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Monthly and Annual Distribution of Both the Frequency of Rainy Days and Rainfall Intensity in Peninsular Malaysia

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ABSTRAK

Tujuan kajian ini adalah untuk menganalisa frekuensi bilangan hari hujan serta keamatan hujan (rainfall intensity) secara bulanan serta secara berpenggal (annual). Secara ringkas kajian ini mendapati bahawa: (a) agihan frekuensi bilangan hari hujan menyerupai agihan bulanan taburan hujan di bahagian barat banjaran utama; (b) terdapat gradien penting pada kedua-dua frekuensi taburan hari hujan dan keamatan hujan di kawasan banjaran Titiwangsa dengan nilai maksima diperhatikan di sebelah barat dan minima di sebelah timur; (c) Taburan kedua-dua frekuensi hari hujan dan keamatan hujan adalah homogen untuk sebelah timur banjaran utama sehingga 50 km dari pantai timur; dan (d) nilai minuma frekuensi hari hujan dan keamatan hujan dicatatkan di kawasan barat laut semenanjung semasa musim sejuk hemesfera utara (boreal winter).

ABSTRACT

The aim of this study is to analyze both the monthly and the annual distributions of both the frequency of rainy days and the rainfall intensity in Peninsular Malaysia. The most relevant findings of this study may be summarized as: (a) the monthly distribution of the frequency of rainy days is similar to the monthly rainfall distribution at the western side of the principal mountain range; (b) an important gradient of both the frequency of rainy days and the rainfall intensity is recorded at the Titiwangsa mountain range where a maximum is observed at its western side and a minimum at its eastern side; (c) the distribution of both the frequency of rainy days and the rainfall intensity is very homogeneous from the eastern side of the mountain range up to a distance of 50 km from the east coast; and (d) minimum of both the frequency of rainy days and intensity rainfall is recorded in the northwestern sector of the Peninsula during the boreal winter.

Keywords: convergence area, northeast monsoon, southwest monsoon, rainy days, rainfall intensity

INTRODUCTION

A rainy day may be defined as a day that rains more than 0.1 mm, while the intensity of rainfall may be defined as the quotient between the monthly precipitation and the number of rainy days of that particular month.

The only attempt to study both the annual distribution of rainy days and rainfall intensity has been done in the late fifties (Dale 1959). No other attempt has been made since then in Peninsular Malaysia. It is our feeling that with a more complete data set an actualization of both the monthly (and the annual distribution) of rainy days and rainfall intensity is timely and pertinent.

There is a significant difference in the way data have been handled in our study as compared with Dale's (1959) investigation. This is explained in a companion publication (Camerlengo and Somchit 2000). The interested reader is referred to that particular work.

DATA

The meteorological data have been obtained from the "Monthly Summary of Meteorological Observations" published by the Malaysian Meteorological Service (1982-96). The location of the stations as well as the name of each station are shown in *Fig. 1* and Table 1 of the companion paper (Camerlengo and Somchit 2000).

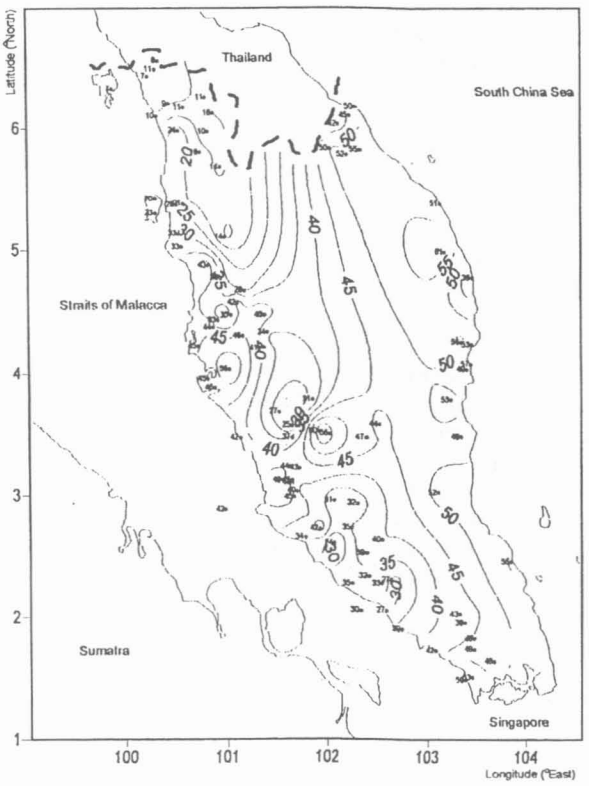

Fig 1. Percentage of rainy days in Peninsular Malaysia during January

RESULTS AND DISCUSSION

Monthly and annual distribution of rainy days

Greater number of rainy days are recorded at the east coast in January, where the largest amount of rainfall occurs in its southern half during this particular month (*Fig. 1*). On the other hand, lower number of rainy days are observed in the northwestern sector of the Peninsula where minimum precipitation occurs in that part of the country (Camerlengo *et al.* 1996)

The largest gradient of frequency of rainy days is observed between Teluk Intan, 56 %, and Kuala Kubu Baru, 25 %. This may be attributed to the fact that: (1) the northeast (NE) monsoon winds are still relatively strong in January (with the consequent discharge of humidity from the east coast towards the eastern side of the principal mountain range), and (2) that the former station is at the windward side of the mountain range while the latter one is at the leeward side.

A considerable decrease of the number of rainy days is observed all across the peninsula during the following month (*Fig. 2*). In particular, the number of rainy days is larger in the western half than in the eastern half where no gradient of rainy days is observed.

