Study on astrometeorological relationship between planet azimuth and temperature

Abstract

Temperature is one of the key weather parameters, which is a necessity for all life on Earth.Any variation from the normal can impede the physical, chemical, and biological processes of life. Extremes would produce permanent changes that would halt the plant's growth and maycause complete withering.Advance information on temperature events will be helpful in protecting the plant and sustain the productivity under any temperature related disasters. Astrometeorology is one of the oldest organized knowledge systems that interplay between planetary movement and weather. In Tamil Nadu AgriculturalUniversity (TNAU), Astrometeorological weather forecast rules for rainfall, wind speed and cyclone events were already well defined. In continuation of this research, identification ofAstrometeorological rules for the temperatureevents had been taken up during 2021-2022 at Agro climate Research Centre, TNAU, Coimbatore. Hourly temperature data from 2011-2016 was collected for 30 districts of Tamil Nadu. In each districts one particular location is selected and is correlated with ephemeris developed for a particular location using Alcyone ephemeris calculator.The findings clearly demonstrated the differential impact of individual planets and their azimuth on the temperature events.The study revealed that low temperature events were influenced when most planets are away (271- 300 degree azimuth) whereas the high temperature events were influenced by the planets that are directly above the location (91 to 120 degrees azimuth) and the in between temperature events were influence by both 61-90 and 241-270. The specific azimuth of the Sun, Mercury, Venus, Jupiter, Saturn, Uranus, and Neptune had a markable influence on a particular temperature event, however all the azimuths of the Moon and Mars had only a mild effect on any temperature event.

Key words – Weather forecasting, Astrometeorology, Azimuth and Temperature.

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1.Introduction

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Agriculture and farming are heavily influenced by the seasons and nature. The Indian farming sector desperately needs access to meteorological data in order to plan and manage their crops and livelihoods.

The most essential atmospheric inputs for supporting life in the earth system are sun radiation, rainfall, temperature, wind speed, and relative humidity. Depending on their size, these inputs can have a positive or negative influence [1]. Plants may experience acclimatory reactions, cellular damage, and eventually death as a result of variations in temperature and solar radiation intensity, range, and length.Variations in their range and intensity primarily impact photosynthesis [2]. The distribution of crops is influenced by the various weather factors, both directly through radiation and indirectly through its effect on air temperatures. Crop yield is more significantly impacted by temperature, which also influences water level [3]. The spread of crops is influenced by the various weather factors, both directly through radiation and indirectly through its impact on air temperatures [4].

Weather is the most essential element which determining the geographical spread and periodical profusion of crop insect pests and animal parasites. It enables farmers to take early protection measures and in turn maximizes the yield potential [5]. Predicting the weather is essential since it helps to identify potential climatic changes in the future. It is used in a number of situations, such as extreme events alerts and advisories. Weather and climate vary as a result of variations in radiation received over different regions of the globe due to its position in relation to the sun, as well as other aspects of the world. Any aberrations in weather can affect both quality and quantity of final crop yield. It also increases risk in farm management decisions [6].

Astrometeorology is one of the oldest known systems of organised knowledge, dealing with the interplay between planetary movement and weather. Every planet in the solar system is thought to have a unique impact on Earth's climate, with the Sun and Mars governing heat and Saturn governing cold[7].By analysing the angular positions of the sun, moon, and planets in respect to one another and to the earth, meteorologists able to predict the weather. This combined effect affects and alters the earth's atmosphere, which in turn affects our weather patterns [8]. The aspects (0° (conjunction), 60° (sextile), 90° (square), 120° (trine), and 180° (opposition))between the planets are also of greater importance [9].Traditional astrologers made a systematic study on meteorology and gained scientific and technical knowledge.Commonly the village astrologers also called pundits are approximately correct in their weather prediction with greater degree of accuracy [10].The Stars (Nakshatram) have mark able impact on the amount of rainfall [11]**.** The combination of traditional and modern methodologies will result in more accurate weather forecasts for end users [12]. One of most effective aspect for weather prediction is the angle between the celestial bodies [13].

