The authors would like to thank the reviewer for the valuable comments provided. The comments are answered below and the changes to the paper will be highlighted in yellow, while the changes which common to all reviewers are highlighted in light blue.

1. **Table 1 and 2 do not give enough information. For example, 'Data' in Table 1 needs to list the specific parameters instead of just highlighting the data interval.**

Tables 1 and 2 have been modified as follows:

- Table 1:
  - LiDAR instrumentation type
  - Type of data measured by the LiDAR
- Table 2:
  - Met station instrumentation.

A reference to the LiDAR instrumentation has been included in line 239:

(https://www.zxlidars.com/wind-lidars/zx-300/, n.d.)

The tables 1 and 2 are shown below with the modifications to the tables being highlighted in yellow.

Table 1: Candidate Site parameters (Cordina, et al., 2017).

Station Name	Qalet Marku LiDAR Station
LiDAR Type	ZephIR 300 (https://www.zxlidars.com/wind-lidars/zx-300/, n.d.)
Cone Angle, **LiDAR aperture height above the tower rooftop.**	60° 1 m
Measurement height, above the LiDAR aperture window, m	80m
Data	Average hourly wind speed, wind direction, atmospheric pressure and relative humidity.
Data range	1st July, 2015 – 31st December, 2016
Geographical Coordinates	$35.946252°N, 14.45329°E$
Average tower rooftop height above surrounding ground level	10 m
Height of base of tower above sea level	6 m

Table 2: Reference Site parameters (Malta International Airport).

Station Name	Luqa MIA Weather Station
Measuring Instruments	Wind – Cup and vane Digital temperature probe Digital Barometer.
Data	Average hourly wind speed, wind direction, air temperature, atmospheric pressure and relative humidity.
Mast height	10 m above ground

	Height of site above sea level	$78\,m$
	Geographical Coordinates	$35.85657°N, 14.47676°E$

2. On line 179, 'While MCP methodologies have been developed for wind speed, they cannot be used directly for predicting wind direction.'. Could you explain this?

Nothing has been found in literature on Measurement-Corelate-Predict techniques which explicitly mentions prediction of wind direction at the candidate site. A reference on the use of vectors was found in a presentation by Bosart and Papin (Bosart & Papin, 2017), which showed a way of using a regression methodology to predict the wind direction, by breaking the wind speed vector into its respective components. MCP methodologies are normally used to predict the wind speed magnitude at the candidate site, not the direction. The methodology used creates a regression model using the wind velocity vector components to predict the wind vector components at the candidate site, hence deriving the wind direction. Bosart and Papin's method is adapted, in this paper, to MCP methodologies.

This clarification will be included in the paper at line 197 as follows.

"While MCP methodologies have been developed for wind speed, they cannot be directly used for predicting wind direction. Nothing has been found in literature on Measurement-Corelate-Predict techniques which explicitly mentions prediction of wind direction at that candidate site. The use of wind speed vectors is a way of using a regression methodology to predict the wind direction, by breaking the wind speed vector into its respective components. MCP methodologies are normally used to predict the wind speed magnitude at the candidate site, but not the direction. Wind velocity may be negative (if one considers it as a vector) and the MCP methodology normally considers the positive value of the wind, i.e. magnitude. The methodology used creates a regression model using the wind velocity vector components to predict the wind vector components at the candidate site (Bosart & Papin, 2017)."

3. On line 243, you said 'SSTEP 1 – the various MCP methodologies are used to compute the MCP model. This is done using wind speed and direction data at a candidate and reference site for the year 2016'. However, the paper lacks the description of the modelling. For the regression model, how many inputs are you use? Are these MCP models one-step ahead prediction model? What are the other settings in these models? For example, how many hidden layers are there in the ANN and what type of hidden neurons are selected. If the modelling information is provided, it will be clearer and easier to understand.

The MCP methodologies used in this paper are described by (Mifsud, et al., 2018). The figures reproduced below are from the reference and show a description of the ANN model used for the regression between the candidate and the reference site.

