

The Climate of Thailand

1. Geographical Situation

Thailand is located in the tropical area between latitudes $5^{\circ} 37' N$ to $20^{\circ} 27' N$ and longitudes $97^{\circ} 22' E$ to $105^{\circ} 37' E$. The total area is 513,115 square kilometers or around 200,000 square miles.

The boundaries of Thailand with adjacent areas are :

- North : Myanmar and Laos.
- East : Laos, Cambodia and the Gulf of Thailand.
- South : Malaysia.
- West : Myanmar and the Andaman Sea.

2. Topography

According to the climate pattern and meteorological conditions Thailand may be divided into 5 parts i.e. Northern, Northeastern, Central, Eastern and Southern Parts. The topography of each part is quite different as follows :-

2.1 Northern Part

This part is divided into 15 provinces i.e. Chiang Rai, Mae Hong Son, Chiang Mai, Phayao, Lamphun, Lampang, Phrae, Nan, Uttaradit, Phitsanulok, Sukhothai, Tak, Phichit, Kamphaeng Phet and Phetchabun. Most areas of the part are hilly and mountainous which is the source of several important rivers. These north-south oriented hill ridges are parallel from west to east and intersected by a number of major valleys, particularly those near Chiang Mai, Chiang Rai, Lampang and Nan provinces. The highest mountain, about 2,595 meters high above mean sea level, is Doi Inthanon in Chiang Mai. Along the eastern border with the Northeastern Part is mountainous called central highlands. The area in the southern portion between the western mountains and the central highlands is a central valley.

2.2 Northeastern Part

This region is naturally a high level plain called northeast plateau. Northwest-southeast oriented Phu Phan ridge in the northeastern portion separates this part into two basins. One is a large high level plain in the west. Another is smaller and slope towards the east. This part is divided into 20 provinces i.e. Nong Khai, Bueng Kan, Loei, Udon Thani, Nong Bua Lam Phu, Nakhon Phanom, Sakon Nakhon, Mukdahan, Khon Kaen, Kalasin, Maha Sarakham, Roi Et, Chaiyaphum, Yasothon, Amnat Charoen, Ubon Ratchathani, Sri Sa Ket, Nakhon Ratchasima, Buri Ram and Surin.

2.3 Central Part

Central Part is divided into 18 provinces i.e. Nakhon Sawan, Uthai Thani, Chai Nat, Sing Buri, Lop Buri, Ang Thong, Sara Buri, Suphan Buri, Ayutthaya, Pathum Thani, Kanchanaburi, Ratchaburi, Nakhon Pathom, Nonthaburi, Bangkok Metropolitan, Samut Prakan, Samut Sakhon and Samut Songkhram. This part is a large low level plain where the Ping, Wang, Yom and Nan Rivers originated in the Northern Part join together to be the Chao Phraya River at Nakhon Sawan province. However the western mountains in the Northern Part extend to this part along the western portion.

2.4 Eastern Part

The south and southwest of the part is adjacent to the Gulf of Thailand. Farther in land, most areas are plains and valleys but there are some small hills in the northern, central and eastern portions. This part is divided into 8 provinces i.e. Nakhon Nayok, Prachin Buri, Sra Kaeo, Chachoeng Sao, Chon Buri, Rayong, Chanthaburi and Trat.

2.5 Southern Part

The topography of this part is the peninsula between the Andaman Sea which is on the western side of the part and the South China Sea which is on the eastern side. The long ridge of western mountains in the Northern and Central parts also extend to this part. Phuket ridge along the west coast and Nakhon Si Thammarat ridge in the central of lower portion forming the backbone of the Southern Part separate this part into two regions, Southern Thailand East Coast and Southern Thailand West Coast. Ten provinces from north to south which are Phetchaburi, Prachuap Khiri Khan, Chumphon, Surat Thani, Nakhon Si Thammarat, Phatthalung, Songkhla, Pattani, Yala and Narathiwat belong to Southern Thailand East Coast while there are 6 provinces i.e. Ranong, Phang Nga, Krabi, Phuket, Trang and Satun in Southern Thailand West Coast.

3. General Climatic Conditions

The climate of Thailand is under the influence of monsoon winds of seasonal character i.e. southwest monsoon and northeast monsoon. The southwest monsoon which starts in May brings a stream of warm moist air from the Indian Ocean towards Thailand causing abundant rain over the country, especially the windward side of the mountains. Rainfall during this period is not only caused by the southwest monsoon but also by the Inter Tropical Convergence Zone (ITCZ) and tropical cyclones which produce a large amount of rainfall. May is the period of first arrival of the ITCZ to the Southern Part. It moves northwards rapidly and lies across southern China around June to early July that is the reason of dry spell over upper Thailand. The ITCZ then moves southerly direction to lie over the Northern and Northeastern Parts of Thailand in August and later over the Central and Southern Part in September and October, respectively. The northeast monsoon which starts in October brings the cold and dry air from the anticyclone in China mainland over major parts of Thailand, especially the Northern and Northeastern Parts which is higher latitude areas. In the Southern Part, this monsoon causes mild weather and abundant rain along the eastern coast of the part.

