



WAKE VORTEX & WIND MONITORING SENSORS IN ALL WEATHER CONDITIONS



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- **Toward Safe, Weather Resilient ATM Systems:
Wind & Wake-Vortex Mitigation**
 - Thierry Beauvais, Key Technology Domain PCC (Processing, Computing & Cognition) Director, THALES

- **Welcome & Workshop Introduction**
 - Frederic Barbaresco, Task Leader - WakeNet3-Europe, THALES AIR SYSTEMS
 - Carsten Schwarz, Greenwake, DLR



- **Monday 29th March - Sensors for Wind Monitoring in All Weather Conditions**
 - Topic 1 : **Wind Monitoring Radars**
 - Topic 2 : **Radar Wind Profilers**
 - Topic 3 : **Lidar Wind Profilers**
 - Topic 4 : **Airborne Sensors & Aircraft Met Data**

- **Tuesday 30th March - Sensors for Wake-Vortex Monitoring in All Weather Conditions**
 - Topic 5 : **Radar Wake Vortex Sensors**
 - Topic 6 : **Acoustic Wake Vortex Sensors**
 - Topic 7 : **IR & UV Wake Vortex Sensors**
 - Topic 8 : **Multiple Sensors**

- At the right of TRT, take the roundabout, turn left and join the bus stop on the roadside.
- The bus schedule are: from 11 am to 2 pm
- The bus stops every ten minutes.
- For the return, wait for the bus on the little place near the canteen.





Sensors for **Wind** Monitoring in All Weather Conditions



- Chairman : P. Eriksen / EUROCONTROL

- **09:10 Next Generation Operational Met Office Weather Radars and Products**
 - P. Tabary & J. Parent-du-chatelet / Meteo-France, France

- **09:30 Wind Field Observations with a Monostatic and Bistatic C-band Doppler Radar Network**
 - M. Hagen / DLR, Germany

- **09:50 Multi-Static X-Band Radar**
 - J. Saebboe / TRIAD, Norway

- **10:10 - 10:40 *Coffee Break***

- Chairman : P. Eriksen / EUROCONTROL
- 10:40 **HYDRIX: An X Band Radar to Monitor Atmospheric Hazards for Airport**
 - J. Testut / NOVIMET, France
- 11:00 **An Airborne X Band Weather Radar Simulator Environment** **Cancelled**
 - J.P. Artis / THALES, France
- 11:20 **DWD's New Remote Wind Sensing Equipment for An Integrated Terminal Weather System (ITWS)**
 - T. Wetter & F. Lehrnickel / DWD, Germany
- 11:40 **All Weather Wind Monitoring with Integrated Radar and Lidar**
 - S. Hannon / Lockheed CT, USA
- 12:00 - 14:00 **Lunch Break**



- Chairman : R. Wilson / LATMOS

- 14:00 **Vaisala UHF Wind Profiler, Optimizing the Wind Measurement**
 - J. Polvinen / VAISALA, Finland
- 14:20 **UHF Wind Profiler Radar Applications in Aviation Support**
 - P. Carrier/ Degreane Horizon, Vinci Group, France
- 14:40 **Long-term Radar Wind Profiler and Windline Measurements for the Wake Vortex Warning System at Frankfurt Airport**
 - J. Konopka/ DFS, Germany

- 15:00 - 15:30 ***Coffee Break***

- Chairman : P. Feneyrou / THALES

- **15:30 New Long Range Lidar for Airport Wind Profiling**
 - L. Sauvage, J.P. Cariou / LEOSPHERE, France

- **15:50 Aviation ZephIR: Lidar Wind Profiling and Wake Vortex Detection**
 - C.Hill / Qinetiq, UK

- **16:10 Lidar Wind-Shear Monitoring : Nice Airport Trials**
 - Florence Besson, Jean-Louis Maridet & Alain Dabas / Meteo-France, France

- **16:30 Wind Monitoring Using 2nd Generation Wind Lidars**
 - Peter Clive / Renewable Energy Consultant, France

- **16:50 Wind Lidar as an Aid to Airport Security Under Unfavourable Weather Conditions**
 - P. Martinez & A. Alcayde / ADTelecom, Spain



- Chairman : L. Mutuel / THALES

- 17:10 **LIDAR Airborne Aerodynamic Sensors**
 - A. Verbeke / THALES Avionics, France

- 17:30 **Potential Use of Aircraft Derived Meteorological Data for Wake Turbulence Applications**
 - E. Johnson / FAA, USA

