

1. DATE OF FIRST SNOWFALL. DATE OF LAST SNOWFALL.
NUMBER OF DAYS WITH SNOW COVER. MEAN ANNUAL MAXIMUM DEPTH OF SNOW COVER
2. DATE OF FIRST FROST. DATE OF LAST FROST.
NUMBER OF DAYS WITH FOG. NUMBER OF DAYS WITH THUNDER OR LIGHTNING
3. NUMBER OF DAYS WITH MAXIMUM TEMPERATURE LESS THAN 0°C.
NUMBER OF DAYS WITH MINIMUM TEMPERATURE LESS THAN 0°C.
NUMBER OF DAYS WITH MAXIMUM TEMPERATURE EQUAL TO OR MORE THAN 25°C.
NUMBER OF DAYS WITH MAXIMUM TEMPERATURE EQUAL TO OR MORE THAN 30°C

1. Date of First Snowfall. Date of Last Snowfall. Number of Days with Snow Cover. Mean Annual Maximum Depth of Snow Cover

In meteorological observations, any small amount of falling snow is recorded as snowfall. The earliest and last days of snowfall are known as the date of first snowfall and the date of last snowfall, respectively. Snow coverage represents a situation in which more than half of the ground surface is covered with snow. The day in which this situation prevails is known as a day with snow cover, whether it snowed on the previous day or any earlier day for that matter.

The southernmost border where snowfall has been recorded in Japan is Naze on Ō Sima (Amami) and the southernmost border for snow cover is Yuwan Dake on the same island. In the high mountains and high-altitude districts where it snows all year round, it is difficult to determine the date of first snow and the date of last snow. For this reason, a year is demarcated from another on the day when the year's highest temperature is recorded. The snow before this day is regarded as the snow remaining from the previous year or the last snow, whereas the snow after this day is considered the snow for the new year. In calculating norms, the use of a mean for the calendar year would disrupt a succession of seasons, so that the mean of the values measured during the cold weather duration in the 30 years extending from the autumn of 1940 to the spring of 1970 is used.

The duration of norms from the first snow to the last snow is about 180 days in the northern part of Hokkaidō, about 140 days in the periphery of Akita, and about 120 days in the perimeters of Niigata and Takada. The duration is over one month longer in the mountain areas. As a whole, the duration is exceedingly long on the Japan Sea side.

As snow cover produces a variety of hazards and influences in conjunction with man's social life, it is more practical to use as a yardstick for the snow season the number of days with snow cover than the duration extending from the day of first snow to the day of last snow.

The normal number of days with snow cover is 120-150 days on the Japan Sea side of Hokkaidō and its mountain areas, 60-90 days in Akita, Niigata and other areas, a few days in areas south to the Kantō Region on the Pacific Coast.

The mean annual maximum depth of snow cover represents the maximum depth of the snow which covers the ground surface in a given year. The mean of the cold weather duration in 30 years is looked upon as the norm. This value stands at 2.5 m in the mountains and piedmonts north to the Hokuriku Region on the Japan Sea side and 0.7-1 m in the plains.

These maps were prepared on the basis of the norms available from about 150 meteorological offices throughout the country.

Sources

1. Japan Meteorological Agency, Climatic Table of Japan, Pt. 2, Monthly Normals by Stations (1941-1970), 1972.
2. Japan Meteorological Agency, Annual Climatic Records of Japan, Snowfalls, 1963.

2. Date of First Frost. Date of Last Frost

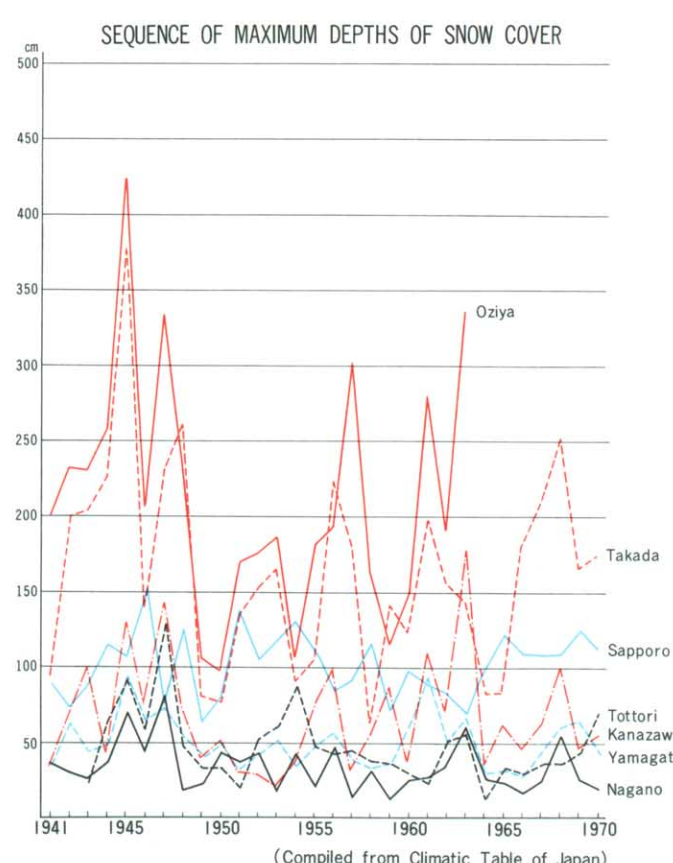
Frost is a crystal of ice that sticks directly to the ground surface or an object on the ground surface as a result of the sublimation of water vapor in the atmosphere. The ice columns are a gathering of crystals which have grown in a capillary phenomenon one after another from under the ground, as moisture in the ground was crystallized at the freezing point. They are classified differently from frost.