The onset of monsoons varies to some extent. Southwest monsoon usually starts in mid-May and ends in mid-October while northeast monsoon normally starts in mid-October and ends in mid-February.

4. Season

From the meteorological point of view the climate of Thailand may be divided into three seasons as follows :

- *Rainy or southwest monsoon season* (mid-May to mid-October). The southwest monsoon prevails over Thailand and abundant rain occurs over the country. The wettest period of the year is August to September. The exception is found in the Southern Thailand East Coast where abundant rain remains until the end of the year that is the beginning period of the northeast monsoon and November is the wettest month.
- *Winter or northeast monsoon season* (mid-October to mid-February). This is the mild period of the year with quite cold in December and January in upper Thailand but there is a great amount of rainfall in Southern Thailand East Coast, especially during October to November.

- *Summer or pre-monsoon season*, mid-February to mid-May. This is the transitional period from the northeast to southwest monsoons. The weather becomes warmer, especially in upper Thailand. April is the hottest month.

5. Surface Temperature

Upper Thailand i.e. the Northern, Northeastern, Central and Eastern Parts usually experiences a long period of warm weather because of its inland nature and tropical latitude zone. March to May, the hottest period of the year, maximum temperatures usually reach near 40°C or more except along coastal areas where sea breezes will moderate afternoon temperatures. The onset of rainy season also significantly reduces the temperatures from mid-May and they are usually lower than 40 °C. In winter the outbreaks of cold air from China occasionally reduce temperatures to fairly low values, especially in the Northern and Northeastern Parts where temperatures may decrease to near or below zero.

In the Southern Part temperatures are generally mild throughout the year because of the maritime characteristic of this region. The high temperatures common to upper Thailand are seldom occur. The diurnal and seasonal variations of temperatures are significantly less than those in upper Thailand.

Seasonal temperatures (°C) in various parts of Thailand

Temperature	Region	Winter	Summer	Rainy
Mean	North	23.4	28.1	27.3
	Northeast	24.2	28.6	27.6
	Central	26.2	29.7	28.2
	East	26.7	29.1	28.3
	South			
	- East Coast	26.3	28.2	27.8
	- West Coast	27.0	28.4	27.5
Mean maximum	North	31.1	36.1	32.4
	Northeast	30.6	35.2	32.6
	Central	32.3	36.2	33.4
	East	32.0	34.1	32.3
	South			
	- East Coast	30.4	33.0	32.7
	- West Coast	32.0	34.1	31.6
Mean Minimum	North	17.5	21.8	23.8
	Northeast	18.7	23.2	24.4
	Central	21.2	24.6	24.8
	East	22.3	25.2	25.2
	South			
	- East Coast	22.8	24.1	24.4
	- West Coast	23.2	24.0	24.3

Based on 1981-2010 period

Extreme maximum temperatures (° C) in Summer

Region	Maximum temperature	Date/Month/Year	Province
North	44.5	27 Apr 1960	Uttaradit
Northeast	43.9	28 Apr 1960	Udon Thani
Central	43.5	29 Apr 1958	Kanchanaburi
		14 Apr 1983	
East	42.9	14,20 Apr 1992	
South		23 Apr 1990	Prachin Buri
- East Coast	41.2	15 Apr 1998	Prachuap Khiri Khan
- West Coast	40.5	29 Mar 1992	Trang

Based on 1951-2015 period

Extreme minimum temperatures (° C) in winter

Region	Minimum temperature	Date/Month/Year	Province
North	0.8	27 Dec 1999	Tak
Northeast	-1.4	2 Jan 1974	Sakon Nakhon
Central	5.2	27 Dec 1993	Kanchanaburi
East	7.6	16 Jan 1963	Sra Kaeo
South			
- East Coast	6.4	26 Dec 1999	Prachuap Khiri Khan
- West Coast	13.7	21 Jan 1956	Ranong

Based on 1951-2015 period

6. Rainfall

Upper Thailand usually experiences dry weather in winter because of the northeast monsoon which is a main factor that controls the climate of this region. Later period, summer, is characterized by gradually increasing rainfall with thunderstorms. The onset of the southwest monsoon leads to intensive rainfall from mid-May until early October. Rainfall peak is in August or September which some areas are probably flooded. However, dry spells are commonly occur for 1 to 2 weeks or more during June to early July due to the northward movement of the ITCZ to southern China.

Rainy season in the Southern Part is different from upper Thailand. Abundant rain occurs during both the southwest and northeast monsoon periods. During the southwest monsoon the Southern Thailand West Coast receives much rainfall and reaches its peak in September. On the contrary, much rainfall in the Southern Thailand East Coast which its peak is in November remains until January of the following year which is the beginning of the northeast monsoon.

According to a general annual rainfall pattern, most areas of the country receive 1,200 - 1,600 mm a year. Some areas on the windward side, particularly Trat province in the Eastern Part and Ranong province in the Southern Thailand West Coast have more than 4,500 mm a year. Annual rainfall less than 1,200 mm occurs in the leeward side areas which are clearly seen in the central valleys and the uppermost portion of the Southern Part.

