

Paris Session 2022



Comparison of provided wind speeds from a weather data company with the ones measured on a conductor

B2 PS2 Q14

How did determine circuit sections, when applied the DLR system to the whole circuit?

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Ampacimon
Smart solutions for a dynamic grid

Introduction

- When introducing a DLR system to an OHL, it is essential to properly select the critical spans to be monitored.
- It seems effective to use a series of historical data presumed by weather service providers or other methods for narrowing down the critical spans, verifying their accuracy.
- The most critical meteorological factor for DLR is wind velocity, so, wind velocities provided by a company were compared to observations and to presumptions obtained by another method in this study.

Wind speed measurement method

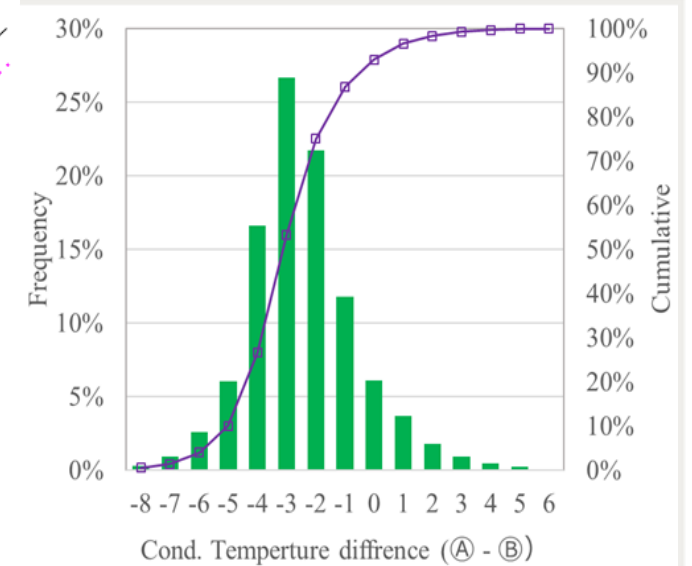
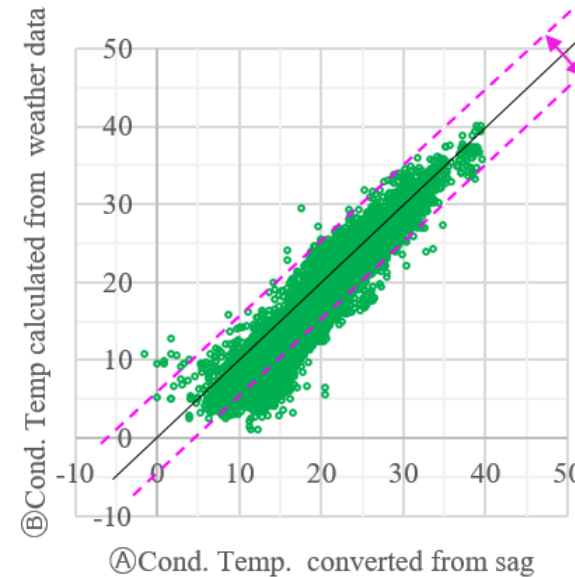
- Wind speed observation was carried out at a span of local OHL located in an open plain in Japan in 2021, installing an Ampacimon sensor on it.
- IACSR 160mm² (D=18.2 mm) has been installed in this span, of which the length is over 600 meters crossing a river.
- The Ampacimon sensor can estimate perpendicular wind speed to conductor by analyzing vibrations and applying “Strouhal equation for vortex-induced vibrations (when wind speed is less than 2m/s)” or “swing angle (when wind speed is more than 2m/s)”



Ampacimon sensor installed on the target span

Reasonability of the wind speed measured by the sensor

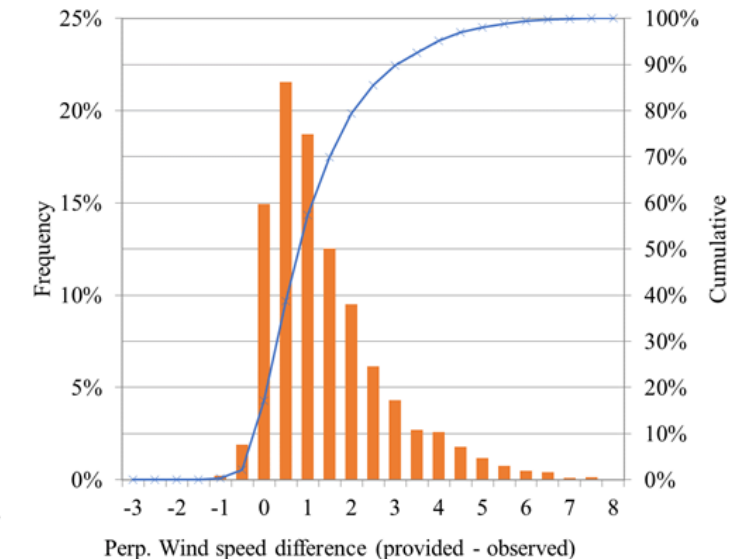
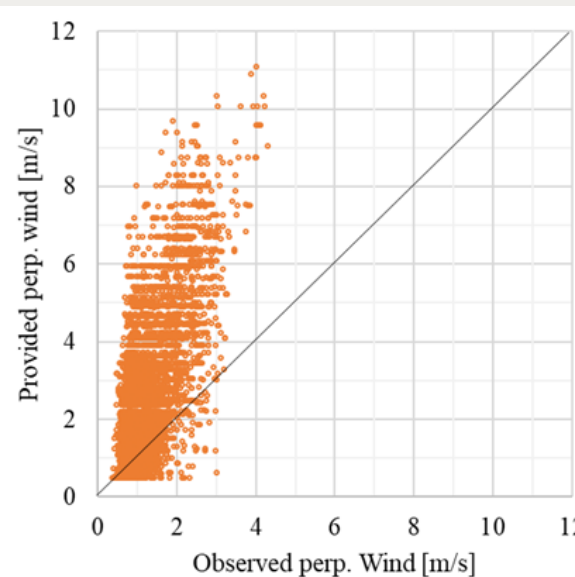
- The reasonability of the wind speeds obtained from the sensor has been verified by the fact that the sags calculated from the observed wind data are in good agreement with the observed sags.
- The reason cond. temperatures converted from the sags tend to be a little high (approx. 3°C) is that the state change equation from sag to temperature has been set conservatively.