Frost frequently appears, when the temperature drops under 5-6°C and the ground surface is frozen to a subzero temperature. A drop in the temperature of the ground surface to 0°C is essential for the appearance of frost. Even if the temperature of the ground surface stands at 0°C, frost sometimes will not form when it snows or rains, when the humidity is low or when the winds are strong.

In general, the period extending from the date of first frost to the date of last frost is known as frost duration, whereas the period extending from the date of last frost to the date of first frost is called the non-frost duration.

2. Number of Days with Fog

Depending on the place of appearance, fog is classified into mountain fog, sea fog, river fog, lake fog, basin fog, city fog, etc. Depending on the structure, fog is also classified into radiation fog, advection fog, frontal fog, etc.



Radiation fog is a condensation of water vapor in the atmosphere which results from the cooling of the atmosphere, by the radiation and cooling of the ground, which is in contact with the ground surface. Advection fog is generated as the atmosphere is cooled by the cold water surface over which streams of hot air pass. In contrast, fog is generated from the water surface, when streams of cold air float over the warm water surface. This fog is a type of advection fog. Frontal fog is generated in the periphery of a front and its cause is ascribed to a rise in dew point. In most instances, fog is generated due to a number of factors, but not to a single factor.

Fog is prevalent in the mountains and basins. There is fog throughout the year in the mountains and is not limited to any particular season. In the basins, fog appears mostly from fall to spring, while the coastal areas have fog mostly from spring to autumn.

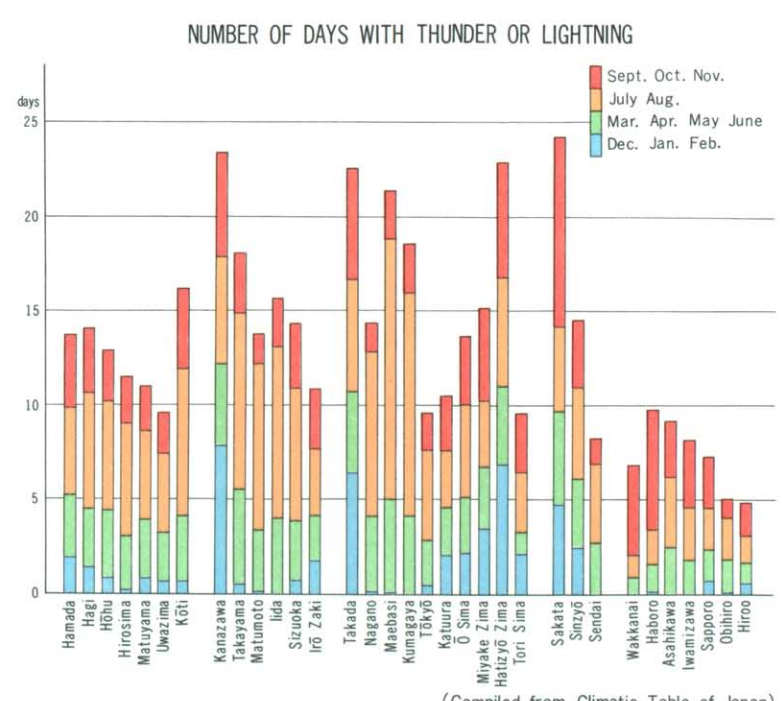
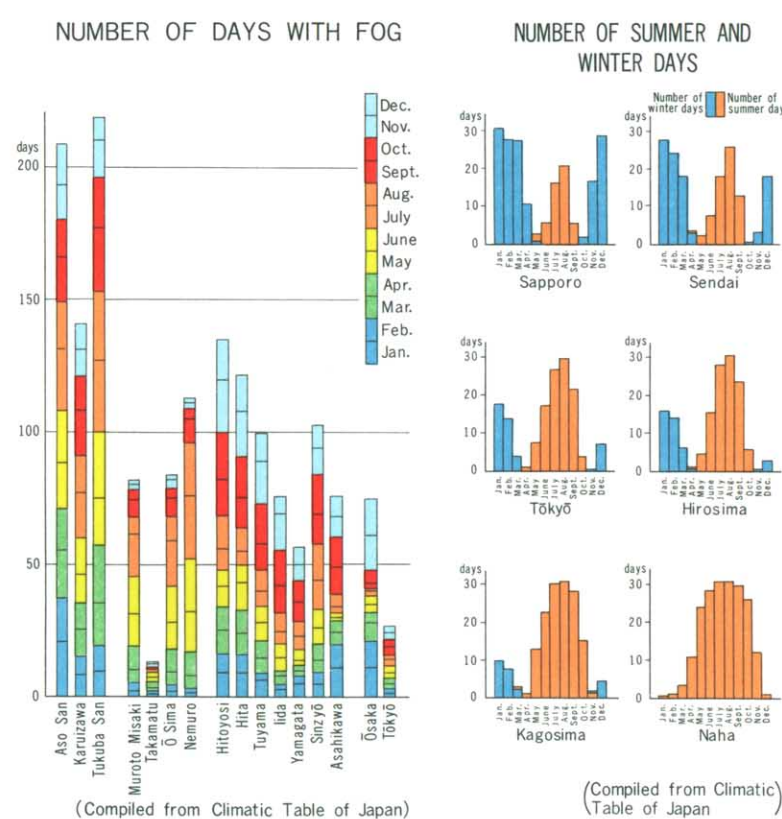
2. Number of Days with Thunder or Lightning

