

COMPARISON BETWEEN AQ510 SODAR AND ANEMOMETER TURBULENCE INTENSITY MEASUREMENTS

Poster based on Technical Note: T0332_03_TN_E02 by Nicolas Jolin, Nergica, 2019-03-21

Objective

- Compare anemometers and AQ510 Sodar TI measurements at different heights;
- Determine possible avenues for improvement of the use of AQ510 Sodar for TI measurements

Data Sources

1. Tower Data collected at Sentrex Wind's 203m validation/verification tower, located in Barons, AB
2. SoDAR Data collected from AQ510 WindFinder with measurement heights from 40m to 200m, located approximately 200m south of the validation tower
3. Data span: Sept 18 2018 18:00 to November 16th 2018 17:50
4. Total number of days: 58

Methodology

Turbulence Intensity Formula used:

$$TI = \sigma_u / U$$

TI: Turbulence Intensity 10 min (%)

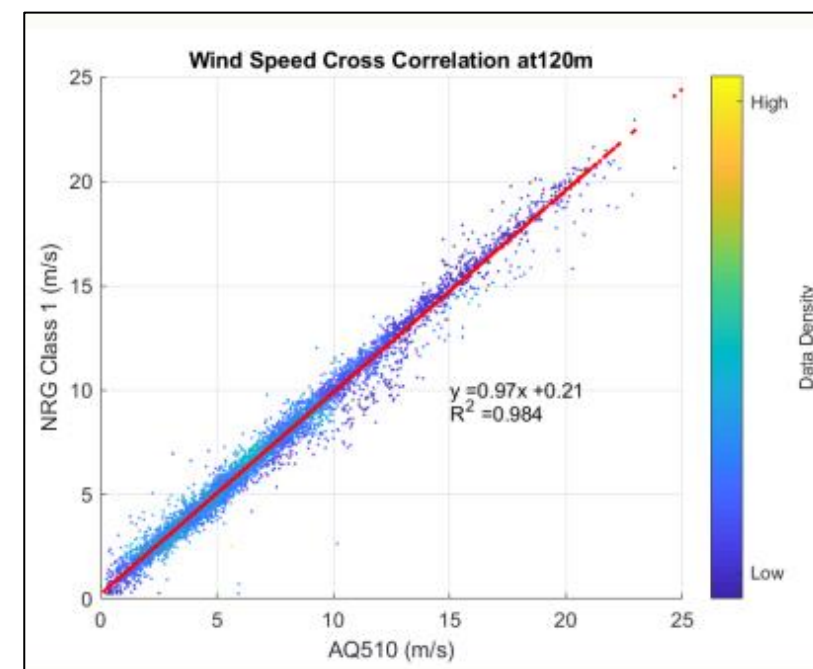
σ_u : 10 minute standard deviation of the horizontal wind speed (m/s)

U : 10 min horizontal mean wind speed (m/s)

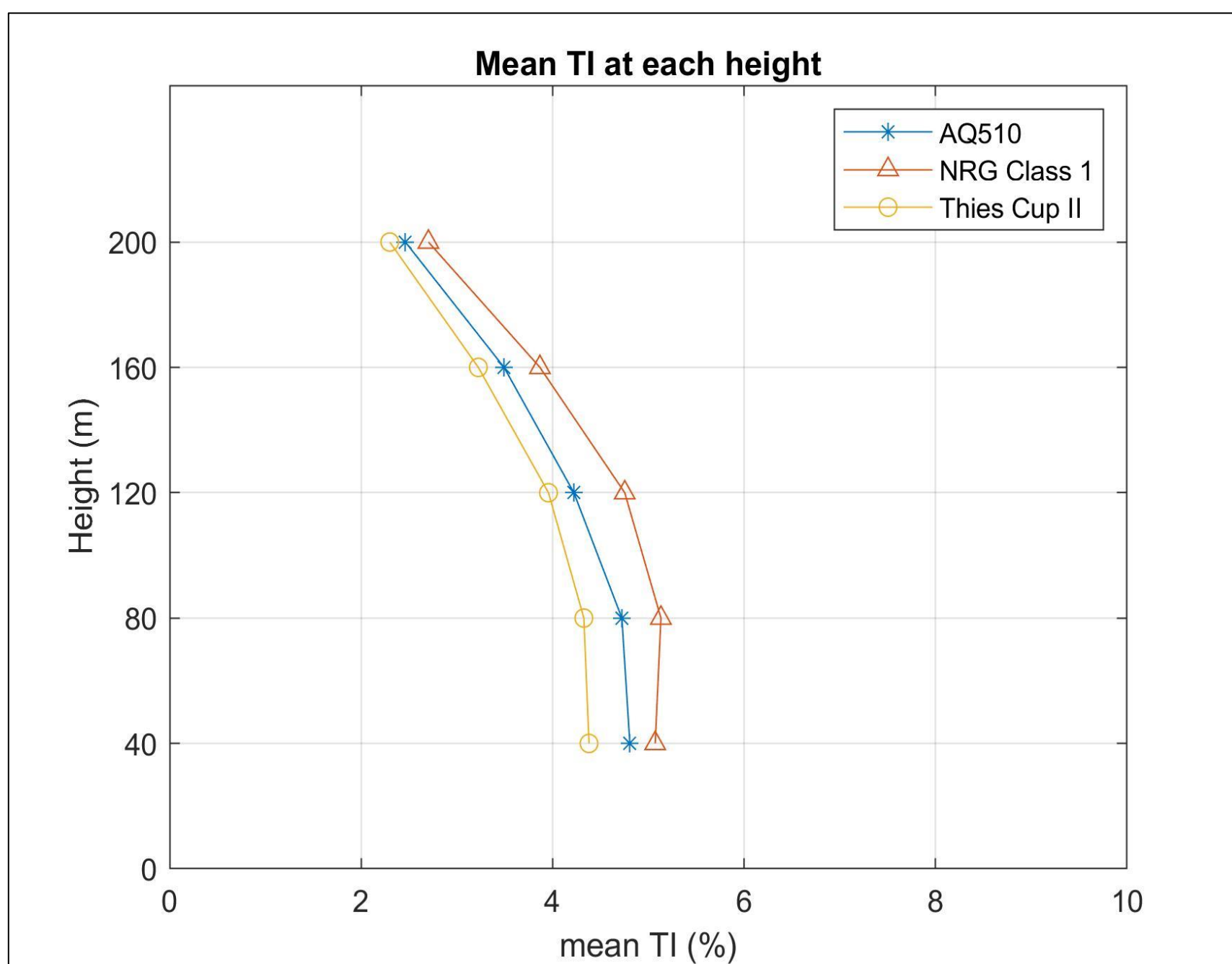
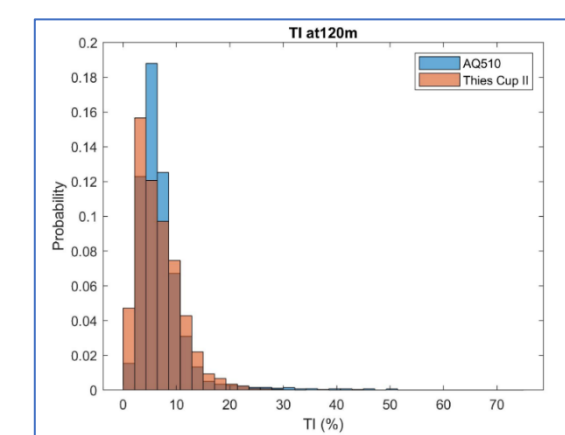
AQ510 TI values were compared to both anemometers at each of the following heights: 40m, 80m, 120m, 160m, and 200m

