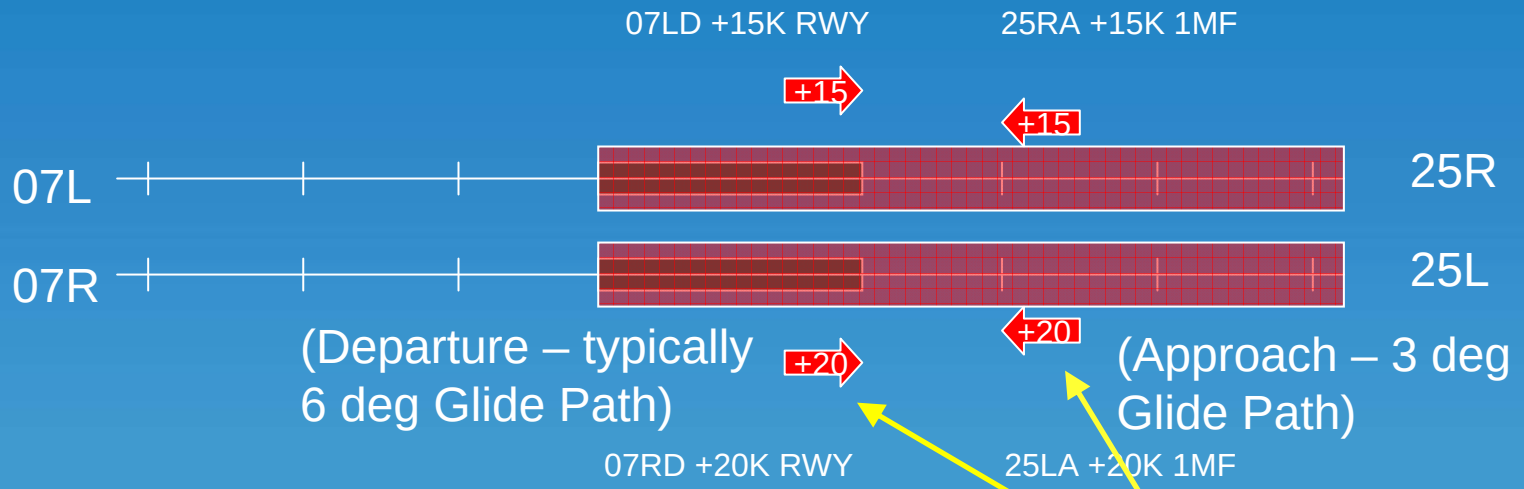
LIDAR Windshear Alert for APP / DEP

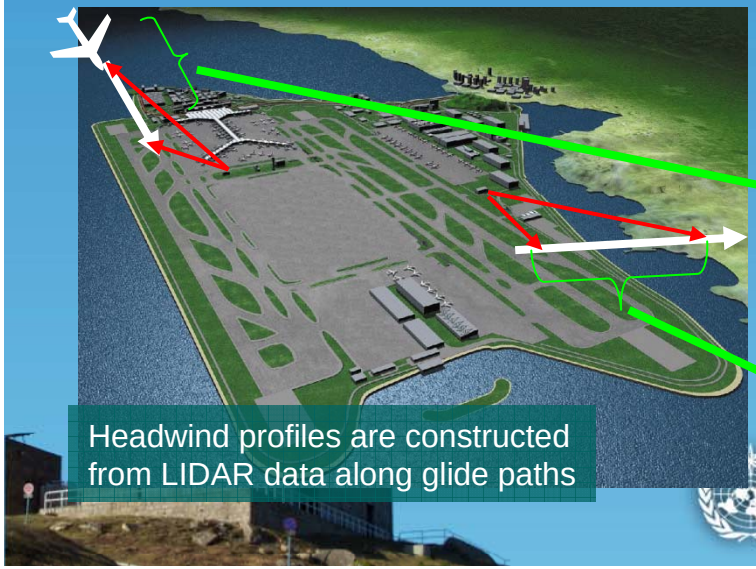
(using “vector” to represent 3D information)



