



The effect of wind on flood occurred in Kerala - a comparative study at the two extreme ends of Kerala

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Abstract

This study examines the variation of weather parameters, wind speed and wind direction on the sudden climatic changes occurred in the Southern part of Kerala during the month of August 2018 resulted severe flood. The parameters affecting weather and climatic changes are usually solar flux, wind speed, wind direction, rainfall, temperature, soil temperature, surface wetness, relative humidity etc. In this work the wind speed occurred from December 2017 to November 2018 at the two extreme ends of Kerala, Kasaragod and Trivandrum are analysed. The climatic changes is found to have a correlation with the observed weather parameters

Keywords: Wind speed. Wind direction Weather, flood

Introduction

Atmosphere describes the mass of gases which surround planet or star. They act as an envelope around our planet and others. The earth's atmosphere is the air we breathe in our day to day lives and is regulated by living organisms in our planet.

Gaseous atmosphere surround planets because of the weight. Due to loss of gravity, all matter is drawn toward other matter and forms into large masses that are planets and stars. The denser and heavier solid materials end up in the centre of the mass and the lighter materials like water and gases ascend to the top much like oil drifting on water. Such gaseous layers are forming the atmosphere. [1]. Weather parameters are the parameters to fix weather. They are Solar flux, Wind speed, Wind direction, Rainfall, Relative humidity, Temperature, Soil temperature and Surface wetness. All these parameters are related to each other

Weather, as most commonly defined, occurs in the troposphere, the lowest region of the atmosphere that reaches out from the Earth's surface to 6–8 km (4–5 miles) at the poles and nearly 17 km (11 miles) at the Equator. Since almost all clouds occur and almost all precipitation develops in the troposphere, weather is largely confined to the troposphere.[2]

1. Wind speed

Wind speed, or wind flow velocity, is a fundamental atmospheric quantity caused by air moving from high to low pressure, usually due to changes in temperature.

Wind speed affects weather forecasting, aviation and maritime operations, construction projects, growth and metabolism rate of many plant species, and countless other implications.[3]

Wind speed is now commonly measured with an anemometer, but can also be classified using the older Beaufort scale, which is based on personal observation of specifically defined wind effects. On Beaufort scale of 0 to 12, 0 represents calm air, 8 is a gale with wind speeds of 63-74 kilometres per hour and 12 is a hurricane (over 116 kilometres per hour).

2. Wind direction

Wind direction is reported by the direction from which it originates. For example, a northerly wind blows from the north to the south.[3] Wind direction is usually reported in cardinal directions or in azimuth degrees. For example, a wind blowing from the south is given as 180 degrees; one from the east is 90 degrees

Climate is the statistics of weather. It is calculated by comparing the patterns of variation in temperature, solar flux, humidity, atmospheric pressure, wind, precipitation, atmospheric particle count and other meteorological variables in a given region over long periods of time.[4,5] Climate change may occur over long and short timescales from a variety of factors.

In Kerala, the south Indian state, severe floods affected of From 8 August 2018, due to unusually high rainfall during the monsoon season. Whether parameter like wind also might have influenced the sudden changes in the weather. It was the worst flood in Kerala in nearly a century. Over 483 people died in the flood. During the pre-monsoon period the temperature was higher compared to that of previous years. So the study of variation of wind speed is much important regarding such climatic changes

Materials and methods

The measurements, wind speed and wind direction for this work are collected from C.P.C.R.I Kasaragod and I.C.A.R CTCRI Trivandrum the two extreme ends of Kerala. The flood occurred in Kerala during August 2018 was severe at southern end of Kerala (Thiruvananthapuram) compared to that of northern end (Kasaragod). The data has been analysed and the graphs are drawn with the parameters, wind speed and wind direction using the software Origin8 [6]. The effect of flood on these parameters is explained here.

Results

WIND SPEED AND WIND DIRECTION:

The graph showing the relation between wind speed and wind direction is a polar graph

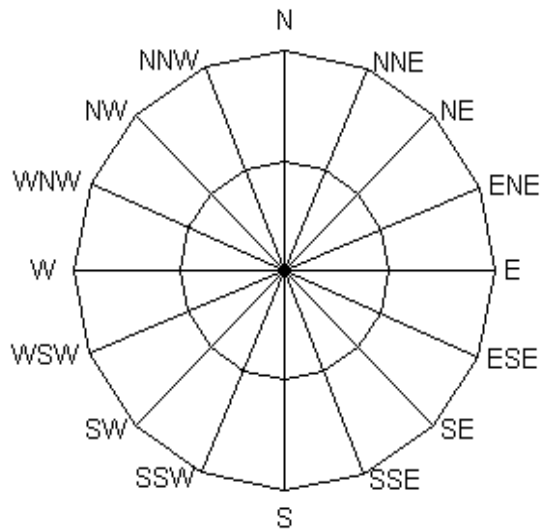


Figure 1

DIRECTION	ANGLE
N	348.75-11.25
NNE	11.25-33.75
NE	33.75-56.25
ENE	56.25-78.75
E	78.75-101.25
ESE	101.25-123.75
SE	123.75-146.25
SSE	146.25-168.75
S	168.75-191.25
SSW	191.25-213.75
SW	213.75-236.25
WSW	236.25-258.75
W	258.75-281.25
WNW	281.25-303.75
NW	303.75-326.25
NNW	326.25-348.75

Table 1

The graphs of each month from December 2017 to November 2018 are given below.