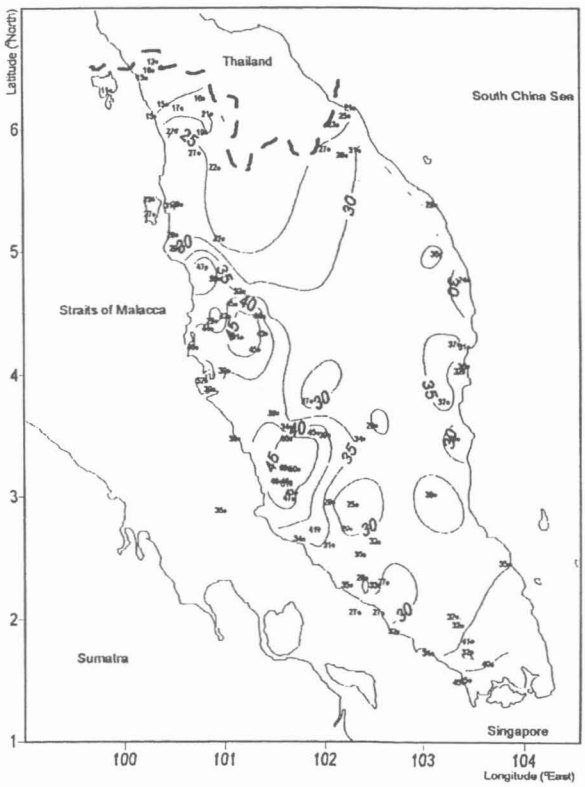

Fig 2. Idem as fig. 1, but for February

As in January, minimum number of rainy days (attributed to the same effect as in the previous month) is observed in February in the northwestern part of the peninsula. On the other hand, the largest number of rainy days is found at the western side of the mountain range. This may largely be attributed to the discharge of humidity from the air mass moving further inland due to the (early afternoon) sea breeze effect. This same maximum is observed from March to May.

March rainfall average is larger than the precedent month. This is reflected in the larger percentage of rainy days (*Fig. 3*). On the other hand, minimum number of rainy days is observed in the northern part of the peninsula in March. In particular, this includes both the states of Kelantan and Terengganu.

Larger number of rainy days is detected in Bukit Maxwell (Larut), Cameron Highlands and in the Kuala Lumpur area during April (*Fig. 4*). Maximum rainfall is precisely recorded in the first two stations during this particular month. This may largely be attributed to the fact that the maximum belt of

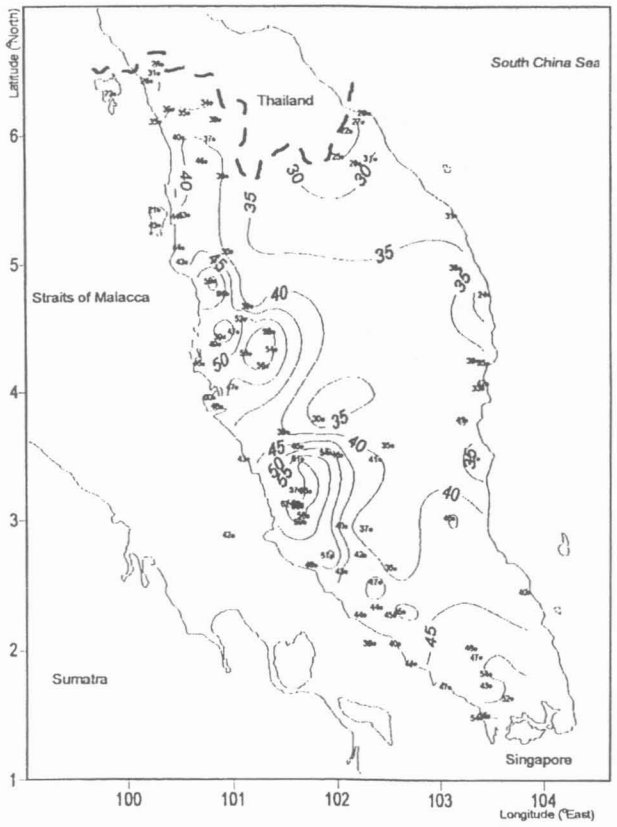

Fig 3. Idem as fig. 1, but for March

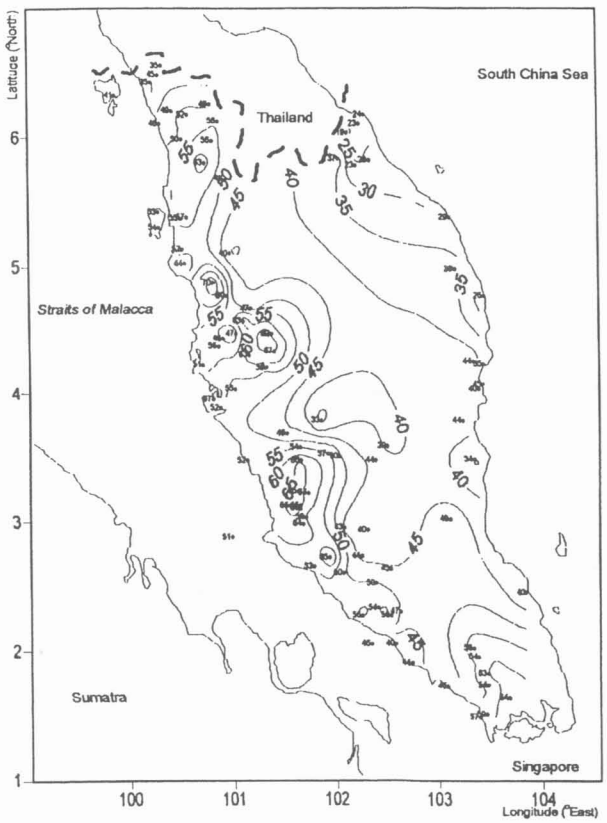

Fig 4. Idem as fig. 1, but for April

precipitation in Peninsular Malaysia is located at a height of approximately 950 meters (Camerlengo *et al.* 1998).

