The Weather and Climate of Tropical Tasik Kenyir, Terengganu

Samsuri Abdullah and Marzuki Ismail

Abstract This study investigates the trend of weather and climate in Tasik Kenyir, Terengganu State based on seasonal monsoons utilizing nearest meteorological station of Kuala Terengganu. Data from 1985 to April 2016 was used to describe the physical environment of Kenyir Lake in terms of rainfall amount (mm), relative humidity (%), ambient temperature (°C), MSL pressure (hPa), and wind speed (m/s) and wind direction (degrees). The data was first divided by different monsoon seasons faced by Kuala Terengganu; Southwest Monsoon (SWM), Northeast Monsoon (NEM) and Inter Monsoon (IM). There exists significant different ($p < 0.05$) during these three monsoon seasons for rainfall amount, ambient temperature, and MSL pressure. Conversely, relative humidity shows no significant different between the monsoon seasons. Rainfall amount, relative humidity and MSL pressure noted high intensity during NEM with an increment of 250.1 mm, 0.3%, and 2.2 hPa from SWM and by 189.2 mm, 0.2%, and 1.3 hPa from IM, respectively. Meanwhile, there was a decrease of ambient temperature during NEM by 1.1 °C from SEM and 0.8 °C from IM. Prevailing wind direction was noticed from NE direction with mean value of 3.5 m/s. In conclusion, regardless of any monsoon seasons, there is no significant change in relative humidity variation, but rainfall amount, ambient temperature and MSL pressure shows significant change for each and every monsoon. The understanding of indigenous community on the changing of monsoon seasons might help them in early preparation for foods and other materials for their own survival and festive activities.

Keywords Meteorological parameter · Monsoon seasons · Tasik Kenyir · Terengganu

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M. T. Abdullah et al. (eds.), *Greater Kenyir Landscapes*,
https://doi.org/10.1007/978-3-319-92264-5_1

Introduction

Malaysia is characterized as having climate of hot and humid throughout of the year, since it is situated near the equator (Ismail et al. 2015a, b). The weather and climate is generally defined through several meteorological parameters. The most important meteorological parameter is rainfall intensity or rainfall amount. The rainfall plays an important role in the distribution of heavy or light rain over the areas. Not to be neglected, some of the other meteorological parameters are also important in defining the weather of an area. Those are ambient temperature, relative humidity and MSL pressure. Wind speed and wind direction are the two key meteorological parameters in determining the prevailing wind of an area.

Tasik Kenyir is situated in Terengganu State of Peninsular Malaysia. Terengganu State is located in East Coast of Peninsular Malaysia which was popularized with the known beaches and islands. The east coast of Peninsular Malaysia experienced several monsoons seasons, southwest monsoon (SWM), northeast monsoon (NEM) and inter monsoon (IM) (Abdullah et al. 2017). The main characteristic of SWM is dry seasons and NEM is wet seasons. In defining the weather and climate of Tasik Kenyir, the analysis was based on these three monsoon seasons. This study highlights the trend of selected meteorological parameters and determines the significant change of each parameter throughout different monsoon seasons. The changes of monsoon seasons is believe in affecting indigenous populations in terms of restriction in accessing a safe and nutritious food, which including traditional foods that is considered very important for cultural practices. The changes of seasons also trigger to the threatening of cultural identities of indigenous people as such plants and animals used in traditional practices or scared ceremonies become less available. By understanding of the trend of monsoon seasons, early steps can be taken by this community for early preparation for their foods and festive activities.

In conjunction describing the weather and climate of Tasik Kenyir, the nearest meteorological station was used in acquisition of data. Kuala Terengganu Meteorological Station was selected in representing the weather and climate of Tasik Kenyir. It is precisely located at coordinate: 5°23′07.4″N; 103°06′37.0″E as shown in Fig. 1. The distance between the Kenyir Lake (5°00′N; 102° 48′E) and Kuala Terengganu Meteorological Station was 66.94 km.

