說　明

一、引言

臺灣地區氣候圖集係根據中華民國臺灣地區氣象站累年觀測資料及大陸東南沿海氣候報告加以整理與統計編彙而成。於民國七十九年出版第一冊一本及附冊二本，八十年出版第一冊普及本（內含附冊），內容包括溫度、降水及風之平面分布圖及歷史曲線圖共二千三百餘幅，今再將海平面平均氣壓、平均最高與最低溫度、降水變率、降水日數、等之平面分布及各地日照、雲、絕對最高與最低溫度日數、地中溫度、相對濕度、平均風速、霧日數、雷暴日數、降雪日數等之頻率分布，編彙成圖集第二冊，以下將說明各該氣候圖之製作依據、底圖規格、資料來源及繪製方法，以利應用參考。

二、依據

本圖集之內容係依據世界氣象組織所出版「氣候實務指引」(1)內之規定，另參考該組織出版之「亞洲氣候圖集」(2)、日本氣象廳出版之「日本氣候圖集」(3)、美國氣象局出版之「美國氣候圖集」(4)，配合臺灣現有資料及客觀需要而編製。

三、底圖

繪製等值線所用之底圖有兩種：一為以臺灣本島為主體之臺灣區域地圖，使用於地形、測站分布、降水變率、降水日數及平均最高與最低溫度等項目，此圖係以聯勤製圖署繪製之蘭勃脫（Lambert）正形投影八十萬分之一比例地形圖為基準，並按編排需要部分採用縮小為四分之一之式樣編入圖集；另一為臺灣及其鄰近地區地圖，使用於海平面平均氣壓及盛行風頻率項目，此圖係根據中央氣象局科技中心印製之彭納（Bonne′s）投影一千一百萬分之一比例尺地形圖描繪而得。

四、資料

本圖集使用之資料，除海平面平均氣壓及盛行風頻率外，均以臺灣本島為主體，另亦採用澎湖、東吉島、彭佳嶼及蘭嶼四處離島資料。資料來源共分二種：一為中央氣象局所屬二、三、四等氣象站（二十五站），之氣象觀測資料(5)(6)(7)；另一為台灣省水利局、臺灣糖業公司、臺灣電力公司、各地農田水利會及大學等三十餘單位所設置之雨量站、農業氣象站、氣候站等專用氣象觀測站之氣象月報資料(8)。前者觀測紀錄較完整，每日觀測次數較多，其中臺北、臺中、臺南、花蓮及臺東五站早期一日觀測二十四次，自民國六十六年（含）後各站一日目視觀測（或記錄）十次（或八次），其中溫度及濕度等有自記記錄者其平均值仍維持二十四次平均，惟目視觀測之雲量則均減少觀測次數，部份四等氣象站二十三時及二時不作觀測，為使統計一致起見雲量採用自民國五十年至民國七十九年三十年每日五時至二十時間之觀測紀錄做為統計樣本。

降水資料可分為月降水量資料及日降水資料兩種，分別應用於降水變率圖及各級日降水量平均日數分布圖，由於雨量站為數眾多，觀測統計之時間或有差異，今以中央氣象局所屬測站三十年紀錄分別以零時至零時之累積降水量及九時至九時之累積降水量，統計0.5ｍｍ以上降水日數，兩者之差異二十四站中以阿里山為最大，全年有三天之差，一般測站則祇有一、二天之差，各月降水日數的差異僅有一天，至於資料不同年期者，以十年（含）以上之資料做十年、二十年及三十年之平均比較，0.5mm 以上之降水日數差別普遍在五天以內，雨量愈大者，其降水日數愈低，差異之日數亦減少，因此降水資料之選擇在觀測時間上未做調整，在年期上則選擇十年以上之測站做統計。

由於氣候資料會受到地理位置、儀器高度、觀測時間及年期長短的影響茲將中央氣象局所屬各氣象站之位置、儀器設置高度及觀測次數列表如表一：

EXPLANATION

1. Introduction

The Climatic Atlas of Taiwan area was compiled according to the observation data accumulated for years by individual weather stations in Taiwan area of the Republic of China and also the weather data reports to the coast of South-eastern coast of mainland China after the arragement and statistics were made. The first volume and two subvolumes were published in 1990. The first popular edition including two subvolumes was published in 1991. It contains more than 2,300 maps for surface distribution of temperature, rainfall, wind and the historical curves. Now, the data about the surface distribution of the mean sea level pressure, the mean maximum and minimum temperature, the variation of rainfall, the days of rainfall, and also the frequency and distribution of the amount sunshine and clouds, the days of absolute maximum and minimum temperature, the earth temperature, the relative humidity, the mean speed of the wind, the days of fogs, thunderbolts and snowfall were compiled in the second volume of the Climatic Atlas. We will explain in the following the basis on which the Climatic Atlas was produced, the specifications for the background map, the source of data and the method of drawing to facilitate applications and references.

2. Basis

The contents of this Climatic Atlas were based on the provisions in the "Guide to Climatological Practices" (1) published by the World Meteorological Organization, and also on the" Climatic Atlas of Asia" (2) published by the same organization, the " Climatic Atlas of Japan "(3) by Japan Meteorological Agency, and the " Climatic Atlas of the United States" (4) by U.S. National Oceanic and Atmospheric Administration while other data available in Taiwan and objective demands were under consideration too.

