

MET provision in the future

A look at some projects that are near to completion

Thematic challenge 3

Efficient provision and use of meteorological information in ATM



EUMETNET
EUROPEAN METEOROLOGICAL
SERVICES NETWORK

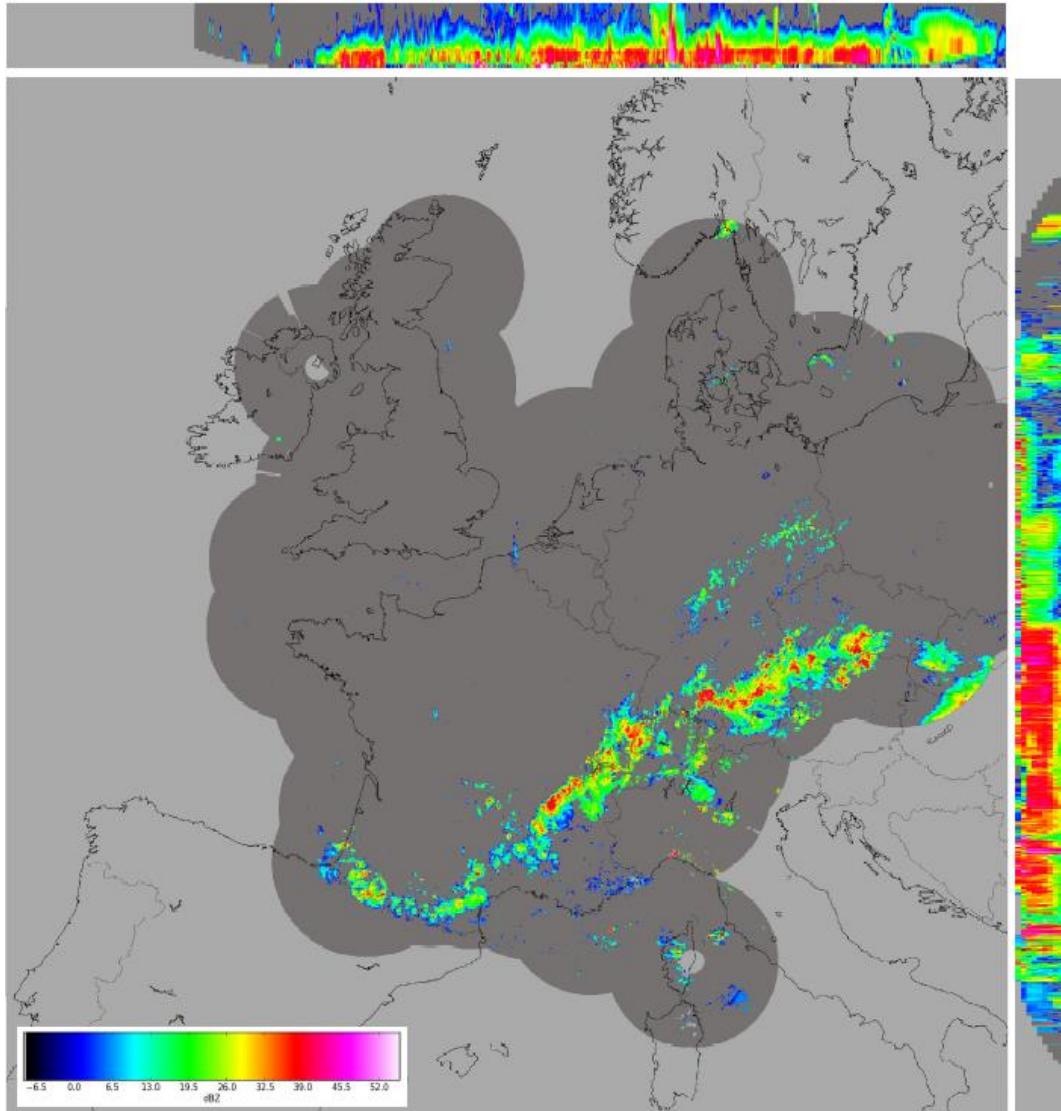
What are we going to highlight

- **SESAR Deployment Projects**
 - **3D European Weather Radar Composite of Convection Information Service**
 - **European Meteorological Aircraft Derived Data Centre (EMADDC) - MODE-S**
- **Wind-shear detection/prediction at Nice Airport**