The powerfully ascending air current generates a thunder or thunderstorm. Depending on the way the ascending air current is generated, the thunderstorms are classified into heat thunderstorm, frontal thunderstorm, spiral thunderstorm, etc.

The heat thunderstorm is the kind of thunderstorm caused by a thermal convection current, which is generated with the ground surface heated under the strong sunlight and with the air close to the ground surface reduced in weight. A frontal thunderstorm is generated, when the streams of warm air in front of a cold front are pushed upward by its advance. A spiral thunderstorm is generated, as the converging air current blowing in from around the sphere of a low pressure area or typhoon turns itself into an ascending air current at the center.

The number of days with thunder or lightning is considered days in which rolls or flashes of thunder are recorded. The frequency of thunder or lightning may sometimes prove greater than the actual number of days with thunder or lightning, because there are cases in which thunder is recorded more than twice a day. The phenomenon of thunder is narrower in range than the generation of fog. In particular, the heat thunderstorm is always an extremely localized phenomenon.

Areas with a large number of days with thunder or lightning include, among others, the piedmont extending from the middle part of Gunma Prefecture to the northern part of Totigi Prefecture, upstream of the Kiso Gawa River extending from the eastern part of Aiti Prefecture to the western part of Nagano Prefecture, and the western part of Toyama Prefecture. In these districts, the number of days with thunder or lightning is recorded as being close to 30. By season, the number of days with thunder or lightning is generally greater in summer, particularly in the piedmont areas on the Pacific Ocean side. In the cities of Kanazawa and Takada on the Japan Sea side, the number of days with thunder or lightning in the three months of December through February accounts for about 30 percent of the annual total, so that thunder in winter is nothing unusual in this district. Practically no winter thunder is generated in northeast Japan, but many cases are reported in areas on the Pacific Coast, such as Irō Zaki and Katura, and Izu Syotō, including Hatizyō Zima and Miyake Zima. Further south down to Tori Sima, the number is smaller. This is because dry seasonal winds, churning across



the northern part of the Kantō Region, come in contact with a highly humid, warm air mass over the Pacific Ocean and become unstable, and as they go down further to the south as far as Tori Sima, consequently the cold mass is heated.

Hail sometimes accompanies a thunderstorm. The percentage of thunderstorms turning into a hailstorm is high in May and June when the temperature does not rise even with strong sunshine. It frequently hails in summer, however, because summer towers above other seasons in the frequency of thunderstorms. The hailstorm is a more localized phenomenon than the thunderstorm but inflicts great damage on farm produce—particularly, tobacco, mulberry leaves and vegetables.

The maps indicating the date of first frost, the date of last frost, number of days with fog and number of days with thunder or lightning were prepared on the basis of the norms gathered from about 150 meteorological offices.

Sources

1. Japan Meteorological Agency, Climatic Table of Japan, Pt. 2, Monthly Normals by Stations (1941-1970), 1972.
2. Japan Meteorological Agency, Climatic Atlas of Japan, Vol. 2, 1972.
3. Japan Meteorological Agency, Significant Weather and Disasters in Japan (1961-1970), 1974.

3. Number of Days with Maximum Temperature Less Than 0°C. Number of Days with Minimum Temperature Less Than 0°C. Number of Days with Maximum Temperature Equal to or More Than 25°C. Number of Days with Maximum Temperature Equal to or More Than 30°C

The temperature is the most commonly accepted yardstick to indicate seasonality. Frequently used is the practice of indicating the state of seasonality at a given point with the number of days with a certain range of temperatures.

