

THE CLASSIFICATION OF THE CLIMATES OF KOREA

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many scientists have been making their efforts on the classification of the climates of the earth and each nation has also worked out to subdivide its territory into smaller climatic regions by taking both local peculiarities and climatic similarities into considerations. For the classification of global climates, there are great diversity in the methods according to the purposes of various usages. One of the most widely used current methods is that proposed by Koeppen. This classification is largely based on the climatic elements and their effects on the vegetation of plants.

Korea, after the Koeppen's classification, has three climatic types which are Cfa (Warm Temperate Rainy Climates without dry season, with hot summers, Dwa (Cool Snow-Forest Climates with hot summers and dry winters) and Cwa (Warm Temperate Climates with hot summers and dry winters). Ullung Do belongs to Cfa and Dwa covers northern region from Seoul (excluding Kangnung area), Chupungnyung and nearby highlands of Taebaek mountain range. Rest of southern region from Seoul belongs to Cwa.

This classification is far too crude to be used for the national purposes and the inadequacy of this classification for actual application to industrial works or to everyday life which are greatly influenced by climates requires further subdivision. In other words, of all industrial fields, agriculture is most influenced by climatic conditions, that is, the vegetations, agricultural activities and the kinds of farm products are greatly limited or dependent on the local climates. And also engineering, transportation, meteorological disasters, inhabitation and almost all the human activities are more or less influ-

enced by the local climatic conditions.

With these lines of thoughts in mind, it is to divide the land of Korea into subclimatic regions considering the facts to follow to provide an easy and logical guide that helps academic geographical researches as well as industrial technical developments.

The climate of a given locality or a given region is determined not by just one climatic element, but the combination of the various climatological variables that make up the climate. And it is also apparent that for a characterization of the climates it is not enough to give only annual mean values but seasonal variation is preferred for the purpose. Since the climate of a particular region is made up of a great number of different elements of which temperature and precipitation are the only two most important, two places of same mean annual temperature can be classified by comparing other elements.

With due combination of the materials here presented such as various climatic elements (Attached Table I); temperature, amount of precipitation, number of days with precipitation, snowcover, fog, cloudiness, frost, sunshine and wind, geographical climatic factors; mountain range, terrain, river distribution of land and sea, distance from sea, and the natural distribution of plants (Attached Table II-a, b) in which about one hundred and thirty species are used as sample, subdivision into following 17 climatic regions is most suggestive for various purposes.

1. Kaema Plateau

It is the coldest region in Korea. The mean monthly temperature ranges 2 to 5 deg. C and

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the lowest mean monthly temperature appears in January, ranging -14 to -20 deg. C. The difference between the mean monthly temperature of the warmest and coldest month is 42 deg. C.

The mean annual precipitation amount is relatively small when compared with the number of days with precipitation. The mean annual precipitation amount is 800 to 900 mm and the mean annual number of days with precipitation is between 100 and 130 days.

The snowfall and frost are most abundant in this region, where the vegetation of plants is quite limited to the particular kinds. The mean annual number of days with snow cover is about 125 days and with frost 168 days. The winds are generally weak here.

2. Northeastern Rain Scanty Region

This region has the least amount of precipitation which ranges no more than 500 to 600 mm annually. Thus it has dry weathers throughout the year.

The mean annual temperature ranges 5 to 7 deg. C and mean annual minimum temperature 0 to -1 deg. C which is relatively low temperature distribution.

3. Northeastern Coast

The cold ocean currents along the Eastern Coast exert remarkable influences on the climate of this region. The mean annual temperature ranges 6 to 9 deg. C and the mean monthly temperature of January -6 to -9 deg. C.

It has the small annual precipitation amount of 600 to 700 mm and most of the rainy days are concentrated in summer, 40 to 50 days in June through August which shows the highest seasonal concentration. There are also 40 to 50 days with fog annually and northeast winds are apparent.

4. Middle Eastern Coast

The mean annual temperature ranges 8 to 11 deg. C and mean monthly temperature of January -2 to -5 deg. C which shows high temperature

distribution for the latitudes. The temperature difference between the warmest and coldest month is less than that of Southern Inland due to the influence of the sea of Wonsan Bay.

