Madras Agric. J., 2019; doi:10.29321/MAJ 2019.000268

RESEARCH ARTICLE

Studying the Astrometeorological Relationship between Planet's Azimuth and Wind Speed Events

Rathika, K*, Dheebakaran, Ga, Panneerselvam, S, Patel Santosh Ganapati and Kokilavani , S
Agro Climate Research Centre, Tamil Nadu Agricultural University, Coimbatore - 641003

Received : 16th October, 2018
Revised : 6th January, 2019
Accepted : 6th February, 2019

ABSTRACT

Astrometeorology is a great science and gift from our ancestors known to humankind. Compared to statistical and numerical methods of forecasting, astrometeorology method has no time restrictions and weather could be forecasted for the next hour to a date far in the future. Wind speed is the weather parameter plays an important role in crop production. A study on the relationship between the wind speed events and the planet's azimuth was conducted at Tamil Nadu Agricultural University during 2017-18 as a part of the formulation of astrometeorological rules for wind speed events. Hourly wind speed observed between 2011 and 2016 from each one location from 31 districts of Tamil Nadu were correlated with the ephemeris developed for the same period in Alcyone ephemeris calculator. It could be concluded from the correlation study on individual planet azimuth and wind speed events that the azimuth range of 61 – 120 of all the planets and 240 – 300 had a good influence on wind speed. The 61 – 90 degrees azimuth of the Sun, Mercury, Saturn and Neptune had good influence on calm to light air wind speed events (0 – 12 km). The 91 – 120 degrees azimuth of all the planets had influenced moderately to heavy wind (19 – 45 km/hour). The Moon, Mars, Jupiter, and Neptune at 60 - 90 degrees azimuth had influenced the extreme wind speed events. The Moon, Mars and Saturn at 271 – 300 degrees azimuth had influenced the moderate to heavy wind (19 – 45 km/hour).

Keywords: *Astrometeorology, Wind speed, Planets Azimuth, Conjunction*

INTRODUCTION

Wind speed is one among the important weather parameters, has its own significance in determining the economics of agriculture next to rainfall. Information on wind speed in advance is much needed in decisions such as scheduling foliar spray, fertilizer broadcasting, sprinkler irrigation, post-harvest winnowing and protecting crops from heavy wind speed*, etc*., (Sivakumar and Korsten,2006). The evapotranspiration, pollination and CO_2 mixing ratio for photosynthesis are completely depended on wind speed. To a great extent, wind speed events remain and dominate our everyday activity. Forecasting wind speed has a vital role in many agricultural activities and is essential to the given idea for the expected variability in wind speed and direction. In recent years, a significant amount of research has been focused on forecasting the wind speed to reduce the risk of heavy winds.

In tropical regions like India, the weather prediction is more challenging one due to its nearness to equator, which causes turbulent and highly variable weather. Trustworthy weather forecast is essential in various fields of applications such as agriculture, marine, transportation, communication, marketing, engineering works and wind energy production, *etc*. Research in atmospheric science and refinement tools such as radar and computer modeling have increased the ability of meteorologists to forecast the weather with high accuracy. At the same time, the truth is "more investment is required for research and development of forecasting tools". The forecasting accuracy is high for short periods rather than long term periods. In recent past, the international and national weather forecasting science community is searching for the alternate method to numerical weather forecasting, in which forecasting accuracy is still 60-70 per cent, even after the introduction of high-performance computing facility and new science logic.

There is a possibility of integration as numerical weather forecasting with statistical and astrometeorological outputs to derive hybrid weather

*Corresponding author's e-mail: rathikayelagiri@gmail.com

forecast with high accuracy (Dheebakaran*et al*., 2017).

Our ancient astronomers and astrologers made a systemic study on meteorology and India had glorious traditional scientific and technological knowledge in astrometeorology, the science dealing with planetary movement and weather. Commonly village level astrologers (pandits) were predicted the weather in higher percentage (Varshneya, 2008). The weather influencing the character of each planet, the strength of the planet and weather influencing angle of the planet are the major factors for the spatial and temporal variation in weather (Green, 2003; Riske, 2014; Varshney *et al*., 2011). Daily rainfall forecast through astrometeorology had the highest forecast accuracy for 74-87% and it could be a good option for alternate forecasting method to the numerical weather forecast (Dheebakaran*et al*., 2017).