3. Background map

There are two kinds of background maps for drawing of isolines. One, focusing on the Taiwan Island is the Taiwan regional map used in topography, distribution of weather stations, variation of rainfall, days of rainfall, and mean maximum and minimum temperature. The map is drawn on the topography according to the scale of 1/800,000 of Lambert Conformal Conic Projection as drawn by the Administration of Mapping, the Headquarters of Combined Service Force. To meet with editting and type setting, a part of maps were printed in four time reduced size. The other is a map of the Pacific area to the eastern Asia, used in the distribution of the mean sea-level pressure and the frequency of the prevailing wind. The map was drawn according to the enlarged Bonne's projection topography at the scale of 1/10,000,000 as published by the Technological Center, the Center Weather Bureau.

4. Data

The data used in the Climatic Atlas were mainly from Taiwan Island. The offshore islands like Penghu, Tungchi, Penchiayu and Langyu also provided a part of the data exclusive of the mean sea-level pressure and the frequency of prevailing wind. There are two kinds of data sources: One is the observation data (5)(6)(7) from 2nd, 3rd and 4th class weather stations (25 stations) under the Central Weather Bureau, the other are meteorological monthly reports (8) of the rainfall stations, agrometeorogical stations and climatic stations established by more than 30 organizations including Taiwan Water Conservency Bureau, Taiwan Sugar Corporation, Taiwan Power Company, various farmland water conservency associations and related universities, etc. The records of the former are comparatively complete and more daily observations are conducted. The weather stations in Taipei, Taichung, Tainan, Hualien and Taitung conducted observations 24 times daily in earlier days. Since 1977, each of them conducted visual obversations (or recordings) ten times or eight times daily. For those which have auto- recorded the temperature and humidity, the mean value still keeps a 24-time average. But the number of times have been reduced for visual observation of clouds. A part of 4th class weather stations do not conduct obserevation at 23:00 and 2:00. To make statistics to be uniform, the observation records of clouds every day between 5:00 and 20:00 for thirty years from 1961 to 1990 were taken as sample statistics.

The data for rainfall may be divided into monthly rainfall and daily rainfall. They are applied in the map of rainfall variation and the distribution map of different interval daily rainfall normal. Since there are too many rainfall stations and differences in times for observational statistics. Now, based on the records in past thirty years owned by observation stations under the Central Weather Bureau, we take accumulated rainfall from midnight hour to midnight hour and accumulate rainfall from nine O'clock to nine O'clock for statistics of the days of rainfall over 0.5mm. For the difference between the two, the largest difference is for the Alishan station in all 24 stations. It has a three-day difference in a year. The weather stations in general have one or two-day difference only. The difference in days of rainfall each month was a day only. Concerning the data in different periods or years, we take the data of over ten years for ten-year, 20-year and 30-year normal comparisons, the difference of days for rainfall over 0.5mm was within five days. When the rainfall was larger, the days for rainfall were fewer and the days in difference reduced. Thus, the choice of rainfall data was not adjusted on the observation time, but in annual periods, choice of data from weather stations which have history of more than 10 years was made for statistics. It is because that the climatological data will be affected by the geographical location the height of the apperatus (equigments), observation time and the duration of years, the geographical location of the weather stations, the height of the apperatus and the times of observation from the Central Weather bureau are listed in Table I below:

