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DTIC FORM 70A

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NATIONAL INTELLIGENCE SURVEY

FRANCE

SECTION 23

WEATHER AND CLIMATE

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CENTRAL INTELLIGENCE AGENCY

Washington, D. C.

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Classification Extended under paragraph 1-301(b) of Executive Order 12065 (protection of foreign government information). The next review will be in 1990 per CIA letter 3 Sept 1980.

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This Section was prepared for the NIS under the general supervision of the Director of Intelligence, USAF, by the Air Force/Air Weather Service in coordination with the Joint Meteorological Committee. Material on amphibious operations was prepared by the Office of Naval Intelligence and material on clothing, storage, and temporary shelter was prepared by the Office of the Quartermaster General.

23. Weather and Climate

A. General weather and climatic conditions*

1. Introduction

There are a number of factors which introduce considerable complexity into the climate of France and Corsica (Corse). The land surface of this NIS Area has a wide variety of relief, ranging from low plains to high mountains and from enclosed depressions to exposed plateaus. France is subject to the effects of numerous migratory cyclones, the centers of which pass over or near the Area and impart great variability to the day-to-day weather. Southern France and Corsica experience a preponderance of good weather in summer, when they are under the influence of the North Atlantic high-pressure cell. Another important factor which causes much of the complexity of the French climate is the position of France bordering the ocean and situated on the edge of the great Eurasian land mass.

Because the terrain greatly affects the climate of the Area, a general knowledge of it is necessary for a proper understanding of the weather and climate. For the purpose of discussion in this Section, the Area is divided into four regions (FIGURE 23-1): 1) The Western Lowlands include the western coastal sectors and the lowland portions of the northern and western parts of the country. This region is influenced primarily by North Atlantic weather factors. 2) The Interior Highlands consist of the inland portion of France, much of which is at an elevation of more than 1,000 feet, and also the western slopes of the Alps. This region is affected by weather from both the North Atlantic Ocean and the Mediterranean Sea. 3) The Mediterranean Coast includes the Mediterranean coastal strip, the south-facing slopes of the higher terrain inland, and the southern portion of the Rhône valley. This region is influenced mainly by Mediterranean weather factors. 4) Corsica, an island with very rugged relief, is affected almost entirely by Mediterranean weather.

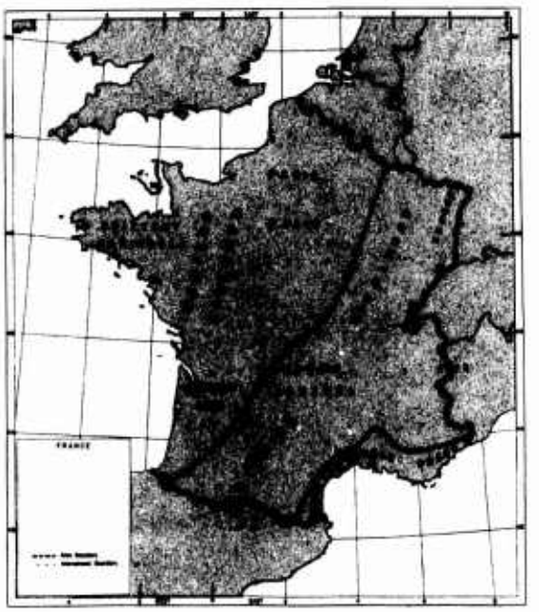


FIGURE 23-1. DISCUSSION REGIONS AND MAJOR GEOGRAPHIC FEATURES

2. Synoptic aspects of the climate

a. GENERAL CIRCULATION — The major airflow over France is part of the circulation around the semipermanent North Atlantic or Azores *high*, the center of which migrates roughly between latitudes 25°N. and 40°N. throughout the year. Since the winds reach France after a long overwater trajectory, they bring a preponderance of maritime conditions to the Area, moderate temperature, frequent cloudiness, and fairly evenly distributed precipitation over almost the entire country.

The Azores high-pressure cell is at its northernmost position during the summer months, at which time most of Europe is covered by low pressure. Therefore, the principal airflow over France during this season is from west through northwest. FIGURE 23-2 shows the mean pressure and wind roses for July.

During winter the Azores *high* is weaker and is displaced southward, while relatively high pressure prevails over the continent and *lows* frequently move eastward over the Mediterranean

* Requests for solutions to specific problems involving the interpretation of the weather factor in the user's unique operational terms should be directed to The Commanding General, Air Weather Service, MATS, USAF, Washington 25, D. C.

Sea. This type of pressure distribution results in frequent southwesterly winds over the Western Lowlands, northwest through north winds over the Interior Highlands, and more variable winds over the Mediterranean Coast. FIGURE 23-3 shows the mean pressure and wind roses for January. Cold, continental air from northeastern Europe or warm, continental air from northern Africa may occasionally cover much of the Area during this season. However, maritime air is experienced about five times as often as continental air. Cyclonic activity is best developed over the North Atlantic during winter, resulting in the most pronounced transport of air masses of southerly origin over the northern North Atlantic at that time.

The waters of the northeastern North Atlantic are abnormally warm for the latitude as a result of the great transport of southerly waters across the North Atlantic by the Gulf Stream. The maritime winds of western France give to the Western Lowlands a remarkably warm and moist climate during winter. The average winter temperatures along the west coast are about 20° F. higher than normal for the latitude. The positive temperature anomaly is much less over the other portions of the country.

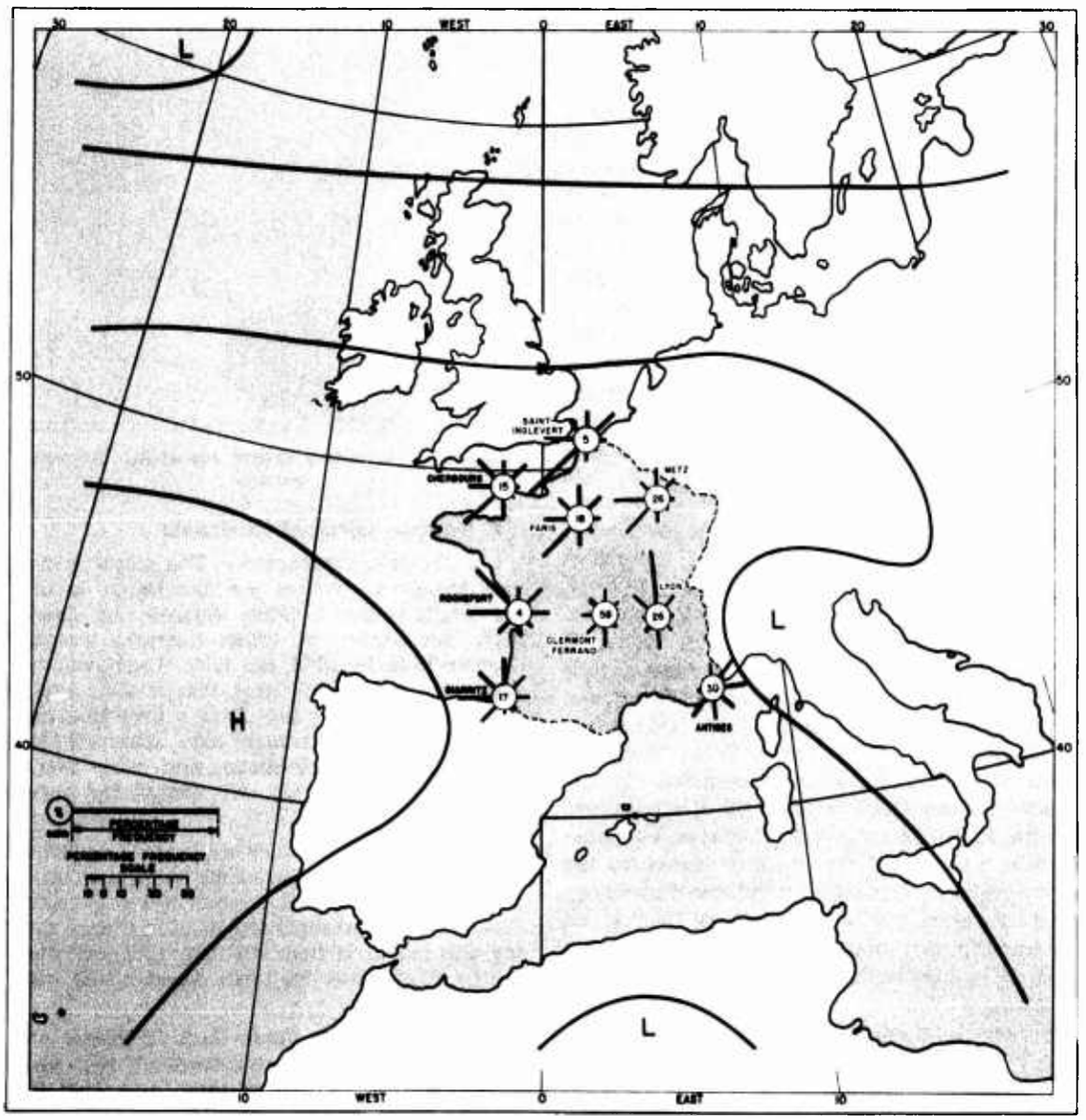


FIGURE 23-2. MEAN SEA-LEVEL PRESSURE PATTERN AND SURFACE WIND ROSES, JULY

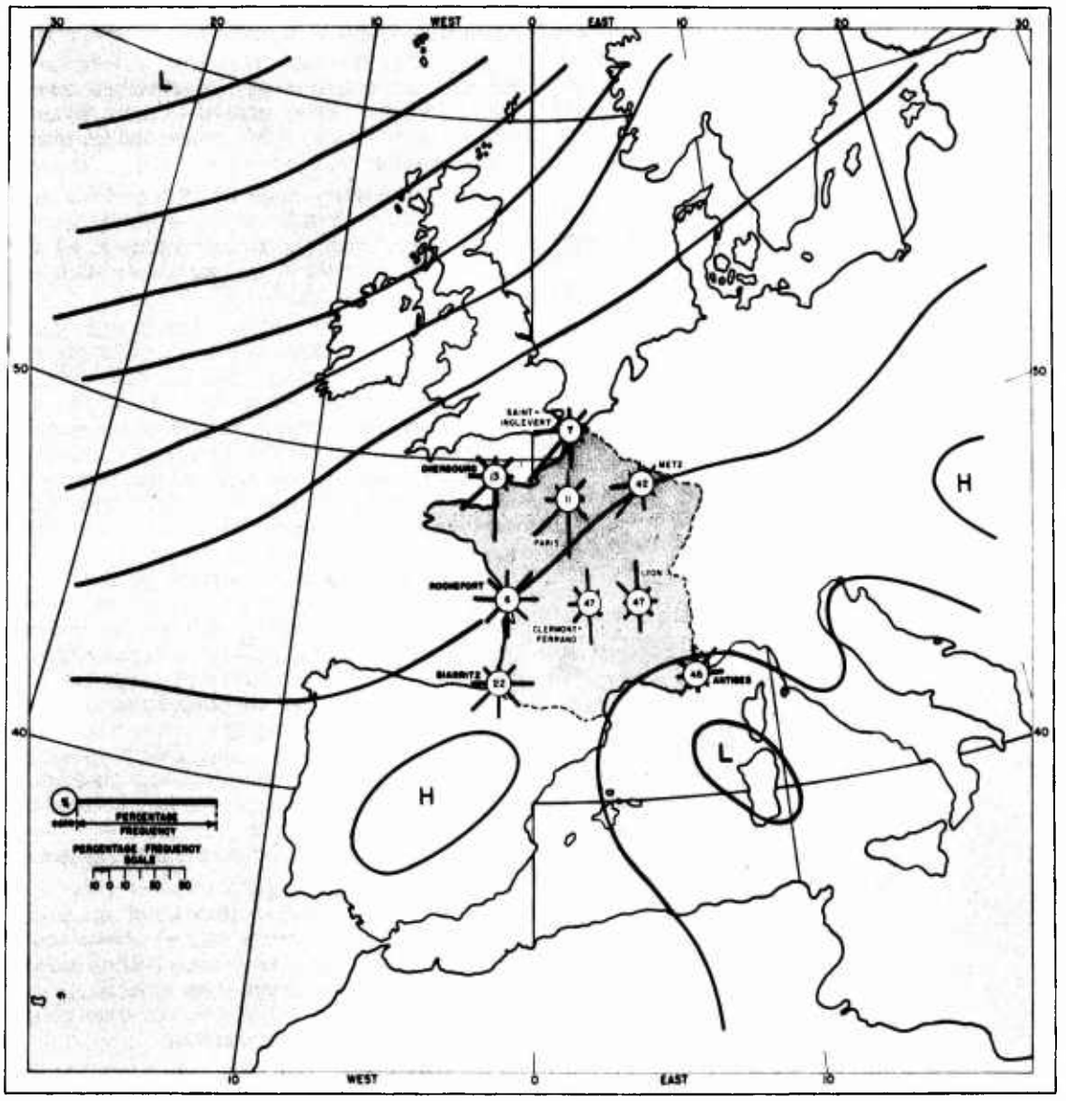


FIGURE 23-3. MEAN SEA-LEVEL PRESSURE PATTERN AND SURFACE WIND ROSES, JANUARY

b. MIGRATORY CYCLONES AND ASSOCIATED FRONTAL SYSTEMS — The weather of France is extremely variable and markedly influenced by nonperiodic pressure changes, particularly the passage of depressions.

Depressions are most numerous over the sea, their frequency diminishing rapidly toward the interior of the continent. FIGURE 23-4 shows the storm tracks and frequencies of low centers for the year. The storms which affect France are, in order of their frequency, those which cross the British Isles, those which move along the English Channel, and those of the Mediterranean, particularly those of the Gulf of Genoa. The Mediterranean storms are also of primary importance to the weather of Corsica.

While there is considerable variation from year to year, some generalizations may be made about relative seasonal frequencies along the various storm tracks. Cyclones which cross the British Isles are at a maximum in October through January and at a minimum in April through June. There is a maximum in September through December and a minimum in February through June

along the English Channel track. Along the tracks over the Bay of Biscay and the Mediterranean Sea the period of maximum frequency is March through May, with minimum frequency in June through September. It should be borne in mind that regardless of the season of maximum frequency, cyclones are best developed during the colder months.

Cyclones whose centers pass to the north of France may directly affect the weather by means of their trailing cold fronts, which may move over France to cause unsettled weather. Those *lows* which move in a generally easterly direction to the north of the British Isles have little effect on the weather of France because their cold fronts have crossed the British Isles and become greatly modified before reaching the French coast. On the other hand, those cyclones moving across the British Isles have an important effect on the weather of France. Their cold fronts arrive in a relatively vigorous state and bring sharp temperature drops, precipitation, and low cloudiness. North Atlantic depressions often occur in families of 4 or 5, the trajectory of each member being farther south than that of the preceding one.

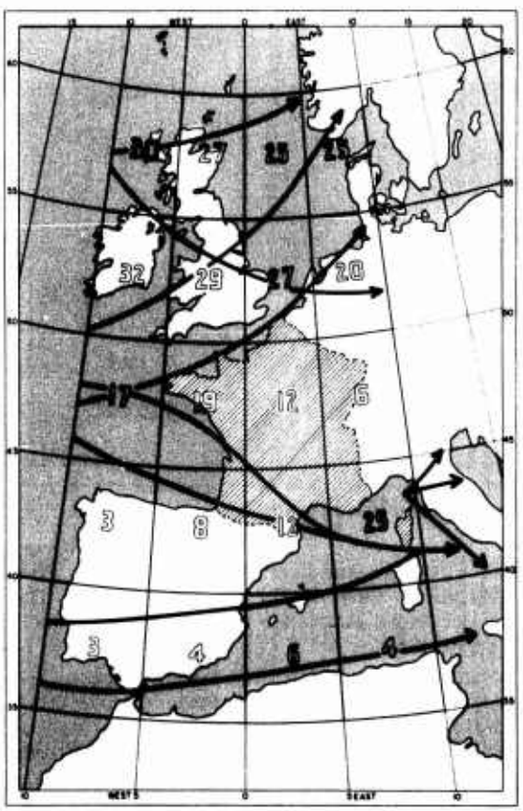


FIGURE 23-4. GENERALIZED STORM TRACKS AND ANNUAL NUMBER OF LOW CENTERS BY 5° SQUARES

In spite of the high frequencies of *lows* there are long spells of good weather which are associated with high-pressure areas, the continental anticyclone centered over Asia in winter and the North Atlantic anticyclone in summer.

c. AIR MASSES — Since this NIS Area is a considerable distance from or separated by sizable water bodies from the source regions of all air masses which affect it, the air masses often arrive in a modified state.

(1) *Western Lowlands and Interior Highlands* — Polar maritime air (*mP*) frequently invades France, primarily from the west through northwest throughout the year. In winter, air that comes from northern regions, in the vicinity of Greenland, reaches France as a cool, unstable air mass because of its initial low temperature as Arctic air and because of its comparatively short trajectory over the ocean. Air from another source which also reaches France as an *mP* air mass is that which leaves North America as polar continental air (*cP*) and moves southeastward over the North Atlantic and then northeastward to western Europe. This air arrives over France transformed into relatively warm and humid *mP* air. All invasions of *mP* air are characterized by relatively high temperatures, high relative humidities, and extensive cloudiness. In crossing the land the *mP* air is modified in winter by cooling from below and by ascent over the higher ground to the east. Widespread low cloudiness and fog result from radiational cooling when the air mass stagnates.

During the summer, *mP* air masses bring mild temperatures to France. Because of the lower wind speeds in this season the air masses move slowly across the land, and strong heating during the daylight hours renders them increasingly unstable. Cumuliform clouds, with occasional showers or thunderstorms, are common.

Tropical maritime air (*mT*), which forms in the tropical section of the Atlantic Ocean in winter, reaches France in a much modified condition because of its long northward trajectory over water. As a result of continued cooling from below in its movement from its place of origin to France, tropical maritime air becomes quite stable in its lower layers. It arrives with considerably lower temperatures than it had in the tropics and with high relative humidities.

Invasions of modified *mT* air are common with the frequent extension of the Atlantic anticyclone across France in summer. As a result of the circulation around this high cell, *mT* air is relatively cool when it reaches France. Because of daytime heating, steep lapse rates are common

over the interior, and higher temperatures are observed inland than on the west coast.

Polar continental (*cP*) air has as its source region the vast snow-covered section of northern Asia. This air mass is characterized by low temperature and humidity. By the time *cP* air reaches France it is considerably warmer and more moist than it was at its source region. However, it is quite cold, and the lowest temperatures in France are experienced in connection with outbreaks of *cP* air from the east. Because of the heating over the land in summer, *cP* air is confined chiefly to high latitudes and is of no importance to the climate of France during this season.

Tropical continental air (*cT*) does not affect these regions in winter. In summer, the southern part of the continent and northern Africa are source regions for *cT* air. All such air masses are warm, but because of the proximity of water bodies, the humidity conditions depend upon the length of the overwater trajectory followed by the air in reaching France.

(2) *Mediterranean Coast and Corsica* — During winter, *mP* air reaches the Mediterranean Coast and sometimes Corsica as a cold and fairly dry air mass. It is transported southward with the passage of cyclones across the Mediterranean. Modified *cP* air may enter the regions in the same way. Modified *cT* air in advance of a migratory cyclone may also affect the regions. The *cT* air originates in northern Africa and is cooled and gains moisture in its lower layers when crossing the Mediterranean Sea. The entire Mediterranean is a transition zone for air masses, and almost all those which reach the Mediterranean Coast and Corsica are modified.

In summer, air-mass modifications are smaller than in winter. In addition, because of the rare occurrence of cyclones, there is no rapid transport of air masses. The transport of air is mainly from north to south, with modified *mT* air from the North Atlantic and *cT* air from interior Europe reaching the Mediterranean Coast. These air masses are still further modified in their overwater trajectory from the mainland to Corsica.

d. SPECIAL PHENOMENA

(1) *Mistral* — The mistral is a cold, northerly or northwesterly wind which may be experienced along the entire Mediterranean coast and may extend inland up the Rhône valley at least as far north as Valence. The mistral is greatly affected by terrain features and, although its general direction is from the north or northwest, it may show considerable local variation from these directions. Its speed is often in excess of the gradient wind speed and its direction is often normal to the isobars. It sometimes reaches Corsica as a northwest wind.

The mistral may blow with great force across the entire Mediterranean Coast, or it may be strong at one sector and light at others. It is usually strongest between Marseille and Perpignan. The duration of the mistral varies from only a few hours to 10 or 12 days. The air of a mistral is usually dry, the sky is usually clear, and rain or snow rarely occurs, except at the cold front preceding the onset of the wind and at secondary cold fronts which may follow. The rain may be very heavy when frontal thunderstorms occur.

There are two types of mistrals, the general and the local. Both occur with high pressure over France. The general mistral is part of an invasion of cold air setting in with usual cold-front weather, the Azores *high* spreading across France behind the cold front. At the same time, a *low* forms in the Gulf of Lion (Golfe du Lion) or the Gulf of Genoa. The local mistral occurs with a weak pressure gradient and affects only the Rhône valley and a few miles on either side of it. FIGURE 23–5 shows the sectors most often affected by the general and local mistrals.

The airflow in a general mistral is about 6,500 to 10,000 feet deep, and the wind speed diminishes with height above the ground. Surface wind speeds as high as 60 m.p.h., with gusts to over 80 m.p.h., have been observed. Aloft speeds are often 60 m.p.h. Surface wind speeds in local mistrals are usually not over 30 m.p.h. The air current is not as deep as the general mistrals, nor are wind speeds aloft as great.

Although mistrals occur throughout the year, they are most frequent and violent in winter and spring and least frequent in autumn. The following tabulation, based on 4 years of record, gives the mean number of days per month with strong mistrals of specified surface wind speeds occurring at one or more of 6 stations in the general southern Rhône valley section.

WIND SPEEDS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
24–37 m.p.h.	4.8	3.8	5.8	5.0	3.5	3.3	3.3	2.5	1.8	1.8	2.5	4.5
≧38 m.p.h.	1.5	1.5	2.3	1.5	1.0	0.8	0.5	0.5	0.5	0.0	0.0	0.5

A mistral occurs at Marseille on an average of 110 days a year.

(2) *Avalanches* — Avalanches occur in the mountains during periods of thaw. Almost every year huge masses of snow slide down ravines which are well known to the local inhabitants. Highways and railroads are at times blocked where they are

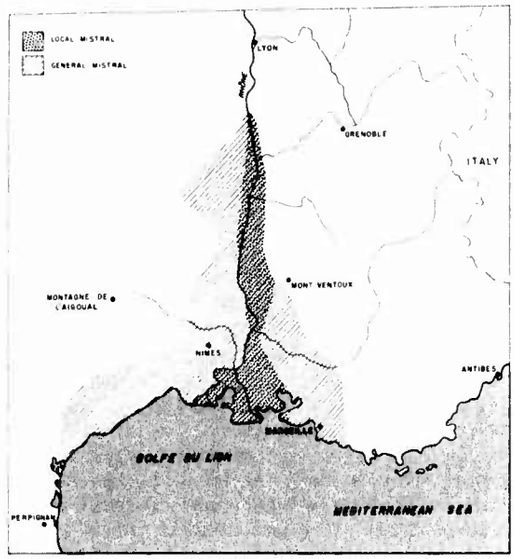


FIGURE 23-5. SECTORS MOST FREQUENTLY AFFECTED BY MISTRALS

not protected against the masses of sliding snow. Avalanches are most numerous in spring, but they may occur in November through May, particularly during periods of southerly winds when above-freezing temperatures occur at higher levels.