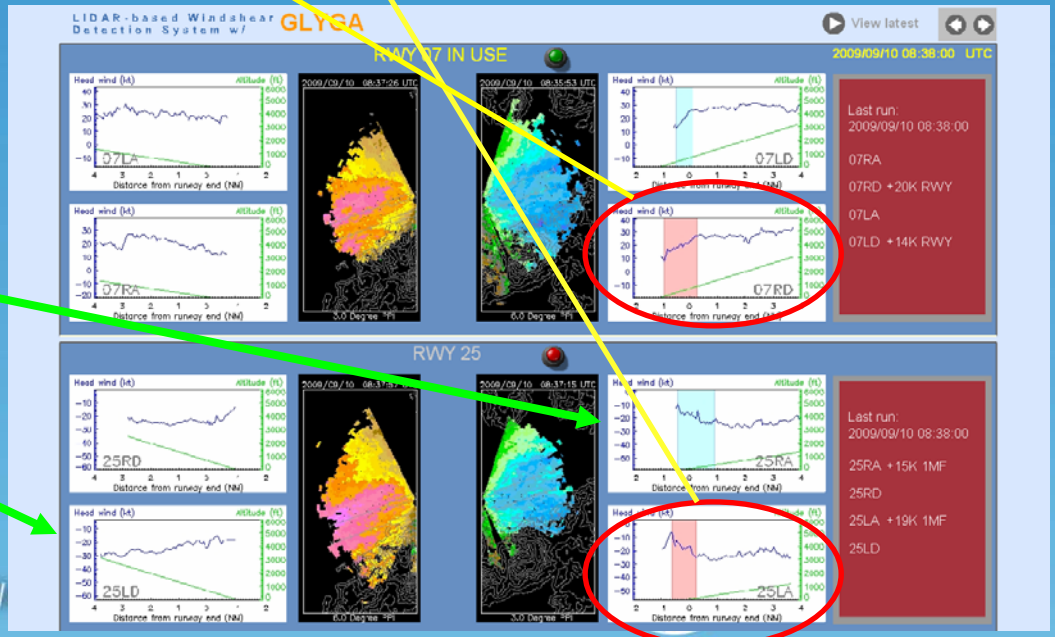
Alert message

07RA
07RD +20K RWY
07LA
07LD +15K RWY
25RA +15K 1MF
25RD
25LA +20K 1MF
25LD

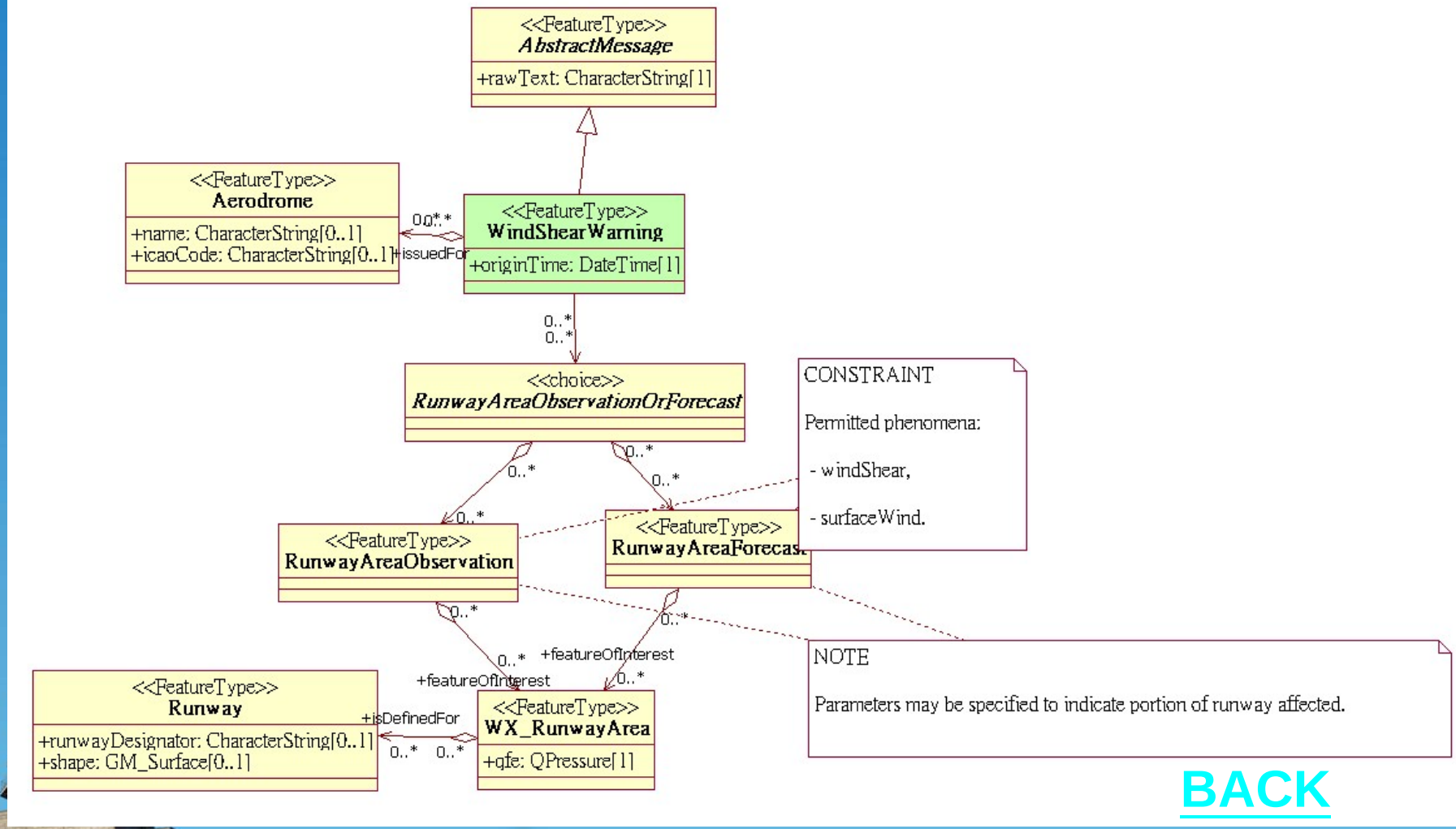
BACK



Headwind profiles are constructed from LIDAR data along glide paths



WXCM - Windshear Warning Class Diagram



BACK

DRAFT TEXT FOR INCLUSION IN THE GENERAL SUMMARY OF TT-AvXML-1

2 Aviation's need for XML

2.0.1 Mr B-L Choy briefed TT-AvXML on the requirements of the aviation community for information on wind shear to be available to pilots in flight. The Task Team concluded that aviation's XML data representation requirement extends beyond what can be represented in TAF or METAR, and that any solution that was only a replacement for the current alphanumeric codes would have long term detrimental impacts on safety and efficiency of aviation.

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