Lidar NEWS
WEATHER & CLIMATE

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INSIDE

Edito

Year 2010 was the scene of several events that highlighted strong interactions between synoptic scale air mass transports and local effects. Over events this year proved how high the ROI (Return on Innovation) of a technology-driven modernization of meteorology was in terms of safety and protection of the economy. The volcanic ash plume episode that grounded all airplanes in Europe for a week in April is still on everyone's mind. What was until then just a research topic, suddenly became a major operational concern. By successfully deploying and connecting a network of ALS polarization lidars, Leosphere persuaded some of the most exposed meteorologists and air traffic management experts - MeteoFrance, the Irish Aviation Authority - to accelerate the integration of lidars into their upper-air observation networks. Meanwhile, substantial efforts are made to provide affordable and high quality wind profilers for met services and airports. As wind is a key physical parameter in hazards such as windshears or supercell genesis, mapping the planetary boundary layer dynamics becomes crucial. Finally, we are happy this month to share an experiment recently conducted by Leosphere to improve air quality models with lidar measurements on wind and particle density. The next steps will lead us to provide new tools to consider the impact of climate change on air quality. It will benefit to main cities in developed and emerging countries such as China, India and Brasil among others.

Laurent Sauvage, Co-founder and scientific director

Irish Aviation Authority equipped with ALS

Dublin airport was impacted more than any other airport by the Icelandic volcano eruption last April. As a result, the airport, which is amongst the ten busiest airports in Europe, was forced to shut down for an entire week. Due to the enormous economic loss during the crisis, the Irish Aviation Authority decided to equip itself with the most accurate operational aerosol profiler tool, in an effort to secure air traffic in case of another volcanic eruption. Contrary to other instruments, the ALS Lidar is the only instrument to detect, identify and accurately contribute to quantification of ash mass concentration of ashes thanks to its polarization channel's vertical extent of more than 12km. Once collected, these allow for the determination of the aerosols' shape and optical density, easing the decision making process of air traffic management experts. Advised by the UK Met Office and the University of Galway, IAA experts chose to deploy the Aerosol Lidar system at the end of the airport's runway last fall. The deployment of the system is also providing the University of Galway with key information on climate change and environmental conditions through complementing their measurements at the Mace Head Global Atmosphere Watch (GAW) site. This site is now part of the existing European Lidar network and appears as a European watch tool of reference.

LEOSPHERE
Lidar Environmental Observations

PBL Wind Doppler Lidar deployed on the FMI Testbed, Finland

Leosphere's PBL wind doppler lidar, the Windcube70, was deployed from September through November 2010 at the Helsinki Testbed of the Finnish Meteorological Institute. Dedicated to mesoscale meteorology research, this project strives to improve weather forecasts through continued development of dispersion models and verification techniques, demonstration of modern technologies integration with complete weather observation systems, progression of end-user products and finally distribution of data to the public and research community. The wind Doppler Lidar performances have been assessed against other wind profilers deployed in the Testbed, such as C-band weather Radars, Sodars and radio soundings. First results presented by Yanni Poutianen during the last COST720 meeting showed a good correlation between conventional techniques and the lidar. These results confirm the high maturity of wind Doppler lidars when applied to severe weather and mesoscale applications.

For more information on the testbed project, have a look at the official website : http://testbed.fmi.fi

Leosphere scientists took part in the second GALION Aerosol Lidar Observation (GAW) Network organized by the WMO, last September in Geneva, as well as in the COST 720 in Köln last november, working on the organisation of a network of meteorological observations in Europe.

New product release Windcube200S

Leosphere is proud to introduce its latest wind doppler lidar dedicated to the prevention of airport hazards : the Windcube 200S. This very compact instrument, the first of its kind, combines a full scanning capability with a range capacity greater than 5 km. The Windcube 200S was designed to offer a fully integrated operational capacity to improve detection of windshear and wake vortices surrounding airports and mitigate the harmful impacts of these phenomena.

THE NEW WINDCUBE 200S IS SPECIALLY DEDICATED TOWARDS SECURING AIPORT SAFETY THANKS TO THE DETECTION OF WINDSHEARS AND WAKE VORTICES WITH ITS 360° SCAN AND ITS 6 KM RANGE