3. Seasonal climatic variations

This Subsection gives an overall view of the seasonal trends in the weather of France and Corsica. The major meteorological elements are discussed briefly; more detailed information and analysis of these and other elements is found in Subsections B and D.

a. WINTER

(1) *Western Lowlands* — Winters are, on the whole, quite mild, particularly near the coast, although very low temperatures may occur with a strong flow of air from the east. Temperatures decrease from south to north and from the coast inland. Relative humidities are high near the coast, with a general decrease inland. Precipitation amounts are greatest on the coast and decrease toward the interior of the country. Precipitation falls on more than half of the days, except in the northeastern part, the frequencies generally decreasing from north to south and from the coast inland. Snow falls on relatively few days and a snow cover is infrequent. Cloudiness is extensive throughout the region, with slight diurnal variation. Fog is frequent at many places in the region.

(2) *Interior Highlands* — Temperatures are somewhat lower than in the Western Lowlands, and at the higher elevations they are below freezing almost all of the time. The occasional outbreaks of cold air from the east bring much lower temperatures than are experienced to the west. There is a general temperature increase from north to south at the stations at lower elevations. Relative humidities are high, with a maximum about midday at all stations. Although precipitation frequencies are about the same as those of the Western Lowlands, precipitation amounts, which are greatly dependent upon terrain, generally increase as the higher ground of the Interior Highlands is approached. Sheltered stations, such as Lyon in the Rhône valley and Clermont-Ferrand on the lee side of high ground, have less precipitation than the region in general. Montagne de L'Aigoual, which is well exposed to moist winds from both the Atlantic and the Mediterranean, receives much more precipitation than the other stations in the region. Snowfall, more common than it is farther west, is most frequent at the high-level stations, where a lasting snow cover is established. Cloudiness is extensive, with very slight diurnal variation. Fogs are common, particularly at exposed mountain stations such as Montagne de L'Aigoual where it occurs on well over half of the days. These fogs are actually clouds in contact with the ground, whereas fogs at the lower elevations are of the radiation type.

(3) *Mediterranean Coast* — Temperatures are highest and relative humidities lowest in this region. Normally temperatures rise to above 50° F. during the day and usually remain above freezing at night. However, cold, northerly winds blowing down the Rhône valley occur frequently and cause relatively low temperatures on the coast from the Iles d'Hyères to the Spanish border. There is a general decrease in precipitation amounts and especially in frequencies from the Interior Highlands to the Mediterranean Coast. Snow falls on a few days only. This is the least cloudy region of France, and diurnal variation of cloudiness is slight. Fog occurs on 1 or 2 days a month in winter. Strong winds are quite frequent along the coast between the Iles d'Hyères and the Spanish border.

(4) *Corsica* — Afternoon temperatures on the coasts of Corsica are about the same as in the Mediterranean Coast region, but nighttime temperatures are normally 5° to 10° F. higher. Although below-normal temperatures may occur with a strong mistral from the mainland, which reaches Corsica as a westerly or northwesterly airflow, freezing temperatures do not occur often on the coast. Temperatures are much lower in the in-

terior mountains. Relative humidities are fairly high. Precipitation amounts are quite high, somewhat higher on the east than on the west coast and in the north than in the south. Amounts are greatest in the mountains, where the large place-to-place variations depend upon elevation and exposure. Precipitation falls on about one-fourth to one-third of the days along the coasts. Snow, infrequent at the lower levels, increases with increasing elevation and is plentiful in the mountains, where persistent snow cover exists. Cloudiness is at a maximum in winter. Amounts at coastal stations average slightly more than over the Mediterranean Coast, and amounts inland are greater, especially over the mountains. Although fog is rare on the coast, some fog develops in valleys during clear nights, and clouds envelop the windward side of high ground, producing fog.

b. SPRING

(1) *Western Lowlands* — Temperatures increase gradually, and by May freezing temperatures are rare. Temperatures decrease from south to north but average about the same at coastal stations as at inland stations of the same latitude; however, afternoon temperatures are slightly higher and nighttime temperatures somewhat lower at inland stations. Relative humidities, which decrease somewhat from the high winter values, are highest in the early morning and lowest in the early afternoon. At places on or near the coast precipitation decreases in both amount and frequency from that of winter, and at places farther inland amounts increase because of thunderstorm activity in spite of decreased frequencies. Snowfall is infrequent and a snow cover rare. Cloudiness, generally less than that of winter, is at a maximum in the early morning at coastal stations and in the afternoon at inland stations. Fog decreases generally.

(2) *Interior Highlands* — Temperatures increase fairly rapidly through the season, except at the high-level stations. Relative humidities are considerably lower than in winter. Precipitation amounts are greater than those of winter almost everywhere; frequencies are about the same as in winter in the northern part of the region but are generally greater in the southern part. Although snowfall is frequent at the higher elevations, it decreases rapidly through the season at the lower elevations, and a snow cover is rare, except at the high-level stations. Thunderstorms increase in frequency as the season progresses. Cloud amounts decrease from winter to spring at all except the stations at high elevation, where cloudiness increases. The diurnal variation of cloudiness is slight.

(3) *Mediterranean Coast* — There is a general temperature increase from winter to spring, when freezing temperatures are much less frequent. Relative humidities, about the same or slightly lower than in winter, are at a maximum in the morning and at a minimum in the afternoon. Both precipitation amounts and frequencies are greater than in winter. Snowfall is infrequent and a snow cover is rare. Thunderstorm activity increases through the season. Cloudiness is slightly more extensive than in winter, and its diurnal variation is slight. Fogs are infrequent.

(4) *Corsica* — Temperatures increase as the season progresses, and freezing temperatures are rare at the low-level stations. Frosts occur occasionally on the interior mountains. Although relative humidities decrease slightly from winter values, the southern part of the island sometimes experiences oppressively warm and humid conditions during periods of southeasterly flow. Throughout the region, precipitation amounts and frequencies are lower than in winter, and precipitation is much greater in the interior than on the coasts. Snow falls occasionally in the mountains, and at the higher elevations a snow cover probably persists until late spring. Thunderstorms increase in frequency in the mountains. Cloudiness decreases gradually from winter through spring. The number of days with fog increases at coastal stations and decreases in the mountains.

c. SUMMER

(1) *Western Lowlands* — Temperatures increase from north to south and from the coast inland, and the diurnal variation is least near the coast. Relative humidities, which are generally lowest during this season, show a pronounced diurnal variation, with a maximum in the early morning and a minimum in the afternoon. Precipitation amounts, relatively large throughout the region, are at a maximum in summer at the most inland stations, where a large portion falls in convective showers or thunderstorms. Cloudiness is at a minimum during this season. Those stations near the coast experience a maximum of cloudiness in the morning and a minimum in the afternoon, while stations in the interior have a maximum of cloudiness in the afternoon and a minimum at night. Fogs are frequent only at stations exposed to the sea; they are at a minimum at the interior stations.

(2) *Interior Highlands* — Temperatures are, on the whole, highest in this region and diurnal variations are greatest. Stations at the higher elevations experience quite cool conditions, and freezing temperatures may be expected at such locations on a few occasions during summer. Relative humidities, which are at a minimum, are

highest in the morning and lowest in the afternoon. Precipitation amounts are relatively great at all but the high-level stations. At stations situated at the general level of the terrain, precipitation generally reaches a maximum during summer. At high-level stations, although amounts are greater than at the lower elevations, they are not at a maximum during this season. Occasionally snow falls in the mountains in June. Thunderstorms are most frequent and cloudiness is least extensive during summer. Maximum cloud cover is recorded in the afternoon at all medium-level stations, but the diurnal variation of cloudiness is not great over the mountains. Fogs are not frequent, except on the windward slopes and peaks of some of the mountains where clouds contact the ground.

(3) *Mediterranean Coast* — Afternoon temperatures are high during summer, but nighttime temperatures are cool. The diurnal variation of relative humidities, which are generally lowest at this time of the year, is slight at the coasts and increases inland. Precipitation amounts and frequencies are low. Thunderstorms are most frequent during this season. Cloudiness is light, particularly in July and August, and the diurnal variation is slight. Although rare on the coast fog is reported on about 1 or 2 days a month inland.

(4) *Corsica* — Summer days are hot, with afternoon temperatures near the coast generally exceeding 80° F., and occasionally 100° F., in July and August. Temperatures are higher in some of the inland valleys. However, nights are usually cool. Humidity is moderate. Precipitation, at a minimum everywhere, falls on a few days a month, primarily in convective showers or thunderstorms. Cloudiness is at a minimum in summer, averaging between 20% and 30% in July and August at coastal stations; amounts are probably greater inland. Skies are cloudiest in the afternoon and almost always clear at night. Although rare at the coasts, fogs may occur from time to time in the interior valleys on clear nights; however, they dissipate soon after sunrise.

d. AUTUMN

(1) *Western Lowlands* — Freezing temperatures occur first in September in the interior and in October at the coast. Daytime temperatures are moderate, but nights are quite cool. Relative humidities increase from the summer minimum toward the winter maximum values and are at a maximum in the morning and at a minimum in the afternoon throughout the region. Precipitation is at a maximum at most coastal locations, but snowfall is infrequent and a snow cover is rare. Thunderstorm activity declines as the season advances. Cloudiness increases through the season, convective types becoming less frequent and those associated with frontal activity becoming more frequent. The diurnal variation is rather slight. Fogs generally increase in frequency, particularly inland.

(2) *Interior Highlands* — Temperatures are somewhat lower than those of the Western Lowlands. The weather is quite cold at the stations at higher elevation, and toward the end of the season freezing temperatures are frequent at night throughout the region. Relative humidity is high. Precipitation varies from place to place because of the effects of terrain. This is the rainiest season at some places, particularly in the southeastern portion of the region. Snow falls on a few days a month in November at the lower elevations in the region and is quite frequent at the high elevations. A snow cover occurs often on the mountains late in the season. Thunderstorms are very rare after October. Cloudiness is almost as extensive as in winter, but the diurnal variation is not large. Fogs, which become increasingly frequent through the season, are of the radiation type on the lower ground and are caused by clouds coming in contact with the ground on the higher slopes and peaks.

(3) *Mediterranean Coast* — Temperatures are mild. Freezing temperatures are rare in September and October and occur on a few days in November. Relative humidities, somewhat higher than the minimum summer values, are highest in the morning and lowest in the afternoon. Precipitation amounts are highest in autumn; snow is rare and a snow cover is not to be expected. Thunderstorms decrease in frequency as the season advances. Cloudiness increases from the low summer values, and the diurnal variation of cloud cover is slight. Fogs occur occasionally.

(4) *Corsica* — Temperatures are moderate near the coasts and fairly low in the interior mountains. Freezing temperatures are rare near the coast. Relative humidities are high at night and moderate during the day at the coasts; however, a strong southeasterly airflow occasionally reaches the southern part of the island, bringing very humid and oppressive weather. Precipitation, which falls mostly in heavy showers, is generally at a maximum in this season. Snow is not to be expected near the coasts. Thunderstorms occur on 2 or 3 days a month in the coastal sector. Cloudiness increases sharply during the early part of autumn and increases steadily as the season progresses. Fogs are rare at the coasts but become more frequent inland, particularly on the high ground where clouds contact the surface and in mountain valleys where they are caused by radiation.

B. Weather and military operations

This Subsection is concerned with the effects of various meteorological elements and their variations upon military operations, which are subdivided into four groups: air, air-ground, ground surface, and amphibious. Included in each of these groups is a wide variety of specific operations. The discussion which follows is not, for the most part, broken down by specific operations, but by the meteorological elements as they affect each group as a whole. Exceptions are made when a combination of particular meteorological elements affects a given operation or requirement. In such cases, the operation or requirement is discussed.

1. Air operations*

Since the larger terrain features have an important effect on the type and severity of the weather, air operations are, to a large extent, dependent on the surface configuration. The terrain not only determines the minimum altitude at which aircraft should operate but also causes large variations in local weather. Icing is a much more serious concern over mountains than over level ground, especially when associated with frontal activity. The frequency of low ceilings increases on windward slopes, high wind speeds are often encountered across mountain tops, and turbulence extends to high levels above mountainous terrain. For example, cloudy weather and precipitation may occur on the west coast of Corsica while clear weather prevails on the east coast.

a. CLOUDINESS — The Western Lowlands is the cloudiest region and the Mediterranean Coast and Corsica are least cloudy (FIGURE 23–9).

Cloudiness throughout the Area is generally most extensive in late autumn and winter. It increases from the coast inland and, over France, from south to north. In November through January, cloudiness averages about 70% to 80% at all stations in the Western Lowlands, except in the south where it is less. Amounts are about the same over the Interior Highlands, except at the high elevations in the south where cloudiness is less extensive. Cloudiness over the Mediterranean Coast averages about 50% to 60% during the same period, and about 60% over the coasts of Corsica.

Summer and early autumn is the least cloudy period. In June through September, cloudiness averages between 60% and 70% over most of the northern coast, decreasing to 50% to 60% inland and to the south over the Western Lowlands. It increases over the southern part of the west coast. Conditions over the Interior Highlands are quite variable because of terrain effects. Average amounts are generally between 55% and 65% in the north and 40% to 55% in the south. Amounts over the Mediterranean Coast and the coasts of Corsica are between 20% and 50%.

There is a gradual decrease in cloudiness in February and March and a slight increase in late March and April. This increase reflects the cumulus development during the afternoons. June and July are the clearest months at the northern coastal stations. Over the interior Western Lowlands, the Interior Highlands, and the Mediterranean Coast, the clearest months are July and August or August and September. July and August are the clearest months over the Corsican coasts.

Winter cloudiness tends to persist throughout the day. Tabular data on mean cloudiness at three hours of the day (FIGURE 23–10) indicate that the diurnal variation of winter cloudiness is slight, seldom over 10%, on the average. In summer the diurnal variation of cloudiness is somewhat greater; stations near the coast experience a maximum of cloudiness in the morning and those in the interior have a maximum in the afternoon.

b. THUNDERSTORMS AND TURBULENCE — Thunderstorms are most frequent over the interior of France and the Mediterranean Coast. They generally occur most often in summer throughout France and in autumn in Corsica. The thunderstorms which occur during the colder months are associated primarily with cold frontal activity, while those which occur in summer are mainly of a convective nature. Orographic lifting in the mountains of eastern France and in the Corsican mountains aids in the development of cumulus or cumulonimbus clouds. The data on the frequency of thunderstorms (FIGURE 23–11) are for the same 10-year period for all stations except Brest and those in Corsica. Since the frequency of occurrence of this phenomenon is quite variable from year to year, it was deemed useful to have the same period of record wherever possible.

In winter, air masses in *lows* affecting France and Corsica are sometimes unstable. Well-developed cumulonimbus clouds are then likely to form in the frontal zones. Since such clouds may

* Air operations are defined as those operations taking place above the frictional influence of the terrain on atmospheric circulation. Some of the operations which can be included in this category are: high-level visual bombing, radar bombing, aerial reconnaissance, and fighter support and interception. In most cases these operations are concerned primarily with upper-air meteorological phenomena, such as cloudiness and icing; but in some instances surface meteorological conditions are very important to the success of an operation. Detailed discussions of surface conditions are found in Subsections on Air-ground and Ground Surface Operations.

form in an almost solid line, it might be necessary to fly through them in order to cross the front.

Summer thunderstorms are mainly convective and/or orographic and are normally localized. By circumnavigating them, flight can usually be maintained in the relatively clear air between cumulonimbus clouds.

No data on turbulence are available. However, most of the turbulence at high levels is associated with thunderstorms with frontal surfaces reaching to those levels, and with jet streams, high-speed air currents, the frequencies and seasonal variations of which are not known definitely at this time.

c. ICING — In order for dangerous aircraft icing to occur, two conditions must exist simultaneously; the temperature must be at or below freezing, and there must be sufficient moisture present, usually in the form of clouds. The most dangerous icing usually occurs at temperatures between 14° and 32° F. Icing can occur at temperatures below 14° F., but at such low temperatures the air cannot hold enough moisture for the icing to be heavy. At temperatures below 0° F., the air can hold so little moisture that there is little danger of accumulating ice.

The average height of the freezing level in winter is about 1,000 feet over the north coast of France and rises to 3,000 to 4,000 feet over the Mediterranean Coast. It is at about 5,000 feet over Corsica. There are wide day-to-day variations in the height of the freezing level at any location, depending on the nature of the air mass overlying that location. The freezing level may be down to the ground surface in winter and early spring even at low elevations. Most occasions of severe icing occur in towering cumulus or cumulonimbus clouds between about 1,000 and 8,000 feet in the north and from about 2,000 feet to very great heights over the south of France and Corsica. The worst icing conditions are associated with cold fronts, in which clouds often build up to vary great heights, often extend in an almost unbroken line, and sometimes are difficult to circumnavigate. Clouds extending to great heights are most common over the western and northwestern Massif Central, over the Rhône valley, and over the western and northwestern mountains of Corsica.

In summer the mean height of the freezing level varies from about 8,000 feet over northern France to about 12,000 feet over the Mediterranean Coast and Corsica. Icing is probably most serious in summer over the high mountains in eastern France because cloud build-ups are greatest during that period. Even in midsummer, severe icing may be encountered in clouds at great heights. The convective clouds of summer are usually found in isolated patches, however, and can, in general, be circumnavigated.

d. WINDS ALOFT — Since there are no summarized upper-wind observations above 10,000 feet for France, the following discussion is based on vector mean wind directions and speeds derived from observational data and theoretical concepts.

(1) *Winter* — Throughout the Area, winds are from a northwesterly direction at 10,000 feet. Mean vector wind speeds are about 10 knots. The flow continues from a northwesterly direction at higher levels, and speeds increase with height. At 20,000 feet the mean vector wind speed is about 15 knots; at 30,000 feet, about 20 knots; and at 40,000 feet, about 30 knots.

(2) *Spring* — At 10,000 feet the flow is west-northwesterly, backing gradually with height and becoming westerly at 20,000 and 30,000 feet. The wind veers to west-northwesterly at 40,000 feet. Wind speeds at the higher levels are slightly greater than in winter. Speeds at 10,000 feet are about 10 knots; at 20,000 feet, 15 knots; at 30,000 feet, 25 knots; and at 40,000 feet, about 40 knots.

(3) *Summer* — The winds at 10,000 feet through 20,000 feet are mainly westerly, veering slightly to west-northwesterly at 30,000 and 40,000 feet. At 10,000 feet, vector wind speeds average about 10 or 12 knots; at 20,000 feet, about 15 knots; at 30,000 feet, about 30 knots; and they decrease to about 15 knots at 40,000 feet.

(4) *Autumn* — Winds at 10,000 feet are westerly over the north and west-southwesterly over the south. They are between west and west-northwest at all levels above 10,000 feet and up to 40,000 feet. Mean vector wind speeds are about 10 knots at 10,000 feet; 15 knots at 20,000 feet; 20 knots at 30,000 feet; and 30 knots at 40,000 feet.

2. Air-ground operations*

a. VISIBILITY — Visibility at the surface is important in many types of operations since, at low levels, restricted surface visibility will, in most cases, prevent or impair visual reference to the ground.

Most of the poor visibility throughout the Area is caused by fog. Fog, particularly of the radiation

* Air-ground operations are defined as those operations taking place in, or primarily affected by, the meteorological conditions of the frictional layer above the earth's surface. Thus, operations such as parachute drops, chemical and biological warfare, incendiary bombing, and low-level reconnaissance are included in this definition. Although these operations may originate above the frictional layer, the success or failure of the operations would, to a large degree, depend upon the conditions near the surface. For example, an airplane carrying chemical agents might fly at a high altitude, but such factors as surface wind, stability of the lower atmospheric layers, and surface temperature would determine the degree to which the contaminant would be dispersed.

type, varies considerably from place to place and is most frequent during the colder months. Low-lying districts, particularly in the neighborhood of marshes, are more prone to fog than those at a moderate height. Sea fog is caused by the drift of warm, moist air over a cool sea surface and is therefore most frequent in summer, when sea-surface temperatures lag behind those of the land. Places at high elevation may be affected by hill fog, which is low cloud resting on the ground surface. Such fogs occur most often in winter on the lower hills and in summer on the high mountains. Fog is generally most frequent and dense in industrial sectors, where smoke pollution aids in its formation and intensification. Fogs on low ground and in valleys, most frequent during the night and early morning, are more likely to persist during the daylight hours in industrial sectors. The tendency for radiation fogs to clear after sunrise is least marked in winter. Hill fogs occur most often during the daylight hours on the mountains. The visibility decreases in the Rhône delta during a strong mistral. The reduced visibility is probably caused by smoke carried from industrial centers in the Rhône valley by the strong winds.

Since fog is so variable locally, few generalizations are possible. Fog is generally more common inland than on the coast, and the foggiest coast is the English Channel coast (FIGURE 23–12). There are few fogs on the Mediterranean and Corsican coasts. The winter maximum of fog at Saint-Inglevert and Le Havre is probably caused by fogs drifting out to sea. Brest, with a summer maximum, is an example of a place affected by sea fog drifting over the land.

Visibilities less than 1¼ miles are most frequent during the colder months at all stations, except a few, such as Brest, on the northwest coast which are prone to sea fog (FIGURE 23–13). Poor visibilities are most frequent in the interior, particularly in the neighborhood of industrial sectors, and least frequent on the Mediterranean Coast and the coast of Corsica, where they rarely occur. Throughout the Area in all seasons, poor visibilities occur most often at night and in the early morning and least often in the afternoon.

Visibilities less than 2½ miles are reported on about one-half, or more, of the mornings during January at the northern interior stations and about 10% or less, of the mornings in the Mediterranean Coast region and at Ajaccio (FIGURE 23–13). They are much less frequent in summer than in winter, except at the north and west coast stations which are subject to sea fog. Such visibilities are most frequent at night and during the early morning hours and least frequent during the afternoon.

b. CEILINGS — A prime consideration in all low-level operations is the need to fly under the bases of low clouds and still maintain sufficient clearance above terrain obstacles. Flying over mountains would be difficult during the passage of a depression, because many of the mountains would be obscured by clouds.

The frequency of very low clouds varies directly with the height of the terrain during periods when the cloudiness is caused mainly by cyclonic activity, as during the colder months. For example, a cross section through Rochefort, Angoulême, La Courtine, Clermont-Ferrand, and Lyon, with elevations increasing from the coast to east of La Courtine and then decreasing to Lyon, would have frequencies of very low cloud heights varying qualitatively with elevation. In January, cloud heights below 1,000 feet increase in frequency from Rochefort to La Courtine and then decrease to Lyon. FIGURE 23–14 gives tabular data on the frequencies of various heights of low cloud bases at 3 hours of the day.

The following discussion is concerned with the heights of low clouds (clouds below 8,200 feet), with no allowance being made for the amount of sky covered by the low clouds. Particularly during the colder months, however, the sky will be overcast or almost overcast in a large percentage of the cases when low clouds are present.