As on now, medium range weather forecast is given by using numerical weather prediction (NWP) methods. In subtropical regions, NWP is of greater accuracy as compared to tropical country like India .It is due to the position of India nearness to the equator, which makes the nature and

weather system more complex and dynamic in nature. There is a idea of integrating numerical weather prediction with statistical and astrometeorological data to provide accurate hybrid weather prediction [14].Hence integrating Astrometeorology as the integral part of available predictive sciences will enhance the accuracy of the weather forecasting. It is essential to combine ancient wisdom with contemporary weather predicting tools to make forecasts more usable, accessible, and readily available to all and hence enhance agricultural productivity [10].

In Tamil Nadu Agricultural University, astrometeorological research is in progress from 2011 to unveil the rules for hourly weather forecast.The Astromet forecast rules for hourly rainfall, wind speed and cyclone have been developed so far and in continuation, research on astrometeorological principles for hourly temperature forecast was carriedout during 2021-2022.The astromet relationship between temperature and azimuth are presented in thispaper.

2.Materials and methods

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2.1.Study location and temperature data

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Study on astrometeorological principles for hourly temperature forecast was carried out by correlating the temperature events of a location with the planet position to the specific location and hour. Temperature data were collected for the period of 2011-2016 from TNAU's Automatic Weather Station (AWS) located in 30selected districts spread well over Tamil Nadu to minimize the spatial variability (Fig.1).All the collected data were checked errors and all unsound and extreme values were removed.Based on the magnitude, the data was grouped in to seven categories*viz*., below 12, 12.1 to 18, 18.1 to 24, 24.1 to 30, 30.1 to 36,36.1 to 42 and above 42^{o}C to formulate ephemeris based astrometeorological forecast principles.

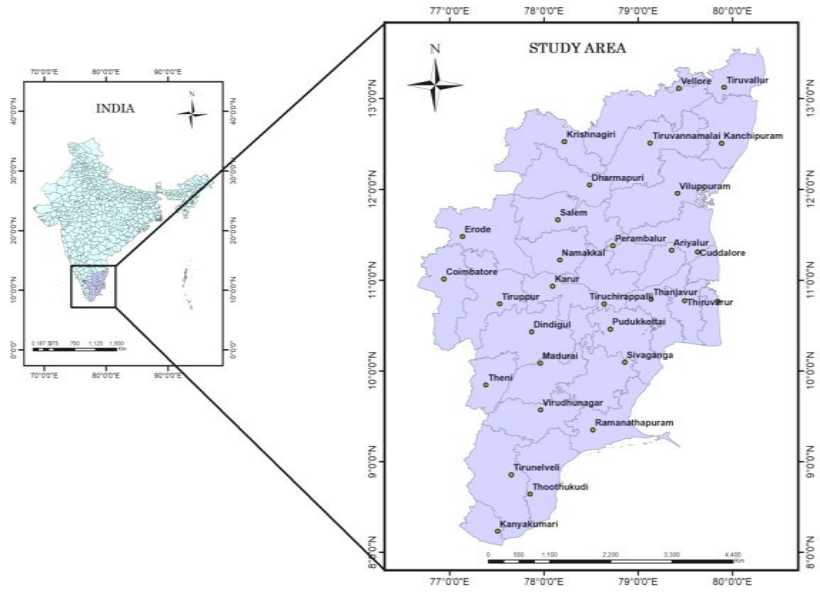

Fig 1.District wise study locations

2.2.Astromet data

Ephemeris is the horizontal coordinate system which elucidating exact position of the planet in the sky. Normally ephemeris or azimuth is considered between true north and celestial bodies by keeping observer position as origin. Assessment of planetary or celestial body position was computed using Alcyone Ephemeris 4.3v calculator, which is the most accurate calculator for period of 3000 BC to AD 3000. Azimuth of individual planets at the time of temperature events wasgrouped into 12 azimuth frequencies *viz*., 0-30°,31-60°, 61-90°, 91-120^0, 121-150^0, 151-180^0, 181-210^0, 211-240^0, 241-270^0, 271-300^0, 301-330^0 and 331-360°.Azimuth frequency was computed by using the formula (Dheebakaran et al., 2017) depicted below and indicated as percentage.