In need of improving the accuracy of the weather predictions, the weather research organizations like IMD, ICAR, CRIDA and ISRO are now directing scientist towards Astrometeorology research. In Tamil Nadu Agricultural University, astrometeorological research is carried out from 2011 onwards to unveil the rules for hourly rainfall forecast using astrometeorological principles. In continuation, research on astrometeorological rules (azimuth, activeness and conjunction) to develop astrometeorological wind speed forecast was carried out during 2017-2018 and the relationship between wind speed events and azimuth are presented in this chapter.

MATERIAL AND METHODS

Study on astrometeorological wind speed forecast was carried out by correlating the wind speed events of a location with the planet position to the specific location. To minimize the spatial variability, each one location of all 32 districts of Tamil Nadu and to reduce the temporal variability, the period from 1.1.2011 to 31.12.2016 were considered for the study. Wind speed data was collected from Tamil Nadu Weather Network (TAWN) for the above period. The data were check verified manually and erotic or missing data were removed. The observed data were grouped in to seven categories viz., below 2, 2.1 to 6, 6.1 to 12, 12.1 to 19, 19.1 to 30, 30.1 to 45 and above 45 km/hour to identify astrometeorological rules for wind speed forecast. The categories and related wind speed events beaufort scale are given in table 1.

Ephemeris or position of planet or azimuth were calculated from the observer point using alcyone ephemeris 4.3v calculator, which is an accurate and fast astronomical ephemeris calculator covering the period 3000 BC to AD 3000. Azimuth of individual planets at the time of wind speed events was grouped into 12 azimuth frequencies viz., 0-30˚, 31-60˚, 61-90˚, 331˚-360˚. Based on this, the azimuth frequency that induces a particular wind speed category was calculated. The entire azimuth frequency calculation was performed in "TNAU Astromet soft". The formulae used for calculating the azimuth frequency was given below and expressed in percentage.

$$\text{Azimuth frequency \%} = \frac{\text{No. of times the planet positioned in the same angle during particular wind category}}{\text{Total number of wind events in the particular category}}$$

RESULTS AND DISCUSSION

Calm air

Results obtained for the influence of individual planet azimuth on hourly wind speed events below 2 km (2,72,437Nos.) were depicted in Table 2. The highest number of calm air events happened frequently when Neptune was at 61-90 (37.9%), Saturn in 61-90 (28.2%) and 271-300 (37.1%), 271-300 (35.5%), Mercury at 271 to 300 (34.3%), the Sun at 271-300 (31.6%), Jupiter at 91-120 (31.1%) and Uranus at 91-120 (26.2%) and 241-270 (25.2%) degrees azimuth to the observer location.

Table 1. Categorization of wind speed and related Beaufort scale

Wind speed (km/hour)	Category	Beaufort scale (wind speed km/hour)	Total events
Below 2.0	Calm	0 (<2)	272437
2.1 to 6.0	Light air	1 (2 to 6)	456988
6.1 to 12.0	Light breeze	2 (7 to 11)	260355
12.1 to 19.0	Gentle Breeze	3 (13 to 19)	55310
19.1 to 30.0	Moderate	4 (20 to 30)	9918
30.1 to 45.0	Strong	5 (31 to 39) and 6 (41 to 50)	60
Above 45	Extreme	6 and 7 (>50)	6
		Total	1055074

Light air

Results obtained for the influence of individual planet azimuth on hourly wind speed events (4,56,988 Nos.) between 2.1 and 6 km were depicted in Table 2. The highest number of light air events were mostly observed when Saturn was at 61-90 (34.4%), 271-300 (31.2%), Neptune at 61-90 (34.8%), 271-300 (34.4%), Venus at 271-300 (27.3%), Mercury at 61-90 (19.1%), the Sun at 61-90 (18.6%), Moon at 241-270 (18.9%) and Mars at 61-90 (17.3%) degrees azimuth to the observer location.