One of the characteristic features is that a great number of clear days are continued, even though the annual precipitation amount is recorded as 900 to 1300 mm, which furnishes this region the only suitable place for aquatic rice production in the Eastern Coast.

5. Southeastern Coast

In January, the influence of warm ocean currents along the coast and foen effect due to westerly winds over Taebaek mountainrange, are so prevailing that the mean monthly temperature ranges 0 to -1 deg. C which is 2 or 3 deg. higher than that of the Western Coast in the corresponding latitudes. The mean annual temperature ranges 12 to 13 deg. C and there are plenty snow in winter.

6. Northwestern Coast

The northwesterly winds are influential in winter and they depress mercury bars below -8 to -10 deg. C as the mean monthly temperature of January, which is lower by 3 or 4 deg. than that recorded in the Eastern Coast in the corresponding latitudes. On the other hand, this region shows higher temperature in summer. The mean annual temperature ranges 9 to 11 deg. C.

The annual precipitation amount is 900 to 1000 mm. It has 40 to 50 days with dense fog and with frost 90 to 120 days annually which shows relatively high concentrations.

7. Middle Western Coast

It does not have any great difference from the climate of the Northwestern Coast except in temperature elements and in the natural distribution of plants caused by the latitudinal difference.

The mean annual temperature ranges 10 to 12 deg. C and mean monthly minimum temperature of January -7 to -9 deg. C.

The annual precipitation amount is 1100 to

1200 mm nearly equal to that of the Northwestern Coast, but it has particularly large precipitation amount in winter and the period of snowcover is shorter.

8. Southwestern Coast

It has relatively warm weathers. The mean annual temperature ranges 12 to 14 deg.C and the mean monthly minimum temperature -2 to -6 deg. C.

The annual precipitation amount is 1000 to 1200 mm and cloudy days are frequent. Thus clear days are fewer and humidity is high. The mean annual number of cloudy days is 140 days.

9. Northern Rainy Plain

Jukyou and Myohyang mountain ranges run from northeast to southwest and they lift up the southeast summer monsoon over them, causing a lot of precipitation over the region. The annual precipitation amount of 1100 to 1300mm, especially plenty rain in summer, and Chungchun River, flowing through the plain, provide rich water sources for farming. The mean annual temperature ranges 7 to 9 deg. C.

10. Middle Rainy Plain

The plenty annual precipitation amount of 1100 to 1300 mm and Han River provide rich farm fields. The precipitation amount in summer records more than half of the annual amount, about 750 mm in June through August.

The mean annual temperature ranges 10 to 12 deg.C and mean monthly minimum temperature of January -9 to -10 deg. C. There are a series of northwest winds in winter and northeast winds are apparent in summer.

11. Southern Rainy Plain

It has annual precipitation of 1100 to 1300 mm and the mean annual temperature ranges 11 to 13 deg. C.

The mild weather and the rich water sources from Nakdong, Kum and Sumjin rivers form a granary region.

It has 125 to 135 cloudy days annually and

they keep the relative humidity somewhat high values between 75 and 76%. The weak northwesterly winds are prevailing here.

12. Northern Mountainous Inland

This region is composed of a series of inland mountain ranges; Kangnam, Jukyou, Nangrim, Myohyang, Onjin, Masikryung, Myolak and Kwangju. The mean annual temperature ranges 8 to 10 deg. C and the annual precipitation amount 1000 to 1100 mm. The mean annual number of days with frost is 120 days and the region records the highest rate of bright sunshine, 62 to 63%.

13. Middle Southern Mountainous Inland

This region is composed of a series of middle inland mountain ranges; Taebaeck, Sobaeck, Noryung, and Charyung. The mean annual temperature ranges 10 to 13 deg.C and the mean annual precipitation amount 1000 to 1200 mm.

The number of days with fog does not exceed 9 to 15 days annually. The frost in this region begins so early in autumn that it frequently brings damages to farm crops. Westerly winds are prevalent here.