Objectives of Aviation Wx Research

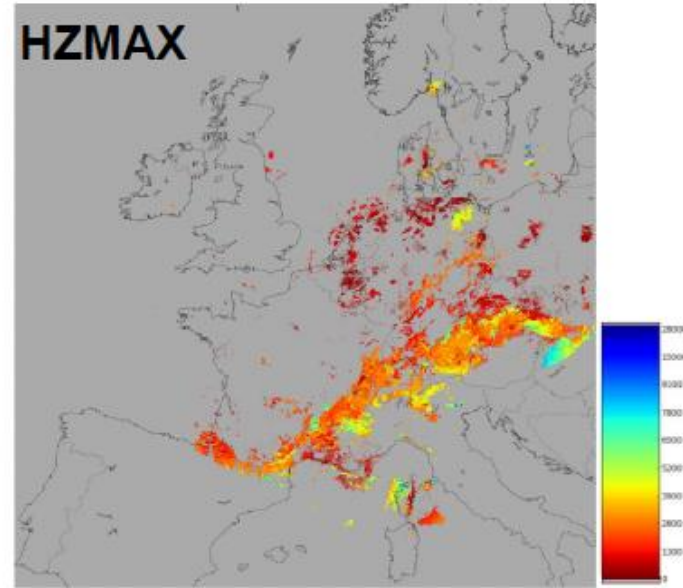
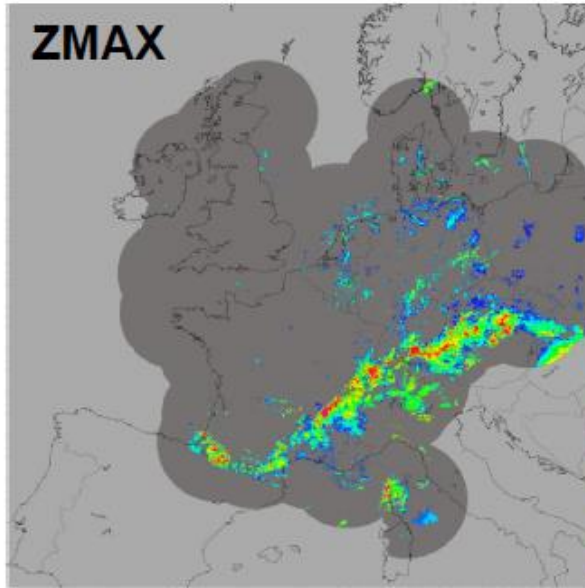
- **European Aviation community desires:**
 - **accurate, reliable and timely MET information,**
 - **consistent information independent of the providing source,**
 - **consistency between MET information,**
 - **cost-effective production and provision of new MET information.**
- **Delivery via SWIM is key**

3D RADAR



- **3D Mosaic Algorithm developed in EUMETNET OPERA Programme**
- **Mosaics can be used to identify areas of risk to aviation (CB height, hail, snow, severity)**
- **Beneficial for Airports, ATC and pilots**

3D Radar (cont'd.)