Seasonal rainfall (mm) in various parts of Thailand

Region	Winter	Summer	Rainy	Annual rainy days
North	100.4	187.3	943.2	122
Northeast	76.3	224.4	1,103.8	116
Central	127.3	205.4	942.5	116
East	178.4	277.3	1,433.2	130
South				
- East Coast	827.9	229.0	680.0	145
- West Coast	464.6	411.3	1,841.3	178

Based on 1981-2010 period

7. Relative Humidity

Thailand is covered by warm and moist air in most periods of the year except the areas farther in land the relative humidity may significantly reduces in winter and summer. For example, the extreme minimum relative humidity values shows only 9 % at Loei and Chiang Rai on 23 March 1983 and 23 April 1990, respectively. In the Southern Part which is maritime characteristic the humidity is relatively higher.

Relative humidity (%) in various parts of Thailand

Region	Winter	Summer	Rainy	Annual
North	74	63	81	74
Northeast	69	66	80	73
Central	70	68	78	73
East	71	75	81	76
South				
- East Coast	81	78	79	79
- West Coast	78	77	84	80

Based on 1981-2010 period

8. Cloudiness

Cloud cover is normally less from November to March. Perfectly clear skies are generally found that is a reason why extreme temperatures usually occur. Most clouds in this period are high clouds but cumulus and cumulonimbus may be seen on some occasions. During the southwest monsoon, most clouds in the sky are convective clouds. Clear skies are seldom in this period except during June which has a few days.

9. Thunderstorms

Thunderstorms in upper Thailand often occur in the period from April to October while those in the Southern Part will occur in March to November. The maximum frequency of thunderstorms in upper Thailand is in May. Convection and the confluence of two different air streams, cold and warm, are the main factor of thunderstorms. The afternoon and evening thunderstorms occur from the convection while the other from the confluence of winds of different airstreams.

10. Surface Wind

The pattern of surface wind directions is characterized by the monsoon system. The Prevailing winds during the northeast monsoon season are mostly north and northeast in upper Thailand and east or northeast in the Southern Part while they are south, southwest and west over the country during the southwest monsoon. In summer, prevailing wind are mostly south, especially in upper Thailand.

11. Tropical Cyclones

Tropical cyclone affecting Thailand usually moves from the western North Pacific Ocean or the South China Sea. Considering its strength it may be characterized by wind speed as follows :

- * Tropical Depression : the maximum sustained winds less than 34 knots (63 kilometers per hour)
- * Tropical storm : the maximum sustained winds up to 34 and less than 64 knots (63 and less than 118 kilometers per hour)
- * Typhoon : the maximum sustained winds 64 knots and above (118 kilometers per hour and above)

Thailand normally receives the effect of tropical depressions because of its location farther in land and some mountain ranges which obstruct and decrease the wind speed before moving into Thailand except the Southern Part has a relatively high risk of tropical storms and typhoon. For instance, the tropical storm “HARRIET” hit Nakhon Si Thammarat province in October 1962 and the typhoon “GAY” hit Chumphon province in November 1989 and the latest one was the typhoon “LINDA” which hit Prachuap Khiri Khan province in November 1997 as it was tropical storm. By considering the annual mean, tropical cyclones usually move across Thailand about 3 - 4 times a year. During January to March, Thailand has never received the effect. According to the historical data, it can be seen that April is the first month which tropical cyclone move across Thailand. The relatively higher frequencies are found from May, particularly September and October. They usually pass through the Northern and Northeastern Parts in early southwest monsoon season and will move across the southern Thailand from October to December.

The frequency of tropical cyclones moving through Thailand
During 65 years (1951 - 2015)

Region	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
North	-	-	-	-	5	2	10	17	25	11	1	-	71
Northeast	-	-	-	-	1	6	4	18	33	25	4	-	91
Central	-	-	-	-	2	1	1	-	7	9	2	-	22
East	-	-	-	-	1	1	1	-	3	13	2	-	21
South	-	-	-	1	1	-	-	-	3	15	24	9	53

Climatological Group
Meteorological Development Bureau
Meteorological Department
2015

References

- L.R. Oldeman and M. Frere. *A Study of the Agroclimatology of the Humid Tropics of South-east Asia*. FAO/UNESCO/WMO, Inter-Agency on Agroclimatology, Technical Note No. 179, WMO No. 597, Secretariat of the World Meteorological Organization-Geneva-Switzerland, 1982.
- Virat Manisarn, Lt.Jg., *Statistic of Meteorological Elements in Various Parts of Thailand During 30 year period (1961 - 1990)*. Technical No. 551.582-03-1995, ISBN : 974-7567-24-5.
- Virat Manisarn, Lt. Jg. *Geography and Climatology in Every Season of Various Parts in Thailand*. Technical No. 551.582-02-1995, ISBN : 974-7567-25-3.
- _____. *Climatological Data of Thailand for 30 - year period (1961 - 1990)*. Meteorological Data Report No. 551.582-02-1994, ISBN : 974-7554-80-1.