14. Taegu Inland Basin

This Inland Basin type covers very small area around Taegu city where the heat and cold are extremely severe. The mean annual temperature ranges 11 to 13 deg.C and the mean annual precipitation amount 900 to 1000 mm. The warmest month is August and the mean monthly maximum temperature reaches the highest value of 31.2 deg.C.

In summer there are easterly winds, and northwesterly winds are prevalent in winter. The mean annual relative humidity shows quite low value of 66%.

15. Southern Coast

The influences of ocean being most apparent in this region, it has one of the mildest weather through the year. The mean annual temperature

ranges 13 to 14 deg.C and the mean monthly temperature of the coldest month, January, 0 to 2 deg. C.

The mean annual precipitation amount is 1200 to 1500 mm. The period of frost is so short in winter that there are many advantages in farming, but in summer, typhoons sometimes bring a great deal of damages.

16. Ullung Do

This island has relatively warm weathers. The mean annual temperature is 12 deg. C and the mean monthly temperature of January is above 3 deg.C.

The annual precipitation amount records the greatest value of 1500 mm and at the same time, the mean annual number of days with precipitation shows also the the greatest value, 156 days. One of the peculiar features is that 450.5 mm is precipitated in winter as snowfall and only 373 mm in summer.

This island has special plants, such as *Tsuga sieboldii* Carr., *Fagus multinervis* Nakai and *Pinus parviflora* Sieb. & Zucc., which grow only here.

17. Cheju Do

This largest island has the warmest and raildest weathers. The mean annual temperature is 15 deg. C and the mean monthly minimum temperature of January is 2 deg. C above frost point.

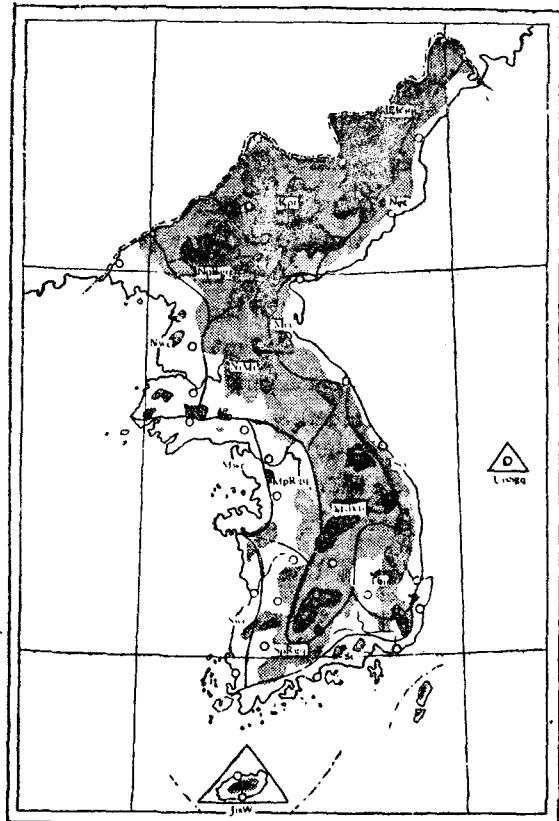
The precipitation amount is 1450 mm and 150 days with precipitation annually. The winds are apparently strong and it is the only place that yields orange in whole Korea.

Climatic Elements

	Temp.
mean	Max. Temp.
annul	Min. Temp.
	Temp. Jan.
mean	Temp. Aug.
monthly	Min. Temp. Jan.
	Max. Temp. Aug.
mean	
annual	Temp. Range

mean	Precpt.
annual	June thr. Aug.
Precpt	Nov. thr. Jan.
mean	Nr. days/Precpt.
Nr. days	June thr Aug.
Precpt.	Nov. thr. Jan.
	Nr. days/snowcover
	rate of sunshine
	rel. hum.
mean	Nr. days/fog
annual	Nr. cloudy days
	Nr. clear days
	Nr. days/frost
	Date, first frost
	Date, last frost
Freq.	January
wind direct.	August
mean	
annual	Freq. wind direction
mean	
annual	Nr. calm days