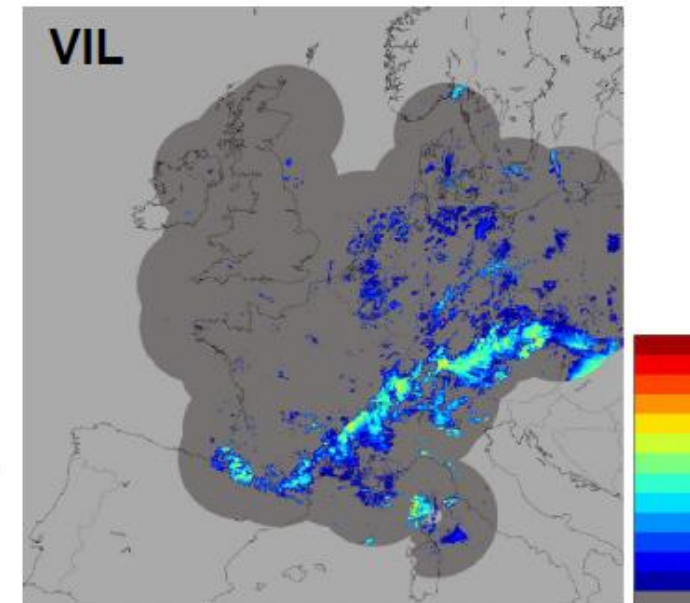
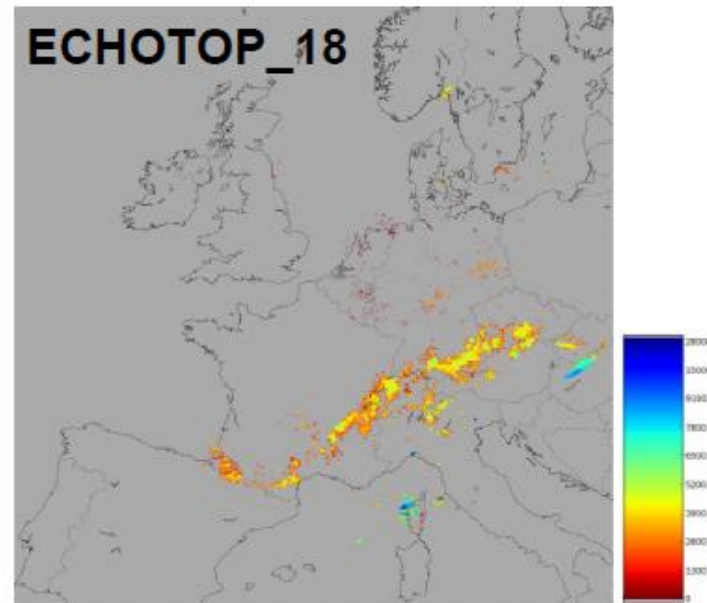