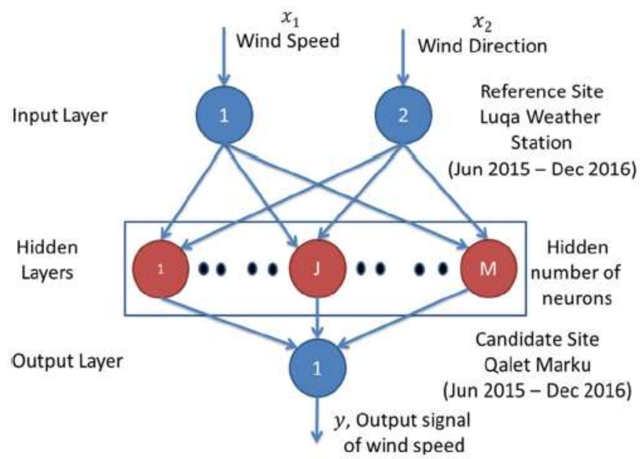

Fig. 7. Model used for Artificial Neural Network for regression between the reference site and the candidate site.

Table 6
Characteristics of the ANN used to compute the regression between the wind speed and direction at the reference site and the wind speed at the candidate site.

Number of inputs	2	Wind speed in ms^{-1} and wind direction in degrees, at the reference site (Luqa Weather Station).
Number of outputs	1	Wind speed in ms^{-1} at the candidate site (LiDAR)
Number of layers	3	
Number of neurons in layer	30,30,10	
Training methodology.	Levenberg-Marquardt algorithm	
Percentage of points used for training.	70%	
Percentage of points used for verification of model	15%	
Percentage of points used for testing of model	15%	

The Multiple Linear Regression (MLR), Artificial Neural Network (ANN), Decision Trees (DT) and Support Vector Regression (SVR) models used for the prediction of wind speed, use wind speed (magnitude) and wind direction (in degrees) as input, and the wind speed at the candidate site as the target data to train the model. The models are created using 2016 wind data and 2015 wind data at the reference site is fed into the model to predict the 2015 wind speed at the candidate site.

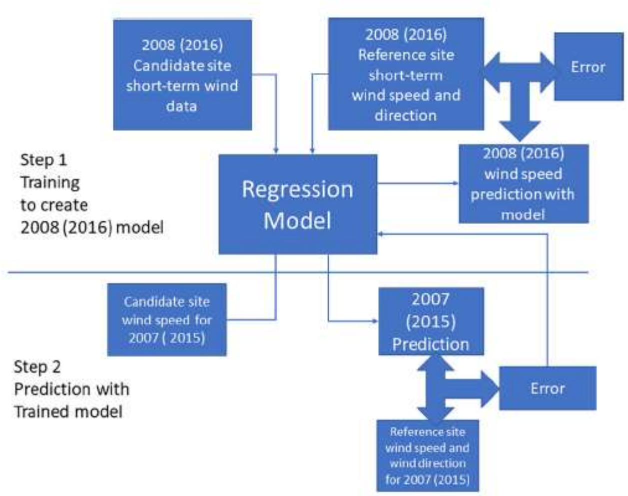

Fig. 6. Steps for constructing the regression model using 2016 data and predicting the 2015 wind speed.

The reference paper describes the MLR, Decision Tree (DT) and the Support Vector Regression (SVR) models. The data and methodologies are the same for this paper. The paper also describes the mathematical theory of the MCP methodologies and how they are applied to predict the wind at the candidate site.

MCP models are not one step ahead prediction models.

The same model structure is used for the prediction of wind direction. The input training data in this case is the vector component in the North or East Direction at the candidate site and the output of the model is the respective component at the candidate site (for 2016). The reference site data for 2015 is then run through the model to predict the north and east components of the wind. The wind direction is then derived.

Table 4 (below) will be introduced as a description of the models used in the MCP, and a description of the contents of the table will be included in line 293, as follows:

1. STEP 1 - The various MCP methodologies are used to compute the MCP model. For wind speed, the models are trained using wind speed and direction data at a candidate and reference site for the year 2016. For the wind direction the input training data is the wind velocity vector component in the North or East direction at the candidate site, and the output of the model is the respective component at the candidate site. The models are summarised in Table 4, below. Table 4 describes the inputs used to train the respective models, both for wind speed and wind direction. It also shows the parameters of the models and the respective algorithms used to train the model, such as Least-Squares for MLR and the Levenberg-Marquardt algorithm for ANN.

