DTU Wind Energy
Department of Wind Energy

→ ATLANTIC FROM SPACE
WORKSHOP
23–25 January 2019
National Oceanography Centre
Southampton, UK

esa

DTU

Forecasting winds for wind energy using Aeolus

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Rationale
- Wind farms in Europe contribute a growing share of the energy each year.
- The fast expansion of wind energy both offshore and on land calls for best possible forecasting of winds, i.e. better temporal and spatial resolution.
- Wind forecasting is used for predicting the energy supplied to the grid in time scales from minutes to days ahead, for:
  - Transmission system operators to schedule the balancing of plant (spinning reserve).
  - End-users can choose to charge electrical vehicles at suitable times.
- Forecasting is relevant for all variable resources such as wind, wave and solar.
- Wind energy forecasting is foreseen to include assimilation of wind vector information from the Aeolus satellite into weather forecasting.

Current activities
- DTU Wind Energy is measuring wind profiles, from the ground and up to a few km – when possible, using ground-based lidars.
- The campaign takes place in Alaiz, Spain as part of the New European Wind Atlas.
- We aim to use this unique dataset and compare it to lower altitude Aeolus data[1].
- Ideally, Aeolus data will be assimilated in the weather forecast systems.

Expected Outcome
- It is of great interest in many regions of the world with installed wind capacity to improve forecasting of winds.
- Mapping of global offshore wind resource may potentially be improved especially in regions where Aeolus is expected to contribute significally, e.g. The Tropics, areas with relatively sparse radiosoundings available.

[1] DTU has applied for Aeolus data and has received positive confirmation.
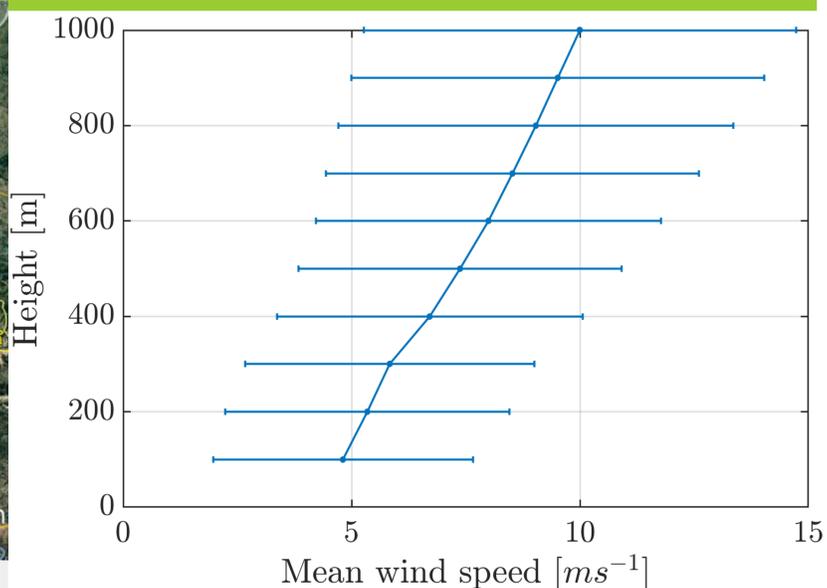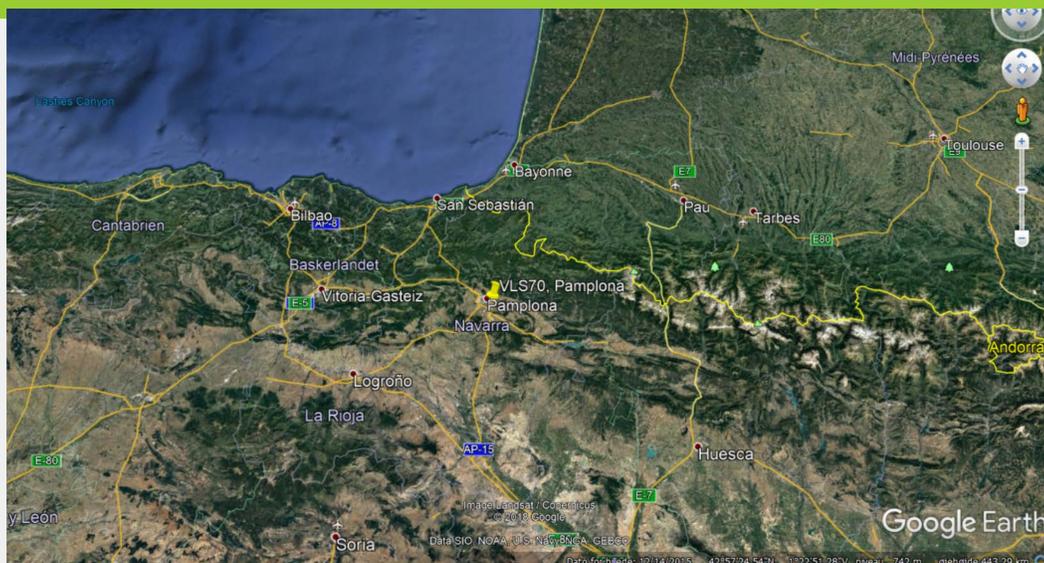
Location of the WLS70 profiler in Spain: 612021.9953 m, 4.738658563*10^6 m, UTM Zone30.
Plot of average profiles over 5 months (Sep/18 – Jan/19), using only 10-min averages, and one standard deviation.

Conclusion
Valid profiles up to 1000m, where the recovery rate is 39.4%, have been averaged.