Cloud bases are generally lowest in winter and highest in summer throughout the Area. Cloud bases below 1,000 feet occur most often over the Western Lowlands and least often over the Mediterranean Coast and the coasts of Corsica. Over the Western Lowlands, there is slight variation throughout the year in the frequency of occurrence of such low cloud bases in the morning at coastal stations; the variation is much greater inland, where they are at a maximum in winter and at a minimum in summer. Cloud bases below 1,000 feet are considerably more frequent in the afternoon during winter than during summer throughout the region, particularly inland.

Over the Interior Highlands, cloud bases below 1,000 feet are considerably more frequent in winter than in summer at all hours. In winter they tend to persist throughout the day, while in summer they are most frequent in the morning. Nearby places may have considerably different conditions, depending upon elevation, relief, and exposure to the prevailing winds. For example, cloud bases below 1,000 feet are about three times as frequent at La Courtine, to the west of high ground, as at Clermont-Ferrand, to the east of the high ground, at all hours in winter. In summer the frequency is also much greater at La Courtine.

Over the Mediterranean Coast, low clouds are generally most frequent in the morning in summer,

and about noon and in the afternoon in the colder months.

Low clouds are less frequent over Ajaccio, the only Corsican station for which such data are available, than over any part of France. Although the west coast of Corsica is affected by dense, low clouds associated with disturbances which form in the Gulf of Genoa, Ajaccio is sometimes sheltered from such effects. This station is free from low clouds a large percentage of the time, particularly in summer. Such occurrences are least frequent in the afternoon throughout the year. The east coast of Corsica receives widespread low cloudiness with a southeasterly sirocco, cloud bases lowering to less than 1,000 feet for many hours, and even days, at a time. Particularly in winter, clouds may envelop mountain tops and be especially dense on the windward side. Cumulonimbus clouds probably extend to great heights over the mountains during the passage of cold fronts.

c. LOW-LEVEL TURBULENCE — Turbulence at the lower levels is common in the hilly and mountainous sectors of the Area throughout the year; it occurs when fairly strong winds, about 20 m.p.h. or higher, are diverted by the terrain. Strong winds associated with cyclones frequently give rise to such conditions.

Most of the low-level turbulence over the Western Lowlands is associated with cold frontal activity. Moderate-to-heavy turbulence occurs in rapid-moving cold fronts most common during the colder months. In summer, light-to-moderate turbulence is experienced in convective currents set up by strong insolation.

The most severe turbulence experienced at low levels over the Interior Highlands occurs once or twice a year in association with the passage of a cyclone northeastward across the region. Heavy turbulence is encountered in the convectively unstable tropical maritime air along the northward-moving warm front and in the warm sector behind the front. In summer the mountain slopes facing the sun are heated and the resulting convection causes moderate turbulence; descending currents may be felt over the shady slopes.

Severe turbulence over the Mediterranean Coast and Corsica is associated with cyclonic activity during the colder months. It is particularly severe over the Corsican mountains and with the strong winds accompanying mistrals in southern France and occasionally in Corsica. In summer, moderate turbulence is often encountered in convective cells set up by insolation.

d. SURFACE WINDS — Surface winds at many places in the Area are considerably different from the general airflow. These differences are caused by terrain features which divert the airflow. For example, surface winds follow the trend of the Rhône valley a large percentage of the time (FIGURES 23–2 and 23–3). Coastal stations, affected by land and sea breezes, may have a diurnal variation in both wind speed and direction.

An irregular pattern of surface winds exists in the Western Lowlands. In general, southwest is the most common wind direction on the north coast during all seasons. The prevailing wind directions are westerly during summer and between south and southwest during late autumn and winter at the southern part of the west coast. Strong winds are most frequent along the coast, the frequency decreasing inland. FIGURE 23–15 gives tabular data on the frequency of gales. Surface wind speeds are highest in winter and lowest in summer throughout the region. Calms are generally relatively infrequent at the coast and quite frequent inland throughout the year, the frequencies increasing from north to south. Inland, up to about 25% of the observations are calm in January, with 10% to 20% at most stations. The frequencies of calms are about the same in July.

In the Interior Highlands, southwesterly winds prevail in the northern part and northerly or northwesterly winds in the southern part. Wind speeds in the valleys are normally lower than in the Western Lowlands. Surface wind speeds are high throughout the year at the higher elevations. There are 56 days a year with gales at Montagne de L'Aigoual. Strong surface winds are most frequent in winter and least frequent in summer. Calms are considerably more frequent than in the Western Lowlands, being reported in 35% to 45% of the observations throughout the year at most of the valley stations. Calms are infrequent at the high elevations.

Surface winds with a northerly component are most frequent in the Mediterranean Coast. Strong winds occur most often during the colder months and least often during summer. Most strong winds are associated with the mistral. Calms are more frequent than in the Western Lowlands and less frequent than in the Interior Highlands. Calms are common in the east and they decrease in frequency in the central and western parts of the region.

Winds at the coasts of Corsica are very variable in winter. There is a slight tendency to northerlies on the west coast, but on the east coast they are almost equally frequent from all points of the compass. In summer, prevailing surface winds are northwesterly or westerly on the west coast and northwesterly on the east coast. Winds on the coasts are locally greatly affected by topography. Winds are mostly light throughout the year, particularly during summer. During winter,

violent winds may occur in connection with a passing depression.

Land and sea breezes are most likely to be experienced when existing pressure gradients are weak. If the pressure gradients are steep, this diurnal variation of surface winds appears as a slight change in wind direction and speed.

Land and sea breezes are common on the coast of the Western Lowlands, particularly in summer. They are best developed in warm, sunny weather, but neither extends very far from the coast. The sea breeze, normally stronger than the land breeze, often reaches speeds of 12 to 15 m.p.h., and the land breeze is usually very light. Under favorable conditions, the sea breeze may set in as early as 0900 LST; under adverse conditions, such as a wind directed from land to sea as a result of pressure distribution, the beginning of the sea breeze may be delayed until 1500 LST. However, the sea breeze usually begins about 1200 or 1300 and lasts until 1900 LST. The land breeze usually blows from about 0100 until 0800 LST.

Land and sea breezes on the Mediterranean Coast and the coasts of Corsica are experienced in clear weather during March through September. The sea breeze is better developed than the land breeze. The land breeze normally sets in about 2 or 3 hours after sunset and reaches a maximum about daybreak. It is usually fitful and may become gusty on mountainous coasts, particularly at the mouths of mountain streams. The sea breeze develops during the forenoon, reaches a maximum about 1300 LST, and dies away at sunset. The extreme limit of the land breeze is about 10 miles and that of the sea breeze, about 20 miles from the coast of southern France, although they seldom extend that distance. When well developed, the sea breeze may reach speeds of 20 to 25 m.p.h. and extend to a height of about 3,000 feet. The land breeze probably does not extend above 1,000 feet. On the west coast of Corsica the sea breeze reinforces the prevailing wind, giving a stiff, onshore breeze at exposed places and a calm at night. On the east coast of Corsica, sea breezes oppose the prevailing wind and as a result, cause a smaller diurnal variation of winds than on the west coast.

e. TEMPERATURE AND PRECIPITATION — Of all the air-ground operations, chemical and biological warfare are those most affected by temperature and precipitation.

Winter temperatures would often be sufficiently low in the Interior Highlands and the mountains of Corsica so that there would be a likelihood of freezing the contaminants; however, above-freezing temperatures during daylight hours are common at low and moderate elevations.

Strong surface heating throughout the Area in summer would frequently cause the vertical diffusion of gaseous contaminants, thus minimizing the surface concentrations. However, gases and smokes could often be effective at night. High temperatures on the Mediterranean Coast and in Corsica might cause too rapid vaporization of chemical agents.

The greatest possibility that contaminants would be washed out of the air occurs in the cooler months throughout the Area. Precipitation is frequent throughout the year in the Western Lowlands and Interior Highlands. It is much less frequent on the Mediterranean Coast and in Corsica. However, summer is the season with the least likelihood of the occurrence of precipitation throughout the Area. Precipitation occurs on more than 10 days a month in the Western Lowlands and Interior Highlands, even in summer; it occurs on 1 to 3 days a month in summer on the coasts of Corsica and up to about 5 days a month in the Mediterranean Coast region.

3. Ground surface operations*

a. TEMPERATURE — Winter temperatures are moderate throughout the Area, except at the high elevations. There is a gradual decrease in temperature from the coasts inland and from south to north. Temperatures are highest on the southern coast of France and the coasts of Corsica, where they normally rise to about 50° to 60° F. in the afternoons and drop to about 35° to 40° F. on the French Mediterranean coast and 40° to 45° F. on the Corsican coasts at night. Afternoon temperatures are in the low 40's along the northern part of the western French coast and increase to the low 50's along the southern part of the west coast; nighttime temperatures are normally slightly above freezing in the north and increase to about 40° F. in the south. Inland temperatures decrease toward the east in France. Afternoon temperatures are about 40° F. at Metz and Strasbourg in the northern part of the Interior Highlands, with nighttime temperatures falling to slightly below freezing. Toward the south at Toulouse, temperatures increase to about 50° F. during the afternoons and about 35° F. at night. Temperatures are almost constantly below freezing at the high-level stations of Montagne de L'Aigoual and Mont Ventoux during winter. FIGURES 23–16 and 23–17 present tabular data showing mean daily maximum and minimum temperatures.

* Although many meteorological elements affect ground operations either directly or indirectly, temperature, relative humidity, and precipitation are the most important factors for operations of this type. Reference can be made to Subsections on Air and Air-ground Operations for discussions of other meteorological elements.

Throughout the entire Area, the mean daily temperature range is about 10° to 15° F. during January. Freezing temperatures increase in frequency from the coast inland and from south to north. Although frequencies are variable on the north and west coasts, freezing temperatures occur generally on less than 10 days a month in winter. Inland, they occur on 15 to 17 days a month at Metz and Strasbourg and 18 to 24 days a month at Grenoble, in the foothills of the Alps (FIGURE 23-18). Freezing temperatures in the Mediterranean Coast region are most frequent at Marseille and Nîmes, where low temperatures often occur with a mistral. They are infrequent on the coasts of Corsica and increase in frequency in the interior. Temperatures of 10° to 15° F. have occurred on the north and west coasts of France; 4° F. has been recorded at Saint-Inglevert. Temperatures of −10° to −20° F. have occurred in the eastern Interior Highlands (FIGURE 23-19).

Summer temperatures are mild on the western coast of France and hot on the Mediterranean Coast and in Corsica. Afternoon temperatures, generally between 60° and 70° F. on the north coast and 70° and 80° F. on the west coast, increase from north to south; at night they drop to between 50° and 60° F. and are somewhat higher in the south than in the north. Temperatures generally increase inland, where afternoon temperatures are normally about 75° F. in the north, increasing to over 80° F. in the south; nighttime temperatures are about 55° F. in the north and about 60° F. in the south. Afternoon temperatures are about 75° to 85° F. on the Mediterranean Coast and on the coasts of Corsica, increasing inland; at night temperatures in summer normally drop to about 55° to 65° F. on the Mediterranean Coast and 60° to 65° F. on the coasts of Corsica.

Daily temperature ranges are greatest in winter. They are normally about 10° to 15° F. on the north coast, increasing to about 20° F. in the eastern Interior Highlands. The daily range is about 15° to 25° F. in the Mediterranean Coast and 15° to 20° F. on the coast of Corsica. High temperatures, uncommon on the north coast of France, increase in frequency southward along the west coast. They occur more often toward the interior and toward the south at low and moderate elevations. Temperatures above 86° F. are most common in the interior portions of the Mediterranean Coast region and Corsica (FIGURE 23-20). They occur on an average of one-half of the days in July and August at Nîmes and probably about the same number of days in the low-lying valleys of Corsica. Temperatures of about 100° F. have occurred at most of the coastal stations and somewhat over 100° F. at most of the low- and moderate-level inland stations (FIGURE 23-21).

b. RELATIVE HUMIDITY — Relative humidities are generally highest over the Western Lowlands and lowest over the Mediterranean Coast and Corsica (FIGURES 23-22 and 23-23). The highest values occur on the Western Lowlands coast and there is a decrease inland. There is little seasonal variation; however, relative humidities tend to be highest during winter and lowest during spring and summer. Diurnal variations are slight throughout the year, although relative humidities are at a maximum in the morning and at a minimum in the afternoon. Lowest humidities occur with a northerly or northeasterly airflow from the continent.

Relative humidities average somewhat lower over the Interior Highlands than over the Western Lowlands, with very little variation throughout the region. They are highest in winter and lowest during late spring and summer and are at a maximum in the morning and at a minimum in the afternoon. Very low humidities occur at times during winter with an outbreak of polar continental air from central and northern Europe.

Relative humidities are lowest and more frequent over the Mediterranean Coast than in any other region in the Area. Relative humidities are highest in winter and lowest in summer. The lowest humidities occur with mistrals in the Mediterranean Coast region.

c. PRECIPITATION — Throughout the year, precipitation is well distributed for all the Area except the Mediterranean Coast and Corsica. There is a general increase through the Western Lowlands and Interior Highlands from northwest to southeast, with many variations caused by terrain effects.

Continuous rain associated with frontal activity is likely in the colder months, October through March. Fronts are often stalled by the mountains, and since most of them move in an easterly or southeasterly direction, precipitation is usually heaviest and most prolonged on the western sides of the mountains and much lighter to the east. Clermont-Ferrand is an example of the rain shadow caused by high ground to the west; during the winter it has much less than half of the precipitation received by La Courtine. FIGURE 23-6 is a northwest - southeast cross section through the Western Lowlands and Interior Highlands showing precipitation in October through March. Precipitation decreases from the high elevations of the Brittany peninsula southeastward, increases on the western slopes of the Massif Central, decreases sharply on the eastern slopes of the Massif Central, and then increases again southeastward with increasing elevation. In summer much of the rain falls in convective showers or thunderstorms. These showers are especially heavy in the moun-

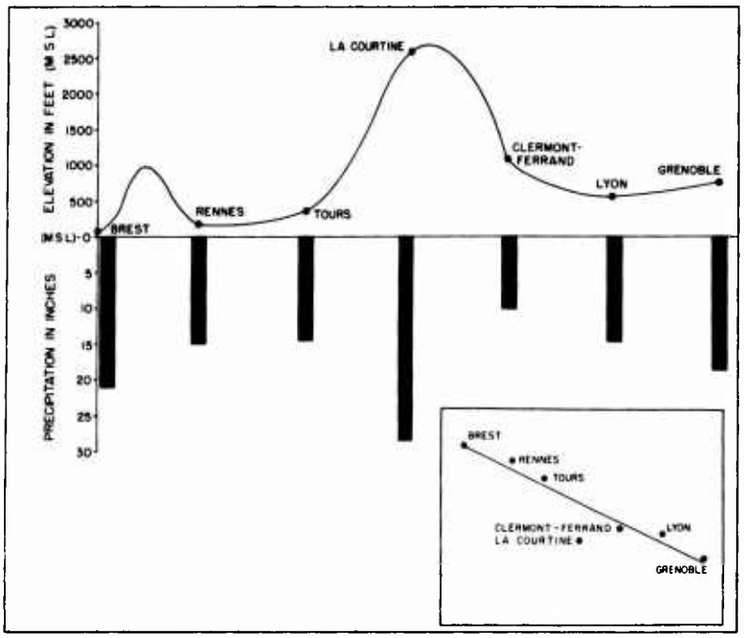


FIGURE 23-6. TERRAIN CROSS SECTION AND MEAN TOTAL PRECIPITATION, OCTOBER THROUGH MARCH

tains, where they sometimes tend to become prolonged.

(1) *Western Lowlands* — There is generally a late autumn or early winter maximum of precipitation throughout the region. At coastal stations the late autumn values are considerably greater than those of summer, but at inland stations, such as Paris and Reims, they are only slightly greater than those of summer, while at Avord, in the east central part, a slight maximum occurs in summer (FIGURE 23-24). Annual precipitation amounts are greatest along the southern coast (Biarritz, 49 inches) and least in the northern interior (Paris, 24 inches). Tabular data showing the greatest and least monthly and annual precipitation (FIGURES 23-25 and 23-26) indicate that precipitation may be quite variable from year to year.

Precipitation is frequent throughout the year. It occurs generally on more than one-half of the days in winter and on 10 to 15 days a month in summer at almost all places (FIGURE 23-27). Heavy precipitation occurs most often during the colder months at all stations. At inland stations there is a much greater tendency toward heavy precipitation during the warmer months than at coastal stations because of a more marked increase in convective activity over the interior. FIGURES 23-28 and 23-29 give tabular data on the frequencies of various daily precipitation amounts.

Snow, because it is so infrequent in the Western Lowlands, is seldom a factor limiting ground operations. Paris has 12 days a year with snowfall and 7 days a year with snow cover (FIGURES 23-30 and 23-31). In January, there are, on the average, only 4 days with snowfall and 3 days with snow cover at Paris.

(2) *Interior Highlands* — Precipitation amounts are greatest in autumn at all but the most southwesterly stations, where they are greatest in spring and early summer. Amounts are least in winter and early spring at most places. Local variations are great because of sheltering effects due to terrain. Stations at high elevations may receive over 90 inches a year, while some valley stations receive as little as 26 inches. Amounts may be quite variable from year to year.

There is a greater tendency for very heavy precipitation to occur during the warmer months in this section than in the Western Lowlands. Precipitation may be particularly intense at the higher elevations, as shown by the data for Montagne de L'Aigoual (FIGURE 23-32).

In winter, snow depths may frequently be great enough to limit ground operations at high elevations. For example, there is a persistent snow cover during winter and early spring at Mont Ventoux, at an elevation of about 6,200 feet. At

the lower elevations, such as Metz and Strasbourg, mean snow depths in winter are several inches and a snow cover is observed on an average of not more than 7 days in any month.

Snow does not lie on the ground for long in a normal winter at the lower levels; even in mid-winter the number of days with snowfall is greater than the number of days with snow cover. In severe winters, however, snow may lie on the ground 2 or 3 times as long as in average winters. On the mountains from about 2,000 feet and higher, there is usually a snow cover during part or all of the winter. It may, however, be intermittent at the lower levels. The duration of the snow cover at any particular place depends on its elevation, the depth of fallen snow, and its exposure to sun and wind.

In the Vosges mountains, roads may be blocked by snow intermittently over their summits for 3 or 4 months. Some sections are completely blocked by snow for 4 or 5 months. In the Massif Central, intermittent blocking lasting more than a few days at a time may be experienced in the higher portions after heavy snowfall, and in passes above 4,000 feet, complete blocking for about 4 months is likely. In the Jura mountains, road summits are not high enough to be completely blocked. Of the main roads across the ranges, only the road going through the Col de la Faucille is occasionally blocked within the borders of France. In the Alps, interruption of road communication by snow is rare below 3,000 feet, except in some valleys where drifting snow is the main cause of blocking. Most of the passes above about 4,500 feet are completely blocked for periods of 6 to 8 months. Col du Mont Genèvre can usually be kept clear of snow, except after a severe snowstorm. FIGURE 21-33 shows, in tabular form, the periods during which certain passes are usually blocked by snow.

(3) *Mediterranean Coast* — Precipitation amounts are greatest during autumn and early winter and least during summer. There can be a great variation from one year to the next. Amounts in autumn may be very large, and some summers are practically rainless.

Precipitation, not as frequent as in the other regions of France, is at a maximum in late autumn and early winter, when it falls on an average of 7 to 10 days a month, and at a minimum in summer, when it falls on about 2 to 5 days a month. Heavy falls occur most often during the colder months.

Snow is rare, falling on not more than one day a month, on the average, in winter and early spring. There is an average of only one day a year with snow cover at each of the stations.

(4) *Corsica* — Precipitation is greatest in late autumn and early winter and least in summer. Amounts are about 25 to 30 inches a year at the coasts, increasing inland up the slopes. The higher portions of the western slopes receive more than 60 inches a year.

Because of the high mountains of the interior, the eastern and western slopes seldom experience heavy precipitation at the same time. The precipitation received by the western slopes during the colder months occurs primarily with *lows* moving northeastward parallel to the east coast of Spain, and with a westerly or northwesterly airflow associated with depressions forming in the Ligurian Sea or the Gulf of Genoa. Heavy rain on the eastern slopes occurs with southeasterly winds, which may produce falls of 4 or 5 inches in 24 hours.

Rain falls mostly in heavy showers, particularly during autumn, although steady, persistent rains also occur. Mountain streams rise rapidly during periods of heavy rain but subside soon after the showers are ended. In summer, there is little rain and the smaller streams probably dry up, except after showers. The time of onset of the rainy period is variable, but it usually occurs in September.

Snow is rare at the lower levels, occurring on 1 or 2 days a year, mainly in January and February, and it remains on the ground for very short periods. It increases in frequency and persistency with elevation, and on the higher mountains, a snow cover probably forms in October and persists until late spring. It is reported that at Lac de Nino (42°15'N., 8°56'E., elevation 5,700 feet) there is often a deep snow cover at the beginning of spring.

d. COMBINATIONS OF WEATHER ELEMENTS — The preceding discussion has been limited to specific climatic elements. The following discussion, information for which was contributed by the Office of the Quartermaster General, is concerned with the overall effects of these weather elements on some important aspects of ground operations and requirements.

(1) *Clothing* — Clothing requirements for this Area are influenced most significantly by temperature, relative humidity and precipitation. Depending upon latitude, altitude, and time of the year, great extremes of hot and cold weather can be found in sections of this NIS Area. These conditions impose a need for five different types of clothing assemblies, ranging from those suitable for warm weather to those suitable for ultra-cold weather, for year-round environmental protection.

The assemblies listed in FIGURE 23-7 have been computed on the basis of mean monthly tempera-

tures, as follows: ultra-cold weather, below 14° F.; cold weather, between 14° and 32° F.; cool weather, between 32° and 50° F.; mild weather, between 50° and 68° F.; and warm weather, between 68° and 86° F. It has been assumed that individuals wearing the specified assemblies will be living in the open for 24 hours a day, requiring that items be included to provide out-of-doors protection at night as well as day. For example, individuals wearing the woolen clothing recommended for mild weather may be over-protected for short periods on many days, but for 24-hour outdoor living, they are better clothed in wool than in cotton.

For personnel at permanent or semipermanent installations where housing is provided, certain substitutions or additions to the assemblies are recommended. For example, the raincoat may be preferable to the poncho under these modified conditions.

