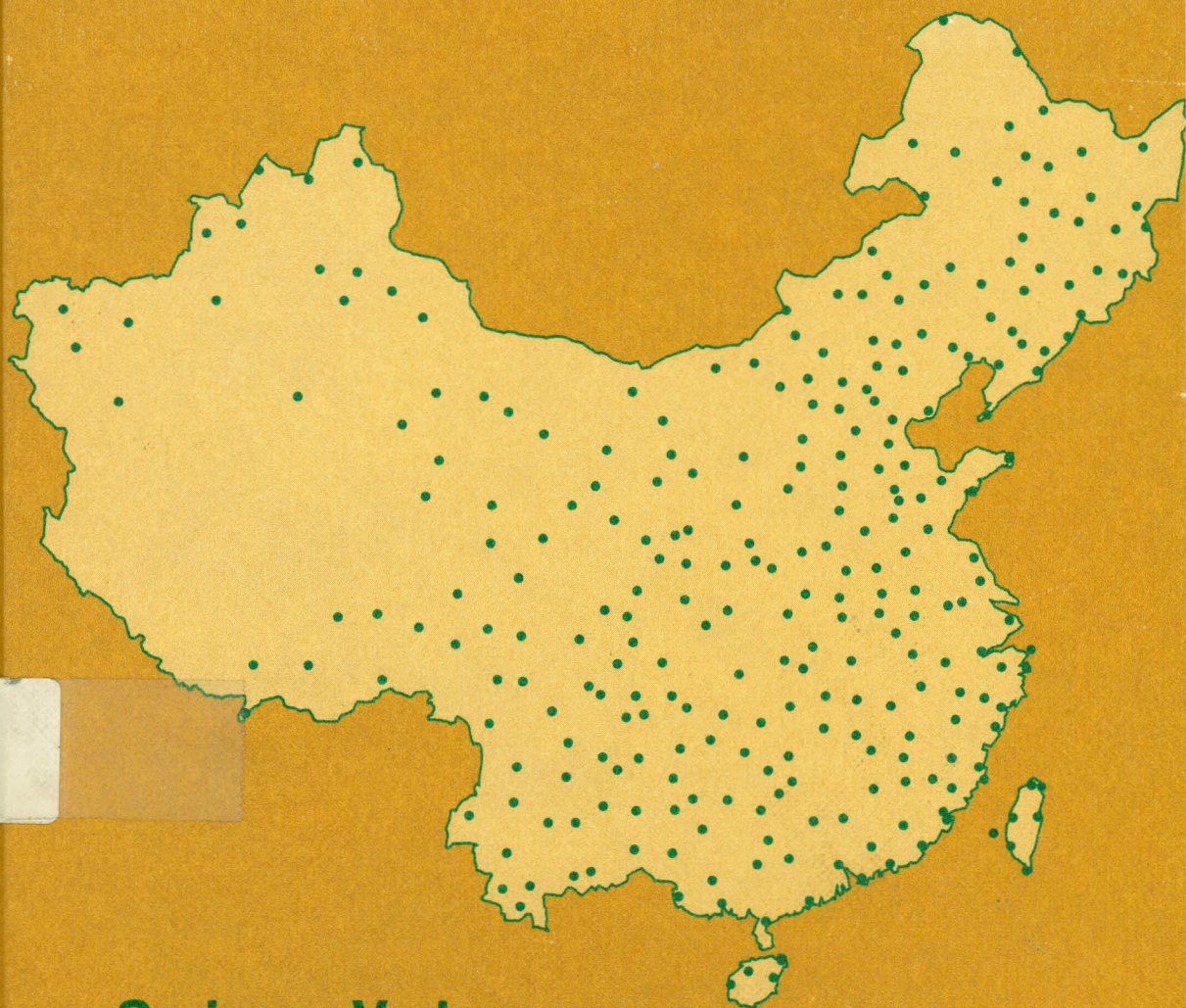


Manfred Domrös
Peng Gongbing

The Climate of China



Springer-Verlag

Manfred Domrös

Peng Gongbing

The Climate of China

256/3269 INSTITUT
FÜR METEOROLOGIE U. KLIMATOLOGIE
UNIVERSITÄT HANNOVER
HERRENHAUSER STR. 2 • 3000 HANNOVER 21

With 126 Figures

Springer-Verlag
Berlin Heidelberg New York
London Paris Tokyo

Contents

1	Introduction	1
1.1	Aims and Concept of the Study	1
1.2	Climate Data	2
1.3	Review of Climate Studies on China	14
2	Controlling Factors of the Climate	20
2.1	Latitude, Longitude and Location	20
2.2	Topography and Landforms	23
2.3	Distribution of Land and Sea and Nature of the Underlying Ground	26
2.4	Seasons	28
3	Circulation	30
3.1	Seasonal Pressure Distribution at Sea Level	30
3.2	Seasonally Prevailing Winds and Air Masses	34
3.3	Winter and Summer Monsoon	39
3.3.1	Characteristics of the Monsoon in General	39
3.3.2	Onset and Duration of the Winter Monsoon	43
3.3.3	Periods of Active and Weak Winter Monsoon	45
3.3.4	Damage Due to Strong Cold Outbreaks of Winter Monsoon	50
3.3.5	Onset and Duration of the Summer Monsoon	52
3.3.6	Some Characteristics of the Summer Monsoon	57
3.4	Frontology	59
3.4.1	Mean Front Position in January and July	59
3.4.2	The Stationary Fronts in February and March as well as in the Pre-Typhoon Season in South China	59
3.4.3	Some Characteristics of the Mei-Yu Front	62
3.5	The Transient Disturbances	65
3.5.1	The Upper Westerly Troughs in the Westerlies	66
3.5.2	Extratropical Cyclones and Anticyclones	68
3.5.3	Typhoons	71
4	Temperature	77
4.1	Mean Annual Air Temperature Distribution	77
4.2	Mean Seasonal Temperature Distribution	80

4.3	Annual Range and Annual Variation of Temperature	86
4.4	Onset and End of Certain Limited Temperatures and Their Duration	101
4.4.1	Mean Daily Air Temperature $\leq 0^{\circ}\text{C}$	103
4.4.2	Mean Daily Air Temperature $\geq 10^{\circ}\text{C}$	107
4.4.3	Maximum Daily Air Temperature $\geq 35^{\circ}\text{C}$	110
4.4.4	Other Extreme Limited Temperatures	112
4.5	Vertical Distribution of Temperature	114
4.6	Comparison of Temperature at the Same Latitude .	116
4.7	Diurnal Range of Temperature	119
4.8	Interannual Variability of Temperature	122
4.8.1	Variability of Annual Mean Temperature	123
4.8.2	Variability of Monthly Mean Temperatures	124
4.9	Historical-Climatic Change of Temperature During the last 5,000, 500 and 100 Years	130