表一　中央氣象局所屬各氣象站一覽表

TABLE 1　LIST OF STATIONS OF CENTRAL WEATHER BUREAU

站號 Station No.	測站名稱 Station Name	北緯 North Latitude	東經 East Longitude	氣壓計海面上高度 公尺 Height of Barometer above Sea Level (M)	溫度計地面高度 公尺 Height of Therm. above Ground (M)	雨量器口面地上高度 公尺 Height of Raingauge above Ground (M)	風速儀地上高度 公尺 Anem. above Ground (M)	海拔 公尺 Altitude (M)	創立年份 Year of Commencement	每日觀測次數 No. of Obs. Per Day
695	彭佳嶼 Pengchiayu	25°38′	122°04′	104.6	1.2	0.2	7.2	101.7	1909	10
691	鞍部 Anpu	25°11′	121°31′	827.1	1.3	0.3	7.4	825.8	1937	8
693	竹子湖 Chutzhu	25°10′	121°32′	607.6	1.2	0.2	11.03	607.1	1937	8
690	淡水 Tanshui	25°10′	121°26′	23.0	1.1	0.2	12.2	19.0	1942	0
694	基隆 Keelung	25°08′	121°44′	27.7	1.2	0.5	*(5.0) 34.6	26.7	1903 1916	10
692	臺北 Taipei	25°02′	121°30′	6.7	1.1	0.2	23.4 *(33.8)	5.5	1896 1986	10
757	新竹 Hsinchu	24°48′	120°58′	35.0	1.1	0.2	13.2	34.0	1938	10
708	宜蘭 Ilan	24°46′	121°45′	8.0	1.3	0.3	14.8	7.2	1935	10
706	蘇澳 Suao	24°36′	121°52′	25.6	1.3	0.5	34.0	24.9	1981	10
749	臺中 Taichung	24°09′	120°41′	85.3	1.4	0.2	17.1	84.0	1896	10
777	梧棲 Wuchi	24°16′	120°31′	26.7	1.2	0.2	33.2	7.2	1976	10
699	花蓮 Hualien	23°59′	121°36′	19.1	1.3	0.2	10.0	16.1	1910	10
765	日月潭 Jiyuehtan	23°53′	120°54′	1007.4	1.3	0.2	8.0	1014.8	1941	8
735	澎湖 Penghu	23°34′	119°33′	11.4	1.4	0.2	14.6	10.7	1896	10
753	阿里山 Alishan	23°31′	120°48′	2415.9	1.4	0.2	15.1	2413.4	1933	8
748	嘉義 Chiayi	23°30′	120°25′	27.8	1.3	0.2	14.5	26.9	1968	10
755	玉山 Yushan	23°29′	120°57′	3845.7	1.2	0.2	9.2	3844.8	1943	8
730	東吉島 Tungchitao	23°16′	119°40′	45.0	1.5	0.3	8.8	43.0	1962	8
761	成功 Chengkung	23°06′	121°22′	37.4	1.4	0.2	12.8	33.5	1940	8
741	臺南 Tainan	23°00′	120°12′	14.6	1.5	0.2	16.3 *(38.7)	13.8	1897 1983	10
766	臺東 Taitung	22°45′	121°09′	9.7	1.4	0.2	11.4	9.0	1901	10
744	高雄 Kaohsiung	22°34′	120°18′	3.1	1.2	0.2	14.0	2.1	1931	10
754	大武 Tawu	22°21′	120°54′	8.9	1.4	0.2	12.7	8.1	1940	8
762	蘭嶼 Lanyu	22°02′	121°33′	325.1	1.5	0.2	12.5	324.0	1941	10
759	恆春 Hengchun	22°00′	120°44′	24.1	1.5	0.2	14.3	22.3	1896	10

* 風速儀地上高度值具有括號者為風速需予以調整之高度值。

* The wind speed at the height of anemometer above ground should be adjusted according to the number which have no parentheses.

地中溫度自三十公分至地面部分是一日觀測三次（五時、十四時及二十一時）五十公分以下之地中鐵管溫度為每日觀測一次（九時）之紀錄，綜合統計而成。

凡涉及全省專用氣象觀測站資料之項目，因測站眾多，採用1956～1985年資料為基準，凡各站單項要素，項目因屆整數年，採用1961～1990年資料為基準。根據世界氣象組織之建議，1901～1930、1931～1960、1961～1990為計算氣候標準準平均值之統計期間，本圖集中各測站氣象要素變化項內，凡屬客觀觀測項目，且資料完整者，按以上年段分別統計，繪於同一圖式內，以利比較氣候之變遷，例如：日照、風速及相對濕度等，若屬目視觀測項目，因受到觀測規定及個人主觀意識之變動，較不適於做準平均之比較，則僅將1961～1990年之統計結果繪於圖中，以便了解氣象要素之日變化及年變化，例如：雲、霧、雷暴等項目。

The earth temperature from the depth of 30cm to the surface is observed three times a day (5:00, 14:00 and 21:00). Observation of the iron pipe temperature in depth of below 50cm is conducted once a day (9:00). The statistics made are resulted from their combined records. For those that are involved in the data of exclusive weather stations islandwide, the data between 1956 and 1985 are taken as basis since there are too many of them. When an item of elements of selected stations reaches a full year, the data between 1961 and 1990 are adopted as basis. As suggested in the World Meteorological Organization, the periods between 1901 and 1930, 1931 and 1960, and 1961 and 1990 shall be statistic periods to calculate the weather standard normal. For all items that belong to objective observation with complete data, and when those items are under the variation of weather elements of weather stations in this Climatic Atlas, the statistics shall be conducted separately according to the year intervals mentioned above and draw in the same map to facilitate comparison of the climatological chang for instance, sunshine, speed of wind and relative humidity, etc. For all items that belong to visual observation, it is because of the rules of observation and subject to the change in personal subjective sense, normal comparison may not be appropriate. We may have the results of statistics for 1961 to 1990 drawn in the map so as to understand the daily and annual changes of the weather elements such as clouds, fogs, thunderbolts, etc.

