

Some Statistical Characteristic of Malaysian Wind Direction Recorded at Maximum Wind Speed: 1999-2008

(Sebahagian Ciri Statistik Arah Angin Malaysia yang Direkodkan pada Kelajuan Angin Maksimum: 1999-2008)

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ABSTRACT

The statistical characteristics of wind direction that was recorded at maximum wind speed in Peninsular Malaysia for two monsoons from 1999 to 2008 for seven stations were analyzed in this study. Modeled by von Mises distribution, the change in parameters values namely mean direction and concentration parameter was measured. Statistical summary, graphical representations, Watson-William Test and linear-circular correlation are used in the analysis. It is found that there is a significant change in the mean direction of wind over the period of ten years for most stations in Peninsular Malaysia. However, there is a weak relationship between wind direction and wind speed. This study suggested the presence of prominent direction of wind that blows in Peninsular Malaysia by monsoon. This finding may provide useful information on giving a better understanding of the behavior of the wind in Peninsular Malaysia and the potential use of wind as an alternative source of energy.

Keywords: Circular statistics; climate; von Mises distribution; wind direction; wind speed

ABSTRAK

Ciri statistik arah angin yang dicatatkan pada kelajuan angin maksimum bagi tujuh stesen di Semenanjung Malaysia untuk dua monsun dari tahun 1999 hingga 2008 telah dianalisis dalam kajian ini. Arah angin ini dimodelkan oleh taburan von Mises dan perubahan dalam nilai-nilai parameternya iaitu min berarah serta parameter menumpu telah diukur. Ringkasan statistik, perwakilan grafik, ujian Watson-William dan korelasi linear membulat turut digunakan dalam analisis ini. Didapati bahawa terdapat perubahan ketara dalam min hala tuju angin sepanjang tempoh sepuluh tahun bagi kebanyakan stesen di Semenanjung Malaysia. Walau bagaimanapun, terdapat hubungan yang lemah antara arah angin dan kelajuan angin. Kajian ini mencadangkan terdapat kehadiran arah utama angin yang bertiup di Semenanjung Malaysia untuk setiap monsun. Penemuan ini boleh memberikan maklumat yang berguna serta pemahaman yang lebih baik terhadap tingkah laku angin di Semenanjung Malaysia dan potensi penggunaan angin sebagai sumber tenaga alternatif.

Kata kunci: Arah angin; iklim; kelajuan angin; statistik berarah; taburan von Mises

INTRODUCTION

The climate in the Peninsular of Malaysia can be described by humid tropical temperature with little variation throughout the year. It is situated between 1°N and 7°N latitude. However, other meteorological conditions such as wind and rainfall are very much dominated by the monsoon season. Malaysia experiences two monsoon seasons namely the southwest monsoon (June to September) and northeast monsoon (November to March) and two inter-monsoon seasons (October and April to May).

Although Peninsular Malaysia does not have extreme weather conditions, it has suffered a fair share of turbulent (catastrophic) meteorological condition over the years. In June 2012 and August 2005, the haze in Malaysia is worsened by wind that brought in high pollutants from forest fires in Sumatera across the Straits of Malacca into the Peninsular Malaysia (Bernama 2012; Mahmud & Ab Liah 2010; The Star 2005). Severe flash floods in September 2008 experienced by the northern region of the peninsular namely the states of Kedah and Northern Perak

were due to heavy rain (Bernama 2008). In December 2006, the southern state of peninsular, Johor, suffered massive flood as a result of the typhoon Utor caused by tropical depression and severe tropical storm (Muhammad Barzani et al. 2010; Nur Aishah et al. 2012; The Star 2006). In 1997-1998, an unusually severe drought in the states of Kedah, Penang and Selangor was associated with the El Nino draught (Bernama 1998).

The climate change in the Peninsular Malaysia is monitored by the Malaysian Meteorological Departments which records daily temperature, rainfall, wind speed, wind direction, weather, wave height, earthquake and tsunami warning and satellite images. In 2009, a report on climate change scenarios for Malaysia from 2001 to 2099 was published. However it was reported that the climate models may not be totally successful to simulate severe future extreme events (Malaysian Meteorological Service Departments 2009). Fredolin et al. (2012) gave an overview of the current scientific knowledge of climate change over Malaysia and addressed that the knowledge