One of the two monthly maximums of precipitation is recorded either in April or May (according to the particular latitude of the analyzed station) (Nieuwolt 1981). This is reflected by the increase in the number of rainy days all across the peninsula (*Figs. 4* and *5*). In particular, both in the northern part and at the east coast of the peninsula it is observed.

June probably represents one of the "driest" months in Peninsular Malaysia. The decrease in the percentage of number of rainy days in June compared to May is attributed to this effect. In spite of the fact that a considerable lesser amount of monthly rainfall is recorded in Alor Setar, 128 mm, compared to Bukit Maxwell (Larut), 332 mm; the highest percentage of rainy days is observed in the former station during June (*Fig. 6.* Camerlengo and Somchit 2000).

In tropical latitudes, both the sea breeze and the land breeze have a considerable larger horizontal length scale influence than at mid-latitudes

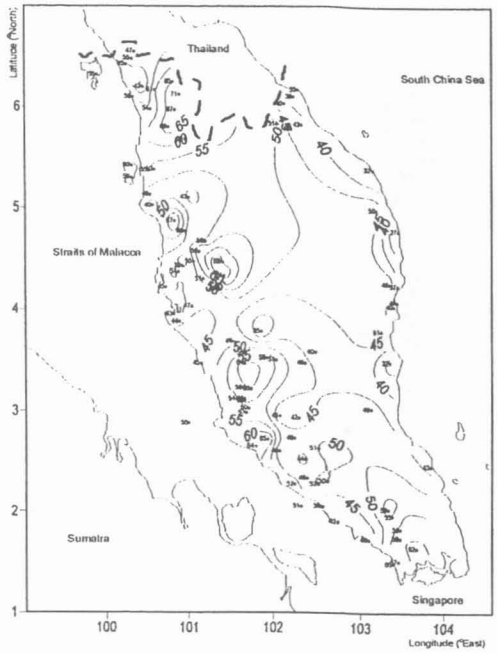

Fig 5. Idem as fig. 1, but for May

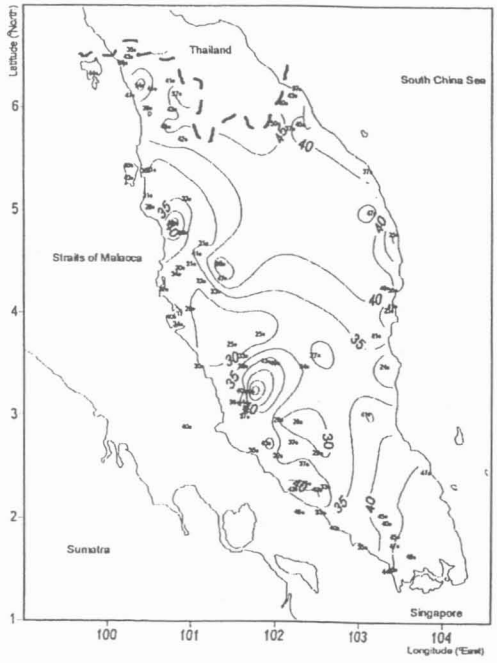

Fig 6. Idem as fig. 1, but for June

(Hastenrath 1990). As such, the sea breeze in unison with the SW monsoon winds may help explain the fact that the larger number of rainy days is observed further inland from the west coast. For example, at Alor Setar, Pusat Pertanian Charuk Padang, the Kuala Lumpur area, Johor Bahru and at Bukit Maxwell (Larut) the percentage of rainy days is higher in July than the antecedent month (*Fig. 7*).

The increase of the percentage of rainy days at the east coast recorded in July may solely be attributable to the convergence of the sea breeze effect and the SW monsoon winds.

A larger (lesser) percentage of rainy days is recorded in the northwestern sector of the peninsula (at the leeward side of the mountain range) in August (*Fig. 8*).

It is interesting to notice that a larger percentage of rainy days is observed both in the northern and in the southern parts of the peninsula compared to its central part in August.