五、描繪等值線之守則

描繪各種氣象要素之等值線，與繪製地形圖上之等高線有異，主要是因為後者可憑藉周密之實測；前者因測站既少，分布又不均勻，尤以平地與山區相差為甚，故描繪極為困難。以雨量站而言，臺灣若干平原地區測站過於密集，觀測值難免因人為因素或測站位置缺乏代表性而造成不均勻之分布，必須用統計方法加以處理；山區則因設站觀測困難，蒐集資料有限，任何測站觀測資料不能輕言放棄。

臺灣因有中央山脈而造成極為複雜之地形，故而描繪各種基本氣象要素之等值線圖格外困難。氣溫不僅隨著海拔增加而降低，且高度相等之山區面西坡又較面東坡及面北坡為暖。降水量則先視海拔而遞增，到達一定高度後，再向上又減少；迎風坡之雨量遠較背風坡為多更為眾所周知之事實。凡此均不能不從大氣物理學、氣候學及中尺度氣象學之考量以補救觀測資料之不足。

本圖集為儘可能達到準確合理而又符合實際觀測資料之目的，特立以下之守則：

㈠、根據各測站位置之代表性、資料之可靠性、以及觀測年代之長短，作為考量其可信度之優先次序。

㈡、統計紀錄年代不同而缺乏比較性，利用統計原理予以補救並修正之(9)。

㈢、描繪等值線前，先對臺灣主要地形有一概念性之了解，再參考以往專家學者之研究成果(10)(11)(12)，以認識各該氣候要素之可能分布。

㈣、然後根據各測站實際之統計數值描繪等值線初稿，利用透視桌，配合臺灣地形，儘量求其合乎大氣之物理原則。

㈤、凡發現某測站之統計值有疑問，而從氣候學觀點難以解釋者，則檢視原始資料做進一步之查證與修正。

㈥、基於海陸之氣候迥異，加以海上缺乏可靠之觀測資料，故臺灣本島之各項等值線均不延伸至海岸線以外。

㈦、台灣地區各離島之面積甚小，大都只有一處測站，故不繪製等值線。

㈧、凡規定之間隔相鄰等值線過寬者，為能表達其較精密之分布形態，得加繪一條用長斷線表示之中間等值線，以利參考。

㈨、凡因測站太少，或無測站而僅憑理論推斷或臆測者，等值線用短斷線表示。

六、色調分級

根據世界氣象組織對氣候圖色調選擇之建議，在高溫度、少降水及低相對濕度之位置，以採用近紅色之熱色調表示為佳。本圖集採用之顏色有紅、橙、黃及綠等四種，每種顏色按深淺再分為若干等級，因此由紅、橙、黃、淺黃逐漸轉變為淺綠、綠及深綠之順序排列，共分二十個等級的色調。這些色調中。除了兩極端之色調代表超過某數值之極限部份外，溫度按每２℃之間隔排列（其中０、10、20、30℃採用粗線）；降水變率各月以每20％，年以每５％為間隔。

七、第二册各圖內容說明

甲、地形及測站分佈圖

㈠臺灣地形

臺灣地形圖涵蓋範圍包括臺灣本島、澎湖群島、彭佳嶼、蘭嶼及綠島等地。圖內除標明海岸線、等高線（間距採100、400、700、1000、1500、2000、2500、3000公尺等八個高度）外，並標示主要山峰、河川、都市之位置、名稱及山峰之標高。

㈡氣候站分布

本圖係根據台灣地區地形圖，將繪製平均最高與最低溫度等值線圖所使用之測站標示於圖中。

㈢雨量站分布

本圖係根據台灣地區地形圖，將繪製雨量變率及降水日數等值線圖所使用之測站標示於圖中。

乙、選擇氣象要素分布圖

㈠臺灣及其鄰近地區之平均氣壓分布與選擇測站之盛行風

採用1950～1980年間之臺灣地區二十五站及大陸東南

5. The principle of drawing isolines

Drawing of isolines of various weather elements is different from drawing of contour, mainly because the latter may rely on careful and actual measurement while the former has fewer weather stations which are scattered unevenly. It is especially in plain and mountain areas which are quite different to make drawing much difficult. In speaking of rainfall, a certain number of weather stations in some plain are too close. As a consequence, the value of observation may be unevenly distributed resulting from man made factors or from lack of representative for the location of these stations. It is therefore necessary to treat it with the method of statistics. The mountain area is a limit to collection of data because of difficulties in the set-up of weather stations. However, any such data thus collected cannot be given up. Taiwan has complicated topography caused form the Central Mountain Range. Thus, it is highly difficult to draw a contour map for various basic weather elements. Not only the temperature drops with elevation above the mean sea level, the mountain areas with similar elevation show warmer in slopes facing west and south than that facing the east and north. The rainfall first increases with the elevation above the mean sea level; and when it reaches some certain elevation, the rainfall becomes less. It is widely known that the rainfall on windward slopes is much more than on leeward ones. Because of all mentioned above, we have to make careful consideration on the atmospheric physics, climatology and mesoscale meteorology as a remedy to the shortage of data for observations. To try to meet the purpose of accuracy, to be reasonable and compatible to actual observation data, we set forth the principles as below for compilation of this Climate Atlas:

(1) On the basis of the representatives of the location for various weather stations, the reliability of the data, the duration of observation in past years, and deliberation of the priority of the reliability will be made.

(2) When the statistical records are found with different years and lack of comparison, we will resort to the theory of statistics as a remedy and make necessary correction.

(3) Before drawing the isolines, we must have conceptional understanding on main Taiwan topography, followed by reference to the results of research by the experts and scholars (10) (11) (12) so as to know the possible distribution of these weather elements.

(4) Then to draw draft isolines according to the statistical figures from all weather stations, and use the perspective drawing table and match the topography in Taiwan to show physical behavior of the atmosphere.