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

3. Results

Assessment on temperature influencing azimuth ofeach planet at the time of temperature events revealed that, regardless of planets, temperature events wereconcentrated in the azimuth of 61-90°, 91-120^0,181-210^0 and 211-240^0, whereas other angles have very minor (<5%) of influences.

3.1. The Sun

Influence of the Sun azimuth on temperature events is depicted in Fig 2. Starting at 18^{o}C, the Sun's azimuth 61-90 degrees had an impact (10%), the maximum impact (22%) was seen between 30 and 36^{o}C, and as temperature rose, the impact waned. While the azimuth between 91-120 degrees showed an increasing trend of influence with increase in temperature, which showed no influence for <12^{o}C and at its maximum influence (68%) for >42^{o}C. The Sun had its greatest impact (100%) on the temperature events<12^{o}C at an angle of 271-300 degrees, and as the temperature rose, that angle's impact decreased (100 to 10%).The Sun's azimuth 241-270 degrees had started its influence from 18^{o}C, maximum influence observed for 24-30^{o}C and become decreasing with increasing temperature.

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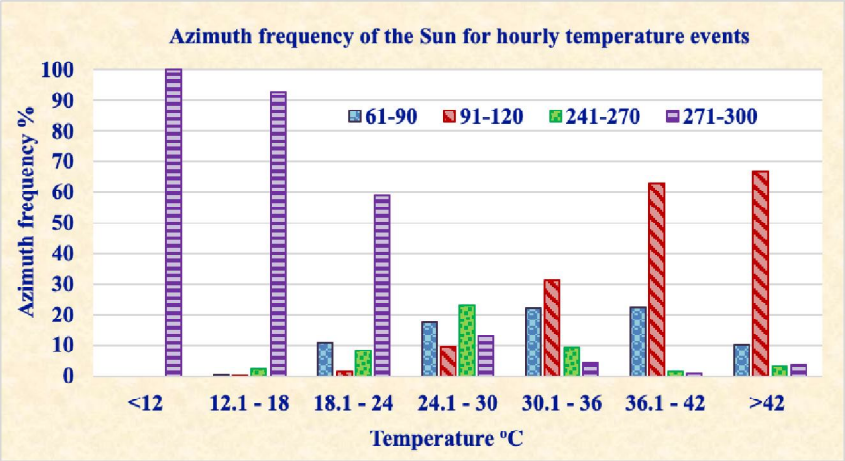

Fig 2.Azimuth frequency of the Sun for temperature events

3.2.Mercury

Influence of Mercury planet azimuth on hourly temperature events is depicted in Fig 3. Mercury had been found to have a similar trend of the Sun's azimuth influence on temperature, albeit to a slightly lesser extent.The results concerning the influence of Mercury azimuth on hourly temperature events were obtained and are depicted in Fig 3. Mercury have similar trend of azimuth frequency percent influence as that of Sun in all temperature events from less than 12^{o}C to greater than 42^{o}C.