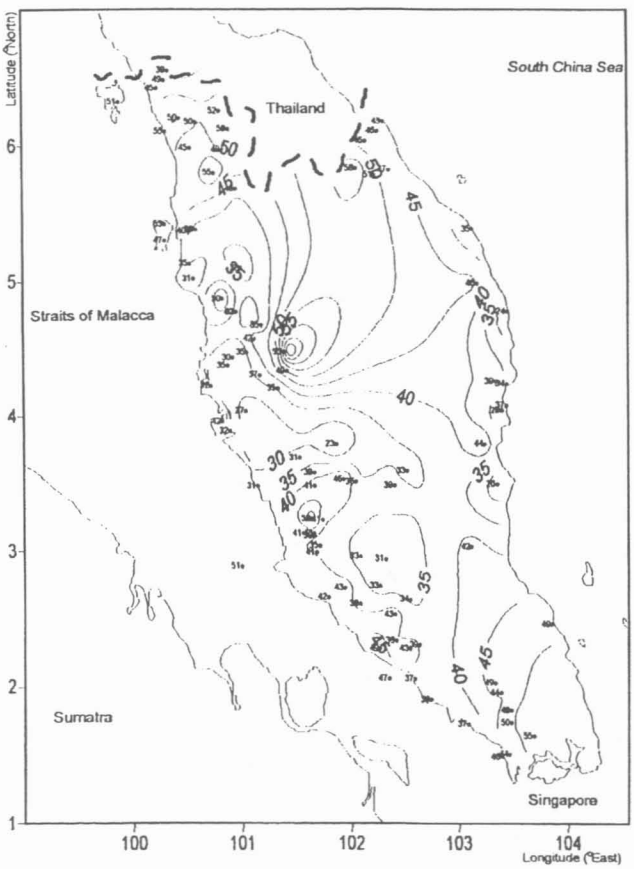

Fig 7. Idem as fig. 1, but for July

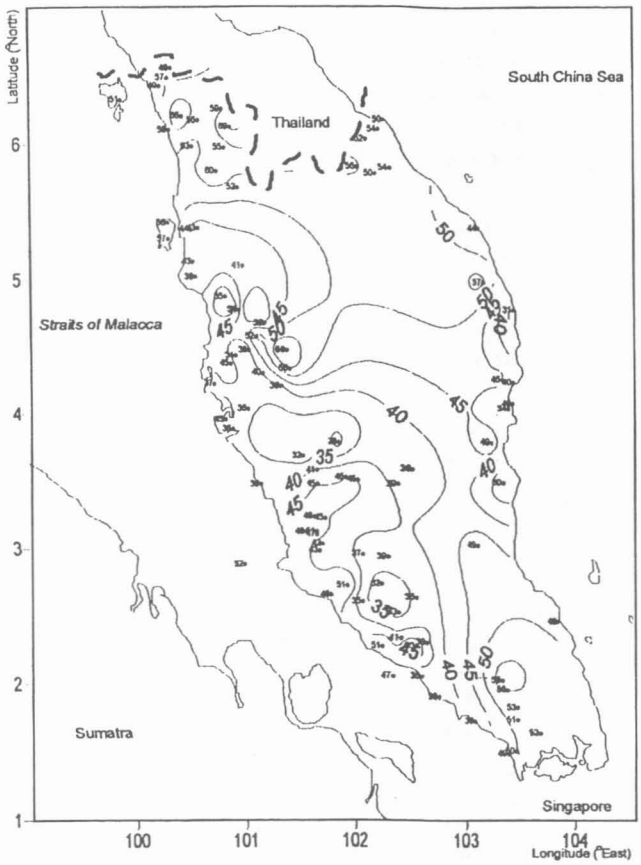

Fig 8. Idem as fig. 1, but for August

A larger percentage of rainy days is recorded all across the peninsula either in September or in October (*Figs. 9* and *10*). In particular, it is interesting to note that: (1) values larger than 70 % may be observed in the northwestern sector of the peninsula, and (2) only a few stations register less than 45 % of rainy days (usually at the eastward side of the mountain range) during both months.

November represents the onset of the NE monsoon season (Nasir and Camerlengo 1997). During this particular month, 30 % of the annual rainfall occurs in the northern half of the east coast (Camerlengo *et al.* 1996).

Therefore, most of all eastern coastal stations register more than 75 % of rainy days during this particular month (*Fig. 11*).

A minimum percentage of rainy days is detected in the northwestern sector of the Peninsula. This minimum tends to decrease (substantially) during the following month in this particular area (*Fig. 12*).