The parameters taken into consideration were rainfall amount (mm), mean sea level pressure (MSLP) (hPa), relative humidity (%), temperature (°C), wind speed (m/s), and wind direction (degrees), all are monthly basis data. The data covers period from year 1985 to 2016 (32 years). The completeness of data in an analysis is important in terms of maintaining the data reliability (Suhaila et al. 2010). In this study, no imputation of missing data was performed as the data was complete for that period. Climate of Terengganu is best described by different monsoon seasons. The data management was performed in dividing the data into three main monsoon seasons. The southwest monsoon (SWM) occurs from May to August, northeast monsoon occurs from November to February and inter-monsoon occurs during September to October and March to April (Daryabor et al. 2014; Suhaila et al.

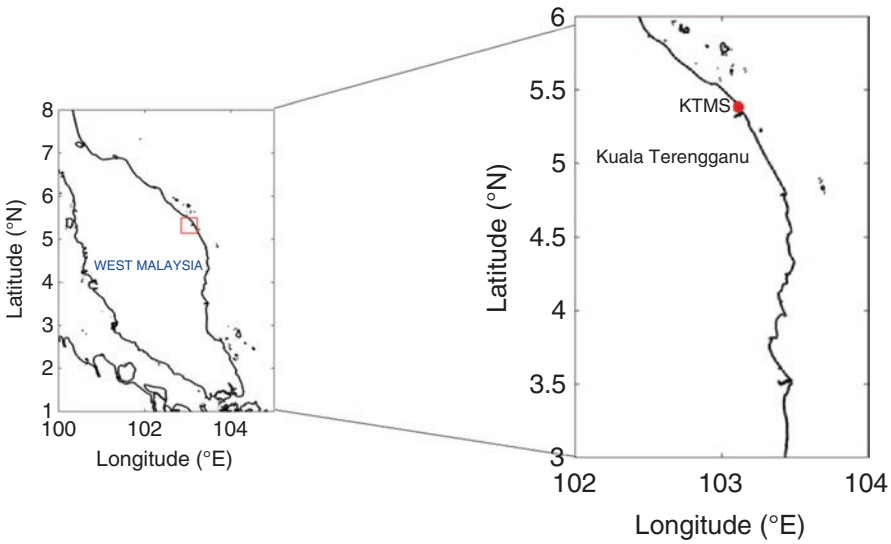

Fig. 1 Location of Kuala Terengganu meteorological station (KTMS)

2010). Therefore three main data sets were extracted which having different monsoon seasons (except for wind speed and wind direction) and statistical analysis was performed on these data sets.

The trend of weather and climate of Tasik Kenyir was determined by constructing the boxplot. Boxplot is describe statistically and act as visual aid which the data was represented by distribution of rectangle containing several information in the data set such as minimum, maximum, first quartile, third quartile, median and mean values (Ismail et al. 2016). The statistically significant different among the monsoon seasons for each parameters considered was tested by applying Analysis of Variance (ANOVA) whereby the evaluated of P-value of less than (<0.05) concludes that there exist significant different among monsoon seasons and vice versa (Ismail et al. 2015a, b). The analysis was taken at 95% confidence interval. Microsoft Excel Spreadsheet 2013 was used for tabulation and analysis of data.

Patterns of Meteorological Parameters During Different Monsoon Seasons

The trend of rainfall amount, temperature, relative humidity and MSL pressure during different monsoon seasons was described in Fig. 2. The trend of rainfall amount on average was same with MSL pressure which the highest was denoted during NEM with rainfall amount of 370.0 mm, and MSL pressure of 1011.4 hPa. Temperature shows that on average, NEM has lowest temperature with 26.5 °C. It indicates that as the increasing rainfall amount, will result in decreasing of