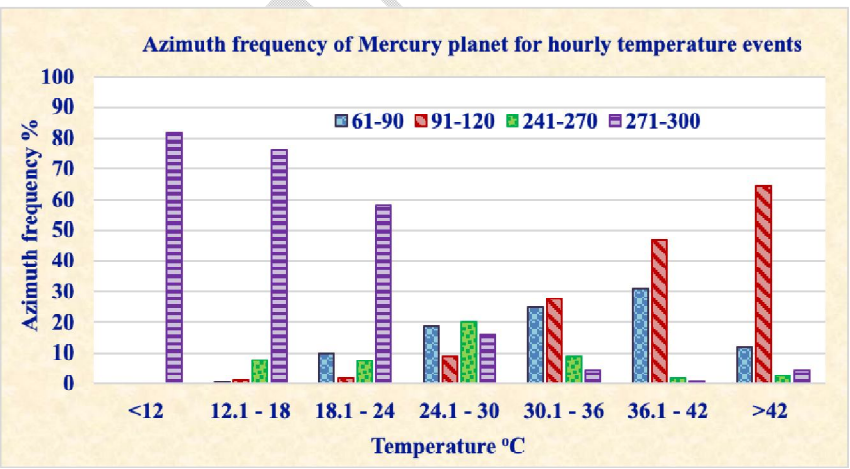

Fig 3.Azimuth frequency of Mercury planet for temperature events

3.3.Venus

Influence of the Venus azimuth on hourly temperature events is depicted in Fig 2. The 91 - 120 degree azimuth of Venus planet had increased influence from 12.1^{o}C and maximum at >42^{o}C (70%). The 241-270 degreeazimuth started its influence from 12.1^{o}C, maximum influence for 24-30^{o}C (21%) and become decreasing with increasing temperature. The Venus at 270 – 300 degrees had the greatest influence for the <12^{o}C (63%) and 12 - 18^{o}C (70%)temperature events and decreased towards increase in temperature.

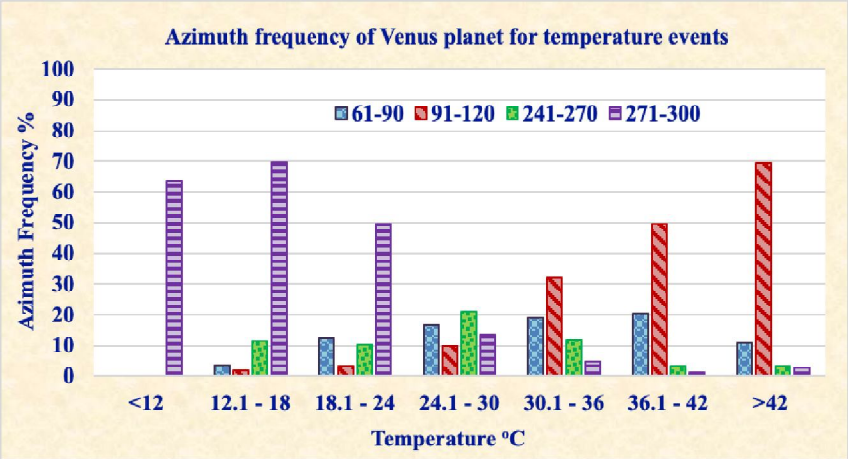

Fig 4.Azimuth frequency of Venus planet for temperature events

3.4. The Moon

Results concerning the Moon azimuth on hourly temperature events are depicted in Fig 5. The influence of the Moon was spread well in all these four azimuth *viz*., 60 -90, 91 – 120, 241-270 and 271-300 degrees for all the temperature events. The moon at 271- 300 degree azimuth, frequency per cent of temperature event >42^{o}C was more (45%), whereas the 241 – 270 had high frequency a 24.1 - 30^{o}C. The azimuth of 61-90 degrees and 91-120 followed the 241 -270 and 271 - 300, respectively for the influence on temperature events.