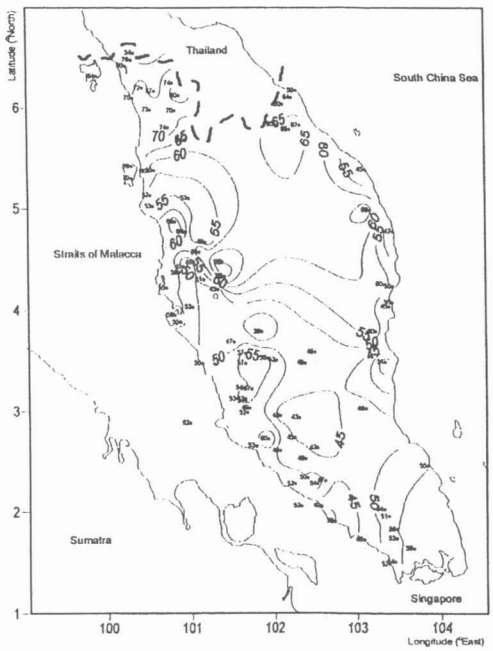

Fig 9. Idem as fig. 1, but for September

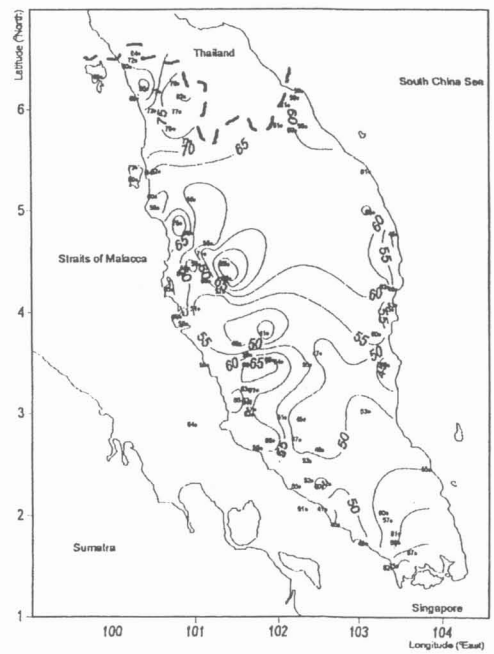

Fig 10. Idem as fig. 1, but for October

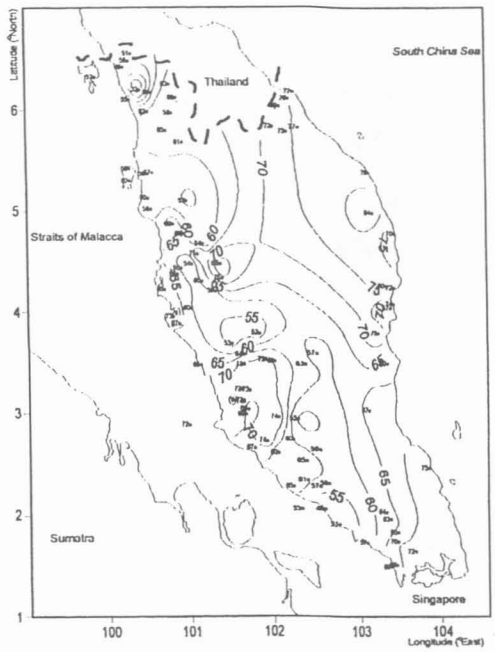

Fig 11. Idem as fig. 1, but for November

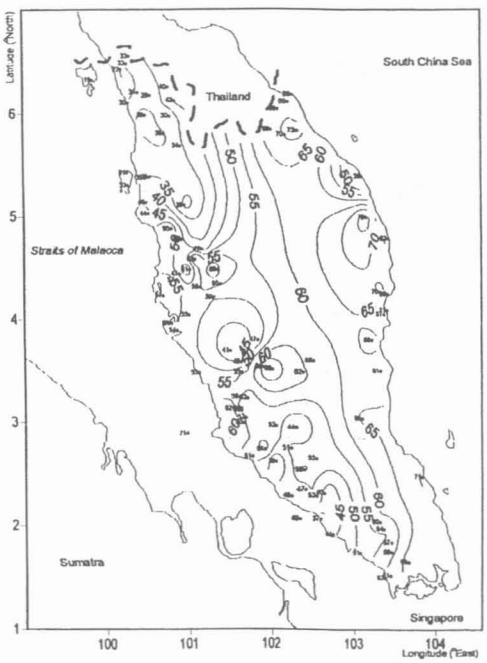

Fig 12. Idem as fig. 1, but for December

The slight decrease of the number of rainy days at the northern half at the east coast observed in December may be attributed to the equatorward migration of the leading edge of the NE monsoon.

A lower number of rainy days is usually recorded at the eastern side of the mountain range. The NE monsoon winds tend to reverse this phenomenon. As a consequence of this, the number of rainy days is higher than 50 % during November and December in this particular area.

The annual distribution of the percentage of rainy days shows that a larger percentage of rainy days is recorded further inland from the east coast i.e. around 50 km inwards from this particular coast (*Fig. 13*). Maximum number of rainy days is observed in Cameron Highlands, Bukit Maxwell (Larut) and within a radius of 50 km of Kuala Lumpur. This phenomenon is mainly due to the relief effect (Nieuwolt 1981; Camerlengo and Somchit 1998).

Minimum number of rainy days is annualy recorded in the northwestern part (as compared to the southern part) of the Peninsula.

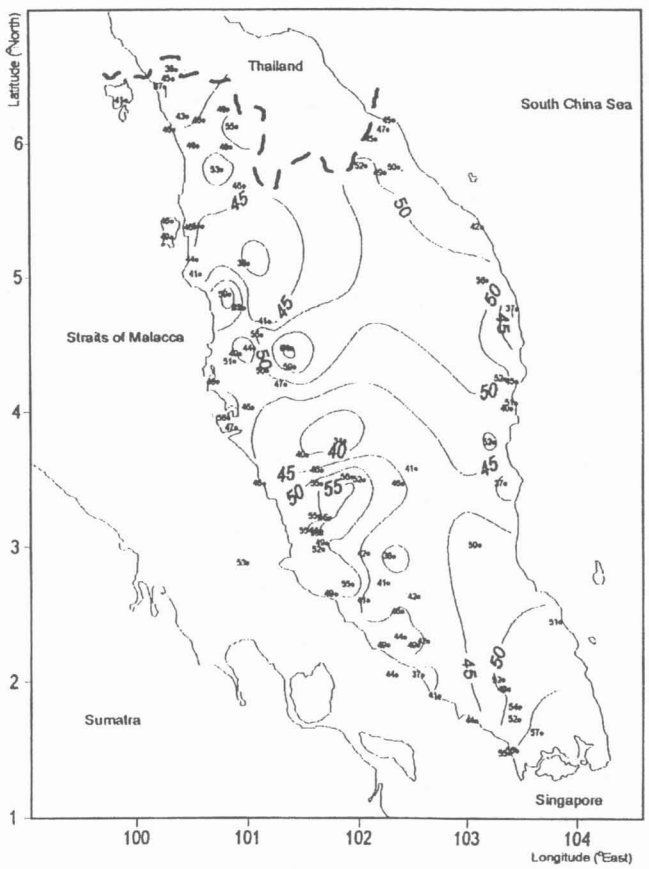

Fig 13. Annual percentage of rainy days in Peninsular Malaysia

Monthly and annual distribution of average rainfall intensity

A principal maximum (minimum) of rainfall intensity is recorded in the southern half at the east coast (extreme northern part) of the peninsula, during January, while a secondary maximum (minimum) is observed at the western side (eastern side) of the mountain range (Table 1).

The retreat of the NE monsoon may help explain the sharp drop in intensity at the east coast in February while a (relative) maximum is observed at the western side of the mountain range.

The situation at the western side of the peninsula remains unchanged in March, whereas an increase of intensity is recorded at the east coast.

The poleward migration of the convergence area during April and the first half of May causes an increase in rainfall intensity (observed in these two months as compared to March) on the western side of the peninsula. In particular, a maximum intensity is clearly distinguishable at the windward side of the mountain range. No similar increase of intensity is observed in the eastern half during these two months.

In spite of the fact that June represents a "relative" dry month, no significant change is observed in the intensity pattern when compared with the previous month (Camerlengo *et al.* 1996).