1. Maximum reflectivity (ZMAX)

2. Altitude of ZMAX (HZMAX)

3. Echo Top Heights

4. Vertically Integrated Liquid (VIL)

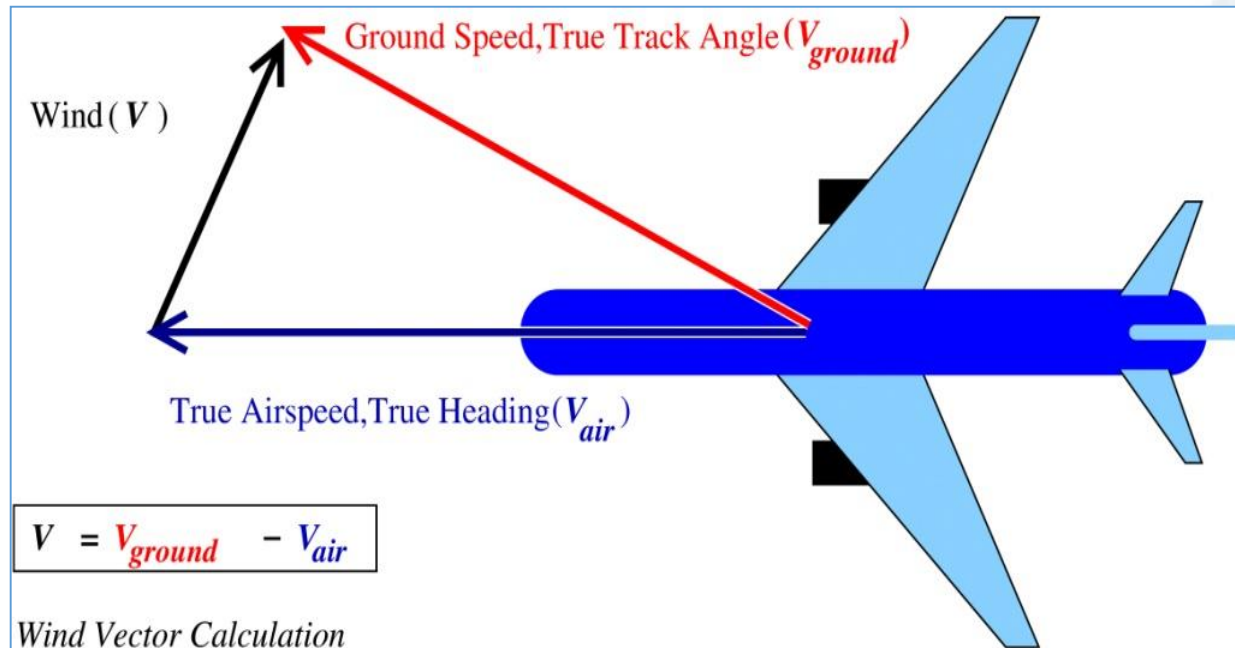


European Meteorological Aircraft Derived Data Center

Objective: to obtain as many quality-controlled meteorological upper air observations for Europe at large for as little cost as possible.

Rationale: new air traffic control surveillance technologies present opportunities to obtain or derive observations for:

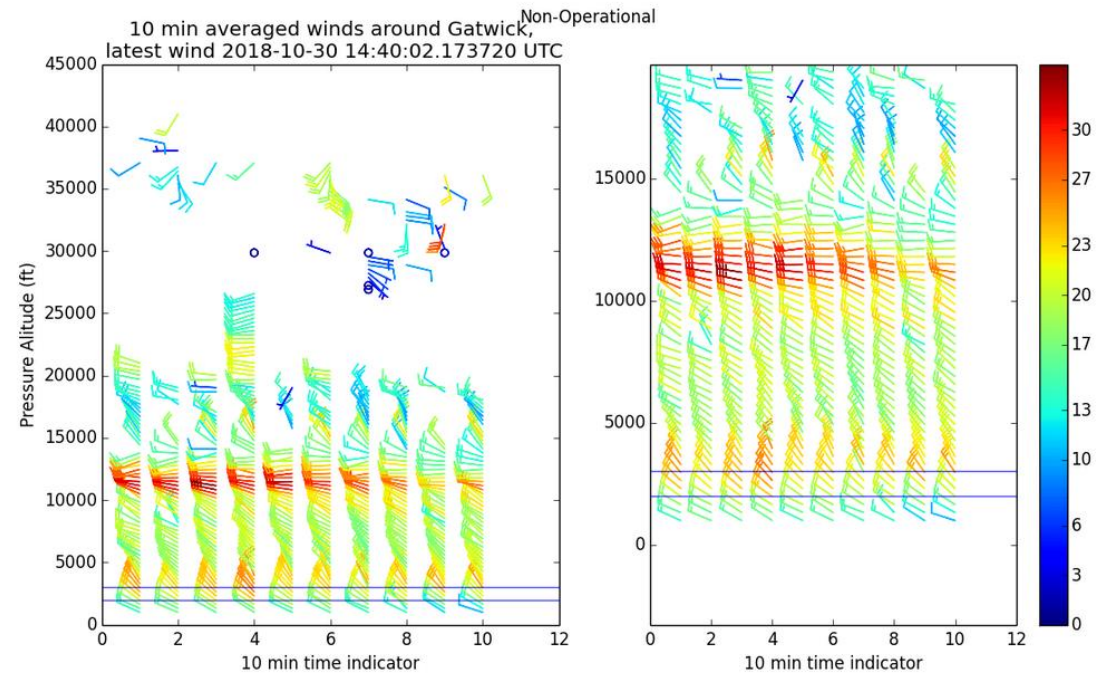
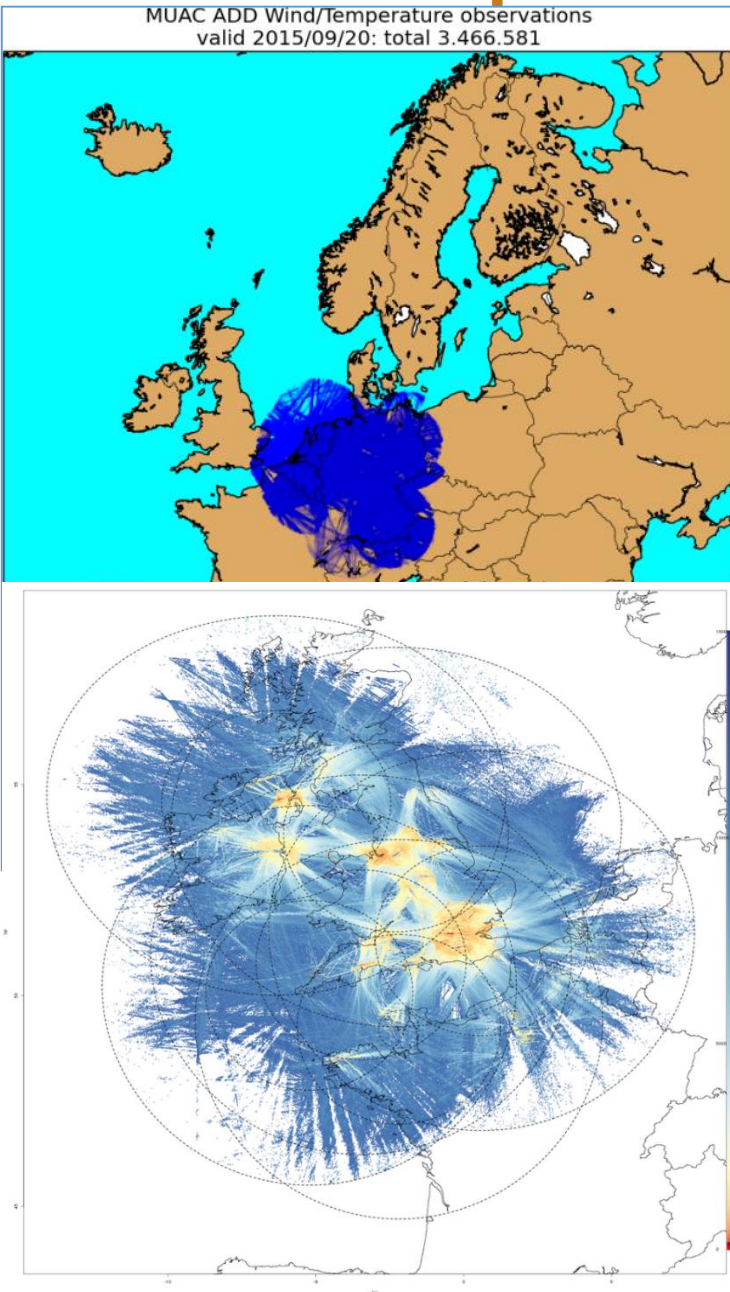
- **Wind direction, wind speed**
- **Temperature**



Schematic representation of wind derivation from aircraft flight information

- The wind vector (black) is deduced from the difference between the ground track vector (red) and the orientation (heading) and speed of the aircraft relative to the air (dark blue). The ground track vector is constructed by ground speed and true track angle.
- Note that both heading and ground track angle are defined with respect to true north.