Light breeze

Results obtained for the influence of individual

planet azimuth on hourly wind speed events (2,60,355 Nos.) between 6.1 and 12 km were depicted in Table 3. The highest number of light breeze events were mostly observed when Neptune was at 61-90 degrees (35.2%), Saturn at 61-90 (33.4%), Jupiter 91-120 (30.2%), 241-270 (29.1%), Venus at 91-120 (24.4%), Uranus at 91-120 (24.4%), Mercury at 91-120 (21.9%) and the Sun at 91-120 (25%) degrees azimuth to the observer location.

Table.2 Azimuth frequency (%) of planet during the calm and light air events

Azimuth (Degrees)	Calm air									Light air								
	Su	Me	Ve	Mo	Ma	Ju	Sa	Ur	Ne	Su	Me	Ve	Mo	Ma	Ju	Sa	Ur	Ne
1 - 30	1.5	1.5	1.7	2.2	2.9	0.2	4.9	0.9	2.9	2.9	3.5	3.3	2.4	2.9	0.2	4.6	1.2	3.8
31 - 60	2.9	3.4	4.0	4.3	7.0	0.3	9.0	1.9	6.0	6.5	7.1	6.3	4.7	6.0	0.4	9.3	2.3	7.2
61 - 90	15.8	16.0	14.9	16.5	19.0	2.9	28.2	16.9	37.9	18.6	19.9	16.9	18.2	17.3	3.1	34.4	16.3	34.8
91 - 120	8.1	7.7	8.6	19.4	11.3	31.1	2.4	26.2	3.8	14.6	13.1	15.9	17.7	16.8	29.2	3.1	22.5	3.6
121 - 150	3.6	3.1	4.7	4.8	3.4	11.1	0.2	4.6	0.3	5.2	4.3	5.6	4.6	4.5	11.0	0.3	4.2	0.3
151 - 180	1.9	1.9	2.7	2.4	1.9	5.6	0.1	2.4	0.1	2.2	2.3	2.5	2.5	2.4	5.4	0.1	2.2	0.1
181 - 210	2.3	2.1	3.0	2.3	2.1	5.6	0.1	2.5	0.1	2.2	2.3	2.8	2.5	2.4	5.5	0.2	2.3	0.1
211 - 240	5.5	4.7	6.9	4.5	4.5	11.1	0.2	4.8	0.3	5.7	4.6	5.9	5.1	4.8	11.9	0.3	4.4	0.3
241 - 270	21.1	18.0	19.3	18.1	21.3	27.9	3.0	25.2	4.9	16.1	14.4	16.3	18.9	16.7	30.4	3.4	24.7	4.5
271 - 300	31.6	34.3	27.3	18.7	19.0	3.6	37.1	11.9	35.5	16.4	17.7	15.2	16.9	17.2	2.5	31.2	16.4	34.4
301 - 330	4.6	5.5	5.2	4.6	5.0	0.4	9.7	1.7	5.3	7.0	7.1	6.0	4.3	6.2	0.3	8.6	2.3	7.0
331 - 360	1.2	1.8	1.8	2.1	2.5	0.2	4.9	0.9	2.8	2.7	3.6	3.2	2.2	2.9	0.2	4.5	1.2	3.7

Su-Sun; Me-Mercury; Ve-Venus; Mo-Moon; Ma-Mars; Ju-Jupiter; Sa-Saturn; Ur-Uranus; Ne-Neptune

Gentle breeze

Results obtained for the influence of individual planet azimuth on hourly wind speed events (55,310 Nos.) between 12.1 and 19 km were depicted in Table 3. The highest number of gentle breeze events were mostly observed when Neptune was at 61-90 (59%) and 271-300 (34.9%), Saturn at 271-300 degrees azimuth (43.4%) followed by Jupiter at 91-120 degrees (41.5%), the Sun 91-120 (40.2%), Venus 91-120 (39.9%), Mercury 91-120 (36.8%) and Uranus 91-120 (34.3%) degrees azimuth to the observer location.

Moderate breeze

Results obtained for the influence of individual planet azimuth on hourly wind speed events (9918 Nos.) between 19.1 and 30 km were depicted in Table 4. The highest number of moderate breeze events were mostly observed when Saturn was at 271-300 (52.3%) followed by Venus at 91-120 (49.4%), the Sun 91-120 (46.8%), Jupiter 91-120 (45.2%), Uranus 91-120 (41.4%), Mercury 91-120 (40.8%), Neptune 61-90 (40.3%), 271-300 (33.1%) degrees azimuth to the observer location.