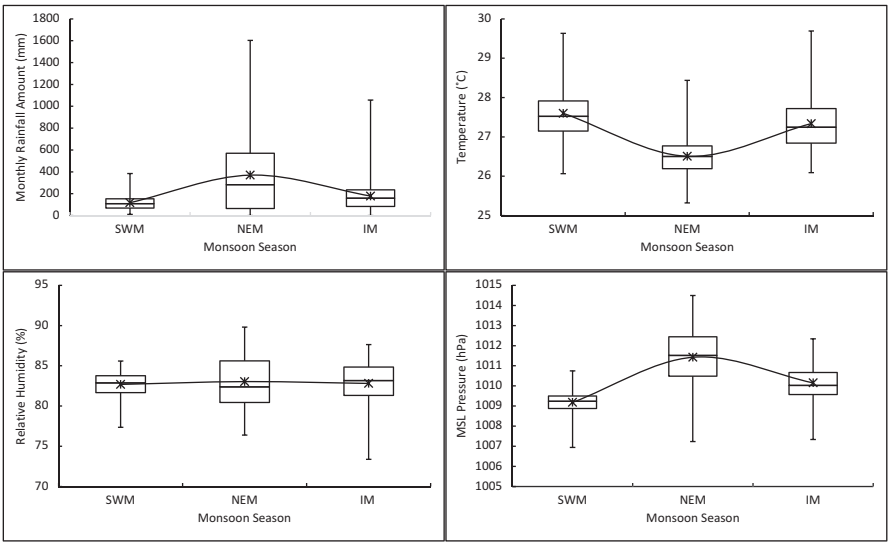

Fig. 2 Trend of rainfall amount, temperature, relative humidity and MSL pressure during different monsoon seasons

temperature. The trend of relative humidity is slightly constant during the three monsoon seasons with range of 82.8–83.0%. Descriptively, the highest mean for rainfall amount was 370.0 mm, where it increased by 191.4 mm from IM and 252.2 mm from SWM. Generally, rainfall amount at east coast of Peninsular Malaysia during NEM is higher as it receives heavy rainfall. Eastern part of Peninsular Malaysia is not blocked by Titiwangsa Range, and therefore heavy rain was bring by northeasterly winds towards east coast, consequently has wettest area during NEM (Akhir and Chuen 2011; Suhaila et al. 2010). NEM recorded lowest mean value of temperature with 26.5 °C, where it decreased by 0.8 °C during IM and 1.1 °C during SWM. It is noted SWM is the drier period for the whole Malaysian Peninsular. There is no slight change of mean values in relative humidity during the monsoon seasons with 82.7%, 83.0%, and 82.8% for SWM, NEM, and IM, respectively. The highest mean for MSL pressure was 1011.4 hPa, where it increased by 1.2 hPa from IM and 2.2 hPa from SWM. The analysis of wind speed and wind direction was based on the data January 1970 to April 2016. Prevailing wind direction was noticed from NE direction with mean value of 3.5 m/s (Fig. 3). The other summary of wind direction and mean values of wins speed were; N (3.3 m/s), E (2.8 m/s), SE (2.3 m/s), S (1.5 m/s), SW (1.5 m/s), W (1.5 m/s), and NW (2.4 m/s).

The differences of each selected weather parameters is further confirmed with the ANOVA. ANOVA was performed in determining the significant different of each parameter during different monsoon seasons. Results show that rainfall amount, temperature and MSL pressure has statistically significant different ($P < 0.05$) with the P-value of 1.37×10^{-16}, 5.04×10^{-39} and 8.06×10^{-51}, respectively