A large intensity gradient is observed across the mountain range, where larger values are recorded at the windward side of the mountain range and lesser values at its leeward side. No significant change of intensity is observed between the leeward side of the mountain range up to a distance of approximately 50 km inland from the east coast. From this point, a significant increase of intensity is observed towards the east coast in its southern half. Minimum intensity is recorded both in the northern part and the extreme southern part of the Peninsula. These main characteristics are prevalent during the rest of the SW monsoon season i.e. from July to September.

The increase of intensity observed in October all across the Peninsula may be attributable to the equatorward migration of the other broad area of convergence. Also, intensity values are greater in October than in April/May due to the fact that convergence is lesser in the latter months than in the former one.

In spite of the fact that the intensity has increased in October all across the peninsula, the same pattern prevails: larger values at the windward side of the mountain range and lesser values at its leeward side.

The equatorward migration of the NE monsoon determines a principal maximum of intensity at the east coast both in November and December. Higher values are reported in the latter month. In a similar fashion as with the percentage of rainy days, an important decrease of intensity is noticeable further inland of the east coast, towards the Titiwangsa mountain range.

A principal minimum of intensity is observed at the northwestern sector of the country during both months.

Another interesting feature to perceive is represented by the secondary maximum (minimum) located at the windward (leeward) side of the Titiwangsa mountain range.

TABLE 1
Monthly and annual rainfall intensity in Peninsular Malaysia

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Kota Baharu	4.2	5.4	16.2	12.7	9.7	10.3	11.1	11.2	10.4	14.3	29.5	24.9	14.7
Mardi Jeram Pasu	8.2	9.0	15.4	2.7	14.2	14.6	15.4	14.1	16.0	17.2	27.1	31.2	17.7
Pusat Pertanian Lundang	5.8	5.0	16.7	13.2	9.7	10.8	12.7	12.4	12.2	14.8	30.3	26.6	15.9
Pusat Pertanian Pasir Mas	6.7	5.4	13.9	11.4	12.4	15.2	15.4	17.1	15.1	13.7	28.5	25.3	16.7
Pusat Penternakan Haiwan Tanah Merah	11.0	10.3	15.5	10.0	15.8	15.7	12.1	14.4	15.1	17.5	23.5	23.6	16.2
Pejabat Haiwan Jajahan Machang	9.5	7.4	15.9	10.2	11.3	15.9	15.2	15.1	15.5	18.9	26.9	32.9	17.9
Kuala Terengganu	6.9	5.8	15.8	10.4	10.7	10.8	10.5	10.5	13.9	11.8	30.0	47.3	16.3
Dungun	13.6	12.2	21.5	15.2	17.1	13.9	16.6	15.6	18.0	14.6	31.2	35.3	21.0
Kemaman	14.0	11.1	16.9	13.5	13.7	16.2	11.3	14.5	14.2	13.2	27.8	35.0	18.5
Mardi Jerangau	13.1	10.0	15.9	12.9	14.4	14.1	13.3	12.3	14.5	14.3	21.2	30.3	16.7
Mardi Kemaman	13.6	11.3	17.6	12.5	11.4	12.4	11.2	12.1	13.4	14.8	26.1	29.3	16.6
Kuantan	16.7	10.0	16.9	11.1	12.2	12.6	10.9	20.3	12.6	13.8	20.4	26.7	16.1
Temerloh	8.8	10.8	13.4	14.7	11.9	12.6	8.6	13.5	12.4	11.8	13.2	9.8	11.8
Cameron Highlands	5.9	9.6	10.9	12.7	12.6	10.4	9.9	11.1	12.2	15.1	12.6	9.1	11.4
FELDA Kampong Sterik	7.1	9.5	13.8	12.3	10.3	10.9	13.1	9.5	9.8	12.2	12.3	9.4	10.8
FELDA Padang Piol	11.4	10.9	14.6	14.4	14.7	16.0	14.9	13.4	14.7	16.1	15.2	13.0	14.1
Bentong	8.2	9.6	12.0	11.3	9.8	10.1	10.1	9.5	9.6	11.4	12.2	11.3	10.5
MARDI Sungai Baging	12.7	10.7	15.0	12.5	11.3	13.6	11.1	11.5	15.5	11.2	24.8	24.4	15.4
MARDI Bukit Riden	16.2	10.8	14.8	12.3	10.7	11.1	8.8	9.7	10.1	12.5	13.9	20.6	13.0
MARDI Cameron Highlands	6.6	10.6	11.4	13.7	14.0	10.9	6.2	10.5	11.8	13.6	11.9	10.3	11.0
NEB Jor	6.5	8.9	10.9	9.5	9.8	10.1	10.0	9.3	10.8	11.6	10.9	7.9	9.9
Pusat Pengeluaran Tanaman Kg Awan	9.2	9.4	13.4	14.0	14.8	13.1	9.6	9.9	14.3	15.0	14.5	12.8	12.7
Pusat Pertanian Gali, Raub	10.3	12.5	14.1	19.4	14.4	16.9	14.1	11.9	10.9	14.4	14.3	12.6	13.8
Pekan	22.8	14.4	23.0	14.5	15.5	20.0	12.0	12.3	20.0	21.3	25.8	25.0	20.1