(5) Whenever the statistics of some weather stations are doubtful and cannot be explained from the point of view of meteorology, it will be necessary to examine the original data and make further verification and corrections.

(6) In view of different weather over the sea and the land, and also the shortage of reliable data of observation at sea, all isolines of Taiwan island shall not be extended beyond the coastline.

(7) The offshore islands in Taiwan Territory have smaller land areas, and most of them have only one weather station only, no isolines will be drawn.

(8) When the isolines, separated or adjoined, too wide in distance, will be draw for reference to show more accurate distribution, one more dotted line may be drawn as a middle isoline for reference.

(9) Whenever few or no weather station can be found, and only reasoning or guess can only be resorted and, a dash will be drawn for isoline.

6. Grading the color shade

As suggested by W.M.O. for the shades of weather maps, adoption of warm color close to red will be advisable to indicate the positions of higher temperature, less rainfall and lower relative humidity. The colors used in this Climatic Atlas include red, orange, yellow and green with each to be graded according to its shade. Therefore, the color of red, orange, yellow and light yellow gradually change in light green, green and dark green in a sequence. A total of 20 shades in 20 grades are resulted. Beside two extreme shades represent the part of extreme which exceeds some figure, the temperature is arranged according to the separation of every 2°C (the bold lines are used for 0, 10, 20, 30°C). For the variation of rainfall, use of 20% in monthly maps, 5% in annual map as separation.

7. Contents of maps in volume II, the Climatic Atlas

A. Topography and distribution of weather stations

(1) Topography of Taiwan
The topographic map of Taiwan covers the Taiwan island of Taiwan, Pehghu, Pengchiayu, Langyu and Green Isle. Beside indication of the coastline and contour (separated by 100, 400, 700, 1000, 1500, 2000, 2500 and 3000 meters of 8 elevations), the positions of main peaks, rivers, streams and urbans are all marked out and their names and elevation of peaks are also indicated.

(2) Distribution of climatological stations This Climatic Atlas is based on the map of topography for Taiwan territory to mark out the weather stations with their contour for mean maximum and minimum temperature.

(3) Distribution of rainfall stations
This Climatic Atlas is based on the map of topography for Taiwan territory to mark out the rainfall stations with the contour for variation of rainfall and the days of rainfall.

B. Distribution of the selected meteorological elements

(1) Distribution of mean air sea level pressure in Taiwan and its adjoining areas, and choice of prevailing winds in selected weather stations.
The atmosphereic pressure of 21 weather stations along the southeastern coast of mainland China and that of 25 weather stations in Taiwan territory between 1950 and 1980, and also the frequency of prevailing wind are drawn and marked out on

沿海二十一站之測站氣壓及盛行風頻率資料填繪於臺灣及其鄰近地區底圖上，參考亞洲地面氣壓平均圖，分一月、四月、七月及十月，標繪盛行風向，氣壓等值線及氣流線等值線圖，可充份表現出此區域內之各季大氣環流特性。

㈡全年及各月平均最高溫度分布

採用1956～1985年間190站之月平均最高溫度，按每2℃之間隔繪成等值線圖，共含月等溫線圖各十二幅及年等溫線圖一幅。

㈢全年及各月平均最低溫度分布

採用1956～1985年間190站之月平均最低溫度，按每2℃之間隔繪成等值線圖，共含月等溫線圖各十二幅及年等溫線圖一幅。

㈣全年及各月平均降水量變率分布

採用1956～1985年間811站月（年）降水量資料，用其平均偏差與平均降水量比值的百分數表示各站之月（年）降水量變率，列式如下：

$$\text{降水量變率} = \frac{\Sigma\,|\,\text{月（年）降水量} - \text{平均值}\,|\,/\text{年份}}{\text{平均值}} \times 100\%$$

共含月降水量變率圖十二幅，等值線間隔為20％，年降水量變率圖一幅，等值線間隔為5％。

㈤各級日降水量平均日數分布

採用1956～1985年間783站日降水量分別按1（10、25、50、100）mm（含）以上之日數統計其平均值，共含各等級月降水日數等值圖四十八幅，等值線間隔依不同等級之降水量而異，茲分敘述如下：

⑴日降水量1公釐及以上之日數等值線各月採用2、4、6、8等兩日為間隔，全年則採用20、40、60、80 等廿日為間隔。

⑵日降水量10 公釐及以上之日數等值線各月採用2、4、6、8等兩日為間隔，全年則採用10、20、30、40 等十日為間隔。

⑶日降水量25公釐及以上之日數等值線各月採用1、2、3、4等一日為間隔，全年則採用10、20、30、40等十日為間隔。

⑷日降水量50公釐及以上之日數等值線各月採用1、2、3、4等一日為間隔，全年則採用5、10、15、20 等五日為間隔。

⑸日降水量100公釐及以上日數僅有全年分布圖，採用2、4、6、8等二日為間隔。

丙、各測站氣象要素逐月變化圖

㈠絕對最高溫度各級日數之出現頻率

採用1961～1990年間中央氣象局所屬臺灣地區二十四個氣象站每日觀測所得之絕對最高溫度，按每攝氏五度之組距分別統計出現之次數，再求其各別頻率，繪成累積相對次數分配直方圖，溫度全距自35℃～－5℃共分十個層級，以英文字母A～J代表列表如表二：

the background map of Taiwan and its adjoining areas in reference to the map the mean surface pressure in eastern Asia. According to January, April, July and October, the frequency of the prevailing wind direction, and streamlines are drawn to show sufficiently the characteristics of atmospheric circulation in each season and within this territory.