Table 4: Description of the regression methodologies used for the Measure-Correlate-Predict Method

MCP methodology	**Wind Speed**	**Wind Direction**
SLR	**Independent variable**: Wind speed magnitude at reference site. **Dependent variable**: Wind Speed magnitude at candidate site.	**Independent variable**: Wind velocity vector in North and East direction at reference site. **Dependent variable**: Wind velocity vector in North and East direction at candidate site.
	Methodology: Least Squares	
ANN	**Number of inputs**: 2 - wind speed magnitude, wind direction at the reference site. **Number of outputs**: 1 - wind speed magnitude at candidate site.	**Number of inputs**: 1 - Wind velocity vector in North and East direction at reference site. **Number of outputs**: 1 - Wind velocity vector in North and East direction at candidate site.
	Number of layers: 3 **Number of neurons in layer**: 30,30,10 **Training Methodology**: Levenberg-Marquardt Algorithm **Percentage of points used for training**: 70% **Percentage of points used for verification**: 15% **Percentage of points used for testing**: 15%	
DT	**Number of inputs**: 2 - wind speed magnitude, wind direction at reference site. **Number of outputs**: 1 - wind speed at candidate site.	**Number of inputs**: 1 - Wind velocity vector in North and East direction at reference site. **Number of outputs**: 1 - Wind velocity vector in North and East direction at candidate site.

	Number of Trees: 200 **Minimum Number of Leafs**: 5 **Methodology**: Tree Bagger Ensemble	
SVR	**Number of inputs**: 2 - Wind speed magnitude, wind direction at reference site. **Number of outputs**: 1 - Wind speed magnitude at candidate site.	**Number of inputs**: 1 - Wind velocity vector in North and East direction at reference site. **Number of outputs**: 1 - Wind velocity vector in North and East direction at candidate site.
	Methodology: Hyperparameter optimisation, **Kernel**: Gaussian **Solver**: Sequential Minimal Optimisation	

4. **You mentioned that the models were created using the data for the year 2016. Have your checked that the amount of data is enough to create a satisfactory MCP model?**

1. MCP are normally carried out using hourly wind data measured over the period of a year. This means that for 2016 there are 8784 data points, which is considered adequate and within the scope of the MCP methodology.

Lines 58 and line 261 have been modified accordingly:

Line 58:

The regression is carried out using concurrent wind speed and wind direction data at the reference and the candidate sites. The reference site is normally the closest meteorological station e.g. airports, and the candidate site is the location chosen for the windfarm. When the model is created, hence establishing a relationship between the wind speed at both sites, the long-term wind data at the reference can be used to predict the long-term wind speed at the candidate site.

Line 261:

The ideal number of data points used to create the MCP models is thus 8784, the number of hours in 2016. Following analysis and filtration of the wind speed data at the reference site, 98% of the data was considered as suitable for the creation of the model. The data at the reference site was all considered as suitable. Hence, the regression model was created using the concurrent 8616 wind speed and direction values. For the year 2015, 95.6% of the data was considered valid (the measurement campaign started on the 26th of June, 2015, hence there were 4368 hours of wind speed and direction measurement of which 4176 were valid data points).

References

Bosart, L. & Papin, P., 2017. *www.atmos.albany.edu.* [Online] Available at: www.atmos.albany.edu/.../2017/pptx/ATM305_Statistics_16Nov17.pptx [Accessed 3 March 2019].

Cordina, C., Farrugia, R. & Sant, T., 2017. *Wind Profiling using LiDAR at a Costal Location on the Mediterranean Island of Malta.* s.l., s.n.

https://www.zxlidars.com/wind-lidars/zx-300/, n.d. [Online] [Accessed 19 January 2020].

Mifsud, M., Sant, T. & Farrugia, R., 2018. A comparison of Measure-Correlate-Pedict Methodologies using Lidar as a Candidate Site Measuement Device for the Mediterranean Island of Malta. *Renewable Energy,* Issue 127, pp. 947-959.