Optimising Lidar Campaigns –
What to keep in mind using a roaming lidar

Wiebke Langreder – Head of EMD Consulting
Why roaming remote sensing (RS)

Kill two birds

A “fixed” mast paired with a mobile (roaming) unit, which typically a couple of months.

Motivation for Roaming Lidar (or RS):
• Kill two birds with one stone: More + higher measurements
• Reduce spatial extrapolation error
• Consequently reduce uncertainty = lower LCOE

15-12-2017
You need MCP (Measure-Correlate-Predict) to “connect” the roaming data string with fixed mast data string

...which will be seasonally biased?

So, we trade spatial extrapolation error $\leftrightarrow$ seasonal bias

Pest $\leftrightarrow$ Cholera
Is this relevant?

How did we find out?

• Treat two masts on one site as if one of the two were a roaming lidar
• 6 sites (Turkey, South Africa) with ≥ 2 masts
  • Maximum distance between masts 10km
  • Minimum 80m measurement height
  • IEC compliant mounting
  • Measnet calibrated First Class anemometer
  • Minimum 1 year data, high recovery rate
  • For most masts tower shadow could be removed

First Aim:
• Check seasonality
Is this relevant?

Methodologies:

• Keep one mast (A) as “permanent” – full period
• Pretend second mast (B) to be “roaming”
• Chop data from second mast (B) in subsets
  • 3 months
  • 6 months
• Extent subset (B) to full period by using MCP: linear regression, 30° sectors, residuals (WindPRO default settings)
• Compare resulting wind speed with real wind speed measured at B
• And the other way round...
Is this relevant?

Results:

• The bad news: Yes, there is an issue!
• The good news: There is not always an issue!
• The even better news: We can predict if there is an issue or not!
Background

Seasonality

Two locations can experience different seasonal variations even if they are

• close to each other (< 5 km)
• in benign terrain (delta RIX < 3)

This is fact is counter-acting the benefits of a roaming unit!
• Turkey
• Mast distance 3km
• Moderate terrain, maximum delta RIX 1.6%

15-12-2017
Background

How to find out?

- Plot ratio of top anemometers from each mast against time
- Describes variations in space and time: “Spatial seasonality”

Consequently, a roaming unit measuring less than a year will suffer from a seasonal bias when MCPed 😞
The BAD News

The short answer

- In some cases a roaming unit is not paying off at all
- Using WAsP results in similar errors (but is cheaper)
- Even if the roaming device measures for either 2 x 3 months or 6 months
- Errors in the order of 6% energy production
The Good News

... and the EVEN BETTER news
Not all sites are affected!

And even better:

We can predict, when it happens!
Example 1

Roaming device not beneficial
Example 2

Roaming device beneficial
Before considering a roaming RS measurement campaign:

- A roaming RS device might not deliver the reduction in uncertainty you expect
- Check Spatial Seasonality!

Contact us for a non-binding offer!
EMD Wind Consulting
wl@emd.dk