BODY CLOTHING	WEATHER				
	WARM	MILD	COOL	COLD	ULTRA-COLD
JACKET—water-repellent, wind-resistant		■			
JACKET—water-repellent, wind-resistant, with hood			■	■	■
JACKET—pile (to be worn under water-repellent, wind-resistant jacket)			■	■	■
OVERCOAT—parka type with pile liner; OR PARKA, pile with parka, water-repellent, wind-resistant					■
SHIRT AND TROUSERS—cotton, herringbone twill weight	■				
SHIRT AND TROUSERS—flannel or woolen		■	■	■	■
TROUSERS—water-repellent, wind-resistant, cotton (to be worn over woolen trousers)			■	■	■
SWEATER—woolen, high neck, long sleeve		■	■	■	■
UNDERSHIRT AND DRAWERS—winter			■	■	■
UNDERWEAR—cotton	■	■			
PARKA AND TROUSERS—field, overwhite (to be worn in snow-covered areas)			■	■	■
PONCHO—lightweight	■	■	■	■	■
FOOTGEAR					
BOOTS—similar to U.S. ARMY service boot, with medium weight woolen socks	■	■			
BOOTS—similar to U.S. ARMY combat, rubber, insulated boot with one pair woolen cushion sole socks			■	■	
BOOTS—similar to U.S. ARMY arctic-type, felt boot, with one pair of cushion sole woolen socks, two pairs of woolen ski socks and one pair of felt insoles; OR BOOTS, similar to U.S. ARMY mukluk boot, with one pair of cushion sole woolen socks, two pairs woolen ski socks, and two pairs of felt insoles					■
HEADGEAR					
CAP—cotton, visored	■	■			
CAP—cotton, visored, with pull-down flaps			■	■	■
MASK—cheek protector, water-repellent, wind-resistant, pile lined					■
MUFFLER—wool				■	■
HANDGEAR					
GLOVES—leather, with woolen inserts		■	■	■	■
MITTENS—with woolen inserts				■	■
MITTENS—simular to U.S. ARMY arctic type mittens, with woolen inserts					■
MITTENS—overwhite (to be worn in snow-covered areas)			■	■	■
SLEEPING EQUIPMENT					
BLANKET—woolen	■				
SLEEPING BAG—woolen, with water-repellent case		■			
SLEEPING BAG—mountain-type (down and feather filled), with water-repellent case			■	■	
SLEEPING BAG—arctic-type (down and feather filled case plus mountain sleeping bag), with water-repellent case					■

FIGURE 23-7. CLOTHING ASSEMBLIES

(a) REQUIREMENTS — The NIS 3 Area is divided into four regions, each having its own distinctive clothing requirements: Western Lowlands, including Paris Basin (Bassin Parisien), the Brittany Peninsula, and the Aquitaine Basin (Bassin d'Aquitaine) (FIGURE 23–1); the Interior Highlands; the Mediterranean Coast; and Corsica. FIGURE 23–8 presents clothing requirements of France and Corsica.

(b) SPECIAL REQUIREMENTS — Protection against insects and pests (mainly mosquitoes, houseflies, sandflies, fleas, lice, gnats, ticks, and mites) are required in a few sections of this NIS Area. Headnets, repellents, insect bars, mosquito gloves, and similar items may be needed in some of the lowland sections of the Mediterranean and Atlantic coasts of France and the coastal lowlands and interior valleys of Corsica, particularly during the months of April through September.

Some type of waterproofed footwear (preferably a boot similar to the U.S. Army knee wader) is desirable in the few isolated swampy regions along the coasts. Water-repellent, wind-resistant, cotton trousers (to be worn over woolen trousers) should also be provided in these regions.

Tinted goggles for protection against sunglare and ointment for protection against sunburn and windburn should be provided. These protections are needed throughout the year in the snow-covered mountain sections and on the Mediterranean Coast and during the summer in the Western Lowlands.

(2) *Storage* — Protection against extremely high temperatures are not necessary in this Area because the maximum daily temperatures during the summer months rarely exceed 85° F. However, for subsistence items which may be damaged by these moderately high temperatures, cold-storage facilities should be utilized whenever available. When such facilities are needed but not available, items should be well spaced and covered to allow maximum ventilation and shade.

At elevations between 5,000 and 10,000 feet, nighttime temperatures may remain below freezing for several weeks during the winter months. Since temperatures are usually below freezing at

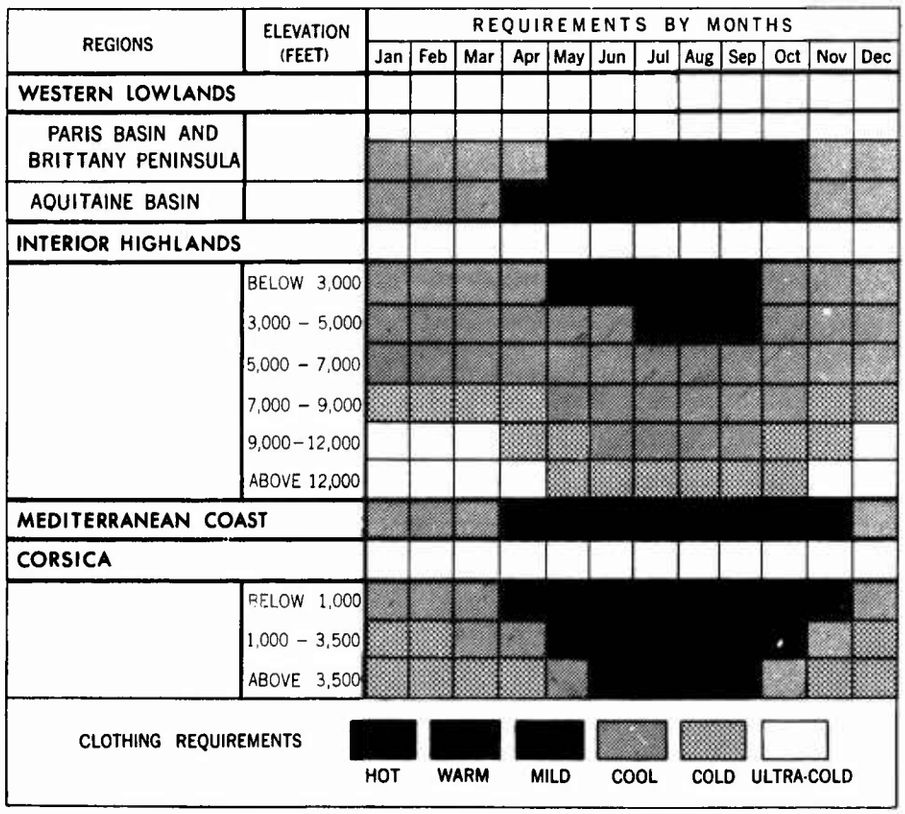


FIGURE 23–8. CLOTHING REQUIREMENTS

night and often above freezing during the day at these levels, items subject to damage by low temperatures or by alternate freezing and thawing should be kept in warehouses, whenever available, or in heated tents or shelters. Freezing and thawing of the ground surface may also become a problem at this level. In sections above 10,000 feet all items which are subject to damage by freezing should be kept in heated tents or shelters.

Rainfall is fairly evenly distributed throughout the year in most of this NIS Area, with a slight maximum during the months of October and November at most places. Protection will be required throughout this entire Area for items which may be damaged by rain, except in the Mediterranean Coast and Corsica during summer.

High humidities usually occur throughout the entire Area; the highest humidities occur in the Western Lowlands and comparatively lower humidities occur in the Interior Highlands, the Mediterranean Coast, and Corsica. Protective measures against mildew and fungus should be routine for all items susceptible to such damage. This protection should be afforded particularly during the months of September, October, and November.

For the maximum protection of supplies against the moist ground, stacks should be built on dunnage (pieces of wood, mats, boughs, or similar material). Timber for dunnage may be found in plentiful supply in the mountains of the entire eastern part of France, in the Pyrenees (Pyrénées) mountains, along the southern portion of the Atlantic coast, and all of Corsica except the extreme northeast. Scattered stands of timber may be found throughout most of the remaining sections of the Area; however, there is only a very limited amount along the northern part of the Atlantic sea coast and the Brittany Peninsula. Swampy and delta sections should be avoided as sites for storage dumps. If it becomes necessary, however, temporary storage sites may be established in either of these undesirable locations, but only after due consideration is given to the particular site.

In the summer, the use of tarpaulins as a protection against blowing dust and blowing sand is advisable. Tarpaulins should be fastened securely since occasional strong winds may cause severe damage.

(3) *Shelter* — Since this NIS Area encompasses regions of diverse climates, shelter should be provided for protection against rain, insects, and extreme temperatures. Shelter should be available in the Western Lowlands, if possible, because of the rains which occur throughout the year. Protection against low temperatures during the winter is needed in the mountain regions at elevations above 5,000 feet. During the summer months it is important that shade be provided for personnel, particularly in the Mediterranean Coast region and Corsica.

Tents similar to those developed by the U.S. Army for arctic operations, such as the mountain tent, lightweight hexagonal tent, or insulated frame-type tent would provide the best temporary shelter during the winter months in the mountain region. During the warmer months at the lower elevations in the mountains, and throughout the year in the lowlands, adequate protection will be provided by tents similar to those developed by the U.S. Army for temperate zone operations, such as the shelter half and the squad and wall tents. During the summer, tents used in the lowlands and the lower elevations of the mountains should be screened in order to provide protection against insects and pests. The sources of timber for improvised shelters are the same as those for dunnage.

In the higher portions of the mountains (above 5,000 feet), snow may accumulate in sufficient depths to permit the construction of snow shelters of the general type described in Army manuals for operations in snow and extreme cold.

4. Amphibious operations*

a. FRANCE — The success of an amphibious operation in any of the coastal waters of France depends almost entirely upon the synoptic condition existing at the time of and subsequent to the operation. The sea, swell, and surf conditions are closely related to the surface windflow pattern; therefore, it is difficult to pick one particular time of the year that is most favorable for amphibious operations. The average number of days per season that the most favorable conditions are likely to exist are given in the discussion which follows. The coastal waters of France are divided into four sections for discussion purposes.

(1) *Dunkirk to Cherbourg* — The roughest seas in this section are associated with winds in the northwest-to-northeast quadrant; winds between southeast and east seldom produce rough seas. For example, at Dunkirk, southeast winds of about 55 m.p.h. will produce waves averaging only about 4 to 8 feet in height, while northerly

* Amphibious operations include all phases of operations involving the movement of troops and equipment onto a beach and associated protective measures. The discussion of coastal weather covers such pertinent elements as surface winds, visibility, cloudiness, precipitation, and temperature. A more detailed consideration of these elements individually and in combination are found in the Subsections on Air operations, Air-ground Operations, and Ground Surface Operations.

winds of about 20 m.p.h. will produce waves greater than 8 feet in height. Spring and autumn are the two seasons when southeasterly winds are likely to occur, giving favorable conditions for amphibious operations. A breakdown of the average number of days per season which have southeast winds is as follows: 8 in winter, 14 in spring, 6 in summer, and 13 in autumn. An important factor is that, with southerly winds in this sector, strong northwest winds usually exist off the coast and almost invariably produce high seas.

These coastal waters are predominantly cloudy, the mean total cloud amount being 60% to 80%. There is very little annual or diurnal variation in cloudiness; the summer season is only slightly less cloudy than the winter season.

Visibility in the coastal waters of this sector is also a synoptic problem. Fog may occur at any time of the year. The western part of the sector has less poor visibility (visibility <2 nautical miles) than the eastern part, and there is a maximum of poor visibility in winter. Poor visibility occurs about 10% of the time in the western part of this sector and 25% of the time in the eastern part.

The annual mean maximum air temperature experienced in the coastal waters of this sector is 57° F. and the annual mean minimum temperature is 46° F. The sea-water temperature in this sector varies from 46° F. in the western part and 42° F. in the eastern part during February, the coolest month, to 62° F. over the whole sector in August, the warmest month.

(2) *Cherbourg to Brest* — The roughest seas in the coastal waters of this sector are produced by winds from southwest to northwest, while the calmest seas occur with winds from southeast to northeast. For example, southwest winds of about 20 m.p.h. or more will produce waves 8 feet or more in height, but it requires southeast-to-northeast winds of about 30 to 40 m.p.h. to produce similar sea conditions. The most favorable synoptic conditions for amphibious operations in this sector will occur with north, northeast, and southeast winds. A breakdown of the average number of days per season which have north or northeast winds is as follows: 18 in winter, 29 in spring, 28 in summer, and 15 in autumn. The average number of days per season having southeast winds is as follows: 8 in winter, 14 in spring, 6 in summer, and 13 in autumn.

This sector is also predominantly cloudy, the annual mean cloud amount being 60% to 80%. There is very little annual or diurnal variation in the cloudiness; the winter season is, however, slightly more cloudy than the summer season. The average annual rainfall for this sector is about 30 to 40 inches, the greater part of which falls during autumn and winter. There is an average of about 150 rainy days per year.

Visibility in this region is generally fair (2 nautical miles) to good. Fog may occur at any time of the year; however, it is not usually persistent.

The annual mean maximum air temperature experienced in this sector is 58° F. and the annual mean minimum temperature is 47° F. The sea-water temperature of these coastal waters varies from 46° to 50° F. during the winter season to 60° to 62° F. during August, the warmest month.

(3) *Brest to Biarritz* — High seas in the coastal waters of this sector are most frequently associated with winds in the southwest-to-northwest quadrant. The most favorable sea conditions occur with winds in the southeast-to-northeast quadrant. Westerly winds of about 20 m.p.h. ordinarily produce seas with wave heights greater than 8 feet. Therefore, the best time for amphibious operations will depend upon the synoptic situation. Since the sea condition is closely related to the wind direction, the following is a breakdown by season of the average number of days per season when winds from southeast to northeast are likely to exist: 26 in winter, 43 in spring, 34 in summer, and 28 in autumn.

These coastal waters are also predominantly cloudy, the average cloud amount being 50% to 70%. There is very little annual or diurnal variation in the cloudiness; however, the winter season is slightly more cloudy than the other seasons. The average rainfall for this sector is about 30 inches per year, with slightly more than half of this total occurring during autumn and winter.

Visibility in these coastal waters is generally fair to good. There is an improvement in the visibility, in general, from north toward the south. Fog can occur at any time of the year; however, the maximum occurrence is in autumn and winter.

The annual mean maximum air temperature in this sector is, on the average, 62° F. and the annual mean minimum, 48° F. The air temperature in this sector is very closely related to the sea-water temperature, which varies from 50° to 52° F. in winter to 64° to 70° F. in August, the warmest month.

(4) *Mediterranean Coast* — Offshore winds are prevalent over the Mediterranean coastal waters of France during all seasons, and while such winds are not conducive to the highest seas along the coast, the unusually high speeds of some of these winds will produce rough seas in spite of their offshore component. The best condition for an amphibious operation depends upon the synoptic situation and occurs when north-to-northeast airflow is present over this region. The following

is a breakdown of the average number of days per season when north-to-northeast winds can be expected: 18 in winter, 29 in spring, 28 in summer, and 15 in autumn. Land and sea breezes in this sector are well marked during clear weather from March through September.

The mistral, which affects the Mediterranean Coast of France, is characterized by its large local departures in speed and direction from the values corresponding to the pressure gradients indicated by the synoptic chart. The speed of the mistral is very variable, and its influence may extend a short distance to seaward only or to the African coast and Malta. The mistral may last anywhere from a few hours to 12 days; however, 3 to 6 days is the most common period of duration. It is said to blow at Marseille on an average of 110 days a year.

The mean cloud amount present in this region is about 50%. There is little seasonal variation; however, the summer is slightly less cloudy than the other seasons. The average rainfall in this sector is about 25 inches per year. Since summer is the dry season, most of the rainfall is equally distributed in the other three seasons.

Visibility on the Mediterranean Coast is good. From October through April, less than 1% of the observations report a visibility less than ½ mile and 5% to 10% have a visibility less than 5 miles. During the period May through September, 1% to 5% of the observations report a visibility of less than ½ mile and 5% to 10% have a visibility less than 10 miles.

The annual mean maximum air temperature experienced in this region is 67° F. and the annual mean minimum, 49° F. The extremes vary from about 15° to about 100° F. The sea-water temperature in this sector ranges from a mean of about 53° F. in February to about 73° F. in August.

b. CORSICA — In general, the best time of the year for an amphibious landing operation on Corsica as far as sea, swell, and surf conditions are concerned is summer (June through August). During winter (December through February) the winds fall chiefly into two groups, westerly and between northeast and east. The west winds are usually strong in early winter and cause heavy squalls along the east coast. Northerly winds are also strong and give rise to heavy seas. Winds from an easterly direction are dangerous in that they produce a heavy sea on the east coast. Mean wind speed during this season is about 13 to 18 m.p.h. In spring (March through May) the winds become predominantly westerly (on one day in two), while northeasterly winds are greatly decreased in frequency. The average speed is about 8 to 12 m.p.h. During summer (June through August) the winds are generally light and variable, with land and sea breezes prevalent; however, the prevailing direction is westerly. The average speed is about 4 to 12 m.p.h. During autumn (September through November) the winds change toward the winter conditions. West winds still predominate; however, more northeasterly winds are present. The westerly winds are much stronger than the winds from the northeast. The average speed during autumn is about 8 to 12 m.p.h.

The annual range of the mean cloudiness is small. The mean cloud amount is greatest in winter, about 50%, and least in summer, about 20% to 30%. Summer is the dry season, and winter is the rainy season.

Visibility in this sector is usually good. Fog and mist are comparatively rare in winter, and occur rather infrequently in summer. The most frequent obstruction to visibility is haze from dust storms; however, even this is not a serious occurrence.

The mean air temperature for this region is given for the following four months which would be representative of the four seasons: February, 53° F.; May, 63°F.; August, 75° F.; and November, 61° F. The average sea-surface temperatures for months representative of the four seasons are as follows: February, 54° F.; May, 61° F.; August, 74° F.; and November, 61° F.

Optimum conditions for an amphibious operation in the vicinity of Corsica exist during the summer season, when the weather is good and the sea, swell, and surf conditions are much less hazardous than at any other time of the year.

C. Meteorological facilities (as of 1951)

The French Meteorological Service (Météorologie Nationale), with headquarters at Paris, has about 1,000 personnel in the service. The Administration Centrale consists of the Director and various subordinate bureaus concerned with personnel, equipment, relations with foreign meteorological services, weather ships, and inspection. The annual budget for the entire service in 1951 was about $6,300,000.

The field service is known as Le Service Météorologique de Métropole et d'Afrique du Nord (S.M.M.). Divisions of this organization are responsible for planning and organizing stations within France, occupied territories, North Africa, and on the high seas, for preparing forecasts, for transmitting meteorological observations and forecasts, and for climatological work and a network of climatological stations.

The Forecast Section of the Forecast Division is responsible for the preparation and analysis of weather charts and the preparation of general

forecasts. It is located in the Central Office in Paris. Four types of personnel make up the forecast section: 1) Six Chief Forecasters, who have university training or its equivalent, share the forecast responsibility of the Central Office. A Chief Forecaster is normally on duty for 12 hours a day for one week in forecasting activity. He then spends four weeks preparing analysis charts for various summaries and publications and engaging in research on various meteorological problems. 2) Public Information Forecasters supply weather information, usually via telephone, to the general public. Two forecasters are normally on duty during the day and one until midnight. 3) Six Analysts, who have completed formal education equivalent to high school, have forecast responsibilities during the night and prepare regular weather map analyses and special charts. 4) Six Aerologists, who have high school level training, do upper-air analyses and prepare air mass analysis charts.

The Extended Forecast Section of the Forecast Division has five professional meteorologists and four nonprofessionals. Two five-day overlapping forecasts are prepared each week. The work is mainly experimental and exploratory.

The Research Establishment (Établissement d'Études et de Recherches Météorologique) is a subordinate organization of Météorologie Nationale. The office of the Chief and the administrative offices are located in the headquarters of Météorologie Nationale in Paris. Limited facilities for research are also located there. However, the principal research and some developmental activity are conducted at the Theoretical and Research Center, Teisserenc de Bort Observatory, Trappes, France, about 9 miles southwest of Paris. This center was scheduled to move into new quarters at Magny-les-Hameaux, about 6 miles from the observatory at Trappes, in August 1951. The facilities of Le Bourget airport, Paris, were used for preliminary and field testing of equipment. Various research projects and theoretical studies are handled at the center. The budget for research and the maintenance of research installations of the Research Establishment was only $37,000 in 1951.

The Research Establishment operates a School of Meteorology, the program of which is designed to train three types of personnel: meteorologists, assistant meteorologists, and technical assistants. Aside from the training program conducted by the French Meteorological Service, there are no schools for forecaster training. Instruction in meteorology is available at the University of Paris, the University of Marseille, and the University of Lyon. However, in all of France, only 5 to 15 students a year receive instruction in meteorology.

The French Meteorological Service maintains a well-distributed network of weather stations in France and on the coasts of Corsica. The Regional Centers are located at Le Bourget airport (Paris), Strasbourg, Renes, Lyon, Bordeaux, and Marignane (near Marseille). There are 13 Principal Stations, 11 in France and 2 in Corsica, 58 Information and Observation Stations, and 27 Observation Stations. In general, weather forecasts can be obtained from Regional Centers and Principal Stations on short notice. Flight weather forecasts from other meteorological stations are subject to delay, sometimes of as much as two hours.

Observations are received and disseminated by the Central Office by means of teletype and automatic multichannel radio receivers. Raw meteorological data are broadcast on radioteletype from Orly Field (Paris). Analyses of weather maps are transmitted to stations which do not have facilities for the preparation of forecast material. An experimental French-designed facsimile transmitting device was in operation in 1951, with three stations in the net.

The French Meteorological Service performs its functions capably and adequately. It is a centralized service, depending to a large extent on its communications for effectiveness. These seem to be adequate, but could be improved by replacing some radio circuits with teleprinters and radioteletypes. It has been reported that there is a large communist element in the French Meteorological Service, which might affect its function and usefulness in the event of hostilities.

D. Climatic data tables

This Subsection consists of climatic data presented in the form of tables. Locations and elevations of stations listed in the tables are shown on FIGURE 23–34.

FIGURE 23–9. MEAN CLOUDINESS (%)*

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	78	74	70	73	69	69	67	70	68	75	77	77	72	14
Cherbourg	77	77	71	72	68	64	66	70	69	77	79	80	72	14
Le Havre	72	65	53	63	54	50	52	55	54	62	70	75	60	13
Paris	75	65	60	64	61	57	58	56	56	64	73	74	64	10
Reims	75	61	57	69	67	64	65	63	63	71	77	72	67	6
Brest	75	72	67	69	69	60	66	68	66	69	78	76	70	10
Rennes	73	69	66	71	67	62	64	64	64	69	75	78	69	13
Nantes	67	62	58	56	54	55	52	48	48	59	68	68	58	29
Tours	74	66	65	70	69	60	61	58	60	67	77	75	67	10
Rochefort	65	63	61	65	62	56	55	53	54	66	70	73	62	14
Angoulême	70	64	63	67	66	61	55	53	54	66	71	73	64	14
Bordeaux	67	63	64	67	68	61	57	53	54	62	72	72	63	10
Biarritz	68	66	79	73	76	73	62	61	66	76	78	76	71	3–4
INTERIOR HIGHLANDS:														
Metz	77	67	64	73	66	63	64	63	63	71	80	77	69	10
Strasbourg	77	69	66	65	61	59	55	54	59	67	76	78	66	15
Dijon	77	65	64	72	68	65	63	60	63	69	78	78	68	14
Clermont-Ferrand	68	66	60	64	61	60	53	49	53	61	69	69	61	*n a*
Lyon	70	63	60	61	59	54	47	46	48	58	71	72	59	29
Grenoble	64	57	62	58	58	51	41	41	46	56	69	65	56	9
Montagne de L'Aigoual	69	65	74	76	70	62	52	51	62	71	76	71	67	14
Mont Ventoux	51	56	64	62	56	51	38	37	48	66	63	66	55	8
Toulouse	70	64	63	67	64	59	51	48	51	60	70	73	62	33
Mont-Louis	43	42	50	53	53	51	33	33	39	42	48	48	45	12
MEDITERRANEAN COAST.														
Nimes	53	52	62	65	58	51	35	39	50	58	60	56	53	14
Perpignan	50	52	57	60	58	53	41	43	51	57	56	53	53	43
Marseille	46	46	50	49	48	40	28	29	38	50	53	48	44	31
Antibes	46	48	54	57	47	42	27	28	43	43	54	50	45	12
CORSICA:														
Ersa	59	58	60	55	52	41	28	31	47	50	61	62	50	10
Ajaccio	59	57	64	60	55	39	23	24	41	49	63	64	50	10
Bonifacio	58	56	59	57	51	39	27	27	42	49	58	61	49	10

n a Data not available.