Comparison of conductor temperatures obtained by two different ways

Comparison of provided and measured wind speed data

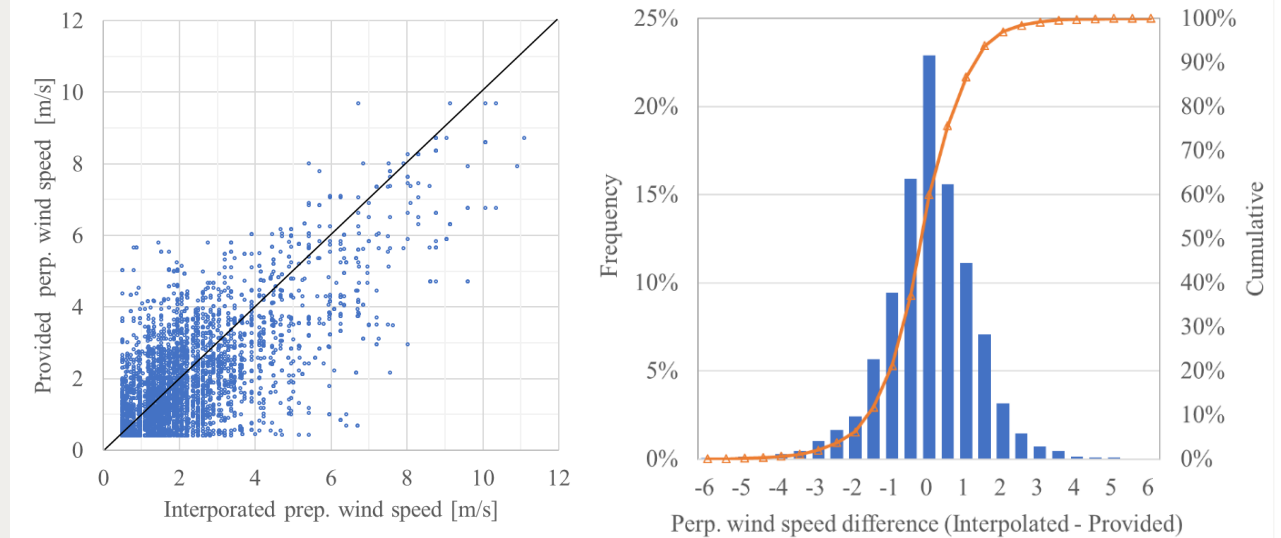
- Comparison of perpendicular wind speeds at the span between “observed by the sensor” and “provided by a weather service company” were performed.
- As a result, although the provided ones tend to be higher, over 60% of the difference data were less than 1 m/s, which suggests the reasonable quality of the data the company provides.



Comparison of perp. wind speed between observation and provision

Comparison of provided and interpolated wind speed data

- The authors independently estimated wind velocities employing the grid points data with 5km intervals from the Japan Meteorological Agency (JMA) and applying the bilinear interpolation method.
- The comparison of perp. wind speeds between “interpolated” and “provided by the company” showed a fair agreement, which also indicates the reasonable quality of the bilinear interpolation.



Comparison of perp. wind speed between provision and interpolation

Conclusion

- This study compared wind speeds between “measured by an Ampacimon sensor on a conductor”, “provided by a weather data company” and “estimated by a bilinear interpolation from the grid points data of the JMA”, indicating their good agreement.
- This suggests the reasonability of wind data provided by a weather data company or interpolated from reliable grid data such as those provided by JMA provides for narrowing down critical spans for introducing DLR.
- However, it should be kept in mind that this study picked up a span located in an open plain where wind velocities are relatively easy to estimate due to few obstacles.
- Therefore, further consideration and real measurements seem necessary when adopting estimated wind speed for narrowing down critical spans in the area with complex topography.