Strong breeze

Results obtained for the influence of individual planet azimuth on hourly wind speed events (60 Nos.) between 30.1 and 45 km were depicted in Table 4. The highest number of strong breeze events were mostly observed when Mars (63%) and Jupiter (57.9%) same azimuth range 91-120 degree, followed by Saturn at 270-300 (52.9%), 61-90 (27.9%), Mercury at 91-120 (51.8%), the Sun 91-120 (46.8%), Venus at 91-120 (43%), Uranus 91-120 (41.5%), Moon 271-300 (33.9%) and Mercury at 211-240 (30%) degrees azimuth to the observer location.

According to astrology, each planet is responsible for specific weather phenomenon viz., Mercury as a windy planet, Moon, Venus, Neptune are considered as rain and moist planets, Sun and Mars as hot planets (Varshney *et al*., 2011). The results obtained from the present investigation on the individual planet and wind speed events also confirmed this concept. Most numbers of wind speed events were observed in particular azimuth of Neptune followed by Mercury, Uranus, Saturn and Venus.

Analysis on wind speed influencing azimuth of each planet at the time of wind speed events inferred that, irrespective of planets, wind speed events were concentrated in the azimuth of 61-120 and 241-300 degrees. It was observed from the results that sun at 91-120 degrees azimuth influenced the high wind speed events of 6 to 45 km/hour than calm or light air. Sun at 271-300 degrees azimuth involved in calm air (<2 km/hour) and the sun at 331-360 degrees azimuth influence the extreme events.

The Mercury at 91-120 and 271-300 degrees azimuth to the observer location also did the same as that of sun. The Mercury at 0-60 degrees azimuth had influenced the extreme (>45 km/hour) wind events. Study on the development of hourly astrometeorological rainfall forecast at Tamil Nadu Agricultural University had inferred that, irrespective of the planet, rainfall events were concentrated in the azimuth of 61-120 degree and 241-300 degrees (Balamurali, 2017).

The Venus at 271-300 degrees influenced

the light air (2.1 to 6 km/hour), whereas 91-120 influenced the heavy wind speed events of 6-45 km/hour. Similarly, Moon at 91-120 also influenced the heavy wind speed events of 6-45 km/hour, Moon at 241-270 azimuth influenced 2.1 to 6 km/hour wind speed events. Also, Moon at 271-300 degrees influenced the wind speed of 12.1 to 45 km/hour. Mars at 91-120 degrees had more influence on wind speed with 30.1-45 km/hour.

Table 3. Azimuth frequency (%) of planet during the light breeze and gentle breeze events

Azimuth (Degrees)	Light breeze									Gentle breeze Azimuth								
	Su	Me	Ve	Mo	Ma	Ju	Sa	Ur	Ne	Su	Me	Ve	Mo	Ma	Ju	Sa	Ur	Ne
1 - 30	3.2	4.1	3.6	2.4	3.1	0.2	4.3	1.1	3.4	1.4	2.1	1.8	2.3	3.1	0.2	4.2	0.6	1.6
31 - 60	8.2	8.4	6.6	4.7	5.3	0.4	9.1	2.3	6.6	3.9	4.1	3.5	3.5	4.5	0.3	7.9	1.4	3.4
61 - 90	17.7	20.2	16.4	18.1	15.7	2.8	33.4	16.3	35.2	10.3	12.2	9.6	14.1	11.2	2.8	20.5	14.9	39.0
91 - 120	25.0	21.9	24.4	18.2	21.6	30.2	3.0	24.4	4.7	40.2	36.8	39.9	21.7	22.1	41.5	1.8	34.3	6.9
121 - 150	7.4	6.2	7.6	4.6	5.4	11.5	0.3	4.4	0.4	10.7	9.5	10.2	4.8	6.0	13.7	0.3	6.5	0.4
151 - 180	2.6	2.7	2.8	2.4	2.4	5.5	0.2	2.4	0.2	3.6	3.2	3.4	2.4	2.1	5.3	0.2	3.4	0.3
181 - 210	2.1	2.6	2.9	2.4	2.3	5.7	0.2	2.3	0.2	2.4	3.8	3.8	2.4	1.7	4.9	0.2	2.9	0.3
211 - 240	6.3	5.0	5.9	4.9	4.6	11.8	0.3	4.4	0.4	8.6	6.5	6.2	3.9	3.6	9.2	0.6	5.5	0.6
241 - 270	13.1	12.5	13.8	17.9	14.0	29.1	4.0	23.8	4.9	13.0	15.0	13.1	15.1	15.3	19.1	6.2	20.8	7.0
271 - 300	6.2	7.2	7.5	17.7	16.0	2.4	32.6	15.3	34.1	2.5	3.0	4.2	22.7	20.6	2.5	43.4	8.0	34.9
301 - 330	5.4	5.4	5.1	4.5	6.5	0.3	8.3	2.2	6.7	2.2	2.3	2.6	5.0	6.9	0.4	9.9	1.0	3.8
331 - 360	2.9	3.5	3.2	2.3	2.9	0.2	4.2	1.2	3.3	1.3	1.5	1.6	2.0	3.0	0.1	4.8	0.6	1.7