RESULTS AND CONCLUSIONS

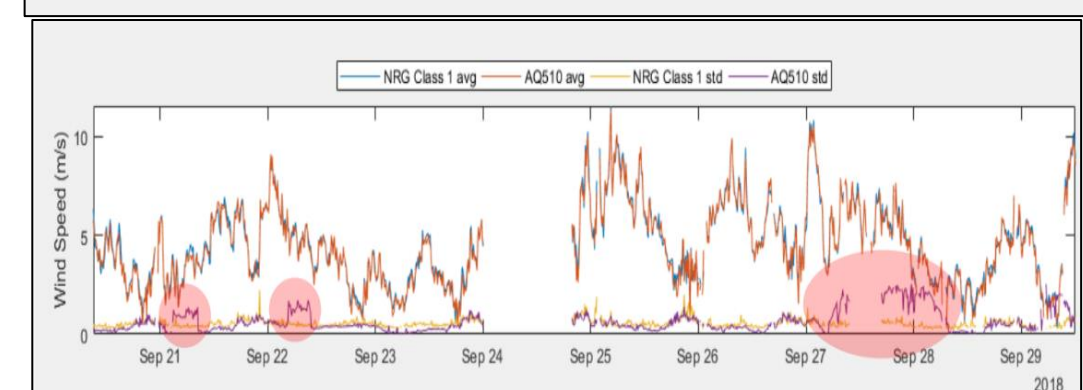
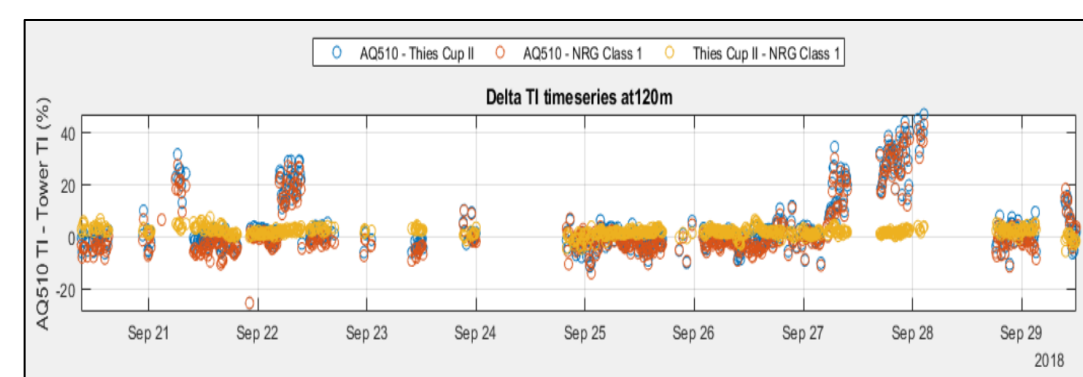
- The AQ510 performs well when we look at the general trend of TI values over time
- TI Histograms from the AQ510 and the anemometers are similar (useful for averaged TI values over a measurement campaign)
- Mean TI values over the period are very similar between the AQ510 and the anemometers
- The correlation trend line between AQ510 TI and anemometer TI is similar to the trend line between both anemometers
- There are higher differences in TI measurements from the AQ510 and the anemometers over low wind speeds
 - Linked to measurements principle
 - Cup anemometer inertia affects reading at low wind speeds and reduce the standard deviation compared to AQ510 measurements



Data Overview



The AQ510 performs well in measuring mean TI over the period, standing always between the NRG Class 1 and Thies Cup II



Examination of the time series (individual 10-minute points) showed that differences in standard deviations, rather than differences in wind speeds between the anemometer and the AQ510 had more effect on the calculated TI. It was noted in the investigation that this situation tended to occur at low wind speeds.