A day with a maximum temperature recorded at less than 0°C is a very cold day in which the temperature does not go above 0°C all day. It is known as a midwinter day. The annual number of midwinter days in terms of norms is 51 in Sapporo, 3 in Sendai, and 9 in Nagano. Practically no midwinter days are recorded in areas along the coasts of the Pacific Ocean west to the Kantō Region and the Seto Naikai.

A day with a minimum temperature registered at less than 0°C is known as a winter day. A check of the daily fluctuations in the temperature of winter days reveals that the temperature is below the freezing point at dawn and above the freezing point during most of the daytime. The annual number of winter days in terms of norms is 145 in Sapporo, 95 in Sendai, 114 in Nagano, 43 in Tōkyō and 25 in Kagoshima, whereas not a single winter day has been recorded in Naha.

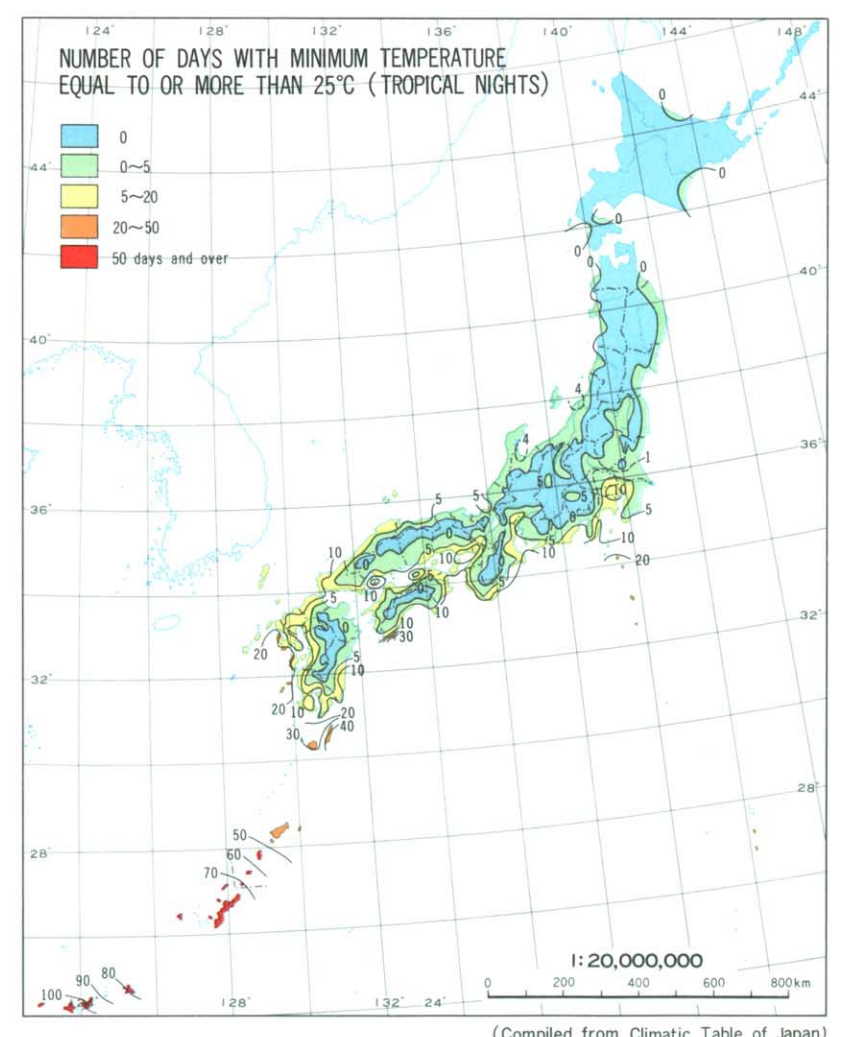
A day with a maximum temperature registered at more than 25°C is known as a summer day and frequently occurs in Tōkyō when May sets in. The annual number of summer days in terms of norms is 50 in Sapporo, 68 in Sendai, 100 in Nagano, 108 in Tōkyō, 109 in Hiroshima, 145 in Kagoshima and 200 in Naha.

A day with a maximum temperature registered at more than 30°C is known as a midsummer day and starts making its appearance in Tōkyō when Baiu (rainy season in early summer) comes to an end. The annual number of midsummer days in terms of norms is nine in Sapporo, 17 in Sendai, 47 in Tōkyō, 45 in Hiroshima, 69 in Kagoshima and 83 in Naha.