Fig. I



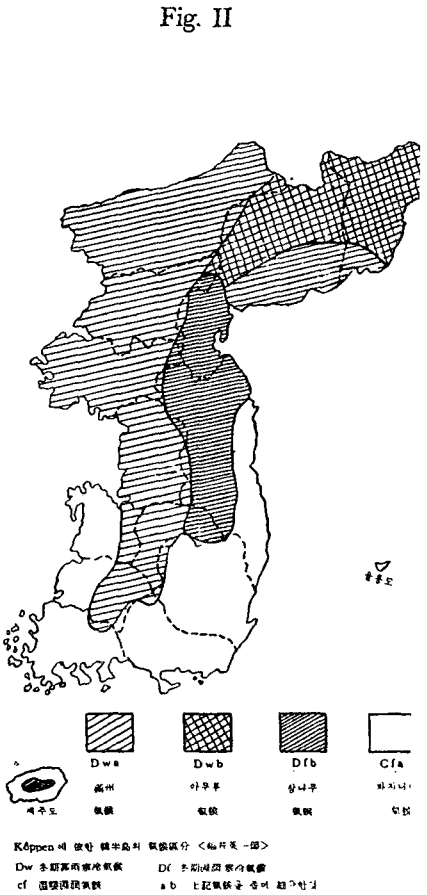
(Attached table D)

Table of Climatic Elements

Climatic Elements	Types of climatic region													JisW			
	Kpt	NE R	NEc	MEc	SEc	Nwc	Mwc	Swc	Np Rgq	Mp Rgq	Sp Rgq	Ni Mt	MSi Mt		TBn	Sc	Uis Bgq
Mean Annual Temperature.	2~5	5~7	6~9	8~11	12~13	9~11	10~12	11~14	7~9	10~12	11~13	8~13	10~14	11~13	13~14	12.0	15.0
Mean Annual Max. Temp erature.	9~13	12~13	10~13	14~15	17~18	13~16	15~16	17~18	14~15	15~17	17~18	17~18	14~16	17~18	17~18	15.3	18.5
Mean Annual Min. Temperature.	0~5	0~1	1~4	2~7	7~9	3~5	5~8	7~10	1~3	5~7	6~9	1~4	4~7	5~8	8~11	9.5	11.4
Mean Monthly Temp. of Jan.	-14 -20	-12 -14	-6 -9	-2 -5	0.0 -10	-8 -10	-4 -5	1~2	-11 -12	-4 -6	0.0 -2.0	-7 -9	-3.1	-1.0	0.0 2.0	0.6	4.8
Mean Monthly Temp. of Aug.	22	22	21~22	23~24	24~25	24~25	24~25	24~25	26	1.24	25	26	23~25	24.7	25.9	25.26	25.8
Mean Monthly Minimum Temperature of January.	-28.8	-18 -20	-10 -13	-8 -15	-4 -5	-7 -14	-2 -9	-2 -6	-11 -20	-9 -19	-4 -6	-13 -15	-7.2	-6.2	-2 -5	-1.9	1.9
Mean Monthly Maximum Temperature of August.	28.3	27~29	24~25	27~28	28~29	28~30	28~30	29~31	29~30	30.5	31.0	28~30	29.8	31.2	25~30	27.2	29.7
Mean Annual Range of Temp.	13.9		7~9	8~11	8~9	9~11	8~9	8.2		10.0	10.0	12~13	10.3	10.7	2~10	5.8	7.1
Mean Annual Precipitation Amount.	600 900	500 600	600 700	900 1300	1100 1300	900 1100	1100 1200	1000 1200	1300 1200	1100 1300	1100 1300	1000 1100	1000 1200	900 1100	1200 1500	1500	1450
Precipitation Amount of June through August.	473	280 320	320 420	500 700	400 550	500 700	800 700	507	700 800	752	900	630	326	458	500 600	375	593
Precipitation Amount of Nov. through Jan.		40	20~30	20~65	40 100	30~50	50~70	121	70~80	70.1	100	40	85.4	68	160	450.5	195
Mean Annual Number of days with Precipitation.	103 130	85 100	80 110	90 120	100 110	100 100	90 110	125	90 100	110 120	90 125	80 100	90 120	85 100	90 110	156	140
Mean Number of days with Precipitation June through Aug.		50	40~50	40~50	40~50	40~50	43	30~50	40	41	40	33	40.4	37	33.8	30.6	34.8
Mean Number of days with Precipitation Nov. through Jan.	28	8~10	10~25	18	15~17	15~25	22.8	33.5	15	30	30	24	23.6	16	15.9	52.7	39.8
Mean Annual Number of days with snowcover	125		25~60	35~55	30	30~50	22~36	24		28	25	46	29	10	2~4	71	11
Mean Annual Rate of Bright Sunshines.	51		52~55	55~61	55	59~62	58~60	50.9		55.1	54	62.9	56.8	58	55~57	45.7	44.5