DECEMBER 2017

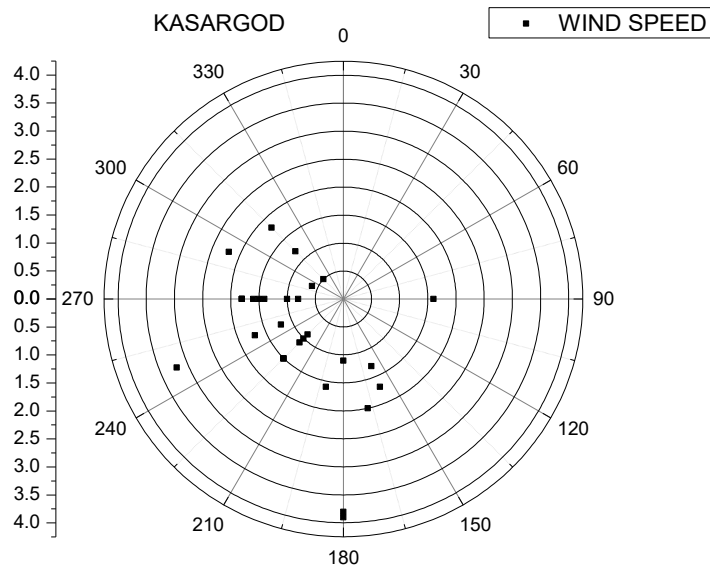


Figure 2

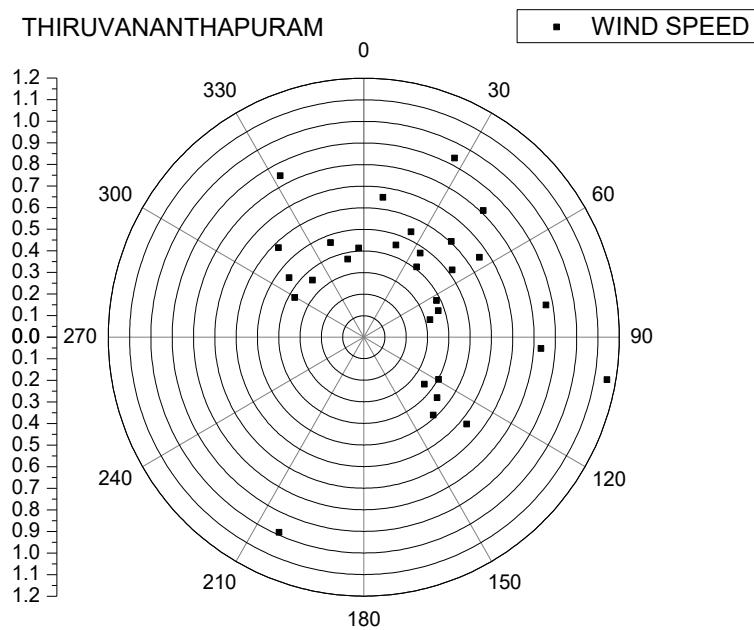


Figure 3

JANUARY 2018

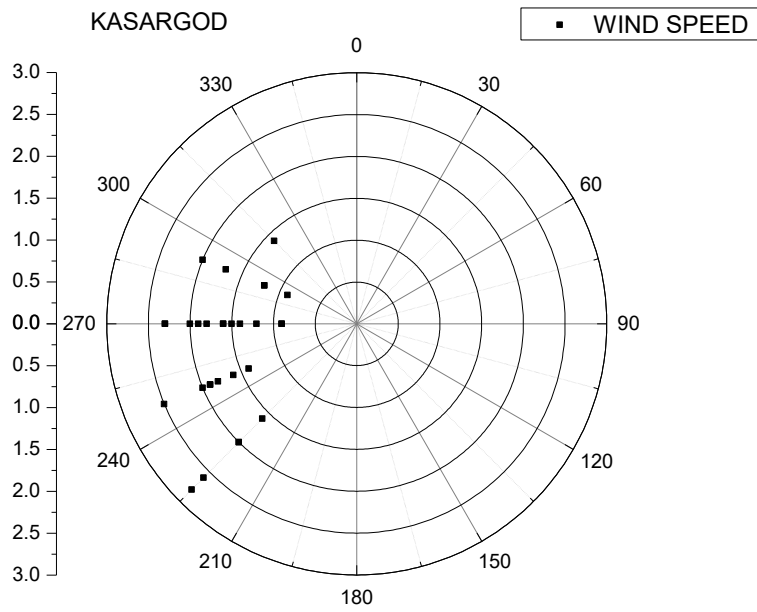


Figure 4

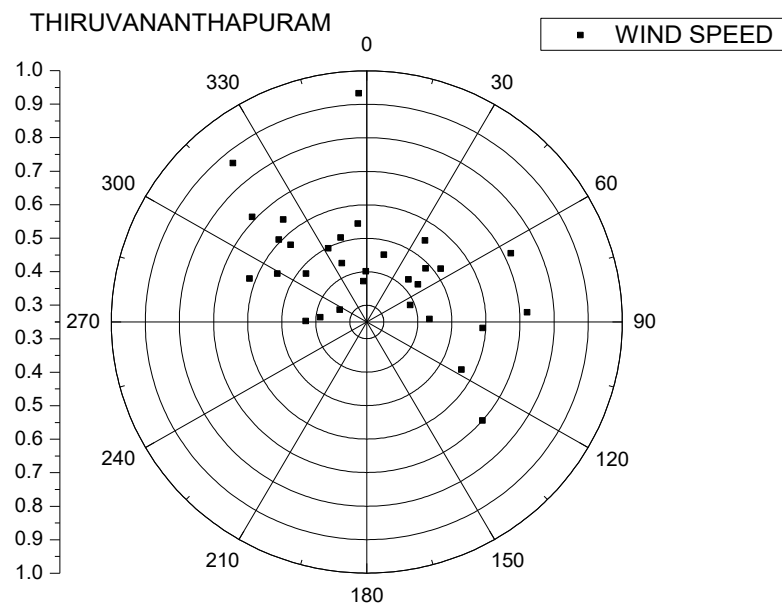


Figure 5

FEBRUARY2018

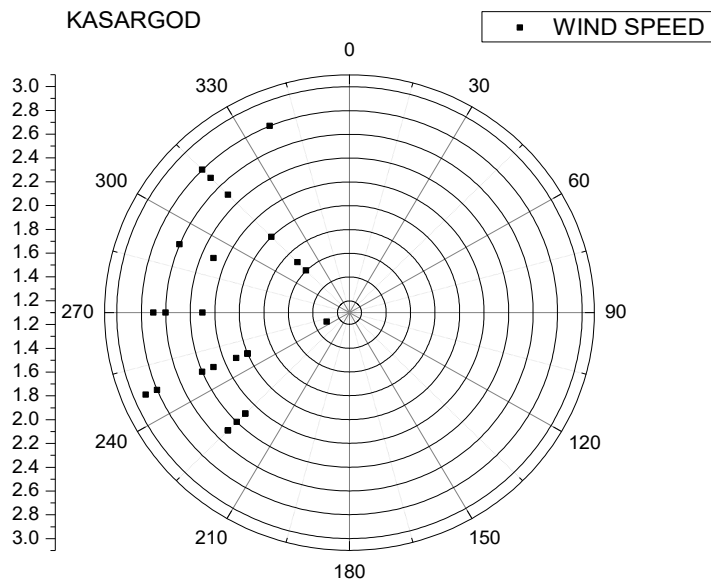


Figure 6

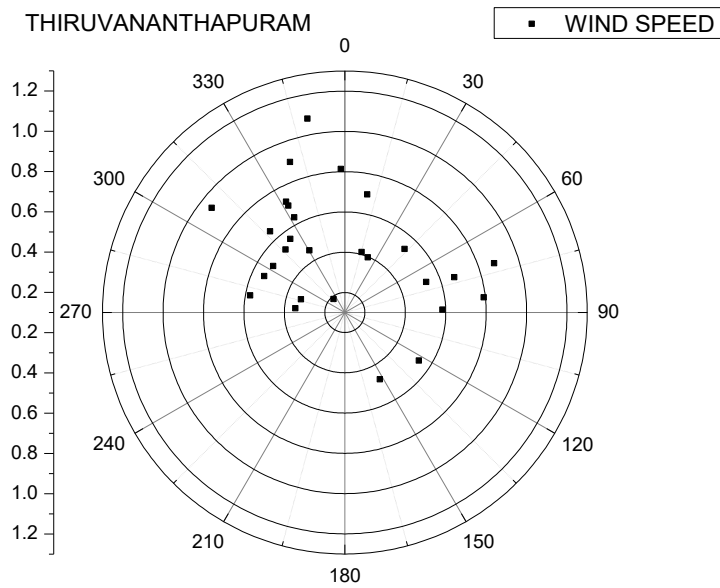


Figure 7

MARCH 2018

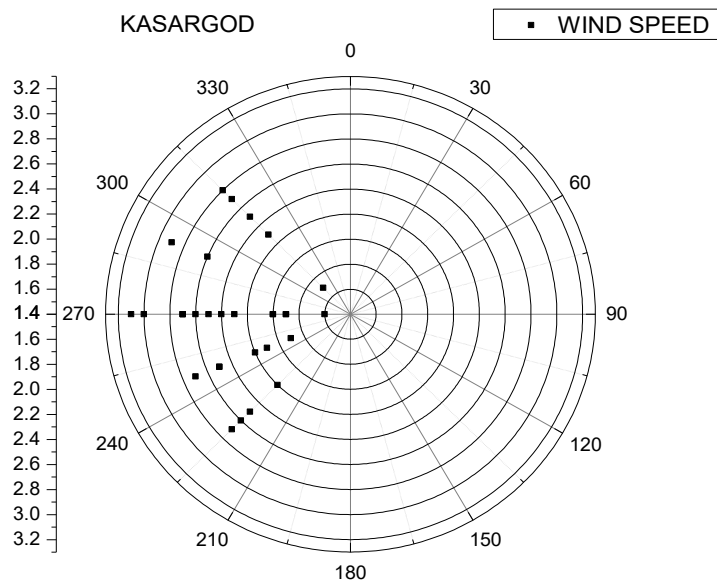


Figure 8

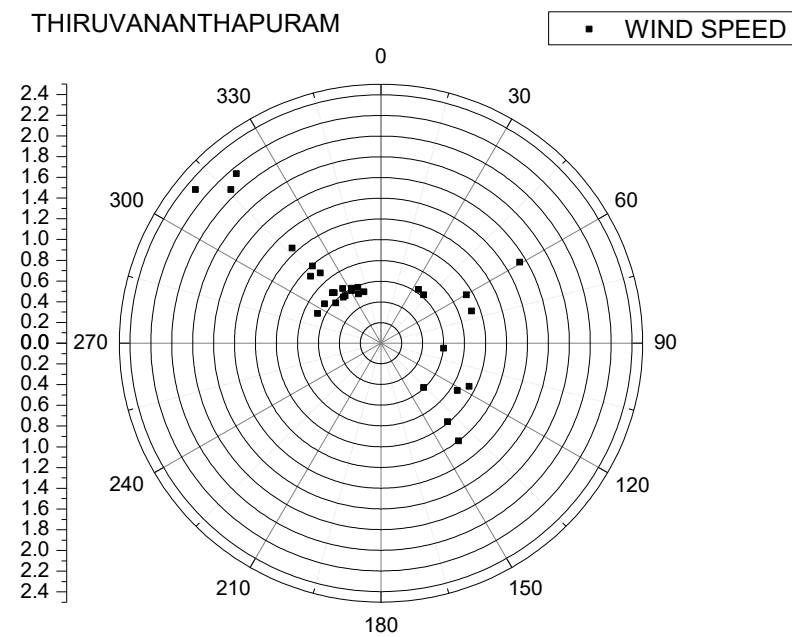


Figure 9

APRIL 2018

