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Poster n°19

A comparative study between a pulsed and a continuous wave lidar mounted on a buoy against a trusted reference

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Context and objectives

FLS (Floating LiDAR Systems) have become widely used to carry out wind resource and metocean assessment campaigns.

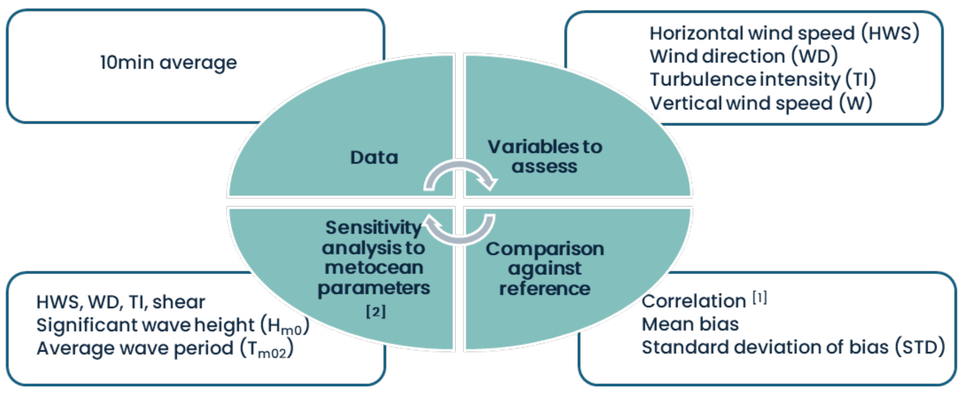
Continuous wave LiDAR and **pulsed LiDAR** are two coherent LiDAR technologies that are accurate remote sensing devices to measure the wind.

AKROCEAN, FLS data provider, mounted one of each on one buoy and conducted a trial to assess the performance of both LiDARs under the same environmental conditions.

Campaign set up

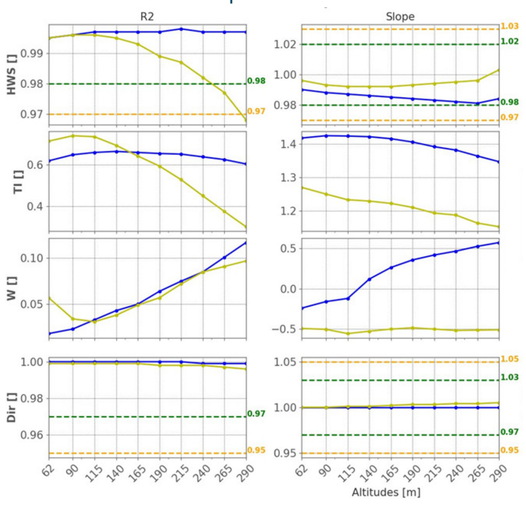
- WindCube v2.1 | Pulsed
  ZX300M | Continous
  Reference: WindCube v2 | Pulsed
- 10 altitudes: 62m to 290m
- February to October 2023 (8.5 month)
- LEG North Sea

Methods

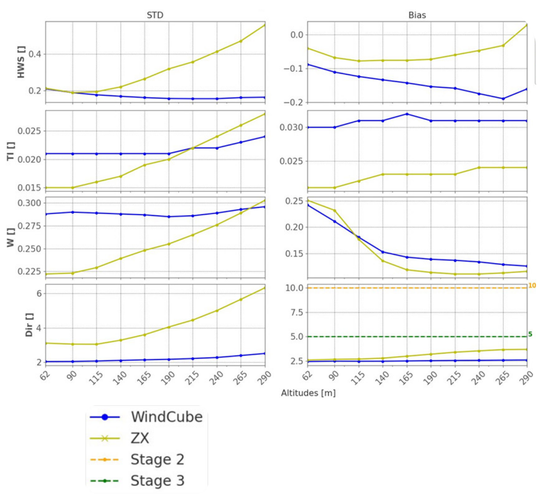


Results

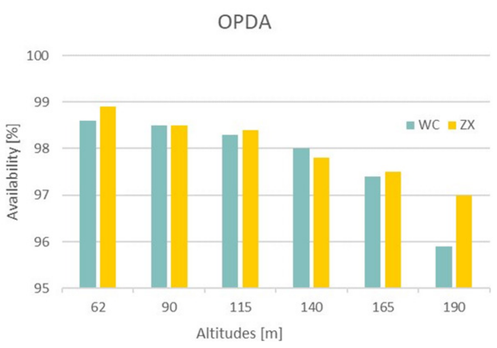
Correlation computation



Dispersion and bias



[1] Overall post-processed data availability



Sensitivity to environmental parameters

Altitudes [m]	190		215		240		265		290	
Lidars	WC	ZX	WC	ZX	WC	ZX	WC	ZX	WC	ZX
HWS	no	no	no	no	no	yes	no	yes	yes	no
TI	no	no	no	no	no	no	no	yes	no	no
W	no	no	no	no	no	no	no	no	no	no
WD	no	no	no	no	no	no	no	no	no	yes
shear	no	yes	no	yes	no	yes	no	yes	no	yes
veer	no	no	no	no	no	no	no	no	no	no
Pitch, roll and heave	no	no	no	no	no	no	no	no	no	no
Tm02, Hm0	no	no	no	no	no	no	no	no	no	no

Conclusion

- Excellent availability for both LiDARs and Stage 3
- Horizontal wind speed is accurately measured by both LiDARs
- Wind direction measured by the WindCube is more precise
- The Windcube accuracy behavior is more stable according to height
- Both **LiDARs are not sensitive** to any of the environmental variables below 190m
- Dual LiDAR would be beneficial for **measurement redundancy** and **increasing data availability**
- Dual WINDSEA is **stage 2** and **commercially available**

Perspectives

- Evaluate the uncertainty of the LiDARs
- Compare both LiDARs to a ZX LiDAR reference
- **Combine** the two LiDARs measurements to improve **accuracy** and **availability**

References

[1] Carbon Trust, “Offshore Wind Accelerator Roadmap for the Commercial Acceptance of Floating LiDAR Technology”, Version 2.0, October 2018

[2] IEC 61400-12-1 Edition 2.0, “Wind energy generation systems – Part 12-1: Power performance measurements of electricity producing wind turbines”, March 2017