Test of a combined X-band Doppler polarimetric radar & Doppler lidar system for all-weather wind shear detection at Nice Airport

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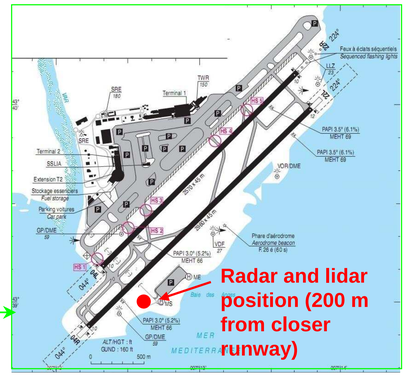
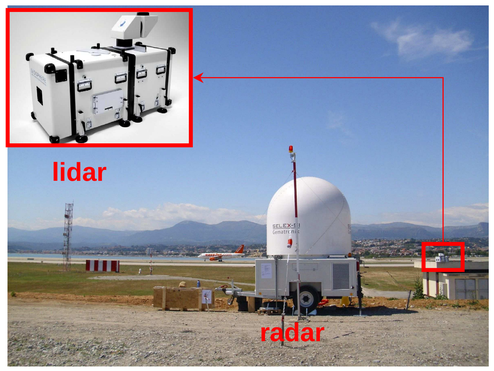
Nice 2011 experimentation

March 2011 : installation of a **Doppler lidar (Leosphere)** at Nice airport
Mai 2011 : installation of an **X-band radar (SELEX) -** for 6 months

Aim : evaluate the contribution of these instruments, in association with the « traditional » systems like the wind ground stations, to detect (and predict?) low level wind-shear affecting the airport and to help forecasters anticipate the change of wind direction that is a determining factor in the choice of airplane approach by the air-traffic controllers





Scanning strategy of the instruments

Lidar : 1 scan at 3°per 5' + 3 RHI (2 in runways directions + 1 toward the Var valley)

Radar : different scanning strategy have been tested and test of different values of PRF have been done to optimize radial velocity quality

Last proposition :

n°T	start (s)	stop (s)	ROT (°/s)	EL(°)	AZ(°)	PRF1 (Hz)	PRF2 (Hz)	Vnyquist (m/s)	RES ang (°)	Larg Imp (µs)	RES dist (m)	Portée (km)
1	0	26	14	1	/	2000	1333	32,1	1	0,5	300	75
2	29,7	55	14	3	/	2000	1333	32,1	1	0,5	300	75
3	59,4	85	14	7	/	2000	1333	32,1	1	0,5	300	75
4	89,1	115	14	12	/	2000	1333	32,1	1	0,5	300	75
5	119	145	14	18	/	2000	1333	32,1	1	0,5	300	75
6	149	174	14	25	/	2000	1333	32,1	1	0,5	300	75
7	178	204	14	35	/	2000	1333	32,1	1	0,5	300	75
8	208	234	14	3	/	2000	1333	32,1	1	0,5	300	75
9	238	263	14	48	/	2000	1333	32,1	1	0,5	300	75
10	267	273	14	60	/	2000	1333	32,1	1	0,5	150	75
11	277	290	14	0-180	44	2000	1333	32,1	1	0,5	300	75
12	294	297	14	1-40	335	2000	1333	32,1	1	0,5	300	75

⇒ **Good quality for radial velocity with the PRF and rotation velocity proposed**

⇒ **SELEX clutter filter seems to work well and the quality is good even close to the radar**

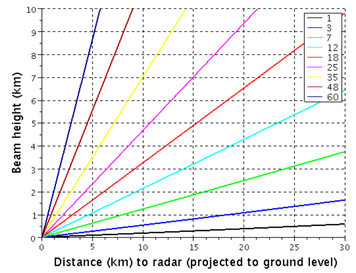
⇒ **The position of the radar on the airport seems to be fine**

⇒ **No sea clutter observed yet**

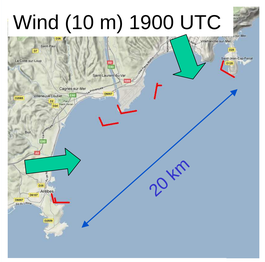
10 scans between (runways and Var valley)