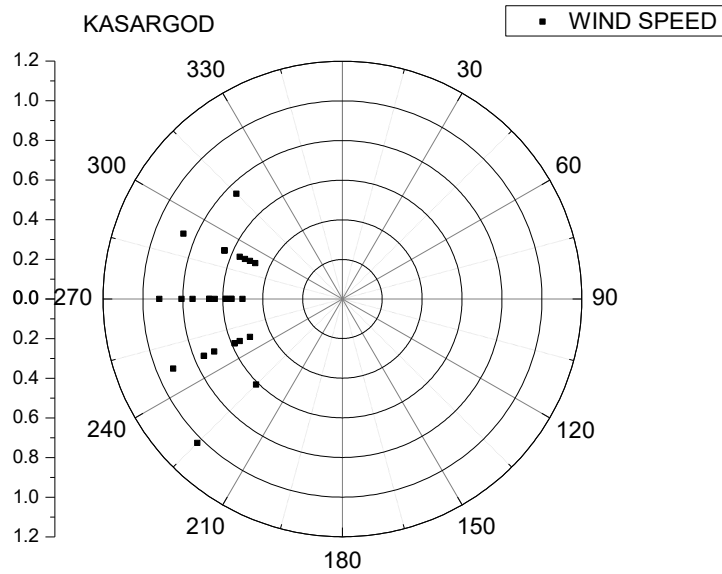


Figure 10

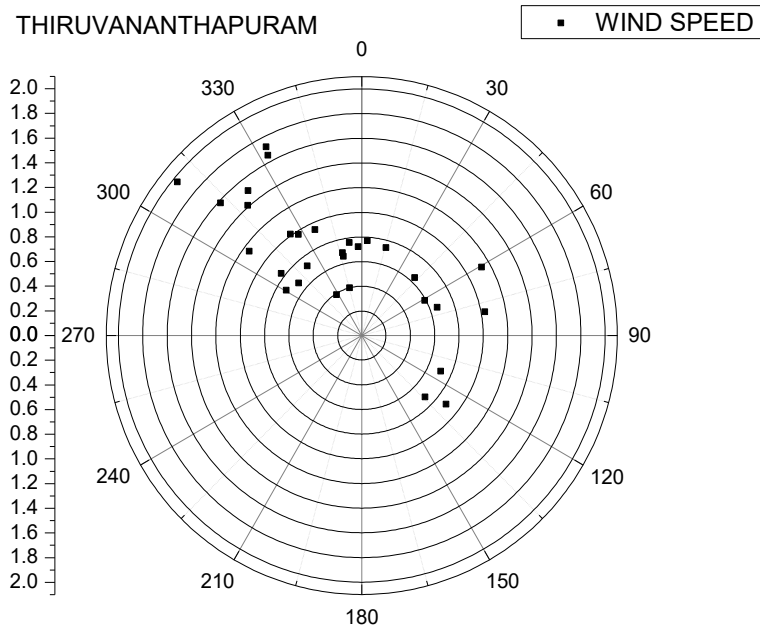


Figure 11

MAY 2018

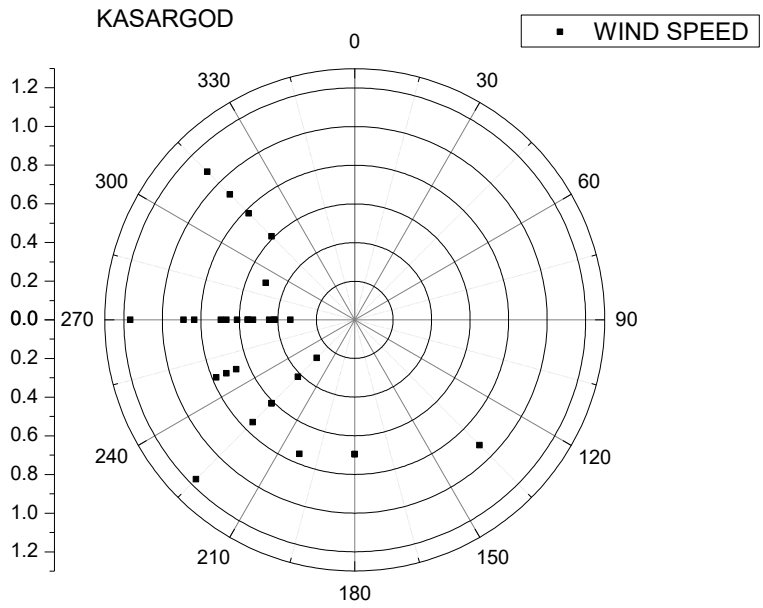


Figure 12

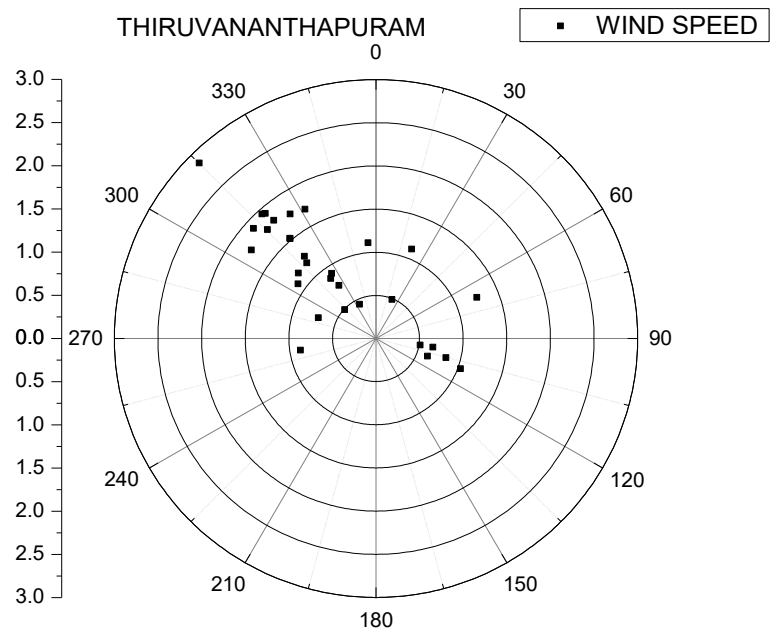


Figure 13

JUNE 2018

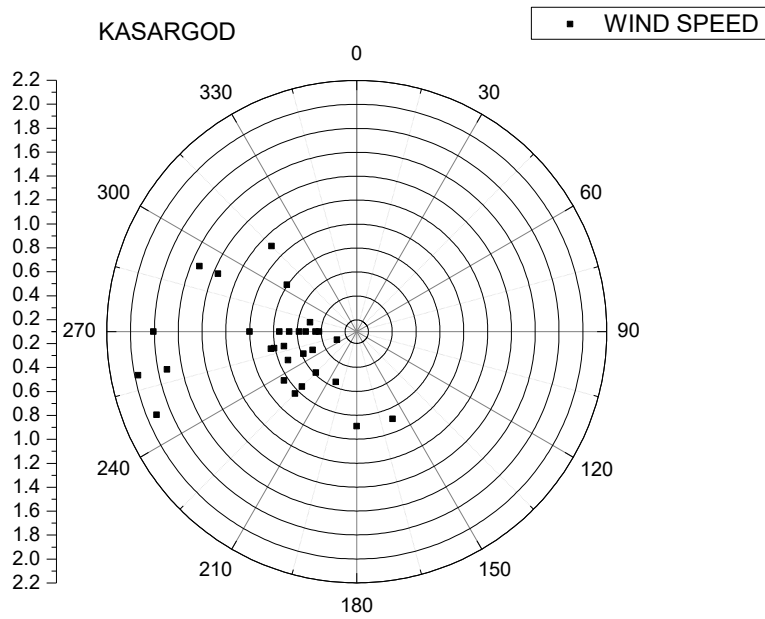


Figure 14

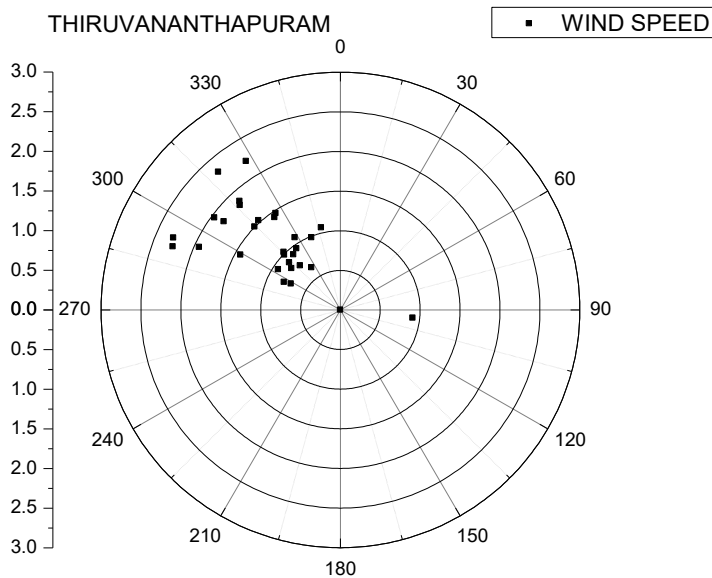


Figure 15

JULY 2018

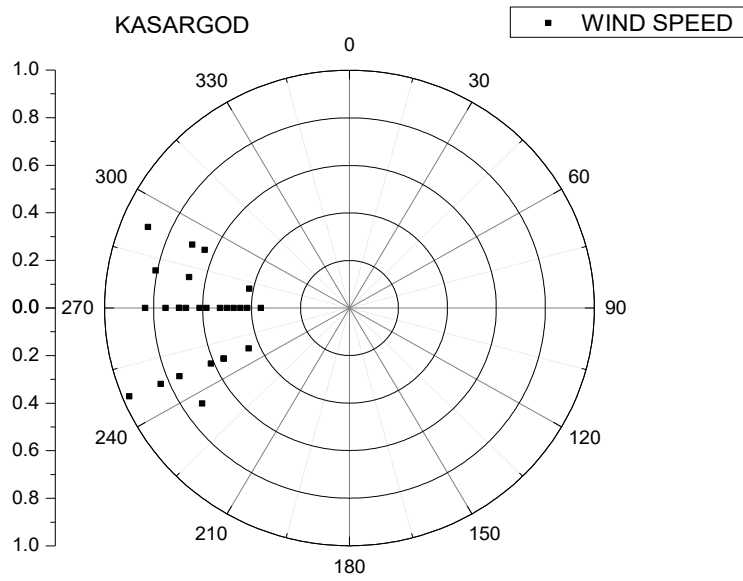


Figure 16

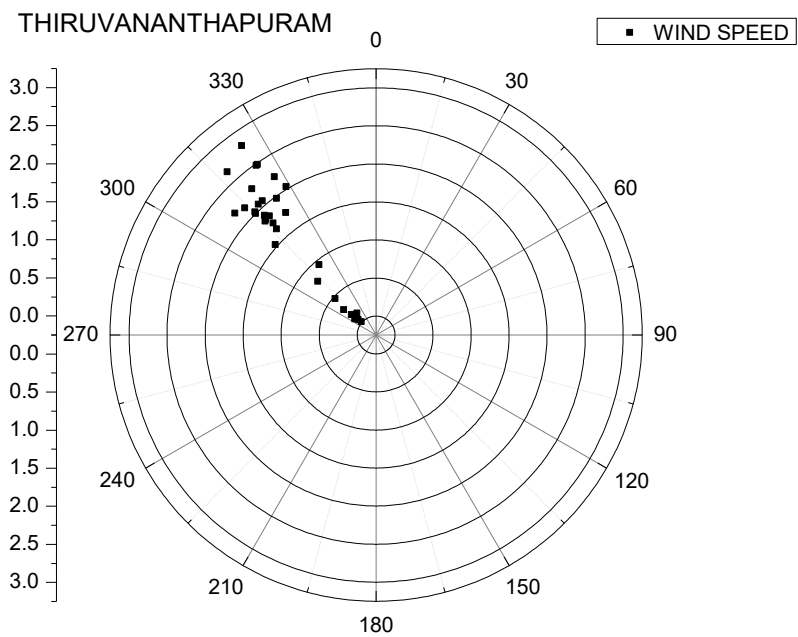


Figure 17

AUGUST 2018