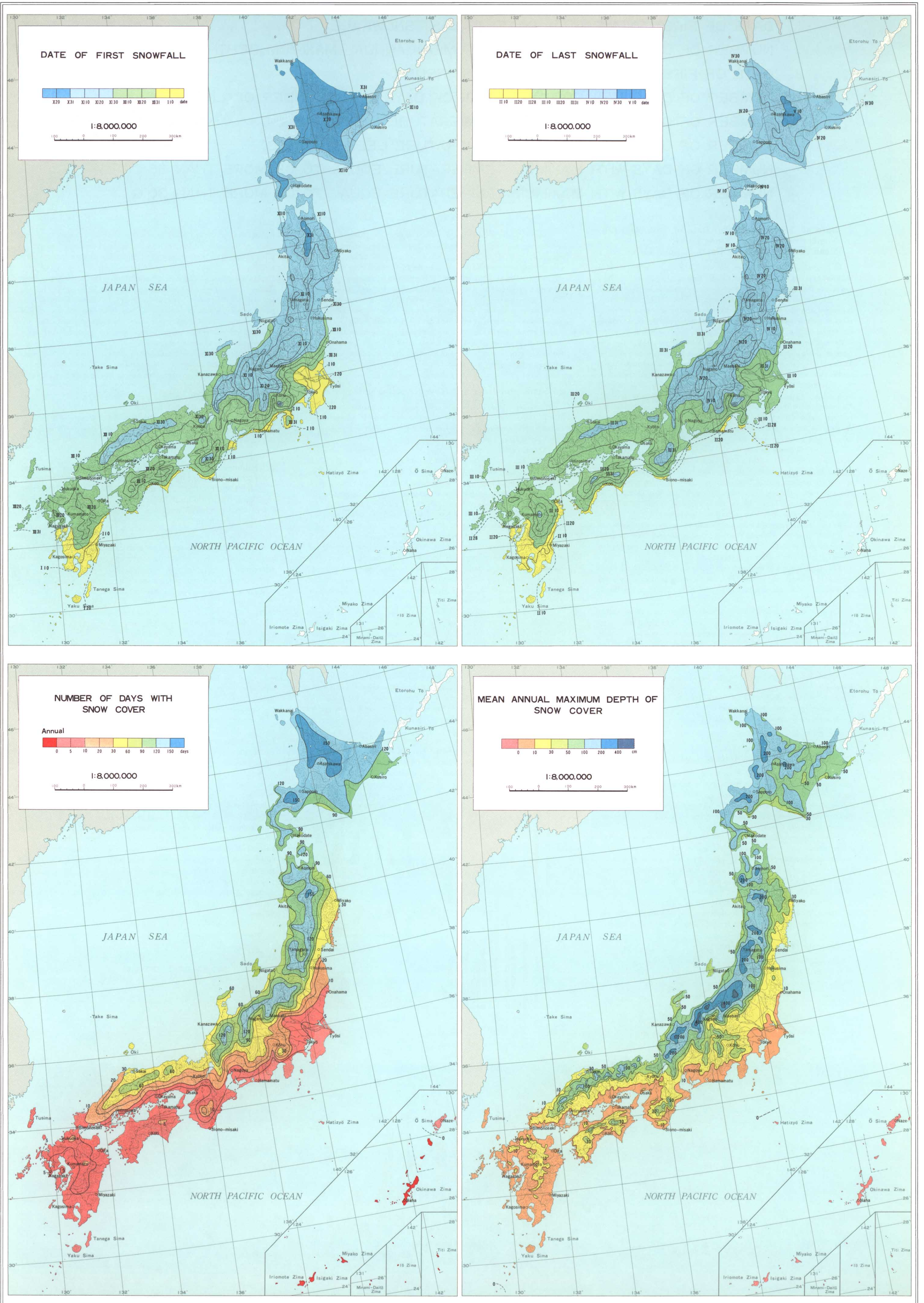
The classification of days with specific temperatures includes, among others, a day with a minimum temperature equal to or more than 25°C. It is known as a tropical night. With the temperature rising above 25°C even at night, people are forced to pass a wakeful night. The annual number of tropical nights in terms of norms is 12 in Tōkyō, 7 in Hiroshima, 16 in Kagoshima, and 77 in Naha, whereas no tropical nights are recorded in areas north to Sendai. These maps were prepared on the basis of the norms available from about 150 meteorological offices throughout the country.