* Based on 3 observations per day.

FIGURE 23–10. MEAN CLOUDINESS (%) AT SPECIFIED HOURS

STATION	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:															
Saint-Inglevert	0700	77	76	74	76	74	72	73	72	70	75	78	78	75	14
	1300	78	74	70	74	68	69	67	70	69	76	79	79	73	14
	1800	78	73	66	70	66	65	62	67	66	73	74	74	70	14
Cherbourg	0700	77	80	73	78	75	69	71	75	74	79	80	80	76	14
	1300	78	76	71	72	67	64	68	70	69	76	79	83	73	17
	1800	76	74	70	67	61	58	58	65	64	76	77	77	69	14
Le Havre	0700	71	66	57	66	58	57	60	62	57	62	71	76	64	13
	1300	71	65	50	60	52	45	49	51	51	61	69	73	58	13
	1800	75	65	53	62	53	48	46	51	55	64	70	76	60	13
Paris	0700	76	68	60	60	59	58	56	57	58	66	76	78	64	10
	1300	79	66	62	67	65	63	62	58	59	66	78	75	67	10
	1800	71	60	58	66	60	50	57	53	52	59	65	70	60	10
Reims	0700	75	62	58	66	63	62	60	64	61	72	81	72	66	6
	1300	77	60	58	74	72	68	70	66	65	74	78	76	70	6
	1800	72	62	55	68	66	63	66	60	62	68	72	68	65	6
Brest	0700	73	71	69	72	72	64	70	71	67	71	78	75	71	10
	1300	78	73	68	70	69	61	66	68	68	70	82	78	71	10
	1800	75	72	63	66	65	56	61	64	62	67	75	74	67	10
Rennes	0700	73	69	68	70	67	65	65	64	64	70	76	78	69	13
	1300	76	72	69	74	70	70	66	68	67	72	80	80	72	13
	1800	71	65	62	69	65	59	56	60	60	64	68	77	65	13

FIGURE 23-10 (*Continued*)

STATION	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS (*Continued*):															
Nantes	0700	73	68	62	60	60	60	60	56	57	66	75	73	64	43
	1300	71	67	65	67	66	63	60	58	56	65	72	73	65	46
	2100	62	53	47	44	42	43	39	32	34	48	59	61	47	29
Tours	0700	77	67	65	67	68	60	63	59	61	70	79	77	68	10
	1300	76	68	67	74	72	65	65	61	63	70	82	78	70	10
	1800	70	63	62	68	68	56	55	54	55	62	69	69	63	10
Rochefort	0700	74	65	63	61	64	65	58	58	57	55	67	73	63	14
	1300	67	65	63	67	65	58	56	54	57	66	73	77	64	14
	1800	63	60	60	64	57	52	50	47	50	64	65	69	58	14
Angoulême	0700	71	68	64	64	65	61	55	55	56	69	75	74	65	14
	1300	70	62	64	69	66	60	58	53	56	57	73	76	64	16
	1800	66	60	60	65	63	58	51	49	49	61	65	67	60	14
Bordeaux	0700	67	66	64	65	67	61	58	56	55	63	74	73	64	10
	1300	71	63	67	71	72	65	62	56	58	66	76	77	67	10
	1800	63	60	62	65	64	58	50	47	49	58	66	66	59	10
Biarritz	0700	68	69	79	77	81	79	70	69	68	78	82	75	75	3-4
	1300	65	66	75	71	70	65	55	56	65	71	76	77	68	5-6
	1800	72	67	80	71	72	68	59	57	64	75	76	74	70	3-4
INTERIOR HIGHLANDS:															
Metz	0700	82	67	67	74	67	62	60	61	65	77	86	79	70	10
	1300	78	69	65	76	70	66	70	67	66	74	82	80	72	10
	1800	71	64	60	70	65	61	63	60	58	63	71	71	65	10
Dijon	0700	79	68	63	65	64	59	58	57	63	75	81	79	68	14
	1300	78	65	66	77	71	69	67	64	66	71	81	79	71	14
	1800	75	61	63	73	69	66	64	59	61	62	72	75	67	14
Lyon	0700	74	67	60	58	57	50	44	45	47	60	74	74	59	29
	1300	70	63	62	65	61	56	50	46	49	60	73	74	61	32
	1800	66	60	57	60	60	57	47	46	48	55	67	69	58	29
Grenoble	0700	64	58	66	55	53	47	37	39	48	60	73	67	56	9
	1300	65	55	59	60	58	51	41	42	44	54	67	64	55	9
	1800	63	59	60	58	62	55	45	43	46	54	68	65	56	9
Montagne de L'Aigoual	0700	69	64	72	77	68	60	53	52	63	71	77	70	66	14
	1300	70	65	74	75	71	64	52	49	71	76	70	72	67	14
	1800	69	66	76	77	71	62	51	51	62	72	74	71	67	14
Mont Ventoux	0700	50	56	62	60	52	45	36	36	42	62	61	66	52	9
	1300	51	55	66	62	57	50	37	36	49	67	63	66	55	9
	2100	52	57	65	74	59	57	41	38	52	69	64	65	57	8
Toulouse	0700	72	67	65	67	64	60	53	50	51	64	74	76	64	33
	1300	73	64	63	67	63	58	49	47	51	59	72	76	62	45
	1800	66	60	61	66	64	59	50	47	50	56	63	68	59	41
Mont-Louis	0700	44	41	49	48	43	36	21	25	35	44	52	51	41	12
	1300	44	42	52	56	55	53	33	32	39	44	48	49	46	12
	1800	41	42	49	55	60	64	46	41	44	39	44	44	47	12
MEDITERRANEAN COAST:															
Nimes	0700	53	51	64	62	54	47	34	39	50	59	62	58	53	14
	1300	57	55	63	68	60	53	35	39	51	59	64	60	55	14
	1800	49	50	60	64	59	54	37	40	49	55	53	51	52	14
Perpignan	0700	50	52	57	60	57	52	39	43	52	58	58	54	53	43
	1300	53	52	56	58	55	49	37	37	47	56	59	57	51	46
	1800	47	52	58	62	62	58	47	50	54	56	52	49	54	43
Marseille	0700	45	46	48	45	43	35	24	27	36	49	52	48	42	31
	1300	52	50	54	53	49	43	29	29	41	54	58	53	47	35
	1800	42	43	48	50	51	42	31	32	37	47	48	44	43	31
Antibes	0700	48	50	54	57	47	41	29	26	43	45	57	53	46	12
	1300	49	48	53	56	45	39	25	27	41	44	56	53	45	12
	1800	41	47	54	59	50	45	28	31	44	41	48	44	44	12

FIGURE 23-11. MEAN NUMBER OF DAYS WITH THUNDERSTORMS

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	0	0	*	1	2	2	2	2	2	1	*	0	11	10
Cherbourg	*	0	*	1	1	1	1	2	1	1	1	*	8	10
Le Havre	*	*	*	1	2	3	2	3	2	1	1	*	15	10
Argentan	*	0	*	1	2	2	2	2	2	1	0	0	12	10
Paris	*	0	1	1	3	4	5	4	2	1	*	0	20	10
Reims	0	0	*	1	3	3	4	2	1	1	*	0	15	10
Brest	*	*	*	*	1	1	1	1	1	1	1	*	8	11
Rennes	0	*	*	1	2	2	2	2	2	1	*	*	13	10
Nantes	*	*	*	1	3	3	2	2	2	1	1	*	15	10
Tours	*	*	*	2	5	4	5	5	3	2	1	*	27	10
Avord	*	*	*	2	3	3	4	3	2	1	*	0	17	10
Rochefort	*	*	*	2	3	2	2	3	2	1	1	*	16	10
Angoulême	0	1	1	3	4	5	4	5	4	2	1	*	28	10
Bordeaux	*	*	1	3	3	4	3	3	3	1	1	1	23	10
INTERIOR HIGHLANDS:														
Metz	0	*	*	1	4	4	4	3	2	*	*	0	20	10
Strasbourg	0	*	*	1	5	5	6	4	2	1	*	*	25	10
Dijon	0	*	*	2	4	5	6	4	3	1	*	0	26	10
La Courtine	0	0	*	1	2	3	3	2	1	1	*	*	13	10
Clermont-Ferrand	*	0	0	*	3	3	3	3	2	*	*	*	16	10
Lyon	0	*	1	2	6	7	7	7	4	2	*	*	36	10
Grenoble	*	*	1	1	2	4	3	3	1	1	*	0	17	10
Montagne de L'Aigoual	0	0	1	1	3	4	3	2	3	1	*	*	19	10
Mont Ventoux	*	1	1	1	4	3	3	4	3	1	1	*	21	11
Toulouse	*	*	1	2	3	4	5	5	3	1	*	*	24	10
Mont-Louis	0	0	0	*	1	2	4	3	2	*	*	*	13	10
MEDITERRANEAN COAST:														
Nîmes	*	*	1	2	4	4	4	5	4	2	2	1	29	10
Perpignan	*	*	1	1	3	4	4	4	4	1	*	*	22	10
Marseille	*	1	1	1	3	2	1	2	4	2	2	1	20	10
Antibes	1	*	1	2	2	3	3	3	4	2	3	1	23	10
CORSICA:														
Ersa	1	1	*	1	1	2	1	1	2	2	3	1	16	*n a*
Ajaccio	1	1	*	1	1	2	2	1	2	2	3	1	17	*n a*
Bonifacio	1	*	*	1	1	1	1	1	3	2	2	1	14	*n a*

n a Data not available.
* <0.5 day.

FIGURE 23-12. MEAN NUMBER OF DAYS WITH FOG*

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	12	11	9	7	9	8	8	6	6	5	9	11	101	15
Cherbourg	1	1	2	1	2	1	2	2	1	1	1	1	16	15
Le Havre	7	6	6	4	3	3	3	3	3	3	6	7	54	15
Argentan	6	5	5	5	5	5	5	5	6	6	7	7	67	15
Paris	12	9	6	3	3	1	1	2	6	6	11	11	71	15
Reims	6	4	4	2	2	1	1	3	5	5	6	6	45	15
Brest	2	2	2	1	3	4	5	5	4	2	1	2	33	11
Rennes	6	3	3	3	3	2	3	3	4	4	6	6	46	15
Nantes	6	3	3	2	2	1	2	2	4	4	6	7	42	15
Tours	11	6	4	3	3	3	2	3	5	6	10	10	66	15
Avord	6	5	3	2	2	2	2	2	3	4	7	8	46	15
Rochefort	5	4	3	2	2	2	2	3	3	5	6	7	44	15
Angoulême	7	4	2	2	2	2	2	3	5	5	7	7	48	15
Bordeaux	8	6	6	5	6	5	5	6	8	8	8	9	80	15
Biarritz	1	2	**	**	1	**	1	1	**	**	2	3	11	5

n a Data not available.
* Not defined.
** <0.5 day.

FIGURE 23–12 (*Continued*)

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
INTERIOR HIGHLANDS:														
Metz	6	5	4	1	2	2	2	4	5	6	8	8	53	15
Strasbourg	9	6	4	2	2	2	1	3	6	7	10	11	63	15
Dijon	9	5	2	1	1	1	1	2	4	5	9	9	49	15
La Courtine	8	5	4	4	4	3	3	3	5	8	7	6	60	15
Clermont-Ferrand	3	2	1	0	0	0	0	1	2	3	4	5	21	15
Lyon	8	6	2	1	1	1	1	2	4	7	8	11	52	15
Grenoble	2	1	1	0	0	0	0	0	2	3	5	3	17	15
Montagne de L'Aigoual	20	17	21	20	16	12	12	10	16	21	21	22	207	15
Toulouse	6	4	2	1	1	1	0	1	2	4	6	7	35	15
Mont-Louis	1	2	3	3	3	2	0	0	1	1	2	2	20	15
MEDITERRANEAN COAST:														
Nimes	1	1	1	1	1	1	1	1	1	1	1	2	13	15
Perpignan	1	1	1	1	0	0	1	2	1	1	1	1	11	15
Marseille	2	1	1	1	0	0	0	0	0	1	1	2	9	15
Antibes	0	0	0	**	**	0	0	0	0	0	0	**	1	15
CORSICA:														
Ersa	0	**	0	**	**	0	0	0	1	0	0	0	2	*n a*
Ajaccio	0	0	**	**	1	**	0	0	0	0	0	0	2	*n a*
Bonifacio	0	**	0	1	2	2	**	**	0	0	0	0	5	*n a*

See footnotes on first page of table.

FIGURE 23–13. PERCENTAGE FREQUENCIES OF VARIOUS VISIBILITIES AT SPECIFIED HOURS

STATION	RANGE	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
	miles															
WESTERN LOWLANDS:																
Saint-Inglevert	<1¼	0700	22	27	22	17	16	16	13	11	13	10	17	23	17	10
	<2½		37	43	38	31	31	29	24	21	28	23	31	40	31	
	<12½		98	99	98	98	98	95	98	98	99	99	98	99	98	
	<1¼	1300	17	18	9	6	5	5	2	3	5	4	14	18	9	
	<2½		38	37	24	17	15	13	9	10	15	11	30	42	22	
	<12½		98	99	97	98	95	93	92	92	93	96	98	98	96	
	<1¼	1800	21	22	10	6	8	7	4	3	7	5	13	24	11	
	<2½		37	39	20	15	14	12	9	8	17	12	29	43	21	
	<12½		98	97	97	95	94	93	92	93	92	95	99	98	95	
Cherbourg	<1¼	0700	2	6	6	7	4	2	3	4	6	2	3	4	4	10
	<2½		13	20	18	14	12	9	11	11	19	9	10	15	14	
	<12½		100	100	97	97	100	99	98	98	98	98	98	100	99	
	<1¼	1300	3	3	2	1	3	3	3	2	1	1	1	3	2	
	<2½		13	13	8	5	9	8	9	8	9	6	7	9	9	
	<12½		98	97	96	93	97	94	93	93	94	91	96	99	95	
	<1¼	1800	4	4	3	1	2	1	3	2	3	2	5	6	3	
	<2½		15	21	11	6	6	5	7	6	11	9	15	16	11	
	<12½		100	100	98	96	98	94	94	95	96	100	100	100	98	
Le Havre	<1¼	0700	15	26	23	16	10	10	7	14	20	14	21	14	16	10
	<2½		28	49	47	33	33	26	23	33	39	31	37	33	35	
	<12½		86	90	91	83	85	77	76	72	79	76	87	81	82	
	<1¼	1300	13	17	7	6	4	2	2	1	3	4	9	15	7	
	<2½		33	36	25	16	14	10	7	9	13	15	26	32	20	
	<12½		85	84	78	64	72	56	50	53	56	59	76	82	68	
	<1¼	1800	15	19	8	5	4	2	1	3	5	5	10	17	8	
	<2½		29	41	30	16	11	8	5	8	20	17	26	37	21	
	<12½		81	83	80	67	69	48	45	46	69	62	78	84	68	
Argentan	<1¼	0700	16	19	19	16	15	13	10	12	25	19	21	25	18	10
	<2½		32	31	29	24	23	22	16	21	33	27	29	40	27	
	<12½		93	89	87	82	81	74	73	84	86	83	89	92	84	
	<1¼	1300	8	5	1	1	*	1	1	0	1	1	3	13	3	
	<2½		13	12	6	4	4	3	3	2	4	2	10	22	7	
	<12½		74	67	55	40	46	37	37	35	43	47	63	74	51	
	<1¼	1800	13	11	3	2	1	1	1	1	2	2	7	17	5	
	<2½		33	23	6	3	4	4	4	4	4	9	22	39	13	
	<12½		89	84	65	48	53	39	35	33	50	74	86	88	62	

* <0.5%.

FIGURE 23-13 (*Continued*)

STATION	RANGE	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
	miles															
WESTERN LOWLANDS (*Con.*):																
Paris	<1¼	0700	41	34	25	17	10	5	5	5	20	28	41	32	22	10
	<2½		62	52	50	35	28	24	17	21	40	45	61	52	41	
	<12½		100	100	99	99	97	98	97	99	100	99	100	100	99	
	<1¼	1300	26	17	2	1	1	*	*	0	1	4	17	23	8	
	<2½		47	29	11	5	4	1	1	3	6	13	37	43	17	
	<12½		96	95	89	87	84	83	84	84	88	90	98	99	90	
	<1¼	1800	30	19	5	2	*	0	*	0	3	8	26	25	10	
	<2½		54	39	16	6	6	2	2	1	10	28	58	53	23	
	<12½		100	99	98	89	85	84	84	85	96	100	100	100	93	
Reims	<1¼	0700	19	17	15	8	9	3	1	5	13	20	21	23	13	10
	<2½		58	50	38	33	25	16	17	28	40	43	53	62	39	
	<12½		100	99	99	100	100	98	97	98	100	100	100	100	99	
	<1¼	1300	12	10	*	0	1	*	0	0	*	2	12	13	4	
	<2½		38	28	11	7	5	2	1	2	8	9	35	39	15	
	<12½		99	96	96	96	88	88	93	93	98	97	98	98	95	
	<1¼	1800	14	10	1	*	2	0	*	0	0	2	16	15	5	
	<2½		44	33	14	8	6	3	1	4	9	21	48	52	20	
	<12½		100	99	99	98	98	96	94	97	99	100	99	100	98	
Brest	<1¼	0700	2	5	5	3	7	7	9	13	10	4	1	3	6	10
	<2½		10	13	12	11	13	14	17	18	18	12	6	9	13	
	<12½		84	80	77	81	78	78	73	75	75	65	73	84	77	
	<1¼	1300	4	6	2	1	3	2	3	5	4	4	2	2	3	
	<2½		10	11	6	4	7	5	5	10	8	7	7	8	7	
	<12½		72	69	67	65	57	59	47	49	59	55	62	72	61	
	<1¼	1800	3	6	3	2	3	3	3	6	5	4	3	3	4	
	<2½		13	10	7	6	7	6	4	9	10	11	9	10	8	
	<12½		81	76	67	65	63	62	48	54	61	67	78	87	67	
Rennes	<1¼	0700	18	16	14	10	9	8	11	15	19	17	20	19	15	10
	<2½		54	51	41	29	25	21	26	30	47	42	50	62	40	
	<12½		100	100	99	97	98	96	100	99	99	99	100	100	99	
	<1¼	1300	7	6	2	*	*	0	2	1	1	1	7	13	4	
	<2½		23	23	9	5	5	5	5	3	5	7	23	35	12	
	<12½		93	89	82	85	86	77	83	85	76	85	93	97	86	
	<1¼	1800	11	9	1	*	*	1	1	1	1	2	10	18	5	
	<2½		31	28	9	5	3	3	4	6	6	12	32	44	15	
	<12½		98	94	86	81	84	74	79	82	78	87	98	99	87	
Tours	<1¼	0700	35	29	19	18	15	13	11	10	22	26	40	33	23	10
	<2½		53	46	37	27	29	20	18	22	35	45	54	53	37	
	<12½		100	100	99	99	99	99	100	99	100	100	100	100	100	
	<1¼	1300	25	11	4	2	2	2	2	*	3	8	22	28	9	
	<2½		37	25	15	6	8	5	5	3	10	14	32	42	17	
	<12½		93	93	89	86	92	81	86	85	92	91	94	98	90	
	<1¼	1800	22	14	5	3	1	1	1	0	5	6	23	27	9	
	<2½		45	32	16	6	5	3	4	2	12	15	37	45	19	
	<12½		100	99	92	92	93	83	87	88	96	100	100	100	94	
Avord	<1¼	0700	24	21	16	5	8	6	5	5	11	17	28	25	14	10
	<2½		58	45	33	20	28	15	15	18	28	35	51	53	33	
	<12½		98	99	97	96	98	95	97	97	100	100	97	99	98	
	<1¼	1300	14	10	3	2	2	*	*	1	1	3	9	17	5	
	<2½		35	27	15	7	7	6	3	3	6	11	31	39	16	
	<12½		95	94	91	86	96	88	90	91	96	92	89	99	92	
	<1¼	1800	17	14	4	2	2	0	*	1	1	2	12	16	6	
	<2½		43	39	19	9	6	6	3	4	8	16	38	44	20	
	<12½		98	97	92	88	94	86	90	89	97	94	95	99	93	
Rochefort	<1¼	0700	24	19	14	8	6	5	2	6	10	16	21	23	13	10
	<2½		51	45	30	23	20	13	9	11	24	30	44	51	29	
	<12½		100	100	99	99	98	97	99	96	97	100	100	100	99	
	<1¼	1300	11	5	2	1	*	*	1	*	*	2	5	15	4	
	<2½		22	15	9	3	2	3	1	1	3	7	17	31	10	
	<12½		98	96	92	86	88	80	82	84	89	92	96	97	90	
	<1¼	1800	20	7	1	*	*	*	*	0	0	4	14	21	6	
	<2½		48	36	13	4	3	4	3	*	3	16	44	52	19	
	<12½		100	99	98	92	87	77	83	87	89	99	100	100	93	

* <0.5%.