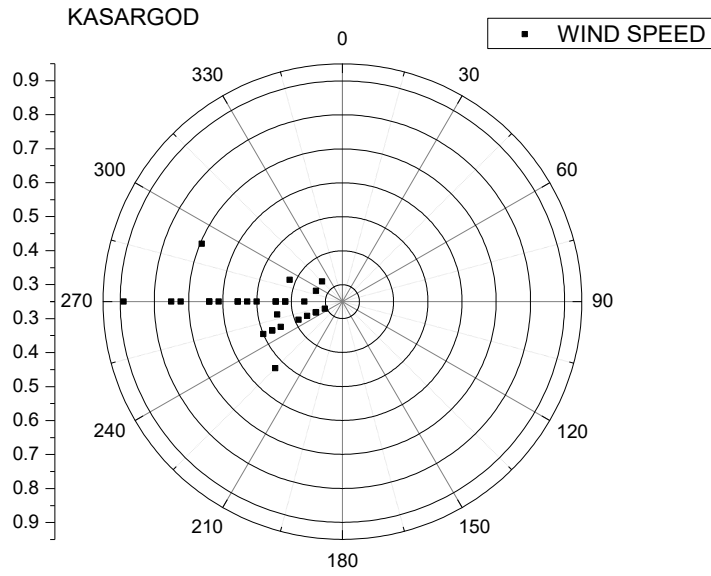


Figure 18

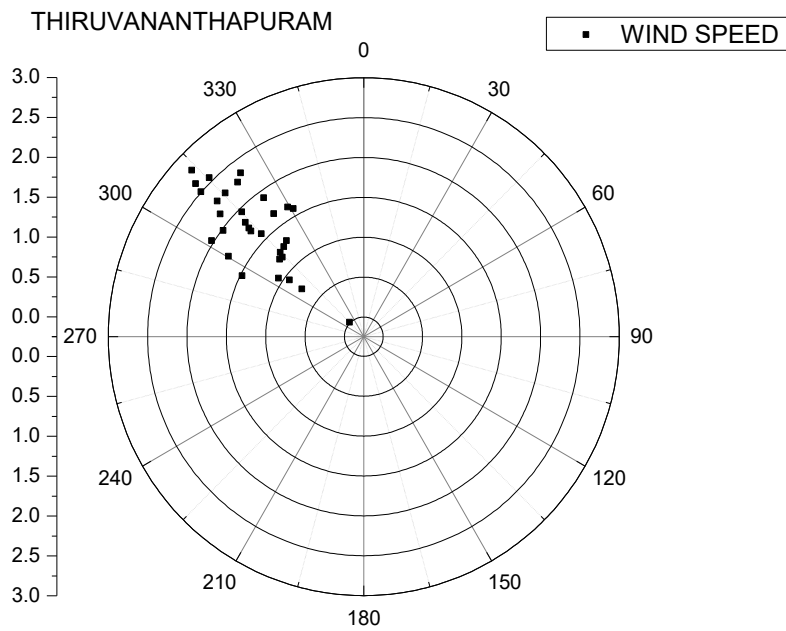


Figure 19

SEPTEMBER 2018

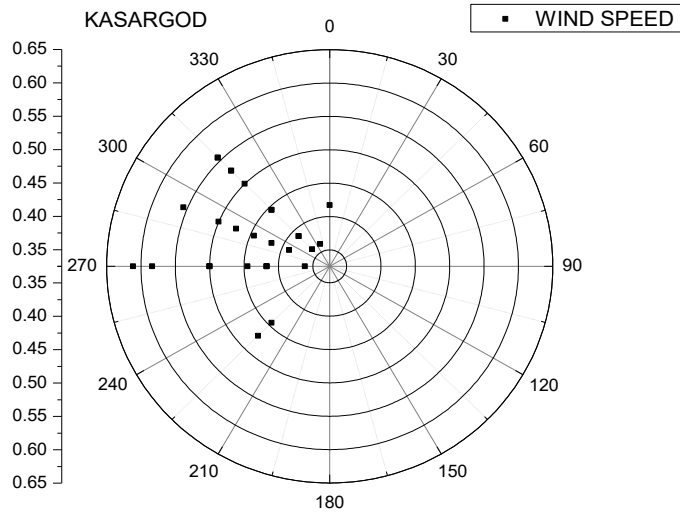


Figure 20

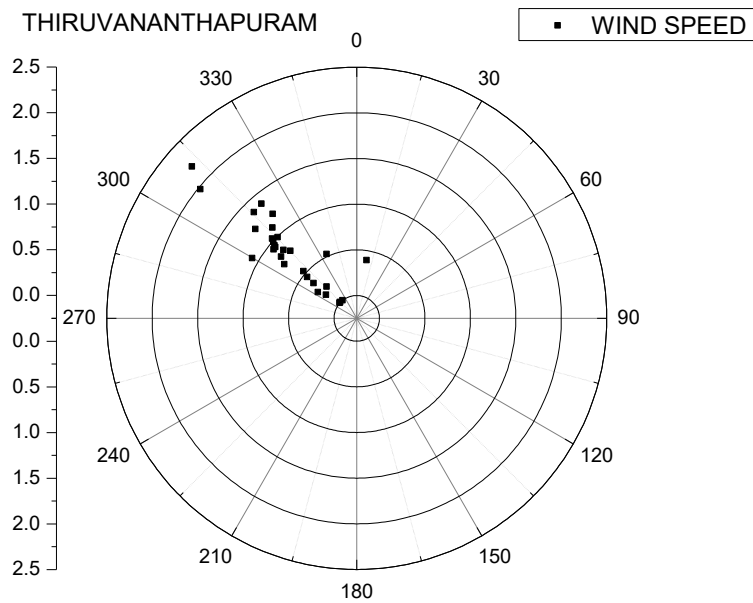


Figure 21

OCTOBER 2018

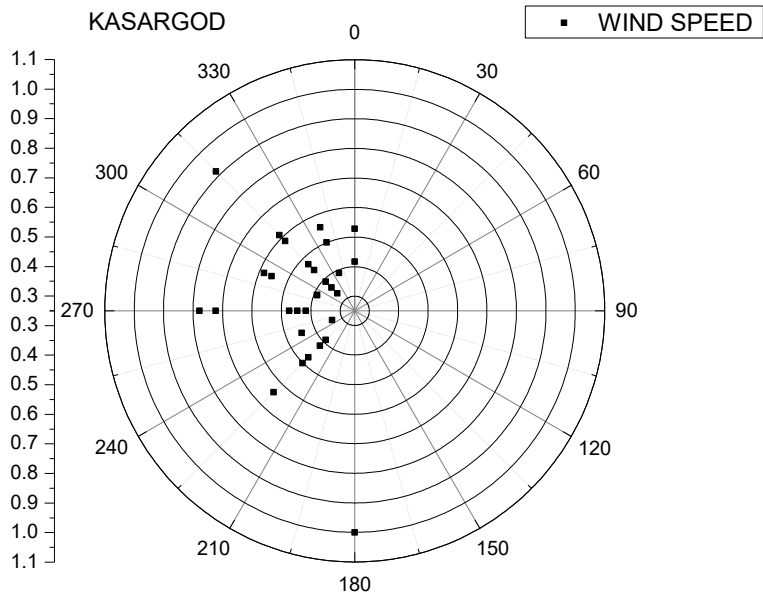


Figure 22

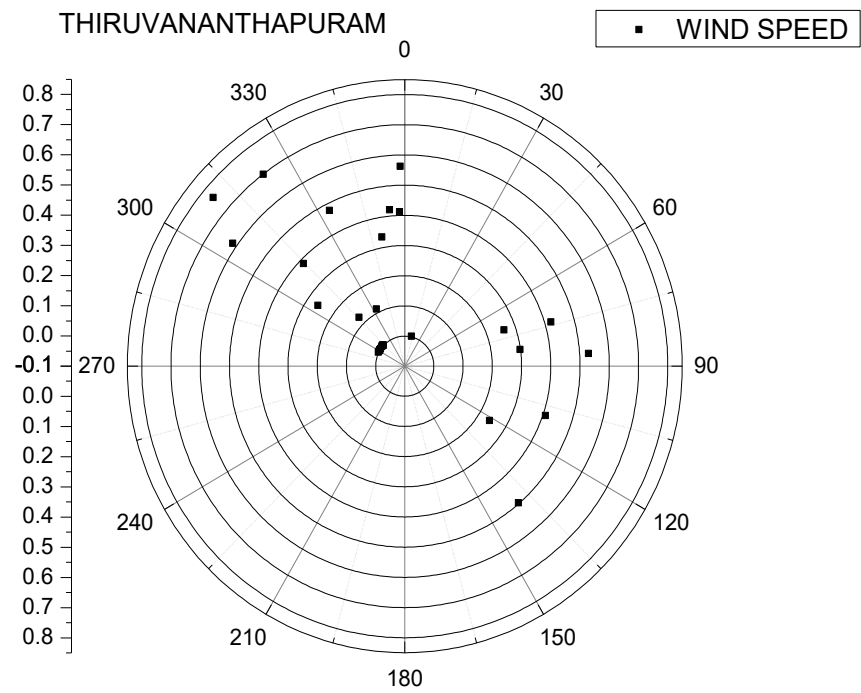


Figure 23

NOVEMBER 2018

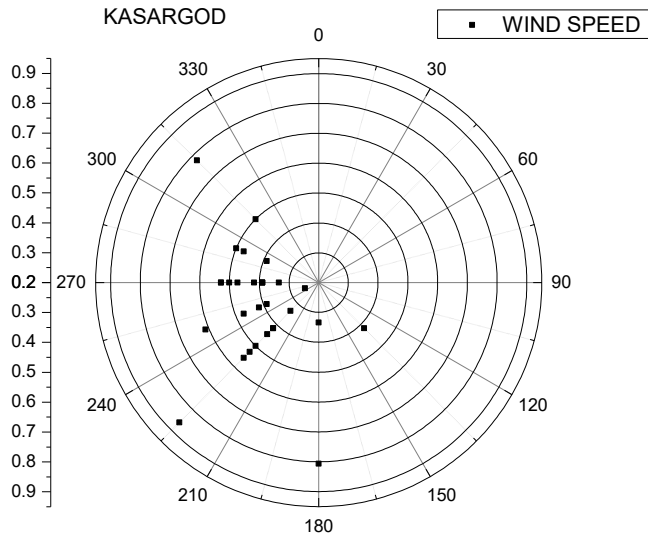


Figure 24

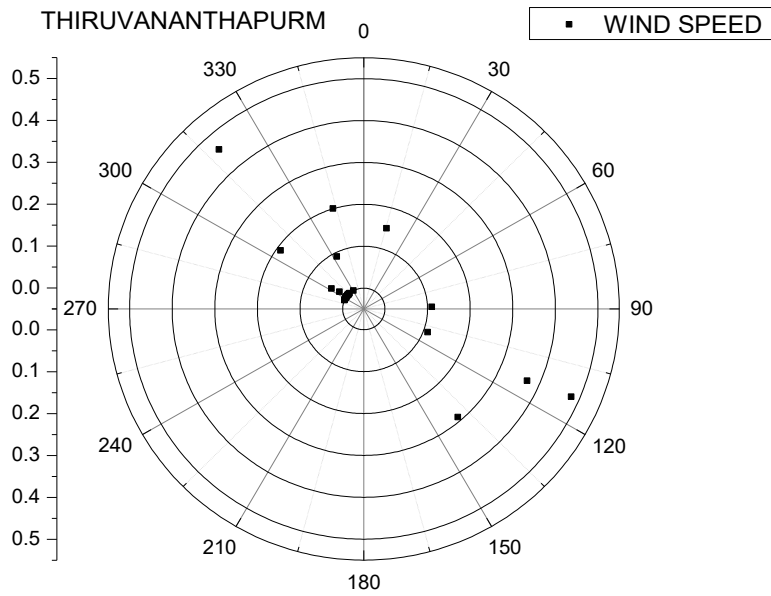


Figure 25

Comparison table