Table 1 Continued

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Johor Bahru	11.9	12.9	12.6	19.3	12.5	10.2	10.7	11.9	12.2	11.1	11.5	12.0	5.8
Mersing	23.4	15.1	10.4	9.8	10.8	9.9	10.4	12.8	11.9	10.5	17.3	27.5	15.0
Kluang	12.5	14.6	14.0	13.2	10.4	10.0	9.5	8.1	9.5	10.8	11.7	15.0	11.5
Cemara Research	12.0	14.8	12.9	12.5	11.3	10.1	10.3	12.3	11.0	10.4	13.4	14.4	12.1
Layang-layang													
Kota Tinggi	17.0	16.0	15.1	11.4	12.7	12.8	11.2	12.7	12.8	11.8	13.4	21.2	13.9
Tangkak	9.3	11.1	12.1	13.0	11.2	8.8	10.2	10.1	10.6	10.8	12.4	9.1	10.8
Muar	13.6	18.1	13.7	17.5	17.1	16.0	15.2	17.6	19.0	17.1	17.4	12.3	16.3
Pontian	10.9	10.6	13.9	13.4	10.8	11.6	14.0	11.6	14.0	10.8	14.2	10.5	12.2
MARDI Alor Bukit, Pontian	11.8	15.0	15.5	12.5	14.2	11.5	13.2	10.4	13.2	10.3	14.0	11.6	12.7
MARDI Kluang	14.0	17.2	15.4	14.3	11.7	10.1	9.3	9.4	10.5	9.5	10.9	16.2	12.2
Pusat Pertanian Parit Botak	12.2	17.3	16.0	14.7	13.7	15.0	17.4	16.1	13.2	11.6	14.6	13.8	14.5
Pusat Pertanian Sungai Sudah	11.7	14.7	15.3	15.5	15.4	16.6	20.2	17.6	17.4	15.1	16.0	14.2	15.8
Segil Estate	12.3	15.5	13.3	14.6	11.2	10.7	12.6	12.0	12.5	12.0	13.2	12.7	12.7
Cuping	4.5	12.7	10.8	12.3	11.1	8.6	11.7	10.8	11.5	10.8	9.4	7.9	10.5
Felda Cuping A	5.4	11.8	14.4	13.2	11.2	10.4	13.0	11.6	13.0	13.7	10.9	9.4	12.0
Kangar	8.8	7.6	13.2	14.5	15.8	12.7	14.5	13.7	14.9	13.2	11.4	11.0	13.4
Penang International Airport	8.3	12.8	11.8	12.3	12.8	12.1	13.7	14.8	16.9	15.7	11.2	8.3	13.1
Hospital Bukit Mertajam	12.1	11.9	13.1	13.3	11.4	10.9	14.0	11.6	15.4	13.6	14.4	11.0	13.0
Pusat Kesihatan Bukit Bendera	10.0	12.0	27.4	17.7	16.3	17.8	16.0	16.9	21.2	16.7	16.9	12.5	17.1
Malacca	6.6	9.0	12.9	12.8	12.8	11.8	11.9	10.4	13.3	11.3	12.9	9.1	11.5
Chemara Research Serkam, Jasin	8.9	11.6	11.9	11.2	11.0	10.8	8.8	10.8	10.0	12.6	12.2	10.1	10.9
Rumah Api Pulau Undan	7.5	8.6	12.0	11.9	14.8	15.8	15.4	15.9	15.1	13.1	11.9	9.6	13.1
Alor Setar Airport	9.5	11.3	11.2	12.5	17.4	8.0	11.3	9.6	12.3	16.9	19.5	8.2	12.4
DID Muda	7.5	7.7	13.0	11.8	13.0	10.7	10.9	12.4	12.7	12.2	13.6	8.5	11.8
DID Pedu	4.1	12.0	15.0	16.9	13.7	11.5	12.6	12.2	12.7	15.0	13.3	10.6	13.2
Baling	7.2	10.3	15.1	15.8	16.3	13.0	14.7	13.8	16.3	15.5	14.2	11.3	14.4
Kulim	13.1	14.8	15.8	17.9	16.1	17.0	15.0	14.2	16.3	18.8	17.1	16.1	16.3
Pulau Langkawi	9.1	16.1	12.0	14.9	14.9	16.9	17.4	15.7	21.0	16.8	13.2	8.9	15.9