FIGURE 23-13 (*Continued*)

STATION	RANGE	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
	miles															
WESTERN LOWLANDS (*Con.*):																
Angoulême.....	<1¼	0700	13	12	8	8	8	7	4	8	14	13	17	15	11	10
	<2½		25	27	19	19	19	15	12	15	28	29	33	35	23	
	<12½		99	95	92	86	87	90	90	87	94	95	97	100	93	
	<1¼	1300	4	3	*	0	0	0	0	*	0	1	4	8	2	
	<2½		13	11	3	3	2	2	1	2	3	4	13	18	6	
	<12½		75	72	62	48	52	42	42	47	53	59	73	84	59	
	<1¼	1800	6	2	*	0	*	0	0	0	0	1	4	10	2	
	<2½		22	15	5	2	1	2	1	1	1	7	20	27	9	
	<12½		95	89	80	58	58	51	46	52	69	90	98	99	74	
Bordeaux.....	<1¼	0700	21	25	22	9	10	8	6	10	24	25	28	27	18	10
	<2½		38	42	35	15	23	19	12	22	35	38	42	44	30	
	<12½		100	99	95	92	95	94	92	94	97	97	99	100	96	
	<1¼	1300	10	7	4	1	*	1	1	1	1	2	7	15	4	
	<2½		20	18	12	3	2	4	2	1	3	5	15	24	9	
	<12½		92	91	82	73	76	70	66	70	79	86	89	100	81	
	<1¼	1800	12	8	2	1	1	1	*	*	1	4	15	15	5	
	<2½		24	17	7	2	2	3	1	2	5	8	27	24	10	
	<12½		95	91	84	74	69	64	56	65	71	70	96	94	79	
INTERIOR HIGHLANDS:																
Metz.....	<1¼	0700	23	22	16	4	8	4	4	10	17	22	25	27	15	10
	<2½		44	42	32	17	19	13	15	22	30	33	43	48	30	
	<12½		89	91	85	77	85	76	75	76	86	85	85	94	84	
	<1¼	1300	10	10	3	1	*	*	*	0	1	1	9	15	4	
	<2½		25	21	8	1	1	1	*	*	3	6	20	31	10	
	<12½		73	73	55	32	47	31	28	33	40	53	70	82	51	
	<1¼	1800	12	9	3	1	0	*	0	0	2	1	8	19	5	
	<2½		33	24	6	3	2	2	*	1	4	11	26	40	13	
	<12½		94	83	60	37	43	29	27	23	43	79	92	95	59	
Strasbourg.....	<1¼	0700	22	22	15	3	4	1	*	6	12	19	31	31	14	10
	<2½		36	32	25	10	8	3	2	11	20	30	44	46	22	
	<12½		85	82	78	64	70	61	64	70	72	75	82	90	74	
	<1¼	1300	16	10	4	0	*	0	0	0	*	3	14	20	6	
	<2½		28	20	9	1	1	1	0	0	3	7	26	36	11	
	<12½		78	79	68	39	51	44	38	52	55	62	75	83	60	
	<1¼	1800	15	10	3	0	0	*	0	0	1	4	18	26	6	
	<2½		32	23	8	1	1	2	1	1	4	13	35	47	14	
	<12½		94	86	67	41	40	35	34	41	52	81	96	97	64	
Dijon.....	<1¼	0700	41	27	14	7	4	3	1	6	12	18	35	33	17	10
	<2½		59	51	39	23	22	15	11	17	32	41	52	55	35	
	<12½		97	96	95	89	94	88	84	94	95	95	96	97	93	
	<1¼	1300	21	8	3	0	1	*	0	0	0	2	11	17	5	
	<2½		37	18	10	4	4	3	1	1	3	8	22	36	12	
	<12½		90	77	70	52	61	50	46	54	61	74	81	85	67	
	<1¼	1800	27	14	4	0	*	*	1	0	*	4	16	27	8	
	<2½		45	32	15	4	3	2	2	1	4	11	32	48	17	
	<12½		98	93	86	62	68	45	47	56	77	97	98	98	77	
La Courtine....	<1¼	0700	29	21	15	15	10	5	10	11	21	21	26	21	17	10
	<2½		44	45	37	28	25	21	27	24	40	43	45	50	36	
	<12½		97	94	94	98	98	96	98	97	99	98	98	100	97	
	<1¼	1300	16	13	9	3	1	2	1	1	2	7	11	18	7	
	<2½		26	32	21	10	6	4	6	5	9	15	21	31	15	
	<12½		90	95	89	91	93	80	79	84	90	93	91	96	89	
	<1¼	1800	20	15	5	5	3	3	*	1	2	10	13	20	8	
	<2½		39	35	20	14	11	6	6	4	9	24	29	44	20	
	<12½		93	92	91	93	99	84	85	87	91	98	99	98	92	
Clermont-Ferrand.....	<1¼	0700	9	9	4	1	2	3	1	1	4	8	14	17	6	10
	<2½		18	21	13	4	7	9	4	3	9	14	20	27	12	
	<12½		72	73	67	68	64	58	52	58	65	65	66	78	65	
	<1¼	1300	8	6	1	1	1	*	1	0	1	1	4	11	3	
	<2½		15	14	6	2	5	3	1	1	3	4	12	20	7	
	<12½		65	64	56	48	54	47	38	40	47	52	57	63	53	

* <0.5%.

FIGURE 23-13 (*Continued*)

STATION	RANGE	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
	miles															
INTERIOR HIGHLANDS (*Con.*):																
Clermont-Ferrand (*Con.*)..	<1¼	1800	7	5	2	0	*	1	*	0	*	1	6	10	3	
	<2½		18	16	9	1	4	3	1	1	4	7	17	25	8	
	<12½		86	77	64	51	52	46	38	35	51	78	82	87	62	
Lyon.....	<1¼	0700	31	26	13	5	3	1	1	5	9	19	24	27	14	10
	<2½		41	41	25	17	13	8	7	19	25	32	36	43	26	
	<12½		85	83	83	76	80	73	75	79	87	83	77	89	81	
	<1¼	1300	8	4	*	0	0	*	0	0	0	1	3	12	2	
	<2½		20	11	5	1	0	*	0	*	1	3	12	24	6	
	<12½		75	72	63	40	38	33	34	40	46	58	68	83	54	
	<1¼	1800	15	8	1	0	0	0	0	0	1	4	8	17	4	
	<2½		29	21	8	1	1	*	1	1	2	10	21	35	11	
	<12½		99	94	76	47	45	39	36	41	60	93	97	99	69	
Toulouse.....	<1¼	0700	12	15	5	1	1	*	*	1	3	9	14	14	6	10
	<2½		21	26	11	3	7	3	3	4	9	19	22	29	13	
	<12½		87	87	81	82	84	81	81	87	88	87	83	89	85	
	<1¼	1300	4	3	*	0	0	0	0	0	0	0	4	5	1	
	<2½		11	10	2	*	0	*	*	*	1	1	9	15	4	
	<12½		82	83	73	64	71	63	66	70	76	78	72	82	73	
	<1¼	1800	4	1	1	0	0	0	0	0	0	*	5	8	2	
	<2½		14	10	4	1	0	1	0	0	2	3	13	21	6	
	<12½		97	88	82	74	74	69	70	77	83	95	100	99	84	
MEDITERRANEAN COAST:																
Nimes.....	<1¼	0700	4	4	4	2	2	1	1	2	4	6	4	6	3	10
	<2½		13	15	14	7	7	5	5	9	14	12	16	23	12	
	<12½		67	71	64	57	54	48	43	55	66	55	64	73	60	
	<1¼	1300	0	*	1	*	*	0	0	0	1	0	1	2	*	
	<2½		8	5	3	1	2	0	0	*	2	3	5	13	4	
	<12½		62	59	48	28	28	22	23	28	36	35	50	65	40	
	<1¼	1800	1	1	*	*	*	0	*	*	*	0	*	3	*	
	<2½		10	9	4	1	2	0	*	1	1	3	8	17	5	
	<12½		100	94	57	27	23	19	21	23	38	89	97	100	57	
Perpignan.....	<1¼	0700	2	4	3	1	1	0	1	2	2	3	1	3	2	10
	<2½		4	6	11	3	3	*	1	4	5	5	5	8	5	
	<12½		30	38	44	27	34	27	25	33	33	31	26	34	32	
	<1¼	1300	1	1	1	*	0	0	0	0	0	1	*	1	*	
	<2½		4	4	5	1	1	0	0	0	1	2	3	5	2	
	<12½		33	38	37	23	33	27	26	31	33	34	29	35	32	
	<1¼	1800	1	1	2	*	*	0	*	0	0	*	1	2	1	
	<2½		5	4	5	1	1	0	*	1	1	3	7	10	3	
	<12½		68	58	46	31	36	27	24	33	35	64	83	86	49	
Marseille.....	<1¼	0700	2	2	2	1	1	0	0	*	1	1	2	6	2	10
	<2½		5	7	5	2	3	1	*	1	2	3	6	11	4	
	<12½		56	65	55	49	47	39	43	44	51	46	50	62	51	
	<1¼	1300	*	*	0	0	0	0	0	0	*	0	*	*	*	
	<2½		1	3	2	*	0	*	*	*	1	1	2	3	1	
	<12½		50	53	50	32	30	22	22	29	33	35	40	57	38	
	<1¼	1800	1	*	0	0	0	0	0	0	0	1	0	1	*	
	<2½		2	2	4	*	0	0	0	0	1	2	1	2	1	
	<12½		63	68	58	37	30	26	22	28	38	54	63	75	47	
Antibes.....	<1¼	0700	0	1	0	*	0	0	0	0	0	0	0	0	*	10
	<2½		1	1	*	1	0	0	1	0	1	0	*	1	1	
	<12½		21	43	45	50	60	56	72	59	56	28	26	22	45	
	<1¼	1300	1	1	0	0	0	0	0	0	0	0	0	0	*	
	<2½		2	2	*	*	*	0	0	0	0	1	0	*	*	
	<12½		16	36	36	35	35	31	48	36	29	19	22	18	30	
	<1¼	1800	*	1	0	0	0	0	0	0	0	*	0	0	*	
	<2½		2	2	*	1	*	*	*	0	0	*	0	0	*	
	<12½		55	61	53	41	38	28	43	32	45	43	48	58	45	

* <0.5%.

FIGURE 23-13 (*Continued*)

STATION	RANGE	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
	miles															
CORSICA:																
Ajaccio.....	<1¼	0700	1	*	0	*	1	*	0	0	0	0	0	0	*	10
	<2½		2	1	3	1	4	1	1	*	0	1	3	2	2	
	<12½		21	24	28	27	29	21	13	11	13	20	24	22	21	
	<1¼	1300	*	1	*	*	0	0	0	0	0	0	*	*	*	
	<2½		3	2	1	2	2	*	1	0	0	1	1	3	1	
	<12½		18	26	30	26	25	15	12	5	11	17	20	22	19	
	<1¼	1800	*	1	0	0	0	0	0	0	0	0	0	1	*	
	<2½		5	3	3	1	2	1	0	0	0	1	3	3	2	
	<12½		43	51	48	37	29	17	12	8	28	43	50	52	35	

* <0.5%.

FIGURE 23-14. PERCENTAGE OF OBSERVATIONS WITH VARIOUS LOW CLOUD HEIGHTS AT SPECIFIED HOURS

STATION AND CLOUD HEIGHT (*feet*)	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:															
Saint-Inglevert:															
<1,000.....	0700	46	45	38	40	36	40	43	33	31	35	40	44	39	10
<5,000.....	....	82	79	71	79	75	81	79	75	75	85	86	81	79	
No low clouds....	....	18	21	29	19	25	19	21	25	25	15	14	19	21	
<1,000.....	1300	44	38	24	24	20	22	24	15	22	25	38	43	28	
<5,000.....	....	85	79	74	87	84	91	82	86	82	91	90	85	85	
No low clouds....	....	15	21	25	10	15	9	18	14	17	9	10	15	15	
<1,000.....	1800	38	36	21	22	18	18	19	15	19	21	34	40	25	
<5,000.....	....	77	79	62	73	68	74	64	68	70	85	87	80	74	
No low clouds....	....	23	21	38	23	30	26	36	32	30	15	13	20	26	
Cherbourg:															
<1,000.....	0700	19	20	14	20	18	18	21	20	22	12	19	22	20	10
<5,000.....	....	86	84	74	76	69	74	73	76	79	88	92	90	80	
No low clouds....	....	13	15	25	22	30	25	26	24	19	11	8	10	19	
<1,000.....	1300	15	16	10	13	10	12	9	12	12	9	18	20	13	
<5,000.....	....	92	86	77	83	83	82	82	86	85	90	90	90	85	
No low clouds....	....	8	13	22	14	15	18	17	14	14	9	10	9	14	
<1,000.....	1800	20	17	9	13	10	8	11	12	15	12	19	21	15	
<5,000.....	....	83	77	65	67	62	60	65	65	69	87	86	83	72	
No low clouds....	....	16	20	35	31	36	39	33	34	30	13	13	16	26	
Le Havre:															
<1,000.....	0700	18	18	17	18	20	21	21	15	16	16	22	19	18	10
<5,000.....	....	79	74	63	72	69	73	72	71	70	76	83	78	73	
No low clouds....	....	20	24	35	24	28	26	26	27	28	21	16	20	25	
<1,000.....	1300	17	15	11	11	9	9	9	7	9	12	19	21	12	
<5,000.....	....	82	76	69	83	82	86	78	81	81	85	84	80	80	
No low clouds....	....	18	21	28	16	15	12	20	16	18	14	14	18	18	
<1,000.....	1800	16	13	6	10	5	5	5	6	8	8	15	19	10	
<5,000.....	....	77	72	58	69	65	63	58	62	69	78	79	75	69	
No low clouds....	....	20	25	36	27	29	34	36	33	31	18	19	23	28	
Argentan:															
<1,000.....	0700	27	30	23	18	21	18	19	19	21	24	34	33	24	10
<5,000.....	....	81	75	65	67	65	65	69	64	65	72	81	83	71	
No low clouds....	....	19	24	35	31	33	32	29	33	31	28	18	16	28	
<1,000.....	1300	18	12	9	5	8	4	1	2	2	7	16	21	9	
<5,000.....	....	82	73	71	84	87	84	82	80	73	82	84	73	79	
No low clouds....	....	17	27	27	12	7	8	14	14	18	15	14	26	17	
<1,000.....	1800	20	10	9	4	7	3	2	1	2	5	17	24	9	
<5,000.....	....	77	67	60	72	73	72	67	65	64	66	69	69	68	
No low clouds....	....	22	31	37	21	18	15	20	23	27	30	28	30	25	

FIGURE 23-14 (*Continued*)

STATION AND CLOUD HEIGHT (*feet*)	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS (*Continued*):															
Paris:															
<1,000	0700	31	21	16	11	12	8	10	11	15	17	34	34	18	10
<5,000	....	72	61	50	50	52	54	56	49	49	55	73	67	57	
No low clouds	....	26	37	46	45	45	42	40	45	46	39	25	29	39	
<1,000	1300	21	16	7	3	3	2	*	*	2	6	22	27	9	
<5,000	....	79	73	64	80	82	82	81	73	74	82	81	78	77	
No low clouds	....	17	27	34	17	15	13	16	22	23	17	19	21	20	
<1,000	1800	20	13	3	2	2	*	*	0	3	7	19	27	8	
<5,000	....	69	58	54	65	73	69	65	55	56	60	61	64	62	
No low clouds	....	28	40	42	25	20	23	28	35	35	35	36	33	32	
Reims:															
<1,000	0700	17	15	7	3	4	4	4	7	7	7	24	24	10	10
<5,000	....	74	59	48	52	54	53	53	51	47	67	76	74	59	
No low clouds	....	23	39	50	43	42	42	43	44	49	30	20	24	37	
<1,000	1300	16	10	2	2	1	0	1	0	1	3	16	19	6	
<5,000	....	77	66	61	83	86	83	87	78	77	80	78	80	78	
No low clouds	....	21	32	37	16	13	16	13	20	21	18	17	20	20	
<1,000	1800	13	6	1	*	0	*	0	*	*	2	11	19	4	
<5,000	....	72	61	48	68	67	69	75	63	61	63	68	71	66	
No low clouds	....	25	36	48	27	27	26	22	33	32	30	26	26	30	
Brest:															
<1,000	0700	21	20	16	16	17	23	25	24	21	19	21	23	21	10
<5,000	....	86	81	75	80	78	76	83	74	78	85	94	88	82	
No low clouds	....	14	18	25	20	20	23	17	25	22	14	6	11	18	
<1,000	1300	18	18	14	7	11	12	9	15	12	15	20	22	14	
<5,000	....	91	84	73	88	89	88	85	85	84	89	96	88	87	
No low clouds	....	8	15	24	11	10	11	15	15	15	10	3	11	12	
<1,000	1800	20	17	15	11	10	16	7	14	14	19	24	21	16	
<5,000	....	87	82	72	81	83	79	75	76	74	86	93	86	81	
No low clouds	....	11	17	27	16	15	21	25	22	25	13	6	13	18	
Rennes:															
<1,000	0700	27	24	24	21	21	21	24	24	29	23	37	35	26	10
<5,000	....	67	69	58	67	66	71	72	58	60	69	78	76	68	
No low clouds	....	32	28	41	27	32	26	27	39	35	29	19	22	30	
<1,000	1300	24	13	9	7	7	3	4	4	11	8	24	25	12	
<5,000	....	81	79	72	87	90	91	86	83	84	86	90	81	84	
No low clouds	....	16	19	27	12	9	8	13	15	16	13	9	15	14	
<1,000	1800	22	13	5	6	4	4	3	3	8	7	20	22	10	
<5,000	....	72	70	60	77	84	84	78	73	71	75	74	68	74	
No low clouds	....	27	27	36	21	12	14	20	22	25	21	24	30	23	
Tours:															
<1,000	0700	43	34	25	21	26	27	24	24	30	36	45	45	32	10
<5,000	....	71	62	50	55	55	57	54	50	50	60	74	77	60	
No low clouds	....	28	35	48	40	43	40	43	47	47	37	25	23	38	
<1,000	1300	34	23	9	6	5	6	4	3	7	15	32	38	15	
<5,000	....	83	69	66	81	86	88	80	75	76	79	83	84	79	
No low clouds	....	16	28	32	18	13	12	19	25	24	20	16	15	20	
<1,000	1800	26	15	6	5	3	3	1	1	4	9	25	33	11	
<5,000	....	68	59	56	72	77	78	71	61	59	59	70	68	67	
No low clouds	....	28	36	39	22	20	18	24	36	37	35	26	31	29	
Avord:															
<1,000	0700	32	27	14	12	17	20	16	12	17	20	28	35	21	10
<5,000	....	72	60	50	48	55	52	51	45	45	61	62	73	56	
No low clouds	....	28	34	48	46	40	44	45	52	51	35	36	25	40	
<1,000	1300	28	22	10	7	7	7	3	2	6	10	24	34	13	
<5,000	....	76	67	64	75	83	78	76	68	68	75	69	78	73	
No low clouds	....	23	27	35	19	14	15	21	30	29	23	28	20	24	
<1,000	1800	23	16	8	7	4	6	3	3	4	7	19	29	11	
<5,000	....	65	53	52	62	60	63	58	53	54	59	57	69	59	
No low clouds	....	31	39	41	28	27	23	30	41	40	35	41	30	34	

* <0.5%.

FIGURE 23–14 (*Continued*)

STATION AND CLOUD HEIGHT (*feet*)	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS (*Continued*):															
Rochefort:															
<1,000	0700	18	15	9	7	8	8	6	4	7	10	17	19	11	10
<5,000	....	63	59	50	54	63	54	58	57	56	62	69	70	60	
No low clouds	....	35	40	49	43	34	44	41	42	44	37	30	28	39	
<1,000	1300	16	11	5	3	3	2	2	3	3	5	16	20	7	
<5,000	....	73	63	60	78	84	83	74	72	70	77	76	79	74	
No low clouds	....	24	34	39	21	16	17	25	28	29	22	24	20	25	
<1,000	1800	17	10	5	3	3	3	2	1	1	5	16	17	7	
<5,000	....	67	58	54	68	69	63	63	62	58	68	67	72	64	
No low clouds	....	32	40	45	30	30	36	35	37	42	30	31	28	35	
Angoulême:															
<1,000	0700	30	27	17	14	21	21	21	14	20	25	34	28	23	10
<5,000	....	66	61	49	50	56	58	53	46	45	56	69	69	57	
No low clouds	....	31	35	47	45	41	38	41	49	51	37	27	30	39	
<1,000	1300	20	14	9	4	3	3	2	3	2	8	19	23	9	
<5,000	....	74	64	67	74	80	78	71	64	66	77	77	78	73	
No low clouds	....	22	33	30	19	15	15	19	31	30	21	20	20	23	
<1,000	1800	15	11	7	3	2	3	2	2	2	5	15	18	7	
<5,000	....	63	54	54	61	62	54	52	48	44	57	62	63	56	
No low clouds	....	31	39	37	24	24	25	29	39	43	36	35	35	33	
Bordeaux:															
<1,000	0700	15	17	13	7	10	12	10	10	11	15	18	20	13	10
<5,000	....	61	53	48	49	56	56	54	47	44	56	61	63	54	
No low clouds	....	39	45	51	47	41	42	43	48	50	42	36	36	43	
<1,000	1300	11	10	4	2	2	3	3	3	4	7	12	17	7	
<5,000	....	67	65	66	75	82	80	73	61	65	70	73	73	71	
No low clouds	....	29	33	31	21	15	16	24	34	33	28	26	26	26	
<1,000	1800	9	12	3	2	2	3	2	2	3	5	11	15	6	
<5,000	....	57	55	53	63	71	65	58	48	44	52	61	62	57	
No low clouds	....	40	41	43	33	25	30	34	44	51	45	36	35	38	
INTERIOR HIGHLANDS:															
Metz:															
<1,000	0700	17	16	8	4	2	3	5	4	10	14	20	19	10	10
<5,000	....	78	59	52	52	50	51	50	50	50	69	81	76	60	
No low clouds	....	19	38	44	41	46	47	44	47	46	26	18	23	37	
<1,000	1300	15	10	2	2	1	0	*	*	1	4	16	22	6	
<5,000	....	77	68	64	75	79	74	73	72	74	78	79	80	74	
No low clouds	....	20	30	31	15	10	15	15	17	21	19	19	17	19	
<1,000	1800	12	9	1	2	1	*	*	1	2	2	11	17	5	
<5,000	....	66	56	45	58	54	57	52	45	47	53	63	68	55	
No low clouds	....	32	39	46	24	28	25	24	36	39	36	36	31	33	
Strasbourg:															
<1,000	0700	18	8	7	3	4	2	1	7	11	14	26	24	10	10
<5,000	....	77	59	50	56	55	55	50	52	54	68	79	80	61	
No low clouds	....	19	39	46	35	38	37	41	40	39	26	17	19	33	
<1,000	1300	15	4	4	1	1	*	1	0	2	6	17	20	6	
<5,000	....	75	62	62	77	79	79	79	63	71	72	77	76	73	
No low clouds	....	21	35	32	14	9	12	11	20	20	20	19	20	19	
<1,000	1800	13	3	1	1	1	1	0	1	*	3	15	19	5	
<5,000	....	67	48	46	58	56	62	59	45	50	54	64	69	57	
No low clouds	....	29	47	44	26	23	19	25	40	41	33	32	28	32	
Dijon:															
<1,000	0700	28	18	12	6	8	4	2	4	10	14	35	36	15	10
<5,000	....	76	59	46	59	54	55	53	48	46	66	75	77	60	
No low clouds	....	24	39	53	40	43	43	45	45	52	32	25	20	38	
<1,000	1300	20	11	8	1	3	1	1	2	3	7	21	28	9	
<5,000	....	79	64	66	78	77	75	76	69	73	76	80	78	74	
No low clouds	....	20	36	32	18	15	14	16	24	24	21	20	20	22	
<1,000	1800	22	10	4	2	3	1	1	2	2	5	20	25	8	
<5,000	....	74	55	53	65	65	63	61	58	51	59	63	72	62	
No low clouds	....	25	40	41	23	23	19	25	28	41	37	35	26	30	

* <0.5%.