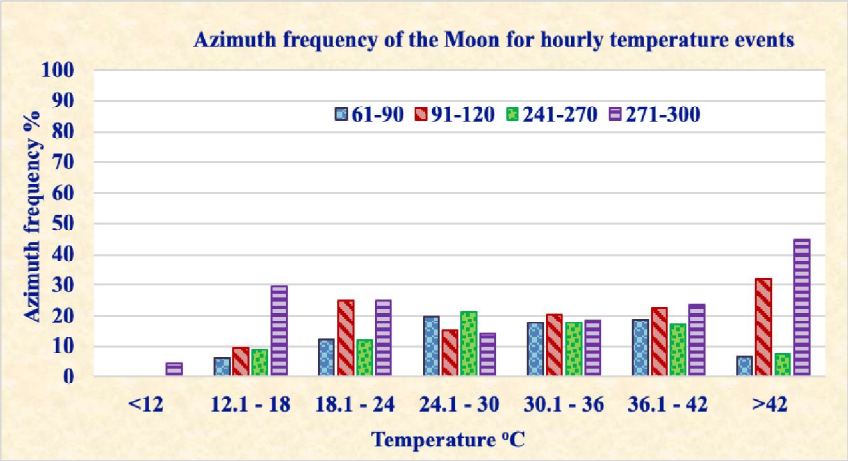

Fig 5.Azimuth frequency of the Moon for temperature events

3.5. Mars

Influence of Mars planet azimuth on temperature events is depicted in Fig 6. The Mars at 61 – 90 degree azimuth had its greatest impact (100%) on the temperature events< 12°C, and as the temperature rose, that angle's impact drastically decreased. While the azimuth between 91-120 degrees showed an increasing trend of influence with increase in temperature, which showed no influence for <12°C and at its maximum influence (52%) for >42°C. Both the azimuth 241-270 and 271 - 300 degrees azimuths had fluctuation in their influence on temperature evens, could not find any clear trend.

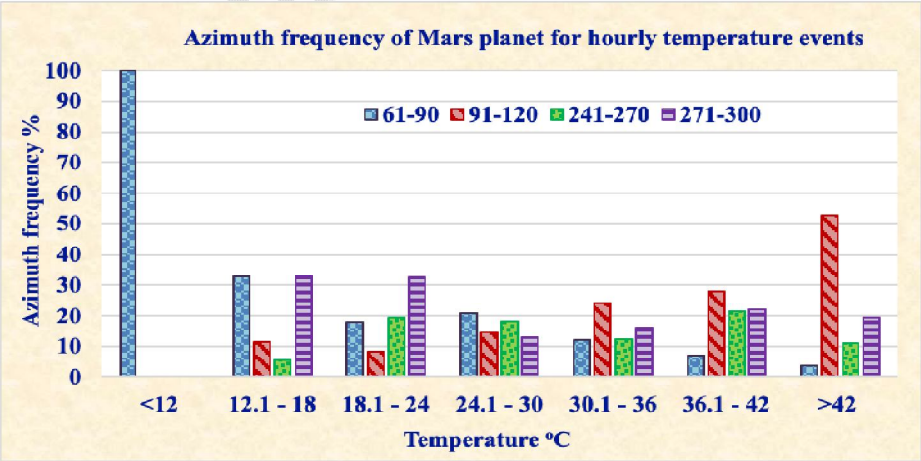

Fig 6.Azimuth frequency of Mars planet for temperature events

3.6. Jupiter

Influence of Jupiter planet azimuth on temperature events is depicted in Fig 7. The Jupiter at 91 – 120 degree azimuth had its influence on 12.1 – 18°C (34%), 18.1 – 24°C (44%), drop a while at 24.1 – 30°C (23%), then increase with increase in temperatureevents>42°C (42%). The frequency of Jupiter's azimuth 241 -270 degrees was increased from 18.1 to 30°C (33%) and then decreased towards increasing temperature. The other two azimuth group 60 – 90 and 270 - 300 degrees did not have any influence on temperature events, except <12°C.