MONTH	MEAN WIND SPEED		MAX. WIND SPEED		MIN. WIND SPEED	
	KSD	TVM	KSD	TVM	KSD	TVM
DECEMBER 2017	0.4435	0.6374	1.08	2.63	0.138	0.322
JANUARY 2018	0.4812	0.5455	0.777	0.93	0.25	0.34
FEBRUARY 2018	0.6428	0.6064	0.777	1.08	0.3611	0.19
MARCH 2018	0.6702	0.9103	0.8611	2.31	0.4444	0.52
APRIL 2018	0.6592	0.9443	0.9168	1.96	0.4722	0.39
MAY 2018	0.6792	1.2186	1.1666	2.866	0.2778	0.438
JUNE 2018	0.8963	1.31	1.9722	2.32	0.2778	0.01
JULY 2018	0.6810	1.56	1.3055	2.8	0.3611	0.01
AUGUST 2018	0.4892	1.73	0.8888	2.77	0.3056	0.01
SEPTEMBER 2018	0.4638	0.79	0.5833	2.21	0.3611	0.00
OCTOBER 2018	0.5134	0.2527	1	0.761	0.3333	0.00
NOVEMBER 2018	0.4777	0.08	0.8611	0.48	0.25	0.00

Table 2

- The maximum wind speed at Kasaragod is in the month of June and it is 1.9722 m/s in the direction WSW-W. The minimum wind speed is in the month of December and it is 0.138m/s in the direction NW.
- The maximum wind speed at Thiruvananthapuram is in the month of May and it is 2.866m/s in the direction NW. The wind speed is zero in September, October, November.

CONCLUSION

From the analysis of data collected from two extreme ends of Kerala, it is found that during the month of February, the wind speed is maximum at Kasaragod whereas from March to September wind speed is maximum at Thiruvananthapuram. The high and continuous wind speed during these months may also be the reason for flood occurred at Thiruvananthapuram. But after these month wind speed at Kasaragod is higher than that at Thiruvananthapuram.

The importance of this study lies in the fact that the comparison of climate at two extreme ends of Kerala is done successfully on the basis of two weather parameters. As the weather forecasting may help to take precautions against the changes in the climate, more studies are needed in this sector.

By considering the above mentioned information the study can be treated as an initiative for the analytical studies of the meteorological data.

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