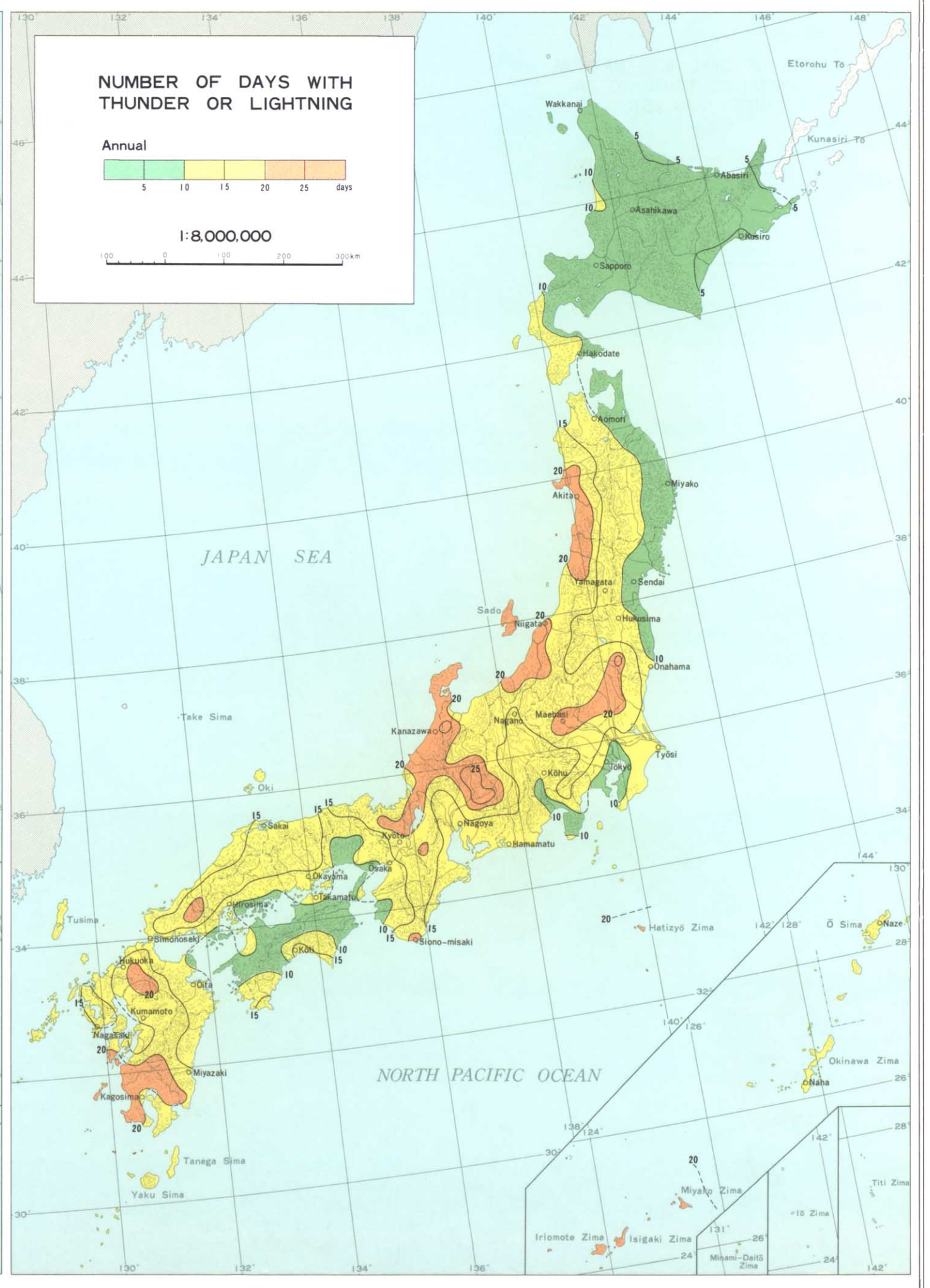
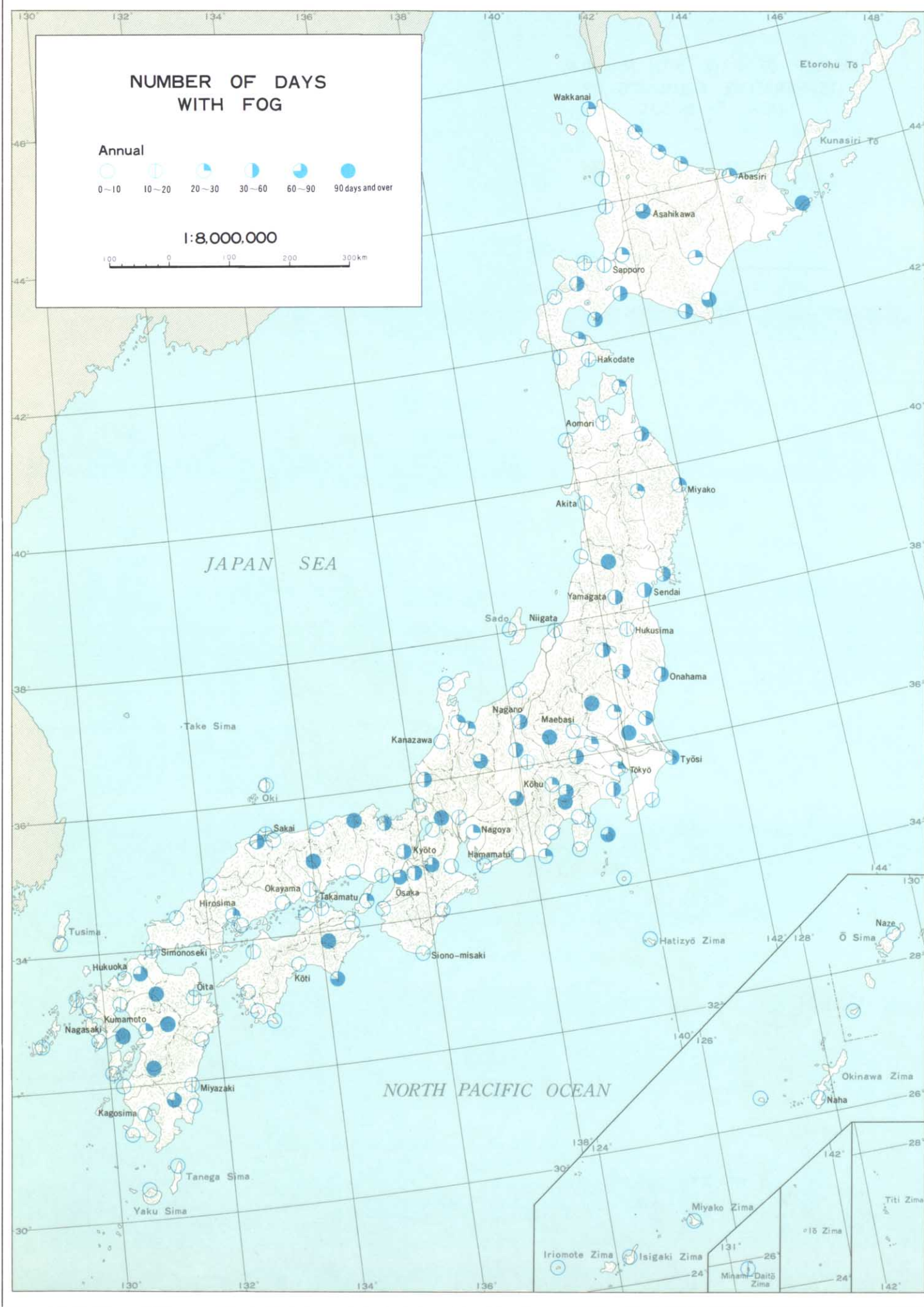