Su-Sun; Me-Mercury; Ve-Venus; Mo-Moon; Ma-Mars; Ju-Jupiter; Sa-Saturn; Ur-Uranus; Ne-Neptune

Similarly, Jupiter's azimuth of 91-120 degrees involved in all the wind speed events category, but the influencing frequency was more towards increasing wind speed and maximum in 30.1-45 km/hour. The Saturn at 61-90 azimuth influenced the calm to gentle breeze (0-12 km/hour), whereas 271-300 had influenced the heavy wind speed from 12.1 to 45 km/hour.

Table 4 Azimuth frequency (%) of planet during the moderate breeze and strong breeze events

Azimuth (Degrees)	Moderate breeze Azimuth									Strong breeze								
	Su	Me	Ve	Mo	Ma	Ju	Sa	Ur	Ne	Su	Me	Ve	Mo	Ma	Ju	Sa	Ur	Ne
1 - 30	0.8	1.6	1.0	0.9	3.4	0.0	3.8	0.5	1.7	0.0	5.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
31 - 60	2.5	3.2	3.2	2.9	3.6	0.1	7.3	0.4	2.3	0.0	1.7	5.3	1.7	6.3	1.3	1.7	0.0	0.0
61 - 90	6.3	7.0	5.1	12.9	9.7	1.3	13.9	12.9	40.3	1.7	3.3	3.0	14.6	4.2	4.2	27.9	5.0	25.4
91 - 120	46.8	40.8	49.4	21.5	24.3	45.2	0.8	41.4	8.6	46.8	51.8	43.0	27.2	63.0	57.9	0.0	41.5	1.7
121 - 150	13.1	14.1	13.5	7.4	6.7	20.0	0.2	7.5	0.6	15.2	9.6	3.6	8.6	1.0	1.7	0.0	11.2	0.0
151 - 180	4.0	2.1	2.3	5.8	1.0	3.2	0.0	4.4	0.4	2.7	1.3	0.3	1.3	0.7	2.4	0.0	1.6	1.0
181 - 210	1.2	3.8	4.0	2.2	1.1	3.0	0.1	2.4	0.1	0.0	1.0	5.0	0.0	1.3	13.3	0.0	2.0	0.0
211 - 240	7.6	7.1	4.5	2.5	1.7	7.3	0.0	7.3	0.3	11.4	10.0	0.0	0.0	1.7	2.4	0.0	12.8	0.0
241 - 270	9.8	12.2	9.0	15.0	14.4	15.1	5.7	15.5	6.8	6.0	5.0	21.7	9.9	0.0	15.7	0.0	24.2	25.1
271 - 300	4.8	4.9	4.8	23.6	25.6	4.1	52.3	7.0	33.1	2.5	2.5	10.5	33.9	16.7	1.3	52.9	1.7	30.1
301 - 330	1.7	2.3	1.8	3.8	5.4	0.5	9.7	0.6	4.4	8.8	2.5	6.3	1.3	2.7	0.0	9.2	0.0	10.0
331 - 360	1.4	0.9	1.5	1.3	3.1	0.2	6.1	0.1	1.2	5.0	6.3	1.3	1.3	2.5	0.0	8.3	0.0	6.7