Mean Annual Relative Humidity.	74	65~72 65~69 65~68 72~73 69~73	73	69 75~76	73	68	66 66~71	72	73
Mean Annual Number of days with fog.	16	40~50 10~20	6~13 35~47 35~50	23.4	39.3 17~24	40	9~15	33 20~25	13.1
Mean Annual Number of cloudy days.	121	125~110~130 120	125 110~110~120 120	143	117 125~135	107	121 110~130	189	186
Mean Annual Number of clear days.	67	78~87 100~120	100 90~100 80~90	64	87 70	108	87 80~100	89	41
Mean Annual Number of days with frost.	188	40~60 35~60	7~20 90~120 100	44	68 86~106	121	46.1 66	16	10
Mean Annual Date of first frost.	IX 25	X 6	X 24 XI 4	X 7	X 19 XI 13	X 18	X 20 XI 16	XI 25	XI 13
Mean Annual Date of last frost.	V 13	IV 26	IV 13	IV 3	IV 14	IV 14	IV 11	III 11	III 12
Frequency of Wind Direction in January.	NE 5	NW 30	W 24	WSW 28	NE NNW 20 17	N 32	WN. NW W 19 15	NW NE 25 13	NW 22
Frequency of Wind Direction in August.	SW 9	NW 16	SW 15	WSW 11	SW 12	S 13	E NE 10 16	E NE 15 11	E NE 16 12
Annual Frequencies of Wind Direction.	SW 113	NW 262	SW 185	WSW 225	NE 150	NW 230	W NW 149 112	W NW 185 126	NE NNW 122
Mean Annual Number of calm days.	373	103	65	46	130	118	55	130	86

*The data are normals, computed from the observed values of principal and auxiliary station.



(Attached Table II-a)

Distribution of Plants

Climatic Regions	Types of																							
	Species of Woody Plants																							
Kpt																		11	12	13	14	15	16	17
NERsq								8	9	10	11	12	13	14	15	16	17							
NEC					5	6	7	8	9	10	11	12	13	14	15	16								
MEC			3	4	5	6	7	8	9	10	11	12	13	14										
SEC		2	3	4	5		7	8	9		11	12												
Nwc					5	6	7	8	9	10	11	12	13	14	15	16								
Mwc			3	4	5		7	8	9	10	11	12	13	14										
Swc		2	3	4	5	6	7	8	9		11	12												
NpRgq								8	9	10	11	12	13	14	15	16	17							
MpRgq				4	5	6	7	8	9	10	11	12	13	14	15	16								
+ Kjt			3				7	8	9	10	11	12	13	14	15	16								
NiMt							7	8	9	10	11	12	13	14	15	16	17							
Mis Alt				6	5	6	7	8	9	10	11	12	13	14	15	16	17							
TBn		2	3	4	5	6	7	8	9	10	11	12	13	14										
Sc	1	2	3	4	5			8			11	12												
UisSgq	1	2	3	4	5			8			11		13											
JisW	1	2	3	4	5	6		8			11		13											

* The basic materials used for the distribution table are extracted from Dr. Matajiro Tozawa's work of 1923-1926.