5	Precipitation	139
5.1	Mean Annual Precipitation Distribution	139
5.2	Mean Seasonal Precipitation Distribution	141
5.3	Annual Variation of Precipitation	155
5.3.1	Specific Precipitation Types and Their Distribution	155
5.3.2	Variation of Wet and Dry Months over Space and Time	160
5.3.3	Summer Precipitation	168
5.4	Interannual Precipitation Variability	168
5.4.1	Variability of Annual Precipitation	169
5.4.2	Variability of Monthly Precipitation	174
5.4.3	Variability of Annual and Monthly Precipitation at Beijing	174
5.5	Precipitation Frequency Expressed in Rainy Days .	182
5.6	Precipitation Intensity	183
5.7	Rainstorms and Certain Events of Heavy Rainfall .	186
5.8	Diurnal Variation of Precipitation	190
5.9	Influence of Topography and Elevation on Precipitation	191
5.9.1	Influence of the Exposition of Slopes on Precipitation	191
5.9.2	Effect of Elevation on Precipitation	193
5.10	Historical Change of Precipitation	195
5.11	Snow	201
5.11.1	Mean Length of Snow Cover Period	201
5.11.2	Number of Snowfall Days	205
5.11.3	Maximum Depth of Snow	206
5.11.4	Altitude of the Snow Line	207

6	Cloudiness and Sunshine	210
6.1	Mean Annual Cloudiness and January and July Amount	210
6.2	Sunshine	212
6.2.1	Annual Sunshine Duration	213
6.2.2	Sunshine Duration in January and July and Annual Variation	216
6.3	Global Radiation	218
6.4	Fog	220
7	Surface Wind	222
7.1	Mean and Extreme Wind Velocities	222
7.2	Local Wind Systems	224
7.2.1	Mountain and Valley Breezes	224
7.2.2	Land and Sea Breezes, Lake Breeze	227
7.2.3	Plateau Monsoon	227
7.2.4	Local Dry and Hot Winds	229
8	Climate Classification and Division of China	230
8.1	General Objectives and Fundamentals of Climate Regionalization	230
8.2	China Within Global Climate Classifications	232
8.3	National Climate Classifications of China	240
8.4	Climate Division of China According to HUANG Bing-wei (1986)	253
9	Climate Zones of China	258
9.1	Cold Temperate Zone (I)	259
9.2	Middle Temperate Zone (II)	260
9.3	Warm Temperate Zone (III)	263
9.4	Northern Subtropical Zone (IV)	266
9.5	Middle Subtropical Zone (V)	268
9.6	Southern Subtropical Zone (VI)	270
9.7	Peripheral Tropical Zone (VII)	272
9.8	Middle Tropical Zone (VIII)	274
9.9	Southern Tropical Zone (IX)	275
9.10	Alpine Plateau Zone (H0)	276
9.11	Subalpine Plateau Zone (HI)	277
9.12	Temperate Plateau Zone (HII)	278
	Appendix: Climate Tables	281
	References	351
	Subject Index	358