FIGURE 23–14 (*Continued*)

STATION AND CLOUD HEIGHT (*feet*)	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
INTERIOR HIGHLANDS (*Continued*):															
La Courtine:															
<1,000	0700	36	26	28	23	14	13	9	12	13	19	24	31	20	10
<5,000	....	72	62	64	67	61	57	57	49	52	67	76	75	63	
No low clouds	....	28	38	36	33	39	41	42	49	47	32	23	25	36	
<1,000	1300	27	15	23	15	5	5	2	2	2	10	14	26	12	
<5,000	....	73	62	73	76	84	82	78	66	70	75	76	73	74	
No low clouds	....	26	37	26	21	13	13	19	28	24	22	23	25	23	
<1,000	1800	30	19	22	18	8	5	2	4	2	14	17	29	14	
<5,000	....	69	58	68	69	74	75	65	56	57	65	70	71	66	
No low clouds	....	30	41	32	24	21	15	26	35	35	33	30	30	29	
Clermont-Ferrand:															
<1,000	0700	10	9	6	2	5	6	2	2	3	5	14	18	7	10
<5,000	....	72	61	56	56	60	56	53	49	52	65	75	72	61	
No low clouds	....	27	35	40	41	34	38	41	46	40	32	24	26	35	
<1,000	1300	8	7	3	1	3	2	*	1	1	2	8	10	4	
<5,000	....	74	67	62	65	66	70	57	52	60	70	71	74	66	
No low clouds	....	24	29	28	19	15	11	20	24	22	20	21	22	21	
<1,000	1800	11	7	3	1	3	2	1	1	1	2	9	13	5	
<5,000	....	70	62	57	59	62	64	52	45	53	66	69	69	60	
No low clouds	....	28	35	34	21	19	19	23	29	28	26	26	30	27	
Lyon:															
<1,000	0700	22	17	10	5	6	4	5	5	11	15	24	29	13	10
<5,000	....	80	67	55	54	55	54	47	45	49	70	81	8.	61	
No low clouds	....	16	30	38	37	37	37	47	48	44	26	13	15	32	
<1,000	1300	12	6	3	2	1	*	1	2	2	4	12	21	5	
<5,000	....	76	66	70	79	86	84	79	74	76	78	82	79	77	
No low clouds	....	18	28	24	15	9	9	11	18	19	19	13	19	17	
<1,000	1800	9	4	4	1	2	2	2	2	2	3	9	15	5	
<5,000	....	64	48	52	63	71	70	65	51	53	57	66	68	61	
No low clouds	....	27	43	39	23	16	15	22	30	33	35	27	27	28	
Toulouse:															
<1,000	0700	21	22	22	16	26	16	15	16	24	30	27	30	22	10
<5,000	....	73	65	67	67	72	71	64	58	60	68	78	78	68	
No low clouds	....	26	32	31	31	25	27	33	41	37	29	21	22	30	
<1,000	1300	16	13	4	2	2	2	2	0	2	8	17	23	8	
<5,000	....	78	74	77	83	87	88	88	73	81	77	83	81	81	
No low clouds	....	20	26	21	17	11	11	11	24	17	23	16	18	18	
<1,000	1800	14	6	5	2	2	2	2	1	2	6	13	18	6	
<5,000	....	62	57	62	72	76	81	80	62	67	63	65	68	68	
No low clouds	....	35	38	33	24	16	14	11	28	27	33	31	31	27	
MEDITERRANEAN COAST:															
Nimes:															
<1,000	0700	4	3	7	4	7	9	7	10	9	8	8	7	7	10
<5,000	...	46	44	47	48	40	32	22	32	36	49	59	53	42	
No low clouds	....	50	55	48	49	58	65	75	68	63	49	38	45	55	
<1,000	1300	4	2	3	3	1	1	*	*	3	4	6	7	3	
<5,000	....	50	51	67	72	69	65	59	57	65	66	63	55	62	
No low clouds	....	43	42	29	23	20	29	34	39	31	30	32	42	33	
<1,000	1800	4	1	3	2	1	1	*	1	1	3	4	4	2	
<5,000	....	33	32	39	48	42	36	25	26	37	34	41	35	36	
No low clouds	....	56	53	44	33	35	42	50	51	48	54	49	58	48	
Perpignan:															
<1,000	0700	3	4	10	9	9	10	9	11	14	11	6	10	9	10
<5,000	....	74	65	75	73	75	69	62	65	69	74	80	76	71	
No low clouds	....	25	31	23	23	22	24	33	29	27	21	17	22	25	
<1,000	1300	2	3	5	3	3	2	3	3	4	4	6	7	4	
<5,000	....	74	66	79	85	90	85	85	84	86	84	83	79	82	
No low clouds	....	25	31	18	10	5	4	6	9	8	12	14	19	13	
<1,000	1800	3	1	5	4	5	4	1	4	5	5	8	5	4	
<5,000	....	70	66	75	75	82	74	67	64	75	76	78	73	73	
No low clouds	....	28	31	22	16	8	11	12	17	14	16	18	25	18	

* <0.5%.

FIGURE 23–14 (*Continued*)

STATION AND CLOUD HEIGHT (*feet*)	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
MEDITERRANEAN COAST (*Con.*):															
Marseille:															
<1,000	0700	1	1	1	1	4	1	1	1	4	5	6	5	3	10
<5,000	....	37	36	47	37	37	31	22	23	36	43	53	49	38	
No low clouds	....	59	62	50	58	60	69	78	76	63	55	43	47	60	
<1,000	1300	1	1	1	0	1	*	0	*	*	*	1	1	1	
<5,000	....	49	48	66	69	75	65	55	55	66	68	63	50	61	
No low clouds	....	47	50	32	29	23	34	42	44	31	31	44	45	37	
<1,000	1800	1	1	*	*	1	*	0	*	1	2	1	1	1	
<5,000	....	34	32	48	52	58	50	38	40	45	42	41	36	43	
No low clouds	....	63	65	48	46	41	47	59	60	52	57	56	61	54	
Antibes:															
<1,000	0700	0	*	1	3	4	3	6	0	1	*	1	1	2	10
<5,000	....	54	53	48	49	53	45	45	35	47	51	64	61	50	
No low clouds	....	40	44	49	48	44	54	54	63	51	46	31	33	46	
<1,000	1300	1	*	*	2	1	0	1	0	0	0		2	1	
<5,000	....	57	56	69	78	88	81	86	74	78	69	66	56	72	
No low clouds	....	39	41	29	21	10	15	12	24	20	29	31	36	26	
<1,000	1800	0	*	2	2	2	1	2	1	0	1	*	1	1	
<5,000	....	38	45	50	58	67	60	60	57	53	47	43	42	52	
No low clouds	....	56	48	44	38	24	34	35	40	43	47	53	53	43	
CORSICA:															
Ajaccio:															
<1,000	0700	0	1	3	1	4	1	*	0	0	0	1	1	1	10
<5,000	....	50	52	48	45	41	26	15	17	26	41	47	54	39	
No low clouds	....	35	40	39	44	52	68	81	80	69	52	40	35	53	
<1,000	1300	1	2	2	1	1	1	1	0	0	1	1	1	1	
<5,000	....	55	64	65	54	59	37	32	30	43	53	60	57	51	
No low clouds	....	24	22	20	32	26	41	44	48	32	28	22	26	30	
<1,000	1800	1	1	1	1	2	2	*	*	*	0	1	*	1	
<5,000	....	49	51	48	48	31	30	24	20	36	49	51	55	43	
No low clouds	....	41	42	42	42	41	59	68	71	54	47	42	40	49	

* <0.5%.

FIGURE 23–15. MEAN NUMBER OF DAYS WITH GALES (WIND SPEED ≧36 M.P.H.)

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert*	4	3	2	2	1	1	1	1	2	4	3	3	28	14
Cherbourg	2	3	2	2	1	0	0	1	1	2	2	3	19	10
Le Havre**	1	1	***	1	***	***	***	1	***	1	1	2	9	10
Rennes	1	1	2	1	***	***	***	***	***	1	2	2	10	13
Nantes	0	0	0	0	0	0	0	0	***	0	***	0	***	14
Rochefort**	2	2	2	1	***	1	1	***	***	2	2	3	16	14
Angoulême	1	1	1	1	***	***	***	***	1	1	1	2	10	14
Bordeaux**	0	0	1	0	0	0	0	0	0	0	0	0	1	5
Biarritz	3	3	5	2	1	***	0	***	2	5	2	5	28	3–4
INTERIOR HIGHLANDS:														
Lyon**	2	2	3	2	2	1	1	1	1	2	2	2	21	6
Montagne de L'Aigoual	7	5	5	6	4	3	2	3	3	6	6	6	56	13
Mont Ventoux	***	1	***	1	1	0	0	0	1	***	1	***	5	5
Toulouse**	4	1	2	1	***	***	***	***	1	1	1	1	9	13
Mont-Louis	3	2	2	2	1	***	1	1	1	2	2	3	18	11
MEDITERRANEAN COAST:														
Nîmes	1	2	1	1	0	1	1	***	***	1	1	1	10	14
Perpignan	6	7	6	7	5	4	3	3	2	4	6	7	61	14
Marseille	4	4	6	4	3	2	2	2	2	3	3	3	38	14
Antibes	***	1	1	***	0	***	0	***	***	1	2	1	6	12

* Wind speed ≧32 m.p.h.

** Wind speed not defined.

*** <0.5 day.

FIGURE 23-16. MEAN DAILY MAXIMUM TEMPERATURES (°F.)

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	43	44	48	52	59	63	68	68	65	57	49	44	55	40
Cherbourg	47	48	50	54	60	64	67	68	65	59	53	49	57	40
Le Havre	45	47	52	58	65	70	73	73	69	61	51	47	59	40
Argentan	43	47	53	58	64	70	74	73	69	59	50	44	59	40
Paris	43	46	52	59	67	73	76	75	70	60	49	44	60	40
Reims	40	45	52	60	66	73	76	76	70	58	48	41	59	40
Brest	49	50	53	57	63	67	71	71	68	61	55	51	60	40
Rennes	46	49	54	59	67	71	76	75	70	61	52	48	61	40
Nantes	46	49	53	59	66	71	75	75	71	61	51	47	60	40
Tours	44	47	53	60	68	74	78	77	71	61	50	45	61	40
Avord	43	44	53	61	68	73	78	78	71	62	50	45	61	40
Rocheford	47	51	56	61	68	73	77	76	73	64	54	49	62	40
Angoulême	47	52	57	63	71	76	81	81	76	65	54	49	64	40
Bordeaux	48	52	58	62	70	76	80	80	76	66	55	50	66	40
Biarritz	52	54	57	60	66	71	74	76	73	67	58	54	64	40
INTERIOR HIGHLANDS:														
Metz	39	43	50	57	64	71	75	74	68	58	46	41	57	40
Strasbourg	38	43	50	58	67	72	75	74	68	57	44	40	57	40
Dijon	41	45	53	60	68	74	78	77	71	60	49	43	60	40
La Courtine	40	43	48	55	62	68	73	72	66	56	46	41	56	40
Clermont-Ferrand	44	48	54	60	68	74	78	78	72	63	51	46	61	40
Lyon	44	48	56	65	72	77	82	81	73	63	51	46	63	40
Grenoble	42	47	55	62	71	77	82	80	74	64	52	45	63	40
Montagne de L'Aigoual	32	33	35	39	49	56	61	61	55	46	38	34	45	40
Mont Ventoux	29	29	31	36	44	52	58	58	52	43	36	31	42	40
Toulouse	47	51	57	62	70	76	82	82	76	66	55	49	64	40
Mont-Louis	41	42	43	48	54	62	69	69	62	54	44	42	53	40
MEDITERRANEAN COAST:														
Nîmes	49	54	59	66	74	81	87	85	78	67	58	51	67	40
Perpignan	53	56	60	65	71	78	83	83	77	69	59	55	67	40
Marseille	52	55	59	65	72	79	84	83	77	68	59	53	67	40
Antibes	56	56	59	63	68	75	80	81	77	69	62	58	67	40
CORSICA:														
Ersa	53	53	56	61	68	75	80	80	75	68	61	56	65	*n a*
Ajaccio	56	58	62	66	73	80	85	86	81	73	65	60	70	*n a*
Bonifacio	55	56	59	62	68	76	81	82	77	71	62	57	67	*n a*

n a Data not available.

FIGURE 23–17. MEAN DAILY MINIMUM TEMPERATURES (°F.)

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	34	34	37	40	46	51	55	55	52	46	38	36	44	40
Cherbourg	40	40	41	44	49	53	57	58	55	50	45	42	48	40
Le Havre	37	37	39	43	48	53	56	56	53	47	42	39	46	40
Argentan	32	34	35	40	45	51	54	54	49	43	37	35	42	40
Paris	33	33	36	40	47	52	55	55	51	44	38	35	43	40
Reims	30	31	33	40	46	52	56	54	49	43	36	31	42	40
Brest	41	40	41	44	49	53	56	57	54	50	44	43	48	40
Rennes	35	36	37	41	46	51	54	54	50	44	39	37	44	40
Nantes	36	37	38	42	47	52	56	55	51	46	40	38	45	40
Tours	35	35	38	42	48	53	57	56	52	46	39	36	45	40
Avord	32	33	35	41	47	52	56	55	51	44	37	34	43	40
Rochefort	37	37	40	44	50	56	59	59	55	49	42	39	47	40
Angoulême	34	35	38	42	48	53	57	56	52	46	40	37	45	40
Bordeaux	35	37	40	44	50	54	58	57	54	48	41	38	46	40
Biarritz	41	42	45	48	53	58	62	62	60	54	46	44	51	40
INTERIOR HIGHLANDS:														
Metz	30	31	35	39	47	51	55	55	49	42	36	32	42	40
Strasbourg	29	30	35	40	48	54	57	56	51	43	36	31	42	40
Dijon	29	31	36	41	48	53	56	55	51	43	36	32	43	40
La Courtine	28	28	30	34	42	47	51	50	46	40	34	29	38	40
Clermont-Ferrand	30	31	35	39	45	50	53	52	48	42	36	32	41	40
Lyon	31	33	37	44	50	55	59	59	53	46	39	34	45	40
Grenoble	27	28	35	40	46	53	56	54	50	47	35	30	41	40
Montagne de L'Aigoual	24	24	26	30	37	43	47	48	44	37	30	27	35	40
Mont Ventoux	18	19	21	26	33	40	44	44	40	33	26	21	30	40
Toulouse	34	36	39	43	49	55	59	59	55	48	41	37	46	40
Mont-Louis	24	23	24	27	33	40	46	46	42	36	30	26	33	40
MEDITERRANEAN COAST:														
Nîmes	35	37	40	46	52	59	63	62	57	49	42	37	48	40
Perpignan	38	39	42	47	53	59	63	63	58	51	44	40	50	40
Marseille	36	37	41	45	51	57	61	60	56	50	43	38	48	40
Antibes	39	41	44	49	55	62	65	66	62	54	47	42	52	40
CORSICA:														
Ersa	44	43	46	49	55	62	67	67	63	56	50	46	54	*n a*
Ajaccio	40	41	44	48	53	59	64	64	61	54	48	44	52	*n a*
Bonifacio	44	44	46	50	55	62	66	67	63	57	51	47	54	*n a*

n a Data not available.

FIGURE 23-18. MEAN NUMBER OF DAYS WITH MINIMUM TEMPERATURE ≦32° F.

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	9	9	7	2	*	0	0	0	0	1	4	9	40	15
Cherbourg	3	3	1	*	0	0	0	0	0	0	1	2	10	22
Le Havre	8	7	4	1	0	0	0	0	0	*	3	7	29	35
Paris	16	13	10	3	*	0	0	0	0	2	7	13	64	47
Reims	14	16	16	7	1	*	0	0	*	4	7	14	79	10
Brest	6	3	3	*	0	0	0	0	0	*	2	5	20	16
Rennes	11	11	7	2	*	0	0	0	0	2	6	9	47	39
Nantes	7	9	5	1	0	0	0	0	0	1	5	8	36	14
Tours	10	9	4	1	0	0	0	0	0	*	5	7	35	25
Avord	13	15	10	4	*	0	0	0	*	2	6	12	63	10
Rochefort	8	8	3	*	0	0	0	0	0	*	3	6	30	40
Angoulême	10	10	7	2	*	0	0	0	0	2	6	9	45	21
Bourdeaux	10	13	5	2	0	0	0	0	*	1	4	8	45	10
Biarritz	4	4	*	0	0	0	0	0	0	0	*	3	11	10
INTERIOR HIGHLANDS:														
Metz	17	15	12	5	*	0	0	0	*	2	9	15	75	22
Strasbourg	17	15	9	2	0	0	0	0	0	2	10	15	69	20
Dijon	17	17	10	3	*	0	0	0	*	1	9	16	73	14
Clermont-Ferrand	14	15	10	4	1	*	0	0	1	3	9	15	72	18
Lyon	16	17	7	2	0	0	0	0	0	1	6	14	62	10
Grenoble	24	18	12	3	*	0	0	0	*	2	10	19	87	28
Montagne de L'Aigoual	27	26	24	20	6	1	0	0	2	10	18	25	159	19
Mont Ventoux	30	27	30	25	12	4	1	1	3	9	23	29	194	11
Toulouse	11	13	3	1	0	0	0	0	*	1	3	8	39	10
Mont-Louis	29	25	23	15	4	0	0	0	1	4	18	26	146	12
MEDITERRANEAN COAST:														
Nimes	8	7	2	*	0	0	0	0	0	*	2	7	25	16
Perpignan	5	3	1	0	0	0	0	0	0	0	*	4	13	10
Marseille	11	13	2	1	0	0	0	0	0	*	2	8	37	10
Antibes	1	1	*	0	0	0	0	0	0	0	*	2	4	14
CORSICA:														
Ersa	*	0	0	0	0	0	0	0	0	0	0	0	*	*n a*
Ajaccio	2	1	0	0	0	0	0	0	0	0	0	1	4	*n a*
Bonifacio	*	*	0	0	0	0	0	0	0	0	0	*	1	*n a*

n a Data not available.

* <0.5 day.

FIGURE 23–19. LOWEST TEMPERATURES (°F.)

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	10	4	19	26	32	41	44	44	39	27	17	10	4	15
Cherbourg	28	16	25	35	36	46	46	48	46	37	31	20	16	10
Le Havre	13	17	20	28	34	41	45	47	37	31	21	13	13	28
Paris	−2	4	10	24	29	36	40	41	33	22	5	−14	−14	172
Reims	9	−6	9	18	27	37	34	40	28	17	22	7	−6	7
Brest	12	16	23	27	33	40	43	41	38	30	18	19	12	63
Rennes	6	−3	18	26	28	36	37	37	33	23	15	11	−3	39
Nantes	12	5	20	27	30	36	42	39	31	22	18	10	5	48
Tours	15	0	20	25	32	40	46	46	36	24	21	12	0	11
Rochefort	14	16	23	25	34	42	47	47	35	27	18	12	12	33
Angoulême	14	12	15	24	32	36	41	43	33	25	17	3	3	21
Bordeaux	3	16	16	25	34	38	46	42	29	24	16	9	3	48
Biarritz	14	19	21	28	37	45	51	48	41	30	20	16	14	36
INTERIOR HIGHLANDS:														
Metz	−7	−3	6	23	29	35	43	41	32	21	13	−3	−7	32
Strasbourg	−7	−2	10	23	31	39	44	44	34	24	11	3	−7	32
Dijon	0	1	11	25	28	38	37	40	29	21	9	−1	−1	38
Clermont-Ferrand	0	−20	12	23	27	32	41	36	27	21	14	−14	−20	13
Lyon	−3	−1	9	26	31	37	43	41	32	24	15	−4	−4	78
Grenoble	4	−12	21	28	32	38	44	39	35	25	13	0	−12	8
Montagne de L'Aigoual	1	−9	1	12	20	28	33	33	21	14	6	−3	−9	19
Mont Ventoux	−12	−7	−5	−3	10	23	23	26	20	11	−3	−2	−12	30
Toulouse	−3	14	18	24	33	39	45	44	34	26	17	3	−3	78
Mont-Louis	−2	2	9	18	23	32	35	36	26	22	12	2	−2	12
MEDITERRANEAN COAST:														
Nimes	19	9	21	28	36	42	51	49	43	30	23	19	9	16
Perpignan	17	18	23	29	36	45	48	48	41	30	22	21	17	51
Marseille	14	9	20	28	32	41	47	47	34	27	21	11	9	112
Antibes	29	17	31	38	41	48	52	54	49	39	30	26	17	14

FIGURE 23–20. MEAN NUMBER OF DAYS WITH MAXIMUM TEMPERATURE ≧86° F.

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	0	0	0	0	0	*	*	1	*	0	0	0	1	10
Cherbourg	0	0	0	0	0	0	0	*	0	0	0	0	*	10
Paris	0	0	0	0	*	1	4	3	1	0	0	0	8	10
Reims	0	0	0	0	*	1	3	3	1	0	0	0	7	10
Brest	0	0	0	0	0	0	*	*	0	0	0	0	*	10
Rennes	0	0	0	0	0	*	1	2	1	0	0	0	4	10
Nantes	0	0	0	0	*	*	3	4	*	0	0	0	7	10
Tours	0	0	0	0	0	*	4	3	1	0	0	0	8	10
Avord	0	0	0	0	0	1	4	4	2	0	0	0	11	10
Bordeaux	0	0	0	0	0	2	6	7	2	*	0	0	17	10
Biarritz	0	0	0	0	*	1	1	3	1	0	0	0	6	10
INTERIOR HIGHLANDS:														
Strasbourg	0	0	0	0	*	1	4	3	1	0	0	0	9	10
Dijon	0	0	0	0	*	2	5	6	1	0	0	0	14	10
Clermont-Ferrand	0	0	0	0	*	2	6	7	2	0	0	0	16	10
Lyon	0	0	0	0	*	2	6	6	2	0	0	0	17	10
Toulouse	0	0	0	0	*	2	7	7	2	0	0	0	18	10
MEDITERRANEAN COAST:														
Nimes	0	0	0	0	1	4	16	14	3	0	0	0	38	10
Perpignan	0	0	0	0	1	3	11	8	3	*	0	0	25	10
Marseille	0	0	0	0	*	2	14	10	2	0	0	0	28	10
Antibes	0	0	0	0	0	1	4	3	1	0	0	0	8	10
CORSICA:														
Ersa	0	0	0	0	0	1	5	5	*	0	0	0	11	*n a*
Ajaccio	0	0	0	0	*	4	10	11	3	1	0	0	29	*n a*
Bonifacio	0	0	0	0	*	1	4	4	1	0	0	0	10	*n a*

n a Data not available.

* <0.5 day.

FIGURE 23-21. HIGHEST TEMPERATURES (°F.)