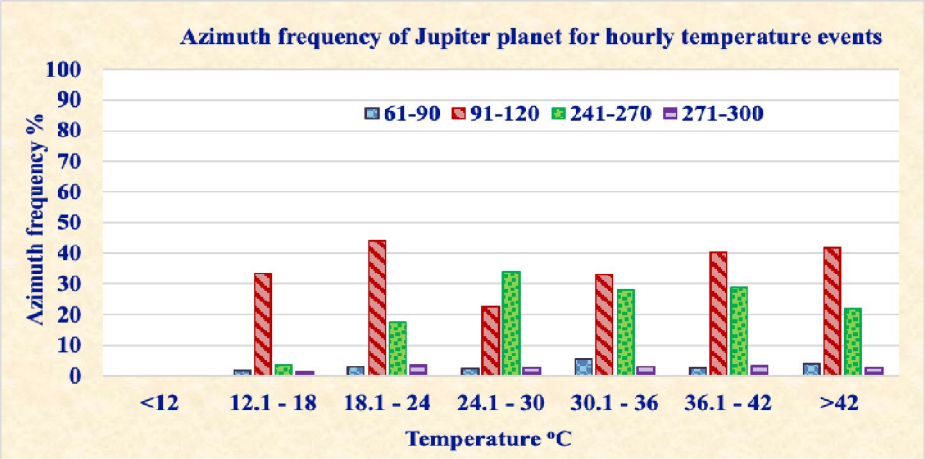

Fig 7.Azimuth frequency of Jupiter planet for temperature events

3.7. Saturn

Results concerning the influence of Saturn azimuth on hourly temperature events are depicted in Fig 8. The Saturn azimuth 61 – 90 and 271 – 300 degrees alone showed influence on the temperature events. At 61-90 degree azimuth frequency percent was increased from 12.1°C to 30°C (42%) and then decreased with increasing temperature. The 271 – 300 degree azimuth frequency had increased from 24.1°C (24%) to >42°C (78%), which was 50 per cent for 18.1 – 24°C.

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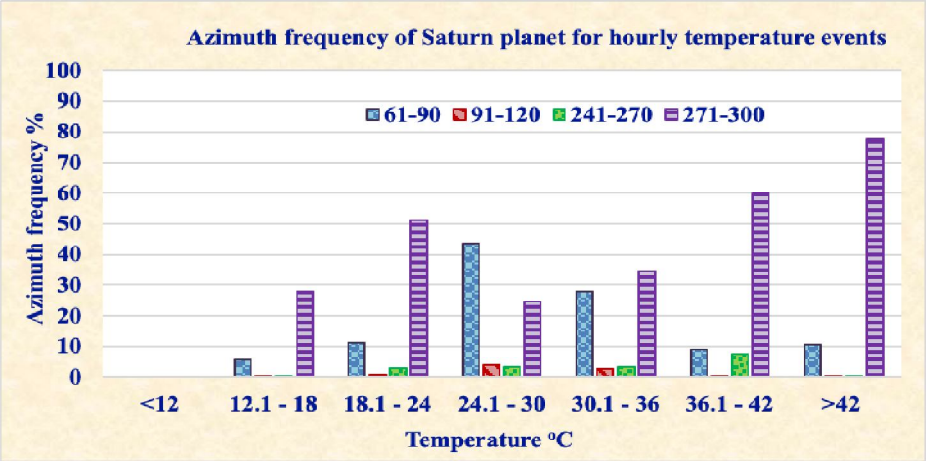

Fig 8.Azimuth frequency of Saturn planet for temperature events

3.8. Uranus

Results concerning the influence of Uranus azimuth on hourly temperature events are depicted in Fig 9. At frequency of 241-270 degree azimuth had increased from <12°C to 18°C, then decreased towards increasing temperature. The frequency of 91-120 had increased from 12.1°C (13%) and maximum at >42°C (65%). The Uranus at 61-90 degree azimuth, the frequency percent was 12 per cent, which increased with increase in temperature up to 42°C (32%).

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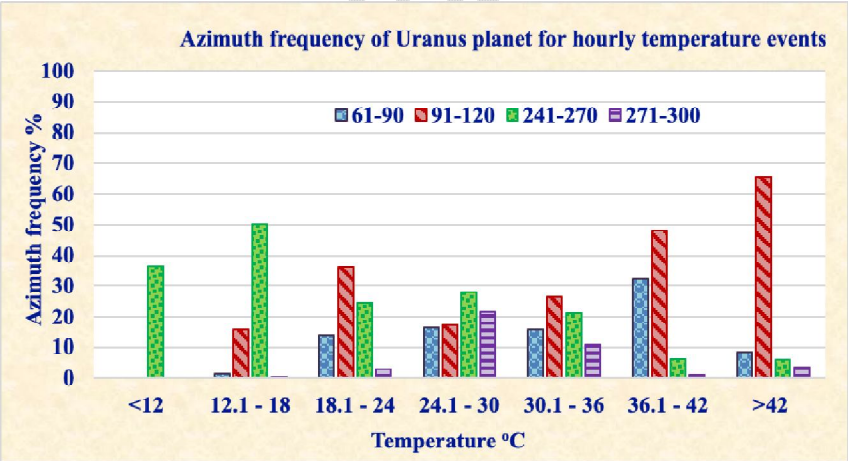