- 17:50 ***End of Day 1***





Sensors for **Wake-Vortex** Monitoring in All Weather Conditions

- Chairman : F. Barbaresco / THALES

- 09:00 **High Resolution W-Band Radar Detection and Characterization of Aircraft Wake Vortices in Precipitation**
 - T. A. Seliga & J. B. Mead / ProSensing Inc., USA
- 09:20 **High Doppler Resolution X-band Wake-Vortex Radar : CDG Airport Trials**
 - F. Barbaresco / THALES AIR SYSTEMS, France
- 09:40 **Electronic-Scanning X-band Wake Vortex Radar : First Demonstrator**
 - P.R. Drake / RAYTHEON, USA
- 10:00 **Study on Wake Vortex Electromagnetic Model and Radar Detection Technologies**
 - X. WANG / NUDT, China
- 10:20 **Multi-Physics Electromagnetic/Fluid-Mechanical Simulator of Radar WV Monitoring**
 - D. Vanhoenacker-Janvier / UCL, Belgium
- 10:40 – 11:10 **Coffee Break**

- Chairman : P. Feneyrou / THALES

- **11:10 Acoustic Technology for Wake Vortex Detection**
 - W. W. Durgin / Worcester Polytechnic Institute, USA

- **11:30 Bi-static Radio-Acoustic System for Wake Vortex Monitoring**
 - J. Saebboe / TRIAD, Norway

- **11:50 Enroute Wake Vortex Flight Data Acoustic Signature Characteristics**
 - A.P. Brown / NRC, Canada

- **12:10 – 14:00 *Lunch Break***

- C. Schwarz / Greenwake Project & DLR
- 14:00 **Pulsed 1.5 micron Lidar for Wake Vortex Measurements and Monitoring : CREDOS Trials on Frankfurt Airport**
 - J.P.Cariou & A.Dolfi / LEOSPHERE & ONERA, France
- 14:20 **Measurement of Aircraft Wake Vortices Using Doppler 1.5 micron LIDAR**
 - H. Kato & S. Fujita / Tohoku University & ENRI, Japan
- 14:40 **Airborne and Ground based Wake Vortex Measurements with Pulsed Lidar**
 - T. Gerz or F. Holzäpfel / DLR, Germany
- 15:00 **Assessment of Pulsed Lidar Measurements of Aircraft Wake Vortex Positions Using a Lidar Simulator**
 - D. Delisi / NorthWest Research Associates, USA
- 15:20 - 15:50 **Coffee Break**

- C. Schwarz / Greenwake Project & DLR
- **15:50 Radiometric Detection of Aviation Hazards**
 - L. West / GTRI, USA
- **16:10 GreenWake : UV Lidar for Wake Vortex Detection**
 - J. Storey / Green-Wake project technical co-ordinator, Lidar Technologies Ltd, UK
- **16:30 GreenWake : Wake Vortex Detection Simulations**
 - Sébastien Lugan / Green-Wake project, UCL-TELE, Belgium



- Chairman : Steven Lang / FAA

- **16:50 Wake Turbulence Measurements – Practical experience, considerations, contributions made to NAS and science to date**
 - F. Wang / Volpe, USA

- **17:10 Wake Vortex Tracker for Radar/Lidar Sensors**
 - Meiko Steen / Institute of Flight Guidance , TU-Braunschweig, Germany

- **17:30 Closing session : Synthesis**
 - F. Barbaresco, Task Leader - WakeNet3-Europe, THALES AIR SYSTEMS



Closing Session



- A new generation of low cost sensors has recently emerged, boosted by technological breakthroughs :
 - Electronic scanning and/or High Power X-band Radar, Electromagnetic Multi-static Radars, ...
 - High Power 1.5 micron Lidar, UV Lidar, Forward-Looking Interferometer, ...
 - Multi-static Acoustics sensors,...
- These sensors will be key enablers for critical Wake Vortex Advisory System that will be developed in :
 - SESAR WP12.2.2 “Runway Wake Vortex Detection, Prediction and decision support tools”.
- In this future system, operational in all weather conditions,
 - Wind data will be ingested in “Wake Vortex Predictor” and will require:
 - accurate/high space resolution
 - fast time update rate
 - Wake-Vortex monitoring will improve confidence of Safety Nets with :
 - Wake vortex position
 - Wake vortex strength (circulation in m²/s)
 - Wake vortex phase (transport & decay)

**Thank you for your
attention
& see you soon in Toulouse
for the next
plenary Wakenet-3
Workshop**