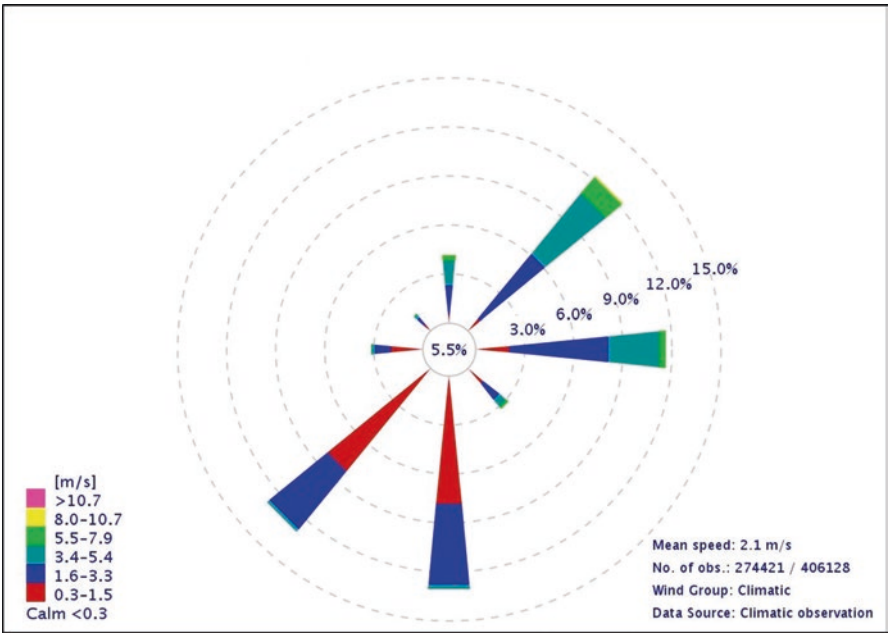

Fig. 3 Wind rose for Kuala Terengganu meteorological station, between 1.1.1970 and 30.4.2016

during the three monsoon seasons, conversely relative humidity has no significant different ($P > 0.05$) with 0.5918 during the different monsoon seasons.

Conclusion

The data of monthly basis from year 1985 to April 2016 was acquired form MMD of Kuala Terengganu Meteorological Station representing Tasik Kenyir, Terengganu. Parameters used were rainfall amount, relative humidity, ambient temperature, MSL pressure, and wind speed and wind direction. The analysis was conducted based on the different monsoon seasons in Peninsular Malaysia namely; SWM, NEM and IM. Results revealed that the trend of rainfall amount and MSL pressure is slightly same with highest mean values during NEM, conversely, ambient temperature has lowest mean values during NEM. Prevailing wind direction was noticed from NE direction with mean value of 3.5 m/s. ANOVA shows that there exist statistically significant different of rainfall amount, ambient temperature and MSL pressure during different monsoon season, while there is no significant different for relative humidity over the monsoon seasons. The comprehension of indigenous group on the different seasons may help them in early readiness for sustenance and different materials for their own particular survival.

Acknowledgements This study was funded by Universiti Malaysia Terengganu Scholarship Scheme (BUMT) to Author 1. The authors also would like to thank the Malaysian Meteorological Department (MMD) for the meteorological data.

References

Abdullah, S., Ismail, M., & Fong, S. Y. (2017). Multiple Linear Regression (MLR) models for long term PM_{10} forecasting during different monsoon seasons. *Journal of Sustainability and Management, 12*(1), 60–69.

Akhir, M. F. M., & Chuen, Y. J. (2011). Seasonal variation of water characteristics during inter-monsoon along the east coast of Johor. *Journal of Sustainability and Management, 6*(2), 206–214.

Daryabor, F., Tangang, F., & Juneng, L. (2014). Simulation of southwest monsoon current circulation and temperature in the east coast of Peninsular Malaysia. *Sains Malaysiana, 43*(3), 389–398.

Ismail, M., Abdullah, S., & Fong, S. Y. (2015a). Trend and status of particulate matter (PM_{10}) concentration at three major cities in east coast of Peninsular Malaysia. *Research Journal of Chemical and Environmental Sciences, 3*(5), 25–31.

Ismail, M., Suroto, A., & Abdullah, S. (2015b). Response of Malaysian local rice cultivars induced by elevated ozone stress. *EnvironmentAsia, 8*(1), 86–93.

Ismail, M., Abdullah, S., Fong, S. Y., & Ghazali, N. A. (2016). A ten year investigation on ozone and it precursors at Kemaman, Terengganu, Malaysia. *EnvironmentAsia, 9*(1), 1–8.

Suhaila, J., Deni, S. M., Zin, W. Z. W., & Jemain, A. A. (2010). Trends in Peninsular Malaysia rainfall data during the southwest monsoon and northeast monsoon seasons: 1975–2004. *Sains Malaysiana, 39*(4), 533–542.