Fig 9.Azimuth frequency of Uranus planet for temperature events

3.9. Neptune

Influence of Neptune azimuth on hourly temperature events is depicted in Fig 10. The Neptune's 61-90 degree azimuth frequency percent was increased from 12.1 to 24°C then decreased for 30°C and again increased with increase in temperature up to 42°C. The frequency of Jupiter at 271-300 degrees azimuth was greatest at 12.1–18°C and decreased towards increase in temperature. The other two 91-120 and 241-270 degree azimuth of Neptune did not have any makeable influence on the temperature events.

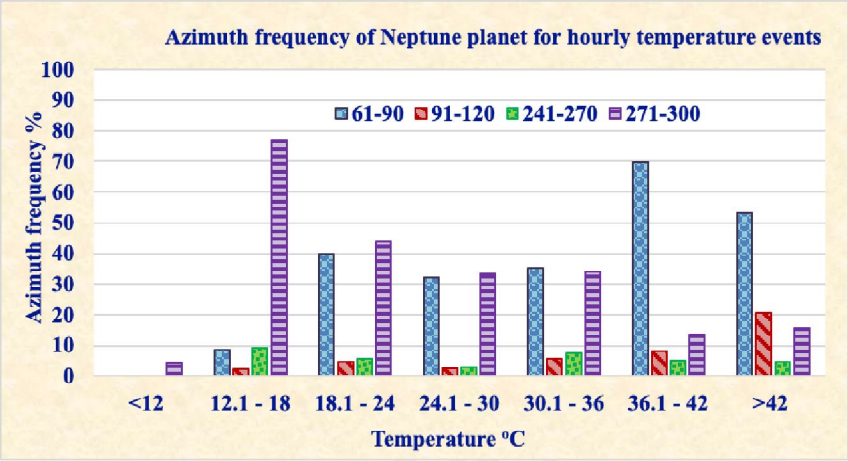

Fig 10.Azimuth frequency of Neptune planet for temperature events

3.10. Temperatureevent wise planets' azimuth

Based on the above analysis the hourly temperature events wise higher frequency of planets azimuth detailed is Table 1. Planets such as the Sun, Mercury, Venus, and Neptune influenced temperature events less than 12°C at an azimuth of 271-300 degrees, while Mars and Uranus influenced temperature events at azimuths of 61-90 and 241-300 degrees, and the Moon, Jupiter, and Saturn had no effect. Between 271-300 degrees azimuth, the Sun, Mercury, Venus, Moon, Mars, Saturn, and Neptune had the greatest influence on temperature events from 12.1 to 24°C, while Jupiter and Uranus had an impact at 91-120 and 241-270 degrees azimuth, respectively. The Mars and Neptune also had some influence at an azimuth of 61-90 degrees for temperature from 18 to 24°C. The Sun, Mercury, Venus, Moon, Jupiter, and Uranus had higher influence at an azimuth of 241-270 degrees in temperature events ranging from 24.1-30°C, whereas Saturn and Neptune have more influence at azimuths of 61-90 and 271-300 degrees. Mars had low influence at all azimuth degrees.

Table 1 Differential impact of planet's azimuth on different temperature events

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Temp. Events oC	Sun	Mercury	Venus	Moon	Mars	Jupiter	Saturn	Uranus	Neptune
<12	271-300	271-300	271-300	Nil	61-90	Nil	Nil	241-270	271-300
12.1-18	271-300	271-300	271-300	271-300	61-90 271-300	91-120	271-300	241-270	271-300
18.1-24	271-300	271-300	271-300	91-120 271-300	271-300	91-120	271-300	241-270	61-90 271-300
24.1-30	241-270	61-90 241-270	61-90 241-270	61-90 241-270	Low	91-120 241-270	61-90 271-300	241-270 271-300	61-90 271-300
30.1-36	61-90 91-120	61-90 91-120	61-90 91-120	All	Low	91-120 241-270	61-90 271-300	91-120 241-270	61-90 271-300
36.1-42	91-120	91-120	91-120	All	91-120 241-270 271-300	91-120 241-270	271-300	61-90 91-120	61-90
>42	91-120	91-120	91-120	91-120 271-300	91-120	91-120 241-270	271-300	91-120	61-90 91-120