* Numerals in above table denote the species as classified in attached table II-b

(Attached Table II-b)

No. Scientific Name of Woody Plants

1. *Cinnamomum camphora* Nees & Eberm.
Lithocarpus cuspidata Nakai
Machilus thunbergii Sieb. & Zucc.
Quercus acuta Thunb.
Ostrya japonica Sargent
Idesia polycarpa Max.
Quercus stenophylla Makino

2. *Torreya nucifera* Sieb. & Zucc.
Thea sinensis L. var. *bohea* Szyszylowicz
Camellia japonica L.
Aphananthe aspera Planch
3. *Salix glandulosa* Seemen
Carpinus tschonoskii Max.
Diospyros kaki Thunb.
Pinus thunbergii Pari.

- Acer palmatum* Thunb. var. *coreanum* Nakai
Phyllostachys nigra Munro var. *henonis* Makino
Chionanthus restusa Lindl. & Paxton.
Phyllostachys reticulata Koch
4. *Paulownia coreana* Uekxi
Ailanthus altissima Swingle
Toona sinensis Roemer
Ulmus sieboldii Davaux var. *coreana* Nakai
Juglans sinensis Max.
Albizia julibrissin Durazz.
Quercus crispula Blume.
5. *Styrax japonica* Sieb. & Zucc.
Biota orientalis Endl.
Evodia danielli Hemsi.
Styphonolobium japonicum Schott.
Carpinus laxiflora Blume.
Ginkgo biloba L.
Lespedeza bicolor Turcz.
Zelkova serrata Makino
Hovenia dulcis Thunb. var. *clabre* Makino
Fraxinus sieboldiana Blume.
Castanea bungeana Blume.
Benzoin obtusilobum Blume.
Castanea crenate Sieb. & Zucc. var. *dulcis* Nakai
Zizyphus sativa Gaestn. var. *inermis* Schneid.
Rhus javanica L.
6. *Abies koreana* Wilson
7. *Alnus hirsuta* Turcy
Alnus sibirica Fisch.
8. *Quercus variabilis* Blume.
Celtis jessoensis Koidzumi
Celtis sinensis PERS. var. *japonica* Nakai
Broussonetia kasinaki Sieb.
Quercus acutissima Carruthers.
Quercus serrata Thunb.
Lespedeza japonica Bailey var. *intermedia* Nakai
Buxus koreana Nakai
- Pterocarya aphanoloba* Planch.
Juniperus chinensis L.
Rhus verniciflora Stokes
Quercus dentata Thunb.
Pourthiaea zollingeri Dcne.
Prunus leveilleana Koehne.
Forsythia koreana Nakai
Hemipteleia davidii Planch.
Alnus japonica Steud. var. *genuina* Callier
Morus bombycis Koidzumi
Pinus densiflora Sieb. & Zucc.
Micromeless alnifolia Koehne var. *typica* Schneid.
Acer ginnala Max.
Prunus padus L. var. *seoulensis* Nakai
Salix neo-lasiogyne Nakai
Salix koreensis Anders.
Salix purpurea L. var. *japonica* Nakai
Carpinus erosa Blume.
Aralia elata Seemann
Lespedeza Maximowiczii Schneid.
Gleditschia koraiensis Nakai
Fraxinus rhynchophylla Hance
Cornus coreana Wangerin
Rhododendron yedoense Max. var. *poukhanense* Nakai
Pyrus ussuriensis Max.
Quercus aliena Blume.
Juniperus rigida Sieb. & Zucc.
Ulmus pumila L.
Kalopanax pictum Nakai
Lespedeza cystobotrya Miq.
Cornus controversa Hemsl.
9. *Betula davurica* Pallas
Tilia mandshurica Rupr. & Max.
Juglans mandshurica Max.
Fraxinus mandshurica Rupr.
10. *Salix rorida* Lacksch.
Acer triflorum Komarov
Prunus mandshurica Koehne.
Salix Maximowiczii Komarov
Acer mandshurica Max.
11. *Acer Mono* Max.
Maackia amurensis Rupr. & Max.

