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Lidar Performance Results in Hot Weather, Dusty Conditions and Clean Air

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ZX Lidars' Australasian fleet operates in some of the harshest and most remote environments. This poster reviews the fleet's performance, drawing insights from a collective 450+ years of operation under the following conditions:

- **Remote locations (often several hours drive from the nearest town)**
- **Hot weather (frequently exceeding 40°C)**
- **Dry, dusty environments**
- **Heavy, tropical rainstorms**
- **Clean air conditions**
- **Market demand for high-height measurements**

Introduction

Wind Lidars, like the ZX 300, are becoming essential tools for providing high-quality finance grade wind data crucial for Energy Yield Analysis in wind farm development. Two key trends have emerged in recent years:

1. Increased Autonomy: Lidars are now being deployed at various times, locations and heights, unlike traditional met masts.
2. Remote and Challenging Locations: Due to constraints in more populated areas, project sites are moving to more remote and difficult-to-access locations.

These trends highlight the importance of continuous data delivery from Lidars. Interruptions can lead to extended campaigns or increased measurement uncertainty. Additionally, remote locations raise the cost and delay of site visits for repairs or maintenance. Therefore, it's crucial for developers to rely on Lidars that maintain high system uptime, even in harsh environments.

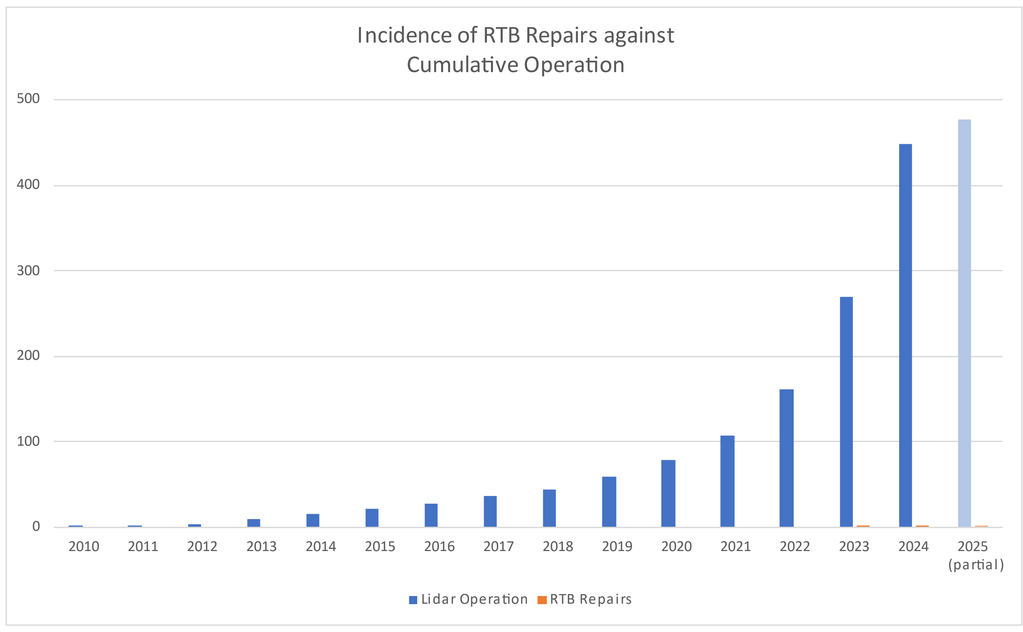
Method

To test Lidar reliability, the authors have chosen to consider the onshore vertical profiling wind Lidar from ZX Lidars (predominantly model ZX 300), in the Antipodean market. This was due in part to the large number of installed systems, with a combined operation period of 477 years, dating back to 2010. Additionally, the prevalence of extreme environments in this region serves as a stress test for the device as a whole. Observed conditions include:

- Temperature: 48 °C maximum with sustained periods above 40°C.
- Rainfall: Approximately 500mm rainfall recorded in less than 10 days during many campaigns.
- Dust: Often the most remote sites are the driest, with Australia's famous red earth being both cloying and corrosive.
- Clean Air: Large parts of the region are remote and unpolluted, with a low boundary layer that can trap aerosols at low heights leaving exceptionally clean air above.

Results

Cumulative Lidar operation is shown against interventions resulting in a break in the measurement campaign and Lidar movement off site (one occurrence in total).



Key Finding:

The single incidence of a Lidar intervention compared to the extensive operation of the fleet equates to a theoretical rate of almost 500 years of operation between interventions.

Observations

Included here are key observations from local Lidar installation teams that are crucial for minimising unscheduled interventions:

- Scheduled Site Visits : required every 6 months as planned.
- Washer Fluid Consumption : 15-25l per visit (water only, no additive)
- Weather Related impacts : No noticeable impact
- Dust or Dirt Ingress : Zero incidents, thanks to the IP67 Rating.
- Data Recovery: Consistently high, even in areas with clean air.

Conclusion

These results demonstrate the maturity of ZX Lidar technology, delivering reliability in even the harshest conditions as demonstrated in the Antipodean market.