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The Sun, Mercury, Venus, Jupiter and Uranus had maximum influence at 91-120 degree azimuth for the 30.1-36^{o}C events, whereas Saturn and Neptune influenced at both 61-90 and 271-300 degree azimuths. Moon hadspreading influence at all the four azimuths degrees and Mars did not influence much on the 30.1-36^{o}C. In the event of 36.1 to 42^{o}C, the Sun, Mercury, Venus, Mars, Jupiter and Uranus had maximum influence at an azimuth of 91-120 degrees whereas Saturn and Neptune had influence at an azimuth of 271-300 and 61-90 degrees, respectively. Moon had spreading influence at all the four azimuths degrees here too. The temperature events greater than 42^{o}C was influence by all celestial bodies at an azimuth of 91-120 degrees, whereas Saturn influenced at an azimuth of 271-300 degrees.

Assessment on temperature influencing azimuth of the planets at the time of temperature events revealed that, the nearer planets to the Earth, such as the Sun, Mercury, Venus, and Moon had an influence on temperature events up to 24^{o}C, 24 to 30^{o}C, 30-36^{o}C, and >36^{o}C at azimuths of 271° to 300°, 241° to 270°, 60° to 90°, and 90° to 120°, respectively.The cool temperature occurrence of 12^{o}C was unaffected by any of the above azimuth of the Moon, Jupiter, or Saturn. Mars had influence on the low temperature <18^{o}C at 61-90 degree azimuth, 18-24^{o}C at 271-300 degree azimuth, no influence for 24-36^{o}C and 91-120 degree azimuth on the >36^{o}C events. Jupiter registered influence for the allthe temperature events above 12^{o}Cat 91 -120 and 241 – 270 degree azimuths, whereas the Saturn had influence at 271-300 degree azimuth, in addition to the influence on 24 – 36^{o}C in 61-90 degree azimuth. Uranus showed a different pattern of impact for the temperature event, influencing up to 36^{o}C at azimuths between 241 and 270 degrees, and the temperature events above 36^{o}C were influenced at azimuths between 91 and 120 degrees.The faraway planet Neptune had the influence similar to that of the Sun, influenced the temperature events from <12 to 36^{o}Cat 271-300 degree azimuth, 18 to 42^{o}C at the 60 -90 degree azimuths and the >42^{o}C events a 90 - 120 degree azimuths.

The Sun, Mars and Pluto would influence increasing temperature [10]. Our study had similar effect that the temperature events between 36^{0}C and greater than 42^{0}C were greatly influenced by the Sun and Mars at an angle of 91-120 degrees. Astrological study [15] had supported that the influence of Uranus planet on temperature, by stating that Uranus is responsible for temperature rise but when it move backwards it produces cold. Similarly, at temperature between 36^{0}C and greater than 42^{0}C Uranus had greater impact at 91-120 degrees whereas at cooler temperature between <12^{0}C and upto 18^{0}C it had greater impact at 241-270 degrees.

4. Conclusion

The findings clearly demonstrated the differential impact of individual planets and their azimuth on the temperature events.The cool temperature events were influenced when most planets are away (271- 300 degree azimuth)and the hot temperature events were influenced by the planets that are directly above the location (91 to 120 degrees azimuth), whereas the in between temperature events were influenced by both 61-90 and 241-270.The specific azimuth of the Sun, Mercury, Venus,

Jupiter, Saturn, Uranus, and Neptune had a markable influence on a particular temperature event, however all the azimuths of the Moon and Mars had only a mild effect on any temperature event.

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