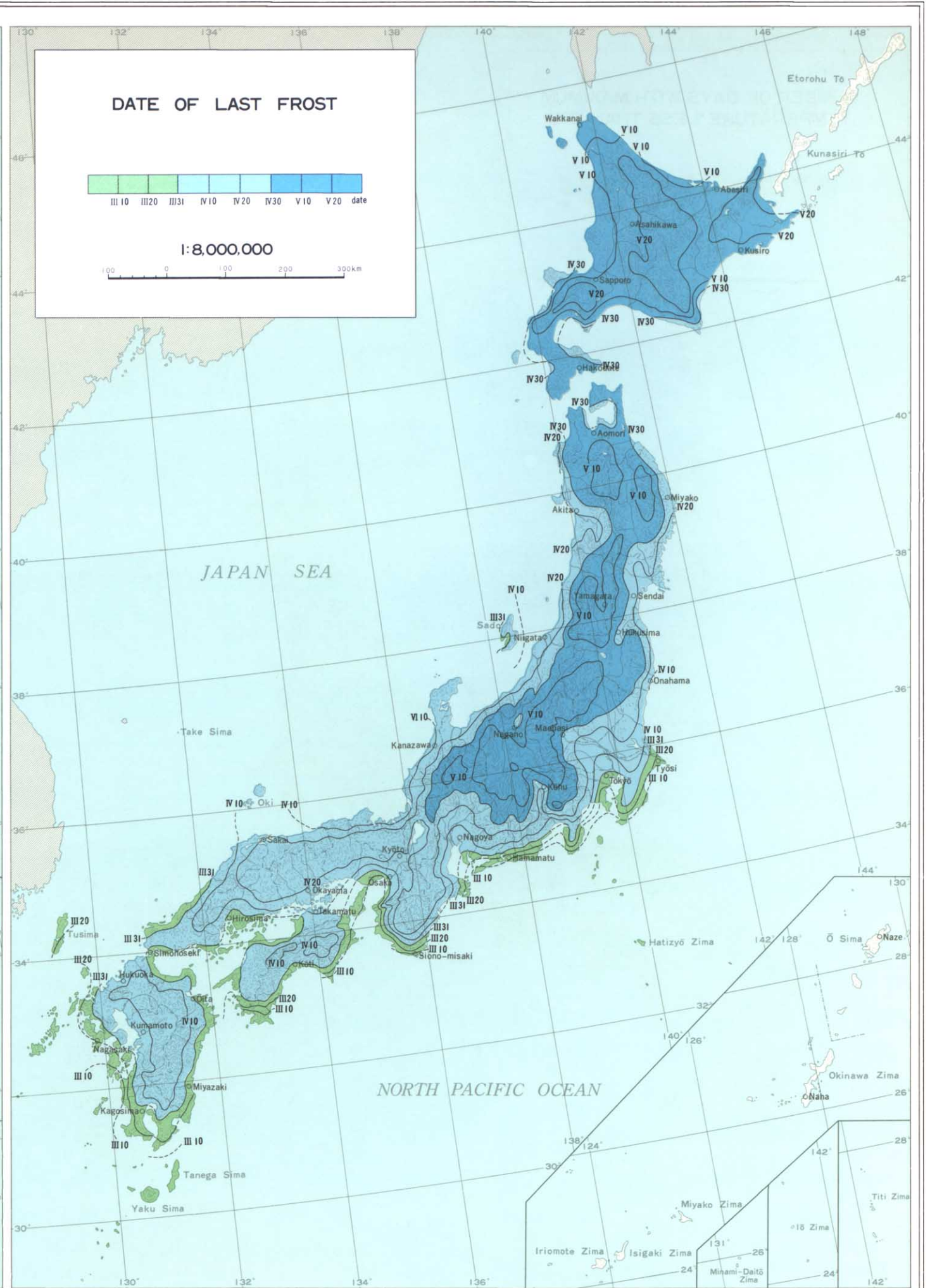
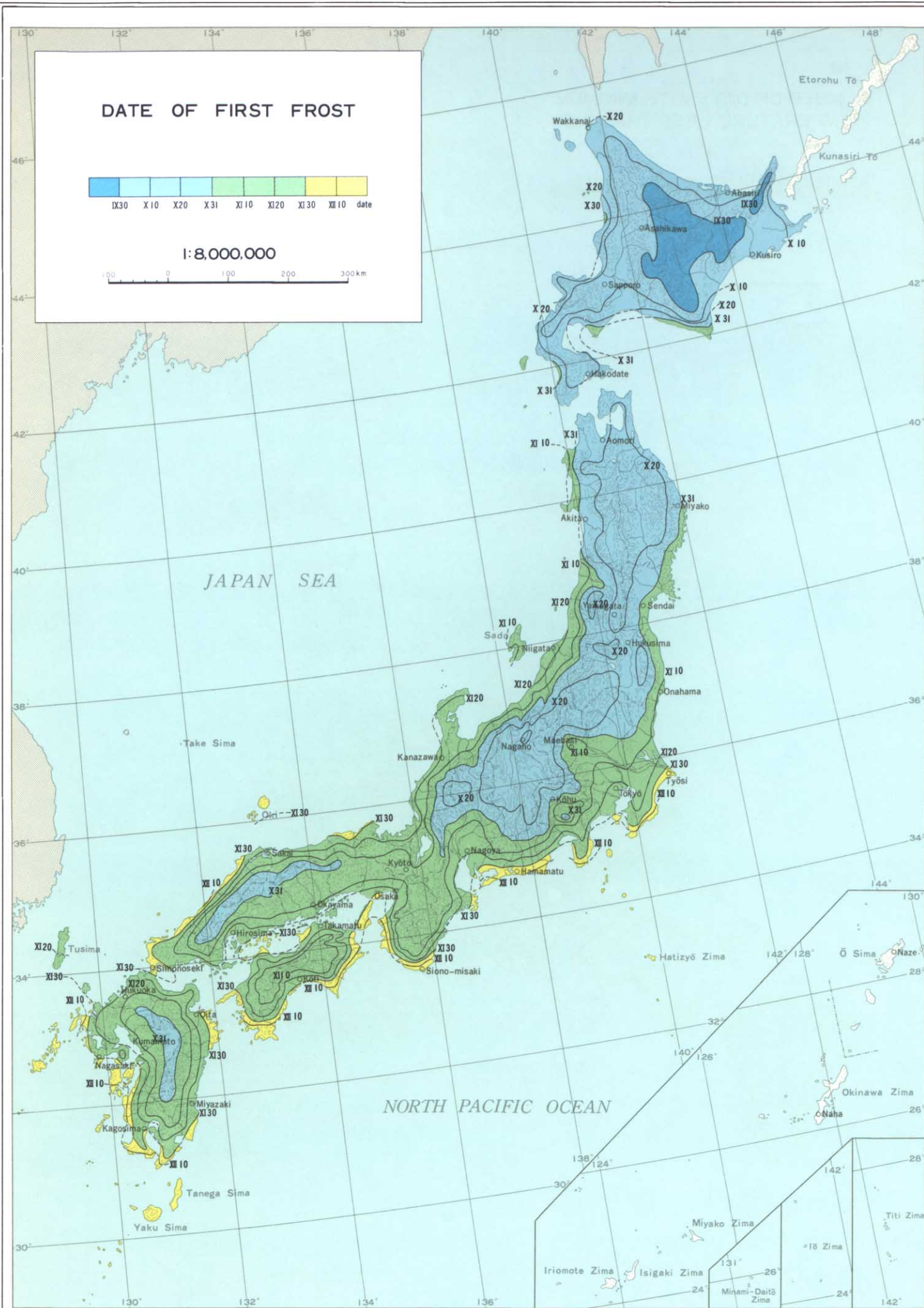
Source

1. Japan Meteorological Agency, Climatic Table of Japan, Pt. 2, Monthly Normals by Stations (1941-1970), 1972.



17.1





17.3