- Rhododendron macronulatum* Turcz.
Acer pseudo sieboldianum Komarov
Populus simonii Carr.
Ulmus japonica Sargent
Rosa davurica Pallas
Betula schmidtii Regel
Malus beccata Borkh. var. *mandshurica* Schneid.
Rhododendron Schlippenbachii Max.
Quercus mongolica Fisch.
12. *Phellodendron amurense* Rupr.
Sorbus amurensis Koehne
Pinus koraiensis Sieb. & Zucc.
Abies holophylla Max.
Acanthopanax sessiliflorum Seemann
13. *Taxus cuspidate* Sieb. & Zucc.
Betula latifolia Komarov
Betula chinensis Max.
Betula costata Trautv.
Populus tremula L. var. *Davidiana* Schneid.
14. *Tilca amurensis* Komarov
Chosenia eucalyptoides Nakai
Abies nephrolepis Max.
Thuja koraiensis Nakai
15. *Populus Maximowiczii* Henry
Populus koreana Rehder
16. *Picea jezoensis* Carr.
Betula ermanii Charm.
Larix dahurica Turcz. var. *koreana* Nakai
Picea koraiensis Nakai
17. *Pinus pumila* Regel
18. *Tsuga sieboldii* Carr.
Fagus multinervis Nakai
Pinus parviflora Sieb. & Zucc.

한국의 기후구분

각 지역마다 서로 다른 기후를 가진 지구상의 기후를 몇개의 기후구로 분류하기 위해서는 오래전 부터

많은 학자들이 연구하여 왔으며 각 국가는 자기 나라 안의 기후를 지역적인 특수성과 기후의 유사성에 의하여 또다시 몇개의 기후구로 구분하기에 이르게 되었던 것이다.

이와 같이 지구상의 기후를 구분함에 있어서는 이용목적에 따라서 여러가지 방법이 있으나 현재 세계적으로 가장 많이 사용되고 있는 기후구의 분류는 Koeppen에 의하여 제안된 것인데 이것은 자연식물의 분류상태도 고려하여 구분한 것이다.

이러한 Koeppen의 기후구분에 의하면 한국은 울릉도지방이 Cfa(온대 년중다우 하서기후), 서울이북 지방(단 동해안 강릉지방 제외)과 추풍령 및 태백산맥인근의 고지대가 Dwa(아한대 동기과우 하서기후), 서울이남이 Cwa(온대 동기과우 하서)에 속한다고 볼 수 있으므로 세계적 입장에서 본 한국의 기후는 이상과 같이 3개 기후구로 구분된다.

그러나 이것은 너무나 간결하게 분류되었을 뿐만 아니라 기후가 생활 주변에 미치는 영향이 커서 모든 산업은 기후의 영향을 받지 않는 것이 거의 없으므로 좀 더 세밀히 구분해 볼 필요성을 느끼게 된 것이다.

다시 말하면 모든 산업 가운데서도 기후의 영향을 가장 많이 받는 것은 농업인데 농작물의 생육과 농업 활동은 그 지방의 기후에 의하여 한정되며 농업 뿐만 아니라 공업, 교통, 기상재해, 거주 양식 등 모든 것이 그 지방의 기후 조건의 영향을 받는다.

그러므로 위와 같은 산업 방면의 기술 이용과 운명에 다소나마 편의를 도모하고 입문지리의 연구에도 도움이 될까하여 다음과 같은 점에 착안해서 분류하였다.

즉 어떤 지역의 기후는 한개의 기후요소에 의하여 결정되는 것이 아니라 모든 기후 요소를 종합함으로써 결정되며 기후 요소의 평균값에 의거하는 것보다는 계절적으로 나눠서 비교해 보는 것이 좋고 여러 가지 기후 요소 중에서도 기후를 가장 대표적으로 지배하는 것은 기온과 강수량이며 기온이 같은 두 지역이라 할지라도 이 두 지역은 서로 다른 기후구로 구분할 수 있다.

이와 같이 기후를 지배하는 기온, 강수량, 강수일수, 적설, 구름, 안개, 서리, 일조, 바람 등의 기후요소(별표 I참조)와 지역적 특성인 산맥, 지형, 하천, 해륙분포, 해안 거리 등의 기후인자(별표 II-a,b 참조)를 고려하여 이상과 같이 17개 기후구로 분류하여 왔다.