European Meteorological Aircraft Derived Data Center

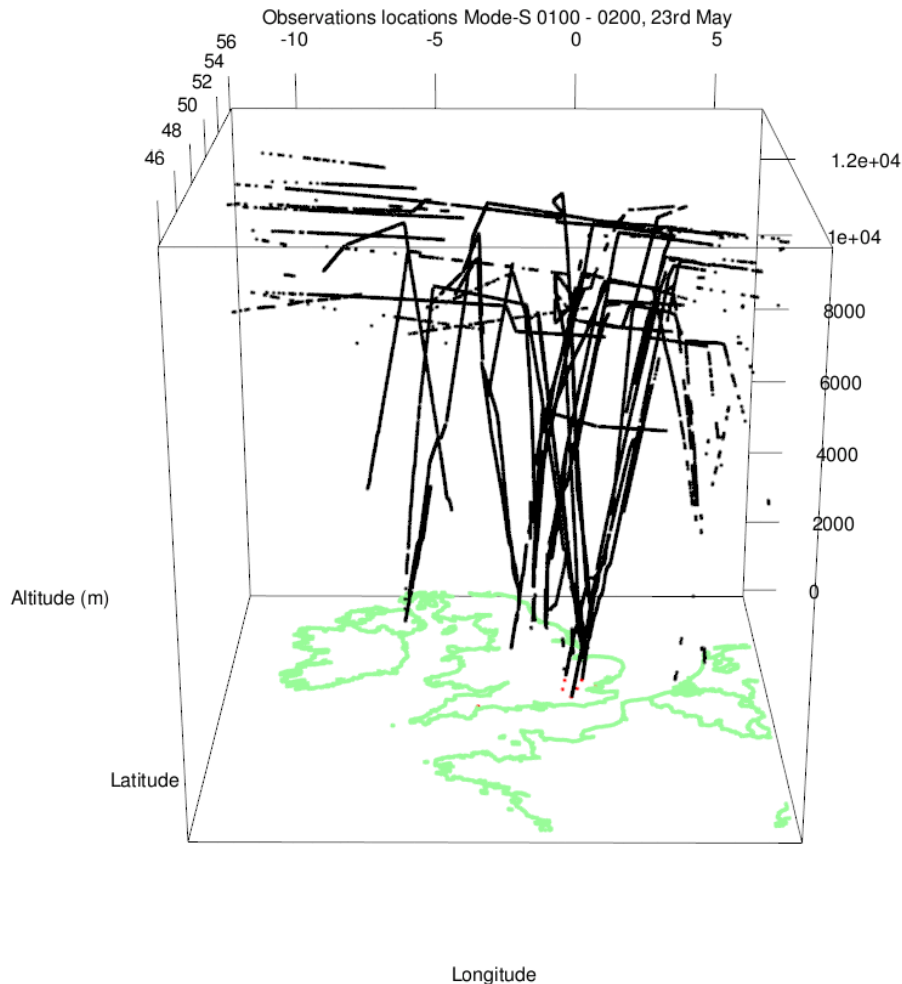


Right Wind at altitude over Gatwick AP UK, note the Jet at about FL 110 (11000ft), this could cause significant wind shear on decent into the AP.

Left Top – extent of current KNMI observations

Left Bottom – Altitude of observations from 5 observing sites in the UK

European Meteorological Aircraft Derived Data Center



Overnight ~61000 observations!