(2) Monthly and annual distributions of mean maximum temperature
Take the mean monthly maximum temperature of 190 weather stations between 1956 and 1985, and draw a map of contour by according to separation of every 2°C to complete 12 maps of monthly isotherm and one map of annual isotherm.

(3) Monthly and annual distribution of mean minimum temperature
Take monthly mean minimum temperature of 190 weather stations between 1956 and 1985, draw a map of isolines by every 2°C to complete 12 maps of monthly mean isotherm and a map of annual isotherm.

(4) Monthly and Annual distribution of variation of precipitation
Take monthly (annual) rainfall data of 811 stations between 1956 and 1985, use the percentage of the ratio between mean deviation and mean rainfall to show the variation of monthly (annual) rainfall of various stations as shown in the formula below:

$$\text{Variation of rainfall} = \frac{|\,\Sigma\text{monthly(annual) rainfall} - \text{mean value}\,|\,/\,\text{year}}{\text{Mean value}} \times 100\%$$

There are 12 maps of monthly rainfall with isoline to be separated by 10%, and a map of annual rainfall variation with isolines to be separated by 5%.

(5) Normal distribution of mean days of different range of daily precipitation
Take the data of daily rainfall of 783 stations between 1956 and 1985, to conduct the statistics for its mean value according to days over (and equal to) 1 (10, 25, 50, 100)mm result from 53 maps to show number of days of monthly (annual) rainfall in different range as described below:

① For the isolines of number of days with daily rainfall in 1mm and over, take 2, 4, 6 and 8 as two day separation, and take 20, 40, 60 and 80 as twenty day separation for the year.

② For the isolines of days of daily rainfall in mm or over, take 2, 4, 6, 8 as two day separation for each month, and for the year, take 10, 20, 30, 40 as ten day separation.

③ For the isolines of days of daily rainfall in 25mm or over, take 1, 2, 3, 4 etc. as one day separation each month, and for the year, take 10, 20, 30, 40 as ten day separation.

④ For the isolines of days of daily rainfall in 50mm or over, take 1, 2, 3, 4 etc. as one day separation each month, and for the year, take 5, 10, 15, 20 etc. as five day separation.

⑤ For days of daily rainfall 100mm and over, and only an annual distribution map is available, take 2, 4, 6, 8 etc. as two day separation.

C. Monthly variation map of meteorologiccal elements of selected stations

(1) Frequency of different intervals of daily absolute maximum temperature
Take the absolute maximum temperature obtained by daily observation in 24 weather stations under the Central Weather Bureau, calculate statistics for the number of occurrence according to the interval of every 5°C then calculate the respective frequency and draw a histogram to show the distribution of accumulated and relative number of times. The temperature ranges from 35°C to -5°C in ten grades. The English alphabet A - J are taken as representative as shown in table 2.

表二、溫度範圍代碼對照表

Table 2 Code Table of Temperature Range

代號 Code	A	B	C	D	E	F	G	H	I	J
溫度範圍 Temp. Range	35℃以上 Over	30℃～34.9℃	25℃～29.9℃	20℃～24.9℃	15℃～19.9℃	10℃～14.9℃	5℃～9.9℃	0℃～4.9℃	-5℃～-0.1℃	-5.1℃以下 Below

圖形縱座標為累積頻率，橫座標為月別，圖內文字代表溫度別，文字上方之數字為各別百分率，百分率不達4％者不標示文字及數值由讀者自行研判。

㈡絕對最低溫度各級日數之出現頻率

採用1961～1990年間中央氣象局所屬臺灣地區二十四個氣象站每日觀測所得之絕對最低溫度，按每攝氏五度之組距分別統計出現之次數，再求其各別頻率，繪成累積相對次數分配直方圖，表示方法同㈠。

㈢地中溫度

採用1956～1985年間臺北、花蓮、宜蘭、臺南、高雄

The vertical coordinate of the map show accumulated frequency. The horizontal coordinate is month. The letters in the map represent the different temperature. he figures below the letters are respective percentage. No letters or figures are given when the percentage is less than 2% and the readers are requested to study and make judgement by themselves.

(2) Frequency of different intervals of daily absolute minimum temperature
Take the absolute minimum temperature obtained in daily observation by 24 weather stations under the Central Weather Bureau from 1961 to 1990, statistics is conducted for the number of times of occurrence according to the interval of every 5°C, then to obtain respective frequency for drawing a histogram of distribution of accumulated relative number of times. The method of indication is same as (1).

