

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

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Measuring and foreseeing wind conditions near airports are crucial issues for air traffic safety. Since aircraft maneuverability is the worst during takeoff and landing phases, severe weather conditions like wind shears near airports can have dramatic consequences on aircrafts. The origins of strong wind shears near airports are mainly generated by geography (coasts, valleys, or mountains). These geographical items induce wind fluctuations in terms of direction and magnitude with altitude. Strong efforts have been done to study and model wind shears but their foreseeing is still a tricky task as their time and length scales vary a lot with meteorological conditions and airports. Thus, on-site measurements remain the best way to detect them in real time.

Coherent laser radars or LIDARs can be very powerful devices for measuring wind shears on dangerous airports. For this special need, LEOSPHERE has developed a new Doppler LIDAR, called the Windcube200S, equipped with an hemispherical scanner and a more powerful laser but which remains eye-safe. This new product will allow to measure and to identify complex wind shears thanks to the possibility of creating specific swept scenarios.

This new LIDAR has been deployed on an airport well known to be dangerous. The objectives are to detect wind shears and to measure them as far as possible from the airport in order to be able to modify the aircraft landing path if strong wind shears appear. Measurements that have been done with the Windcube200S demonstrate its ability to detect highly complex wind shears. Several wind configurations have been observed and have been analyzed thanks to an appropriate data processing.