Table 1 Continued

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Sungai Petani	7.8	9.8	10.2	13.0	10.1	10.9	11.1	13.0	14.0	13.7	10.8	10.2	11.7
MARDI Gajah Mati	8.8	11.1	10.6	15.1	11.2	9.1	11.4	11.4	13.2	12.7	11.9	9.1	11.8
Pusat Pertanian Batu Seketol	7.3	9.7	16.7	15.3	15.2	14.9	16.7	16.7	15.2	16.6	16.5	12.2	15.4
Pusat Pertanian Charuk Padang	7.3	11.2	14.9	14.6	15.1	12.6	13.9	13.7	16.5	15.8	13.9	9.7	14.0
Pusat Pertanian Teluk Chengai	8.0	7.6	11.6	12.3	15.4	12.9	15.5	13.1	15.6	14.3	11.9	6.8	13.5
Ipoh	9.1	11.5	11.6	14.8	12.4	11.0	13.3	10.1	10.8	14.2	12.4	14.4	12.3
Setiawan	10.7	10.6	10.9	11.5	10.0	9.3	11.5	10.5	10.0	8.9	11.7	12.7	10.7
Bukit Maxwell (Larut)	13.6	15.5	16.9	19.6	21.5	22.9	23.0	23.0	24.2	23.2	22.8	14.9	20.4
FELDA Trolak Utara	11.5	15.7	13.3	17.1	15.3	16.4	12.9	13.1	12.5	15.2	16.1	13.5	14.5
Ulu Kinta	10.9	15.4	15.3	14.9	15.5	15.3	15.2	13.4	14.4	17.7	17.4	13.4	15.1
Batu Gajah	17.1	11.2	16.9	18.5	13.7	12.4	13.4	13.6	15.0	14.2	17.0	24.1	15.7
Kampar	14.1	16.4	17.9	20.3	17.6	17.9	18.7	16.0	17.8	19.8	20.1	18.8	18.1
Kuala Kangsar	11.7	13.5	13.7	13.8	11.6	10.1	11.2	10.1	11.6	11.5	11.2	11.9	11.9
Lenggong	11.9	11.6	14.5	13.0	13.6	10.3	11.0	11.1	13.2	12.2	13.3	12.3	12.7
Parit Buntar	11.5	12.7	23.2	13.3	12.2	10.5	10.2	11.6	13.1	12.1	12.0	11.7	12.9
Tanjung Malim	12.8	18.6	19.8	21.4	19.5	20.8	16.1	18.9	17.5	20.2	19.4	17.2	18.7
Tapah	19.8	23.7	17.1	18.5	18.8	17.4	20.2	16.2	18.7	18.9	19.1	18.6	18.9
Teluk Intan	11.1	14.5	14.6	15.1	13.0	11.7	14.4	15.2	12.1	14.5	16.0	17.6	14.2
MARDI Hilir Perak	9.8	12.5	10.1	10.6	8.8	8.4	11.4	9.2	9.4	11.8	11.8	12.1	10.6
MARDI Kuala Kangsar	10.0	13.1	10.6	11.4	9.3	9.2	9.1	8.5	9.3	10.2	11.2	10.1	10.2
MARDI Parit	18.4	17.4	14.2	14.9	15.5	11.0	11.2	13.3	14.3	13.1	15.1	15.1	14.5
Pusat Pertanian Titi Gantong	11.9	11.5	12.7	13.3	10.4	8.7	10.0	11.1	11.1	10.1	14.3	12.6	11.7
JKR Bagan Serai	14.5	12.3	15.1	13.5	14.0	12.1	13.6	10.9	14.2	13.9	16.2	12.9	13.8
Kuala Lumpur	10.9	12.7	14.3	12.3	14.3	12.1	9.5	11.4	12.3	11.6	13.0	14.1	12.5
Universiti Malaya	12.6	15.6	13.4	17.1	14.2	8.4	10.2	11.5	13.8	13.4	15.1	16.3	13.6
Kolej Tunku Abdul Rahman	9.9	12.9	13.8	14.6	14.6	14.3	11.9	13.8	15.2	14.2	13.0	12.9	13.6

Table 1 Continued

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Petaling Jaya	13.0	15.3	14.0	16.2	14.0	11.9	11.1	11.6	12.3	14.6	14.9	16.0	14.0
FRI Kepong	7.2	13.0	14.2	14.3	14.6	12.5	9.5	12.6	15.0	13.4	14.8	12.0	13.0
Hospital Kuala Kubu Baru	11.1	13.6	13.2	17.1	18.0	14.7	14.1	14.1	16.1	14.9	14.7	13.9	14.9
MARDI Serdang	11.2	13.7	14.3	13.5	13.8	10.3	9.9	10.3	11.8	11.5	12.3	14.0	12.4
MARDI Tanjung Karang	10.3	10.6	11.8	11.5	8.9	10.0	9.8	10.8	11.0	11.9	12.5	13.6	11.2
Pusat Pertanian Batang Kali	10.7	11.7	13.5	14.6	15.3	12.3	12.4	14.5	14.1	13.8	15.6	12.4	13.7
Rumah Api One Fathom Bank	10.8	11.2	11.3	12.6	13.9	13.0	13.8	12.9	14.5	16.7	13.5	14.8	13.5
Universiti Putra Malaysia Serdang	12.5	12.2	15.3	13.4	13.8	10.7	12.7	10.3	12.6	11.2	13.4	13.6	12.8
Cemara Research Tanah Merah	10.3	9.0	11.4	10.1	8.4	11.9	4.4	9.9	13.4	13.6	11.7	12.2	6.6
FELDA Pasoh Dua	9.6	14.3	14.8	13.2	11.5	15.2	12.1	10.2	14.4	13.3	14.8	12.7	13.0
Haiwan Jelai, Gemas	9.5	11.8	16.9	12.6	10.4	11.2	10.0	7.8	11.3	13.5	13.4	11.7	11.7
Jelebu	7.8	8.8	10.0	10.5	7.9	9.7	7.8	8.3	9.8	8.7	9.9	9.4	8.8
Kuala Pilah	8.6	12.9	13.0	11.6	10.1	7.5	10.0	7.9	10.3	10.6	11.9	9.5	10.4
Seremban	7.7	12.0	11.6	11.7	10.3	10.0	9.8	9.6	11.6	12.9	13.0	12.2	11.2
Pusat Pertanian Chembong	11.9	15.3	18.8	17.8	14.6	14.7	14.5	12.7	16.4	15.5	15.8	12.2	15.3
Pusat Pertanian Gemencheh	9.3	10.0	13.8	11.5	12.4	9.2	7.0	9.3	8.4	10.8	10.7	10.6	10.4

The annual distribution of rainfall intensity shows two maximums: one at the east coast and the other one at the western side of the mountain range. On the other hand, three minimums of rainfall intensity are recorded: (1) at the northwestern sector of the peninsula, (2) at the extreme southern tip of the country, and (3) at the eastern side of the mountain range.

CONCLUSION

The main conclusions of this investigation are:

- The pattern of the frequency of rainy days is similar to the monthly (average) rainfall pattern at the western side of the Titiwangsa mountain range.
- A large gradient of both the frequency of rainy days and the rainfall intensity is recorded at the principal mountain range where a maximum is observed at the western side and a minimum at its eastern side. The minimum of frequency of rainy days disappears during both November and December.
- The patterns of both the number of rainy days and the rainfall intensity are very homogeneous from the eastern side of the mountain range up to 50 km inwards of the east coast.
- Minimum (Maximum) percentage of rainy days is recorded in the northwestern sector of the peninsula during the boreal winter (September and October).

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