(3) Earth temperature
Based on the data of earth temperature from nine stations in Taipei, Hualien, Ilan, Tainan, Kaohsiung, Chiayi, Taichung, Hengchun and Taitung from 1956 to 1985,

、嘉義、臺中、恆春、臺東等九站之地面、地下 5、10、20 30 公分及地中鐵管 50、100、200、300、500 公分深度之各觀測資料予以統計繪製，圖內縱座標表示地面下深度，橫座標表示月別，以 1℃為等值線之間隔，繪成各站地中溫度等值線圖。

㈣平均相對濕度與水汽壓

採用 1901～1990 年間，中央氣象所屬臺灣地區各氣象站之完整月平均相對濕度及水汽壓值，按 WMO 所建議之標準準平均年代的畫分規則予以統計，分別以直條及折線標繪於一圖內，其中實線部分代表 1961～1990 年間平均值，長斷線部分代表 1931～1960 年間平均值，短斷線部分代表 1901～1930 年間之平均值，縱座標左側標示相對濕度百分比單位，右側標示水汽壓毫巴數，橫座標標示月別，可顯示出相對濕度與水汽壓之長期趨勢及相關程度。

㈤平均風速及最大風速

採用 1901～1990 年間之各氣象站平均風速及最大（十分鐘平均）風速，統計成各時段之平均值及極端值，分別以直方及折線標示於一張圖內，一方面表示風速的氣候變化，另方面表現各地最大風與平均風之相差程度。圖內縱座標左側為平均風速每秒公尺單位的標尺，右側是最大風每秒公尺單位的標尺，兩者比率相差十倍。風速之觀測是採用十分鐘平均值，由於風速資料與風速計離地高度有關，其中臺北及臺南兩站之風速計曾有十公尺以上之較大變更，必需予以一致化的調整[3][13]，使用公式如下：

$V_x = V_h (X / h)\ 1/7$

V_x 為 X 公尺高度之風速

V_h 為 h 公尺（風速計）高度之風速

一致化使用之高度採用紀錄時間較長之高度為基準高度，各測站風速計離地高度見表一。

㈥日照時數及日照率

採用 1961～1990 年間，中央氣象局所屬二十二個氣象站之月統計資料繪成，圖內直條代表日照時數，單位為小時標示於左側標尺，折線代表日照率，單位為百分率標示於右側標尺。

$$\text{日照率} = \frac{\text{實際日照時數}}{\text{可能日照時數}} \times 100\ \%$$

㈦日照機率之日變化

日照機率圖之日變化，採用1961～1990 年間，各時間之日照時數，經統計消除單位後以比率表示各該時刻之日照機率，繪成相對機率等值線，橫座標為月別，縱座標為時刻，曲線為等日照機率線。

$$\text{日照機率} = \frac{\text{日照時數}}{\text{總時數}} \times 100\ \%$$

㈧全天空太陽輻射

全天空太陽輻射，單位採用每平方公分卡數，選擇十一個氣象站之觀測資料繪成直條圖，可與日照時數圖做比較其相關性，又由於各測站日照資料會受到觀測儀器位置附近環境（如山脈、丘陵、建築物）之影響，因此數值之使用必需考量環境因素。

㈨平均雲量

採用 1961～1990 年間上午五時至下午八時之雲量月平均值，繪成直條圖，並將一日內各時間之雲量多寡，以等值線方式繪成各時間雲量分布圖合併為一圖編製。

㈩天空狀況累積頻率

按各時間雲量分別統計其次數，再綜合求其比率，依雲量為零者表示碧空天，雲量一至六者表示疏雲天，雲量七至九者為裂雲天，雲量十者為密雲天，繪成累積相對次數分配直方圖，縱座標為累積頻率，橫座標為月別，直方格內之數字為該天空狀況所佔之相對次數。

(十一)平均霧日數

霧的觀測雖然起源很早，但因為受到觀測者主觀判斷的影響，不但站與站間有差異，同站不同年代之資料亦有差異，平地與山地更有差異，山中之雲與霧的分別在於是否移動及是否與地面接觸的判別。因此本圖集中將平地與山地氣象站之資料採用不同比率之標尺標示，資料期間採用 1961～1990 年間之紀錄。

(十二)平均雷暴日數

採用 1961～1990 年間各月各站觀測員判斷曾有雷暴現

and also on the data of their underground temperature in depth of 5, 10, 20, 30cm and that of underground iron pipe in depth of 100, 200, 300, 500cm, statistics is conducted for the map. The vertical coordinates show the depth underground and the horizontal coordinates indicate respective months. With separation of isolines by 1°C, an isolines map to show earth temperature is thus complete.

(4) Mean relative humidity and vapor pressure

Based on the complete monthly mean relative humidity and vapor pressure value from the weather stations of the Central Weather Bureau from 1901 to 1990, statistics is conducted according to the suggestion from WMO of the rule for division concerning the standard normal year, and draw straight histogram strips and broken line coordinates in the map. The solid lines represent the mean value from 1961 to 1990. The land broken lines represent the mean value between 1931 to 1960. The dash lines are for mean value from 1901 to 1930. The left side of vertical coordinates indicates the units of percentage for relative hunidity, while the right side show the figure of millimeter of vapor pressure. The horizontal Coordinates show respective months, and from it, the long time trend and relation of relative humidity and vapor pressure can be found.

