

# IPID4all Internship Research Exchange with University of Oldenburg

## Feedback report

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Wind Energy

### Introduction

The main task during the exchange is to get experience in analysing wind mast data and polish the data analysing techniques. With data provided by Hamburg wind mast, we have the ability to plot wind rose diagram at different altitudes, also, temperature data helps us to understand stability problem in atmosphere turbulence issue. Regarding the data analysing technique, for example the synchronization which enables us to deal with missing data in data base.

### Research Undertaken

The main task is to help the researchers in ForWind to analyse the measured meteorological data. First, I have to plot the wind rose diagrams at different altitude, shown in Figure 1 and 2. In addition, wind speed profiles in different seasons were plot which is presented in Figure 3, though the profile is meaningless. The reason is that the wind comes in different directions, the mean value calculated without considering direction is physically meaningless. The last analysis is the stability investigation in seasons. The stability of the atmosphere reveals the mechanism of the atmosphere turbulence. This is important as the wind turbine design, especially in the rotor blades. From the turbulence intensity, seen in the Figure 4 (a), evidently, the intensity in winter time is considerably lower than other seasons. In addition, the temperature difference between high altitude and ground plays important role in stability analysis, shown in Figure 4 (b). The difference is significant in both summer and spring times. Those results have good agreement with historical meteorology data.

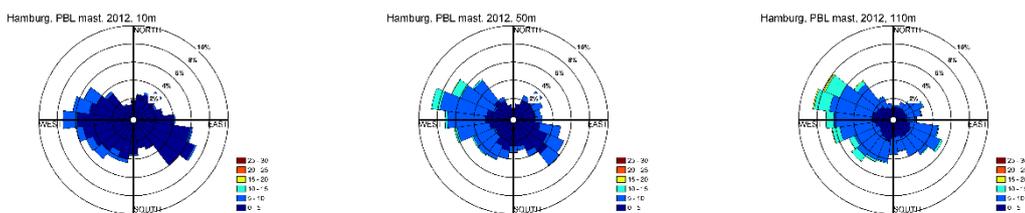


Figure. 1 The wind rose diagram at 10m, 50m, and 110m

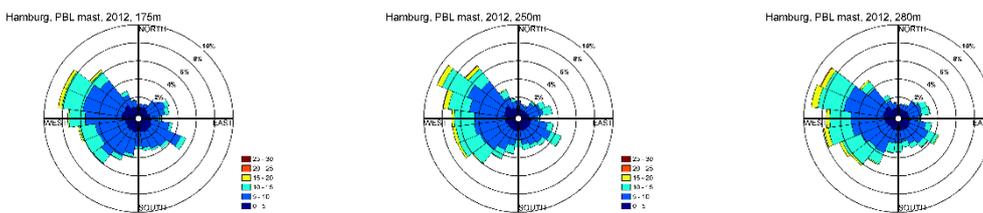


Figure. 2 The wind rose diagram at 175m, 250m, and 280m

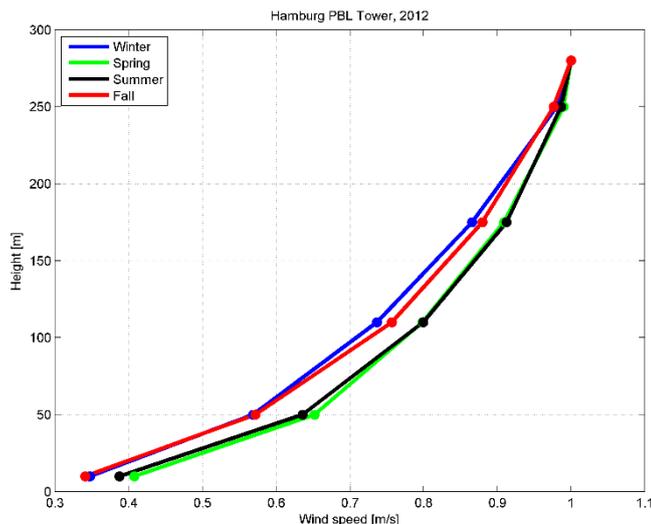


Figure. 3 The seasonal wind speed profile

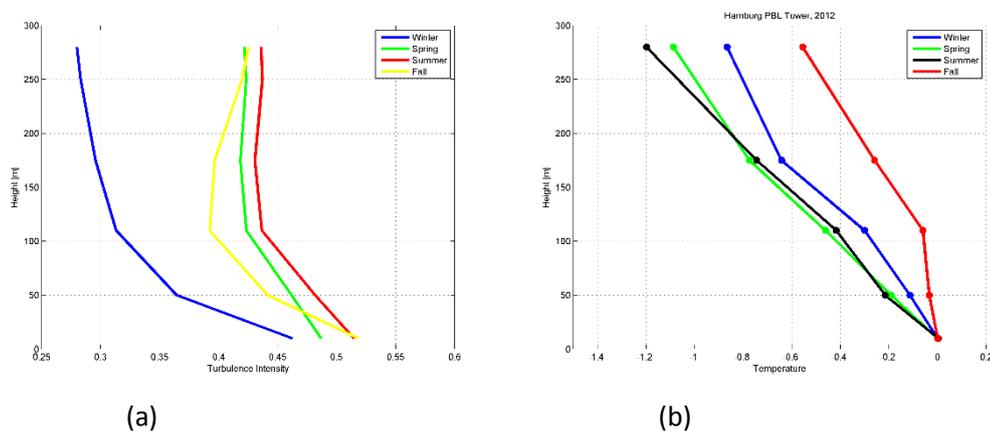


Figure. 4 (a) The turbulence intensity in seasons (b) the temperature difference

**Personal Experience**

What I'd like to emphasize is the data processing techniques learned during the exchange. The professional researchers in ForWind showed many useful tools to me, like the synchronization, really help a lot. Also, some experiences in analysing meteorology phenomenon were exchanged between the members in ForWind.

Besides, I had a great experience in Germany culture. The one month stay in Oldenburg and adventure in other cities like Hamburg and Bremen, make me understand the real German daily life.

**Conclusions**

During the exchange what I have learned is not only the professional knowledge in meteorology but the culture in Germany. In my opinion, the meaning of the exchange should not limited in academic achievement. Indeed, I learned a lot from the researchers in ForWind, those professional knowledge do help us in the future development and research. While the well-built relationship between people is even more important. This relationship between two groups of research institutions hopefully improves the further cooperation in the future.

**Outlook**

Regarding the future outlook, for me, it's possible to seek an opportunity study for PhD in the University of Oldenburg or other ForWind associated universities in Germany. In addition, there were a summer school held by ForWind in NCKU last year, and we receive constructive feedbacks from students and professors in NCKU. It is looking forward that the similar event can be held in the future.