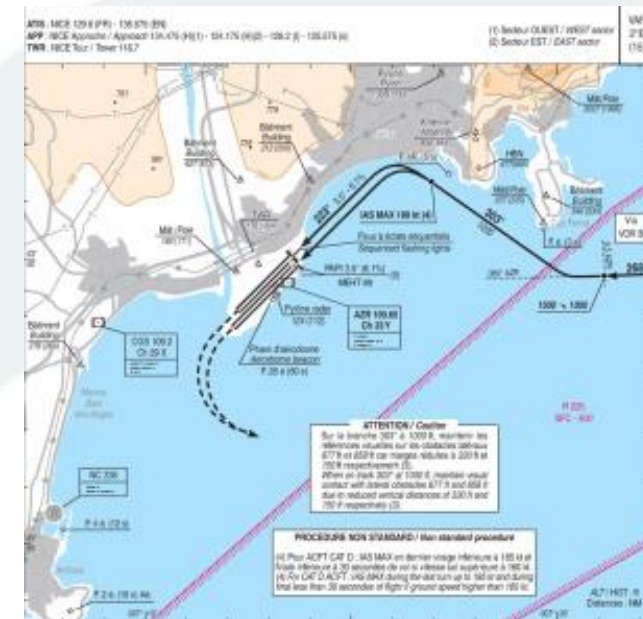
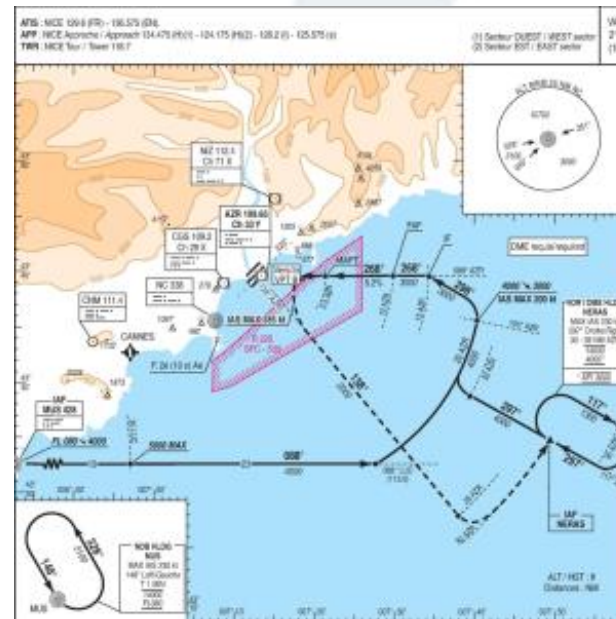
- **Development of MODE-S receivers that can be deployed 'anywhere' using Raspberry-Pi technology**
- **Observations can be used for:**
 - **Tactical decisions (Right figure previous slide)**
 - **Data Assimilation to produce high resolution wind forecasts and nowcasts**
 - **Enabler for ATM solutions like TBO and CDO**