(5) Mean wind speed and maximum wind velocity

Based on the mean and maximum speed of wind (ten minutes in average) as recorded by weather stations from 1901 to 1990, statistics is conducted for the mean value and extreme value in various periods of time which are indicated separately in the same map by histogram and square line and broken line coordinates. On one hand, it indicates the change of climate, and on the other hand, it shows the extent of difference between the strongest wind and the mean wind in various places. The left side of vertical coordinates in the map is a scale to show how many meters in a second for mean wind speed, while the right side shows a scale for the velocity of strongest wind in a second. Both have ten time difference. Observation of wind velocity is based on mean value in ten minutes. Since the data of wind velocity are concerned with the altitude of wind meter away from the ground, there is a difference of more than ten meters as shown in the wind meters used by Taipei and Tainan stations, thus it will be necessary to make some adjustment to achieve the uniformity ([3])([13]). The formula used is as below:

$Vx = Vh\ (x/h)\ 1/7$

Vx is wind velocity when the altitude is x meters.

Vh is the wind velocity when the anemometer is at the altitude of h meters anemometer.

For uniformity, the altitude of recording for some longer period of time is adopted as basic data. The altitude of the anemometer in weather stations is shown in Table 1.

(6) Sunshine duration and sunshine rate

The map is drawn on basis of the data of monthly statistics from 24 stations of the Central Weather Bureau from 1961 to 1990. The straight lines represent the number of hours for sunshine. The unit -- hour is marked out on the scale to the left side. The broken lines represent the rate of sunshine. The unit-persentage is shown on the scale to the right side.

$$\text{Sunshine rate} = \frac{\text{number of hours for sunshine}}{\text{number of hours for possible sunshine}} \times 100\%$$

(7) Daily variation of probability of sunshine

The daily variation of probability of sunshine is based on the number of hours for sunshine in various times from 1961 to 1990, and after statistics to eliminate the units, percentage is used to show the probability of sunshine in these times. The isolines are drawn in the map to show relative probability. The horizontal coordinates are months. The vertical coordinate are time. The curve shows equal sunshine probability.

$$\text{Sunshine probability} = \frac{\text{Hours of sunshine}}{\text{Hours for possible sunshine}} \times 100\%$$

(8) Global Solar Radiation

For solar radiation of the whole space, the unit of a square centimeter "cal/cm^2" is used. The histogram is drawn according to observation data from 11 weather stations, which may be compared with the map of sunshine hours for their relation. Since the sunshine data of weather stations may be affected by the adjoining environment of the location of the observation instruments (like mountain, craggy terrains and buildings), environmental factors will be required when use of figures.

(9) Mean clouds amount

The histogram is drawn on the basis of monthly mean value of clouds from 5:00 a.m. till 8:00 p.m. from 1961 to 1990. The volume of clouds in different times within a day is taken to draw a map of distribution of volume of clouds in different times with isolines. The two maps are then compiled into one.

(10) Accumulated frequency of clear, the sky status

Statistics is conducted according to the clouds in various times then combined to find out the percentage. We mark zero cloud as a clear day, and mark scattered-clouds day when the volume of clouds reaches 1 to 6, and the broken-clouds day when the volume of clouds is 7 to 9, while cloudy day is indicated when the volume of clouds is 10. The histogram of the accumulated frequency is thus completed; the vertical coordinates the accumulated frequency; the horizontal coordinates are months. The figures in the checker are the percentage for sky conditions.

(11) Mean fog days

Though observation of fogs may be traced to earlier days, because of the effect from subjective sense of the observers, not only are there difference between one station and another, but also the difference that can be found owing to the data from different years, especially in plain and mountain areas. The distinction of clouds from fogs in mountain areas can be judged only on whether they are moving and whether they are touched with the ground. Therefore, this climatic atlas focuses on separate arrangement of data from the weather stations in mountain areas and plain with adoption of different percentage - scales for indication. The data are based on the records from 1961 to 1990.

(12) Mean thunderbolt days

Take the number of days on which the observers in weather stations judged the

象發生（不一定有下雨）的日數和之平均繪成直條圖，縱座標為日數，橫座標為月別。

㈩平均降雪日數

臺灣地區降雪多發生於山區，中央氣象局設於山地的氣象站有竹子湖、鞍部、日月潭、阿里山及玉山五處，除玉山站每年均有觀測到降雪現象外，其餘各站均僅偶爾會有降雪發生，日月潭位於中部，又有大湖存在，高度不高，僅於1977年有一次降雪，本圖集茲將阿里山、玉山及鞍部之降雪日數予以繪圖標示。

phenomenom of thunderbolts (not necessarily raining) and its average to draw a histogram. The vertical coordinates are number of days, and the horizontal coordinates are months.

(13) Mean snow days

The snowfall in Taiwan mostly takes place in mountain areas. The Central Weather Bureau has five stations in Chutzehu, Anpu, Jihyuetan, Alishan and Yushan. Except the station in Yushan where snowfall can be observed every year, other four stations may occasionally find the snowfall. Jihyuetan is located in central Taiwan where there is a lake. It is not high enough in altitude. Snowfall was found once only in 1977. A map to show the number of days for snowfall in Alishan, Yushan and Anpu is drawn for reference.