Su-Sun; Me-Mercury; Ve-Venus; Mo-Moon; Ma-Mars; Ju-Jupiter; Sa-Saturn; Ur-Uranus; Ne-Neptune

The Uranus at 241-270 had a good influence on calm and light air, whereas the Uranus at 91-120 had influenced the heavy wind speed events. In the case of Neptune, two azimuth range viz., 61-90 and 271-300 had a good influence on wind speed events, which, the 61-90 azimuth frequency were increasing with increasing wind speed. The rainfall astrometeorological study had supported this individual planet-angle by stating that "Among the planets, the Saturn and Neptune at 61-90 and 271-300 degrees azimuth had higher rainfall influencing capability. Similarly, Jupiter's 91-120 degrees and 241-270 degrees azimuth also had a good influence on rainfall events. The frequency of hourly rainfall events under Saturn and Neptune was increased with an increase in intensity, which proves the greater influence of Saturn and Neptune on rainfall" (Balamurali, 2017). As the wind is one of the major factor for the rainfall events, both wind and rainfall influence by planets might be similar.

The influence of Mercury, Neptune, Saturn, Mars and Jupiter on wind speed was supported by many kinds of literature (Farnal, 2005; Varshney *et al*., 2009) but no such literature was available for the angle that influences the different wind speed events. The angles at which wind speed are much influenced in our study viz., 61-90, 91-120 and just opposite angle 270-300 (180+90 and 120) are considered as strong angles in astrology.

CONCLUSION

It could be concluded from the correlation study on individual planet azimuth and wind speed events that the azimuth range of 61-120 of all the planets and 240-300 had a good influence on wind speed. The 61-90 degrees azimuth of the Sun, Mercury, Saturn and Neptune had a good influence on calm to light air wind speed events (0-12 km/hour). The 91-120 degrees azimuth of all the planets had influenced moderately to heavy wind (19-45 km/hour). The Moon, Mars, Jupiter and Neptune at 61-90 degrees azimuth had influenced the extreme wind speed events. The Moon, Mars, Saturn at 271-300 degrees azimuth had influenced the moderate to heavy wind (19-45 km/hour).

REFERENCES

Balamurali, B. 2017. Formulating ephemeris based astrometeorological rules to increase the accuracy of medium range rainfall forecating in tamilnadu M.Sc. Thesis, Tamilnadu Agricultural University, Coimbatore, Tamilnadu.

Dheebakaran, Ga, Arulprasad, S,Kokilavani, S, and S.Panneerselvam. 2017. Astrometeorology: An option to improve the accuracy of numerical daily rainfall forecast of Tamil Nadu. *Journal of Agrometeorology,* **19**: 205-211.

Farnal, K. 2005. A basicguide to AstroMeteorology. Retrieved from http://www.skyscript.co.uk/meteorology1.html

Green, H.S. 2003. Weather predicting by Astro-Meteorology. Retrieved from *https://books.google.co.in/books?isbn=0766142892*

Riske, K. B. 2014. Predicting weather events with astrology.Retrieved from https://www.scribd.com/book/273746969/Predicting-Weather-Events-with-Astrology

Sivakumar, D. and L. Korsten. 2006. Influence of modified atmosphere packaging and postharvest treatments on quality retention of litchi cv. Mauritius. *Postharvest Biology and Technology,* **41(2):** 135-142.

Varshneya, M.C. 2008. Blend of AncientWisdom and modern science of Meteorology for improving agriculture. **In:** Souvenir of International symposium on AgrometeorolIrology and Food security (INSAFS),CRIDA, Hyderabad. p.15.

Varshneya, M. C, Vaidya, V. B, Vyas Pandey, Shekh, A. M. and B. I. Karande. 2008. Validation of Astrometeorological Rainfall forecast for Gujarat. *Journal of Agrometeorology*, **10(2):**345-348.

Varshneya, M., Vaidya, V., Pandey, V., Chimote, L., Damle, K., Shekh, A. and B. Karande. 2009. Forecasting of rainfall for Gujarat based on astrometeorology. *Asian Agri-History,* **13(1):** 25-37.

Varshneya, M.C, Kale, Vidya,V.and B. Karande. 2011. Agromet Information System for Farm Management: Challenges and Opportunuties inAgrometeorology (3-Ed.) Springer, Berlin, Heidelberg. p: 263-273.