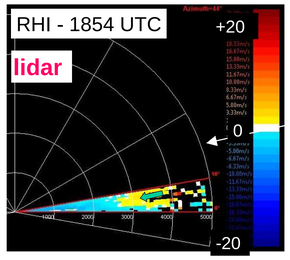
3° repeated twice

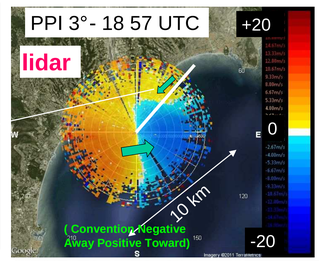
2 RHI (runways and Var valley)

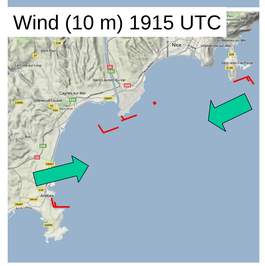


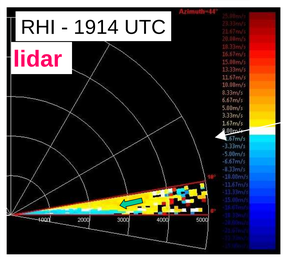
Case of 08/08/2011

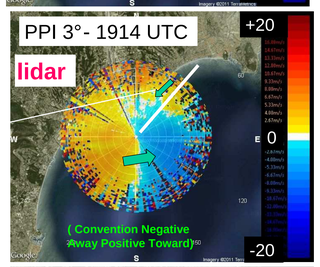






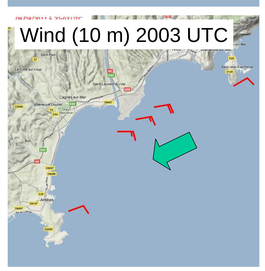


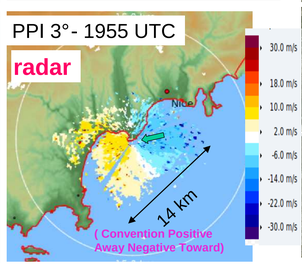


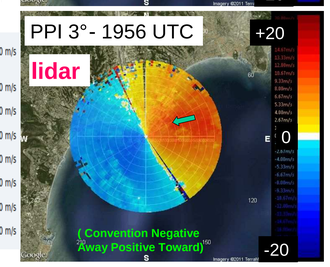


- Anticipation by the lidar of the wind rotation coming from the East, north-east of the airport

- At the ground stations, the change is seen only at 1915 UTC (seen at 1900 by the lidar)



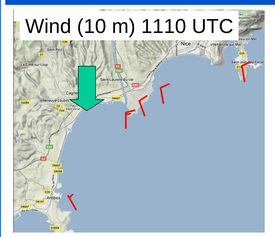


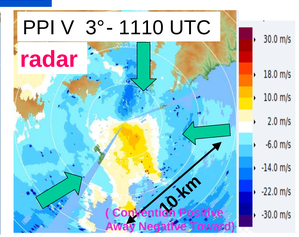


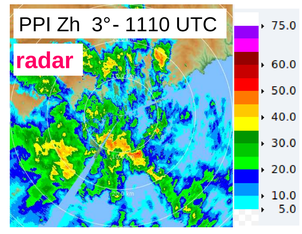
- At 2000 UTC (just after the change of wind direction), the quality of lidar data is improved : more aerosols coming from the East?

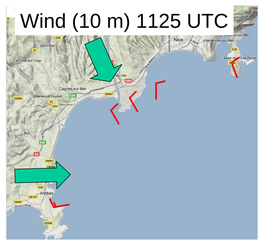
- clear air signal seen by the radar and coherent with the lidar

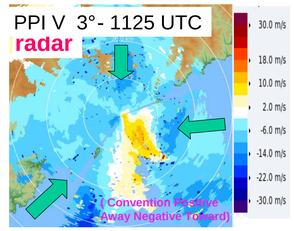
Case of 05/06/2011

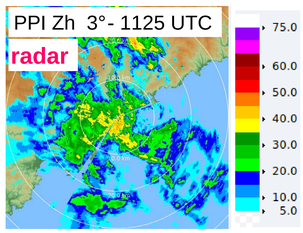












- On this case, the convergence and the south-westerly wind component (south-west of the airport) can be anticipated thanks to the radar : the wind rotation is seen at Cape Antibes at 1125 UTC (more than 15 min after the radar signature)

Acknowledgements

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