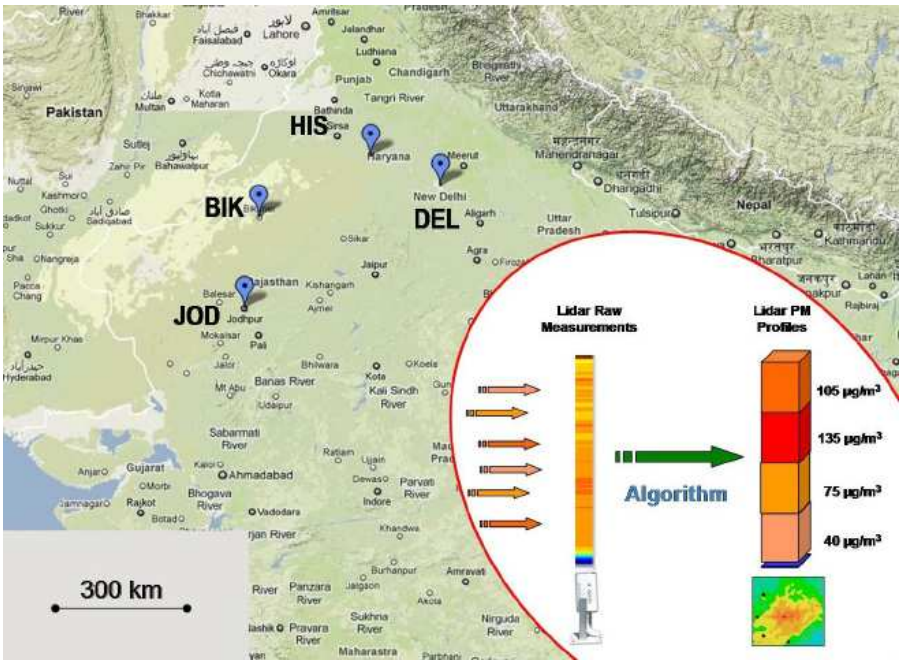
To improve detection of wake vortices, the Lidar beam sweeps the vertical plane perpendicular to take-off and landing trajectories at high scanning frequencies. For windshear detection, the Windcube 200S provides a full 360° scan of the atmosphere, offering enhanced measurements of differing wind speed and direction that create windshear. The instrument will run operationally for the first time at Charles de Gaulle airport in Paris, France in early 2011. This deployment is part of the vast European air traffic capability enhancement project called SESAR. The aim of this study is to develop a new standard for real-time wake vortex sensing, prediction, and alert. This should significantly improve airport traffic capacity and safety.

Windcube 200S with the 360° scan head

Radial speed with fixed zenithal angle

Lidars support air quality management in Delhi

The 2010 Commonwealth Games held in Delhi in October 2010 allowed for the opportunity of an innovative two-fold air quality program involving ALS Aerosol Lidars, in cooperation with the Indian Central Pollution Control Board. Leosphere operated mini-networks of ALS Lidars at both regional and urban scales. The lidars provided inputs to the air quality forecast model run by Aria Technologies as well as to original observations of 3D pollution patterns in the vicinity of the Games' venues. On a regional scale, the goal was to feed the forecast model with proper atmospheric observations of possible dust inputs, a parameter that is hardly controlled at the boundary conditions. Aerosol lidars were installed in three locations up to as far as 500 km West of New Delhi, and operated from May to June 2010, over the pre-monsoon period, when dust events frequently hit Northern India. Not only did the model benefit from the use of the depolarization channel which discriminates spherical particles from non-spherical ones: for the first time, lidar data was converted real time into mass concentrations, allowing direct assimilation by the 48-hour forecast model. A world premiere! On the urban scale, aerosol lidars continuously ran for eight weeks at four locations within New Delhi metropolitan area, collecting valuable observations of the atmospheric structure and particulate content. An additional unit was operated from a running vehicle all over the Games period along New Delhi ring roads and special routes. This experimental setup allowed the real-time retrieval of a quantitative and qualitative mapping of emission sources and local meteorological effects.



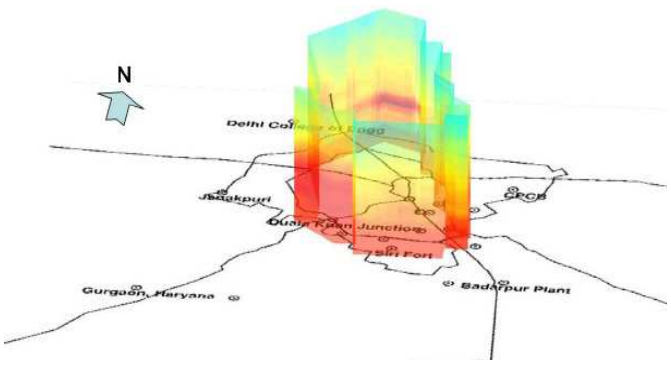
Regional mini-network. Lidar outputs were converted in a format directly usable by the forecast model.

The Delhi program showed how the complementary operational performances of models and lidars can create synergies between the fields of meteorology and air quality.

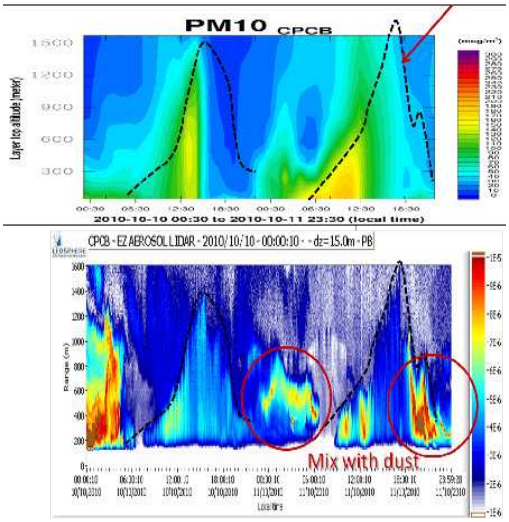
Acknowledgements: The French Ministry of Finances supported the programme under the FASEP scheme. Microcomm, Leosphere's official representative in India, managed the technical and logistical matters.

Links:

Online results from the programme: www.aria.fr/Delhi
Indian environmental protection bureau www.cpcb.nic.in
Microcomm www.microcomm-group.com
Aria Tehcnologies www.aria.fr



3D map of the distribution of particulate pollution alongside Delhi inner ring road - Oct. 6th, 2010



Comparison between the ALS Lidar and the Aria Model

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