WIND SHEAR DETECTION/PREDICTION – Nice Airport



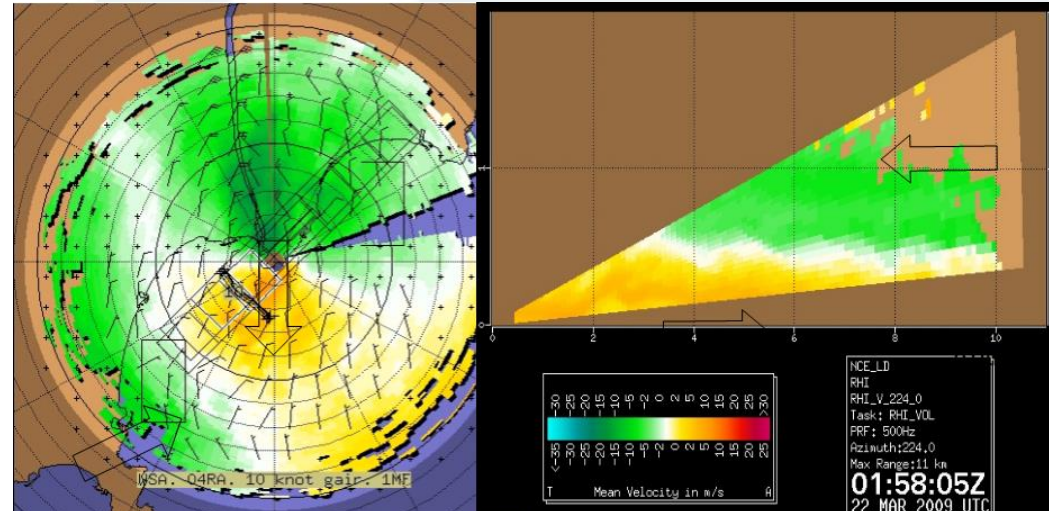
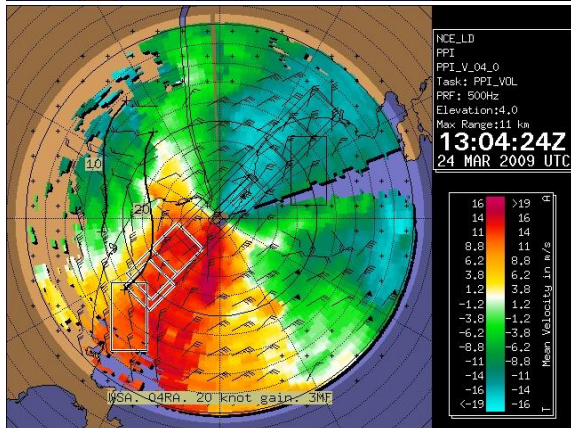
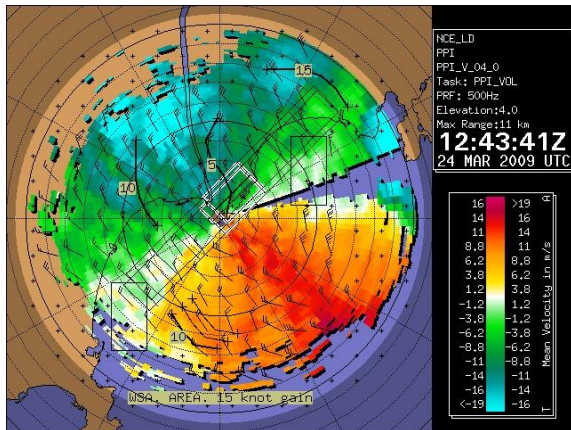
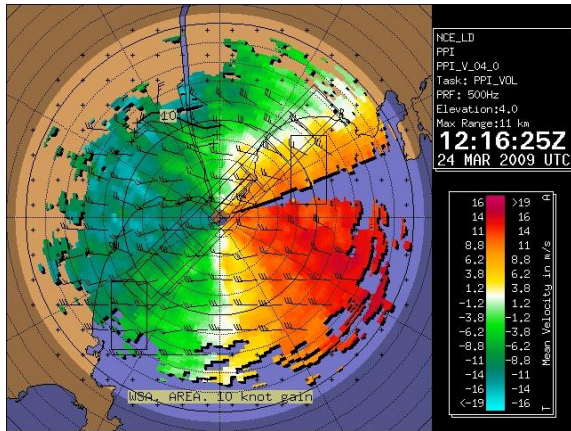
Airport situated on a polder :

- Var river estuary,
 - Middle of a bay,
 - Surrounded by hills,
 - Urban environment
- => Special Approach procedures



WIND SHEAR DETECTION/PREDICTION

- 35 to 40 days a year with go-arounds, 2/3 of which are by clear sky resulting in a number of Mayday (low fuel), multiple delays in Air Traffic, planes rerouted to alternates
- In order to better understand the causes of such phenomena, Météo-France undertook climatological studies of situations where go-arounds had occurred, numerical simulations at hi-resolution, instrumental experimentations.
- This led to :
 - determine a climatology of synoptic situations where wind-shear can occur and thus improve the understanding of local mechanisms
 - define the target instrumentation set for operational use : in the end X-band radar + scanning lidar.
- Methodology to be shared with other EUMETNET members (Madeira airport)



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