



Towards the real time monitoring of wind hazards in the planetary boundary layer with a scanning doppler laser radar

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Understand the needs for developing better lidars



Windcube200S Overview

 Windcube200S is a scanning Wind Doppler lidar based on the heterodyne principle







Windcube200S on the shore in 2011

•Nice Côte d'Azur airport (**MétéoFrance**) #3 Airport in France Permanent deployment











Wind shears problematic overview

- Aircrafts maneuverability is the lowest during takeoff and landing phases
- On flight aircraft stability directly linked to topology of wind field
 - Wind gradients: negative
 - micro-bursts : negative
 - Turbulence : negative

→ Need to accurately monitor the wind fields near airports





Some examples of wind fields measured by the Windcube200S

2 particular wind fields

• Transient wind in the planetary boundary layer



• Increase of low altitudes wind





Wake vortex problematic overview



- All aircrafts create wake vortices, whose the strength is linked to weight, wingspan, speed
- FAA specifies distance/time between two aircrafts for landing and takeoff
- Limitation of the landings / takeoffs during the rush hours
- Need to monitor wake vortices until their dissipation





Focus on Wake detection during Paris deployment

Goal: Detect and monitor wake vortices of small to heavy planes during takeoff and landing

Many issues:

- Predominant ground effect
- Lateral detection
- Large variety of take-off Trajectories
- Windcube located 700 meters from landing
- Real time monitoring



Wake of a heavy aircraft at Take-off



Wake of a heavy aircraft at landing



Summary and perspectives

- Windcube200S deployed on two airports
 - On-going Wake Vortex Data analysis
 - More results coming soon especially on wind shears
- Other potential applications of Windcube200S
 - Large site assessment for wind energy
 - Data assimilation for Weather forecasts and Meteorology researchs
- Many improvements of Windcube200S are planed so as to increase range for instance





Thank you