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	57	62	71	77	86	84	91	94	91	84	64	59	94	15
Cherbourg	60	63	67	75	78	80	84	91	85	72	65	59	91	10
Le Havre	59	64	76	80	89	92	96	96	97	85	67	63	97	28
Paris	60	69	79	85	92	96	101	99	96	83	71	64	101	172
Reims	57	57	72	83	86	90	96	96	96	78	67	60	96	7
Brest	62	69	75	83	90	92	100	95	95	86	72	61	100	63
Rennes	62	63	74	84	88	98	105	100	98	86	69	64	105	39
Nantes	64	65	74	83	88	94	102	99	98	88	71	62	102	48
Tours	60	65	71	82	83	91	97	97	93	80	67	61	97	11
Rochefort	63	69	75	79	89	94	98	102	95	87	71	68	102	33
Angoulême	66	71	77	84	95	96	104	105	100	83	75	67	105	21
Bordeaux	67	79	84	86	96	97	103	107	100	88	77	68	107	48
Biarritz	73	79	84	86	99	99	99	103	98	93	80	73	103	35
INTERIOR HIGHLANDS:														
Metz	57	68	71	79	94	92	98	98	90	78	69	60	98	32
Strasbourg	62	67	73	80	92	90	99	96	89	76	71	64	99	32
Dijon	69	67	76	86	94	96	102	100	97	83	74	62	102	36
Clermont-Ferrand	61	71	76	84	89	98	99	102	95	84	75	71	102	13
Lyon	66	69	77	82	94	97	101	101	95	82	73	65	101	78
Grenoble	66	70	80	81	90	100	99	99	93	82	76	68	100	9
Montagne de L'Aigoual	55	59	61	64	72	80	83	85	79	68	61	56	85	19
Mont Ventoux	54	50	55	51	65	70	79	79	84	63	57	51	84	30
Toulouse	66	77	83	86	93	98	105	106	100	95	79	66	106	78
Mont-Louis	53	61	63	77	81	89	91	89	82	72	65	55	91	12
MEDITERRANEAN COAST:														
Nimes	67	75	77	82	93	107	99	107	94	84	77	68	107	16
Perpignan	72	80	84	83	94	95	101	99	95	89	75	76	101	51
Marseille	69	71	79	83	93	99	100	101	92	86	76	70	101	112
Antibes	72	69	71	81	83	90	94	97	91	87	77	73	97	14

FIGURE 23-22. MEAN RELATIVE HUMIDITY (%)

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	89	87	83	82	80	80	80	81	84	86	90	90	84	10
Cherbourg	83	81	79	78	78	79	79	80	81	79	81	82	80	10
Le Havre	85	81	78	77	76	76	76	76	81	79	84	85	79	10
Argentan	86	80	84	72	71	69	71	74	77	83	86	87	77	10
Paris	84	79	71	67	63	65	64	67	72	79	85	85	74	10
Reims	87	80	72	69	67	67	68	70	75	82	87	87	74	10
Brest	85	84	82	84	85	85	85	85	85	85	84	85	84	10
Rennes	85	81	73	74	74	74	74	75	78	82	86	86	74	10
Tours	87	79	73	70	70	68	64	67	73	81	87	88	75	10
Avord	86	79	73	70	70	69	65	68	69	82	85	88	74	10
Rochefort	88	81	78	77	76	75	74	74	78	85	89	91	81	10
Angoulême	84	77	71	70	69	69	66	69	74	81	86	87	76	10
Bordeaux	85	78	75	70	69	69	67	68	74	82	87	88	76	10
INTERIOR HIGHLANDS:														
Metz	84	78	70	66	66	66	60	68	76	82	87	86	74	10
Strasbourg	87	80	75	70	69	68	68	73	77	86	88	88	74	10
Dijon	85	78	68	67	67	66	64	65	71	81	85	86	73	10
Clermont-Ferrand	83	76	69	71	72	71	69	71	75	79	82	83	75	10
Lyon	81	75	70	67	66	62	60	65	70	77	81	83	72	10
Toulouse	82	77	73	69	69	65	60	60	69	78	83	85	73	10
MEDITERRANEAN COAST:														
Nimes	66	61	63	58	56	53	47	52	63	69	73	70	61	10
Perpignan	64	61	64	58	58	56	54	57	64	68	70	69	63	10
Antibes	68	68	69	72	72	69	68	68	70	70	70	70	69	10
CORSICA:														
Ajaccio	75	73	71	69	69	63	61	61	67	71	77	77	70	*n a*

n a Data not available.

FIGURE 23-23. MEAN RELATIVE HUMIDITY (%) AT SPECIFIED HOURS

STATION	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:															
Saint-Inglevert	0700	93	92	91	90	87	88	89	90	92	93	93	92	91	10
	1300	86	82	74	74	74	74	73	72	73	79	85	87	78	10
	1800	88	87	84	81	79	79	79	81	86	87	91	91	84	10
Cherbourg	0700	86	85	85	84	83	84	85	86	87	84	84	84	85	10
	1300	80	78	73	73	74	75	75	75	75	73	78	79	76	10
	1800	83	81	78	77	77	77	77	78	82	80	82	82	80	10
Le Havre	0700	88	86	86	85	83	85	86	86	86	86	88	88	86	10
	1300	82	76	73	73	72	72	71	71	71	73	80	83	75	10
	1800	85	80	76	75	74	72	72	72	75	78	83	84	77	10
Argentan	0700	91	90	89	86	86	85	86	90	91	93	93	91	89	10
	1300	80	72	62	62	59	55	62	64	64	73	79	83	68	10
	1800	87	78	70	69	68	67	66	67	75	83	86	87	75	10
Paris	0700	90	88	87	84	81	80	79	85	89	91	91	90	86	10
	1300	79	72	61	56	56	55	56	56	60	68	78	80	65	10
	1800	84	78	66	62	62	60	58	60	68	78	85	85	71	10
Reims	0700	91	89	88	85	83	83	83	88	92	93	93	91	88	10
	1300	83	72	59	58	55	56	58	58	62	71	81	82	66	10
	1800	88	80	68	65	64	63	63	63	72	83	88	88	74	10
Brest	0700	86	86	87	88	90	90	90	90	90	87	86	84	88	10
	1300	84	82	78	81	81	81	80	80	80	80	83	81	81	10
	1800	85	84	82	83	84	84	84	84	85	86	86	83	84	10
Rennes	0700	91	90	89	89	89	88	89	93	95	93	93	91	91	10
	1300	78	71	64	64	64	64	63	62	66	71	79	80	69	10
	1800	85	76	68	68	68	68	65	65	73	81	87	87	74	10
Tours	0700	93	91	89	88	86	84	83	87	91	94	94	93	89	10
	1300	81	71	61	59	59	59	54	55	60	68	80	83	66	10
	1800	87	77	66	64	64	61	56	59	68	80	88	88	71	10
Avord	0700	92	89	89	87	87	84	83	87	91	93	92	92	89	10
	1300	81	71	61	59	59	59	54	56	59	71	77	83	66	10
	1800	86	79	68	64	64	63	58	61	69	81	86	89	72	10
Rochefort	0700	93	91	91	90	88	87	87	90	93	94	95	94	91	10
	1300	82	73	68	68	68	67	65	62	66	75	83	87	72	10
	1800	88	80	75	74	73	72	69	70	76	85	91	91	79	10
Angoulême	0700	91	89	86	86	86	86	85	88	91	93	93	92	89	10
	1300	78	69	61	59	59	59	55	57	61	69	79	82	66	10
	1800	83	74	67	66	64	62	57	61	70	80	87	87	72	10
Bordeaux	0700	93	91	91	89	87	86	87	90	94	95	95	94	91	10
	1300	76	67	66	58	58	58	56	54	59	68	77	81	65	10
	1800	86	75	67	63	62	62	59	59	69	82	89	90	72	10
Biarritz	0700	80	81	78	81	84	85	86	86	86	84	82	80	83	5
	1300	71	74	68	71	75	76	73	73	74	73	74	76	78	5
	1800	*Data not available*													
INTERIOR HIGHLANDS:															
Metz	0700	89	88	86	82	82	81	74	86	92	93	92	91	86	10
	1300	79	69	58	57	57	56	51	57	62	71	82	82	65	10
	1800	84	77	65	60	60	60	55	62	74	82	88	86	71	10
Strasbourg	0700	91	90	89	84	83	82	81	87	90	93	93	91	88	10
	1300	81	71	64	59	59	58	57	61	64	71	81	84	68	10
	1800	88	80	72	68	67	66	65	71	78	84	90	89	76	10
Dijon	0700	90	88	81	78	78	77	74	77	83	89	92	91	83	10
	1300	79	69	58	58	58	58	57	53	59	70	76	81	65	10
	1900	85	77	66	65	65	64	60	62	70	81	87	85	72	10
Clermont-Ferrand	0700	87	86	84	83	82	81	81	84	88	88	89	88	85	10
	1300	76	66	58	61	63	64	60	61	62	67	73	76	66	10
	1800	85	77	66	68	70	69	65	67	74	81	85	84	74	10
Lyon	0700	87	86	84	79	77	75	73	81	85	88	88	88	83	10
	1300	74	65	58	56	55	52	50	52	56	64	73	78	61	10
	1800	82	75	69	66	65	60	56	61	69	79	82	84	71	10
Toulouse	0700	90	89	87	84	83	81	78	81	88	91	91	90	86	10
	1300	74	66	62	58	58	55	49	48	55	64	73	78	62	10
	1800	83	76	71	66	65	59	52	52	66	80	85	87	70	10

See footnote at end of table.

FIGURE 23-23 (*Continued*)

STATION	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
MEDITERRANEAN COAST:															
Nimes	0700	74	72	74	69	66	64	59	65	74	79	81	77	71	10
	1300	56	49	52	48	47	44	37	40	50	56	62	62	50	10
	1800	69	62	62	57	56	52	46	52	64	71	76	72	62	10
Perpignan	0700	72	71	75	67	66	64	63	67	74	77	78	75	71	10
	1300	54	50	53	50	49	48	46	48	53	56	59	60	52	10
	1800	66	63	65	58	58	55	52	57	66	71	74	71	63	10
Antibes	0700	72	72	73	74	75	70	70	68	73	73	73	73	72	10
	1300	61	62	64	68	69	66	65	65	64	63	63	63	64	10
	1800	71	71	71	73	73	70	70	70	73	73	73	73	72	10
CORSICA:															
Ajaccio	0700	83	82	79	76	76	70	67	68	73	78	84	83	77	*n a*
	1300	63	61	61	59	59	54	51	51	57	60	66	67	59	*n a*
	1800	78	75	74	72	72	66	65	65	72	76	80	81	73	*n a*

n a Data not available.

FIGURE 23-24. MEAN PRECIPITATION (INCHES)

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	2.8	2.2	2.2	2.1	2.2	2.1	2.4	2.8	2.7	4.5	3.6	3.6	33.2	40
Cherbourg	3.2	2.9	2.8	2.0	1.9	1.8	1.9	3.0	2.9	4.9	5.0	5.4	37.6	40
Le Havre	2.7	2.4	2.5	2.4	2.4	2.4	2.5	2.7	2.3	3.3	3.9	3.6	33.0	40
Argentan	1.8	1.7	2.1	1.7	1.7	1.9	2.4	2.3	1.7	2.9	2.9	2.9	26.1	40
Paris	1.3	1.5	1.8	1.9	2.1	2.1	2.3	1.9	1.9	2.4	2.0	2.3	23.9	40
Reims	1.8	1.5	1.9	1.9	2.1	2.1	2.6	2.3	1.7	2.6	2.3	2.3	25.2	40
Brest	3.5	2.8	2.5	2.3	1.7	1.7	2.0	2.2	2.2	4.0	4.0	4.3	33.2	40
Rennes	2.3	1.9	2.0	1.9	2.0	2.0	2.0	1.8	1.9	3.0	2.7	3.1	26.7	40
Nantes	2.6	2.4	2.6	2.2	2.2	2.1	2.1	1.8	2.0	3.7	3.5	3.8	30.9	40
Tours	2.1	1.9	2.2	2.0	2.3	2.2	1.9	1.8	1.7	2.8	2.8	2.7	26.4	40
Avord	1.9	1.7	2.2	2.2	2.2	2.9	2.5	2.2	2.2	2.7	2.3	2.1	26.9	40
Rochefort	2.5	2.3	2.5	2.2	2.1	2.0	1.7	1.9	2.6	3.5	3.8	3.7	30.4	40
Angoulême	2.3	2.6	2.7	2.5	2.8	2.9	2.0	2.2	2.2	3.1	3.1	3.2	31.7	40
Bordeaux	2.6	2.7	3.1	2.6	2.6	2.4	2.0	1.9	2.2	3.2	3.7	3.9	32.8	40
Biarritz	4.1	3.8	4.3	4.0	3.4	3.1	2.6	3.2	4.3	6.4	5.7	4.6	49.4	40
INTERIOR HIGHLANDS:														
Metz	2.0	1.6	1.9	1.8	2.0	2.3	2.7	2.5	2.2	2.6	2.4	2.5	26.5	40
Strasbourg	1.5	1.3	1.7	2.1	2.5	2.7	3.5	3.0	2.7	2.6	2.0	1.9	26.4	40
Dijon	1.9	1.6	2.0	2.0	2.2	2.7	2.4	2.4	2.1	3.1	2.7	2.4	27.4	40
La Courtine	4.3	3.9	5.3	5.0	4.6	4.6	3.9	3.8	3.8	4.4	5.1	5.4	54.1	40
Clermont-Ferrand	1.2	1.3	1.8	2.1	2.9	3.2	2.6	2.7	2.7	2.3	1.9	1.5	26.1	40
Lyon	1.3	1.7	2.3	2.4	3.1	3.2	2.6	3.5	3.0	4.1	3.1	2.2	32.6	40
Grenoble	2.6	2.4	2.9	3.2	3.1	3.3	3.0	3.6	3.3	4.2	3.3	3.5	38.5	40
Montagne de L'Aigoual	7.2	5.9	7.7	7.2	7.8	5.1	2.8	3.5	8.4	13.4	12.7	8.2	90.0	40
Mont Ventoux	2.6	2.9	3.6	4.0	5.7	4.4	2.5	3.4	4.2	5.9	5.2	4.0	48.4	40
Toulouse	1.8	1.7	2.4	2.7	3.0	2.5	1.6	2.0	2.3	2.3	2.4	2.2	26.9	40
Mont-Louis	3.5	2.5	3.1	3.0	3.3	3.3	2.7	2.4	2.2	2.8	2.6	3.0	34.4	40
MEDITERRANEAN COAST:														
Nimes	1.5	1.5	2.4	2.2	2.7	1.9	1.0	2.2	2.6	4.2	3.0	2.0	27.2	40
Perpignan	2.4	1.2	2.1	2.0	1.9	1.5	0.9	1.3	1.5	3.3	3.0	2.4	23.5	40
Marseille	1.6	1.6	2.2	1.8	1.7	1.0	0.7	0.7	2.2	3.9	3.0	2.1	22.5	40
Antibes	2.6	2.7	3.3	2.0	1.9	1.2	0.7	0.8	2.5	5.6	4.0	3.5	31.4	40
CORSICA:														
Ersa	3.0	2.3	2.3	2.0	1.7	1.1	0.2	0.8	2.3	4.3	4.0	3.0	27.0	*n a*
Ajaccio	3.3	2.2	2.7	2.1	1.9	1.2	0.3	0.7	2.2	3.6	5.0	3.2	28.3	*n a*
Bonifacio	2.5	1.9	2.0	1.6	1.2	0.8	0.1	0.4	1.7	2.9	4.3	2.8	22.2	*n a*
Bastia	4.5	3.0	3.3	2.8	2.4	1.5	0.6	1.3	3.3	6.0	5.6	4.5	38.7	*n a*
Alistro	3.7	2.5	2.8	2.4	2.0	1.2	0.3	0.8	2.7	4.7	5.6	3.9	32.5	*n a*
Vivario	6.5	4.0	5.2	2.0	4.3	2.2	1.0	1.6	4.3	6.6	10.6	8.0	58.2	*n a*
Bastelica	6.7	4.8	6.1	4.3	4.6	2.3	1.0	1.6	4.3	6.3	9.8	7.7	59.6	*n a*

n a Data not available.

FIGURE 23–25. GREATEST PRECIPITATION (INCHES)

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	5.6	4.4	3.1	3.8	4.9	4.6	6.2	5.6	7.7	11.3	7.6	6.1	46.3	15
Cherbourg	8.2	7.1	5.9	5.8	4.6	3.3	4.2	7.9	6.0	10.5	9.9	13.4	51.1	21
Le Havre	5.9	4.2	5.8	4.6	5.4	6.6	5.6	7.0	11.3	6.9	7.7	6.3	42.6	34
Paris	2.4	3.5	3.6	4.0	3.7	4.2	4.7	4.9	4.6	6.2	4.5	5.3	29.8	50
Reims	2.7	2.7	2.1	2.7	4.0	3.7	4.1	5.2	3.5	4.3	2.6	4.3	*n a*	7
Brest	9.0	6.1	4.7	5.1	4.2	4.3	3.7	3.7	4.8	7.3	9.5	8.2	*n a*	11
Rennes	4.2	5.4	4.0	4.2	4.1	4.0	6.6	7.4	5.2	8.4	7.0	7.3	39.2	39
Nantes	8.0	6.4	6.2	6.3	4.9	4.1	4.7	5.1	6.0	8.6	9.0	10.0	41.6	54
Tours	5.0	6.9	4.5	5.2	6.4	5.0	6.0	8.4	4.9	7.2	9.1	5.2	*n a*	78
Rochefort	6.1	6.0	6.7	6.6	4.4	5.2	5.1	5.7	6.2	8.1	8.7	7.1	47.9	40
Angoulême	7.1	5.3	6.4	8.4	4.8	5.2	5.5	6.5	5.8	5.3	6.4	6.9	43.9	21
Bordeaux	4.9	7.2	8.1	3.9	5.0	5.6	3.7	7.6	6.8	7.0	7.8	8.4	*n a*	11
Biarritz	8.8	6.8	6.0	8.1	6.9	8.8	11.2	9.0	13.0	12.8	13.3	6.8	72.3	10
INTERIOR HIGHLANDS:														
Metz	5.0	4.7	4.0	3.5	4.3	4.9	4.5	5.7	5.3	6.2	6.9	4.2	35.4	27
Strasbourg	3.6	2.9	3.4	6.2	5.1	6.1	6.1	6.6	6.0	6.4	4.9	3.2	*n a*	24
Dijon	4.5	3.7	4.4	5.2	8.3	6.1	4.8	6.7	5.4	8.0	7.1	5.4	58.1	40
Clermont-Ferrand	3.0	1.9	3.3	4.4	5.9	6.0	5.5	7.5	5.6	5.5	3.5	3.0	*n a*	18
Lyon	5.3	4.9	4.9	6.3	10.0	8.1	6.4	9.7	8.4	9.7	7.5	5.6	45.2	90
Grenoble	7.0	7.5	6.7	9.4	9.8	5.9	9.4	15.3	9.8	10.7	9.3	9.3	55.8	35
Montagne de L'Aigoual	23.4	19.3	13.8	21.7	49.0	17.1	8.7	10.2	30.2	30.8	25.4	39.4	137.4	19
Mont Ventoux	6.7	6.8	18.0	10.4	8.8	9.9	8.7	8.0	9.4	11.3	12.3	8.1	70.7	11
Toulouse	5.1	3.9	6.0	6.1	6.6	7.6	5.2	5.5	9.5	5.9	5.5	7.1	41.1	50
Mont-Louis	4.4	6.0	7.8	6.1	5.8	5.0	5.6	3.9	4.9	4.3	4.7	9.2	50.0	12
MEDITERRANEAN COAST:														
Nimes	7.3	4.3	7.9	10.9	5.4	3.6	3.6	4.9	12.0	7.0	12.7	7.3	42.2	16
Perpignan	10.0	9.0	8.2	7.5	5.3	5.0	5.5	7.5	7.8	14.1	10.4	17.5	52.8	50
Marseille	4.9	5.1	5.5	6.6	6.9	3.8	4.2	4.8	11.1	12.4	10.5	9.4	43.0	60
Antibes	10.4	5.8	5.6	8.3	6.3	3.8	2.0	2.3	9.0	10.4	21.0	9.5	52.9	14

n a Data not available.

FIGURE 23–26. LEAST PRECIPITATION (INCHES)

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	1.4	0.4	0.4	0.5	0.5	0.2	0.2	0.4	0.3	0.7	1.4	0.6	15.8	15
Cherbourg	0.9	0.1	0.0	0.1	0.6	0.0	0.1	0.9	0.7	0.7	1.5	0.9	16.7	21
Le Havre	0.2	0.2	0.1	0.8	0.4	0.3	0.3	0.6	0.3	0.5	0.8	0.7	24.3	34
Paris	0.2	0.1	0.2	0.0	0.0	0.0	0.2	0.4	0.0	0.2	0.4	0.6	10.9	50
Reims	1.0	0.1	0.0	0.7	0.5	1.3	0.6	0.4	0.8	1.3	1.2	0.3	*n a*	7
Brest	1.0	0.5	0.2	1.5	0.5	0.7	0.1	1.0	0.9	0.1	1.2	1.2	*n a*	11
Rennes	0.9	*	0.4	0.0	0.1	*	0.1	0.4	0.2	0.4	0.8	0.9	18.3	39
Nantes	0.3	0.0	0.1	0.1	0.5	0.0	0.1	0.2	0.2	0.4	0.6	0.3	16.1	54
Tours	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.3	*n a*	78
Rochefort	0.4	0.0	0.1	0.2	0.4	0.0	0.0	0.3	0.1	0.3	0.8	1.1	16.9	40
Angoulême	0.8	0.1	*	0.9	0.5	0.6	0.6	0.5	0.7	0.6	1.2	0.5	28.1	21
Bordeaux	0.5	0.1	0.0	0.6	0.4	1.1	0.4	0.5	0.6	0.8	2.4	1.0	*n a*	11
Biarritz	1.1	0.5	2.4	1.5	2.1	0.7	0.6	0.4	1.5	2.7	2.4	2.2	31.8	10
INTERIOR HIGHLANDS:														
Metz	0.5	0.2	0.2	0.9	1.0	1.1	0.7	0.5	0.2	0.2	0.7	*	16.9	27
Strasbourg	0.8	0.4	0.2	0.3	0.6	0.6	0.6	1.5	0.3	0.3	0.5	0.4	*n a*	24
Dijon	0.2	0.1	0.2	0.2	0.4	0.2	0.3	0.4	0.0	0.5	0.5	0.3	16.1	40
Clermont-Ferrand	0.1	0.1	0.5	0.5	0.4	0.9	0.6	0.2	0.5	0.3	0.3	0.3	*n a*	18
Lyon	0.1	0.0	0.0	0.2	0.7	0.1	0.1	0.3	0.0	0.0	0.0	0.0	18.9	90
Grenoble	0.0	0.3	0.0	0.2	1.0	0.3	0.0	0.0	0.0	0.4	0.6	0.0	25.8	35
Montagne de L'Aigoual	1.0	0.7	0.4	1.9	1.1	0.8	0.7	0.8	2.0	4.9	3.3	1.7	44.7	19
Mont Ventoux	0.7	1.1	2.4	1.0	2.0	1.2	0.2	0.4	1.7	0.5	1.9	1.1	32.8	11
Toulouse	0.3	0.2	0.0	0.5	0.7	0.3	0.0	0.0	0.0	0.3	0.2	0.6	18.3	50
Mont-Louis	0.2	1.2	0.9	0.9	0.7	0.8	0.4	0.8	0.7	0.6	0.5	0.5	20.7	12
MEDITERRANEAN COAST:														
Nimes	0.1	0.1	0.2	0.5	0.3	*	*	0.1	0.7	0.2	0.5	0.3	20.1	16
Perpignan	0.0	0.0	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	12.9	50
Marseille	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	8.6	60
Antibes	0.1	0.1	0.0	0.4	0.2	*	0.0	0.0	0.2	0.1	0.2	0.7	19.6	14

n a Data not available. * <0.05 inch.

FIGURE 23-27. MEAN NUMBER OF DAYS WITH PRECIPITATION ≧0.004 INCH

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	18	15	14	15	14	11	13	14	15	17	18	18	182	40
Cherbourg	19	14	15	14	13	8	11	14	13	17	18	19	175	40
Le Havre	21	15	16	16	15	11	13	12	15	17	19	19	189	40
Argentan	20	14	15	16	15	11	14	13	12	16	17	20	183	40
Paris	17	14	13	14	14	12	12	12	12	14	15	17	166	40
Reims	15	10	12	12	11	13	14	10	12	15	13	14	151	40
Brest	24	16	15	16	16	10	13	15	12	17	20	22	196	40
Rennes	19	15	13	16	16	10	14	12	12	16	19	19	181	40
Nantes	18	14	13	16	15	11	13	14	12	16	17	18	177	40
Tours	17	13	13	15	13	11	11	12	10	14	15	17	161	40
Avord	16	14	12	15	14	12	12	12	10	15	16	16	164	40
Rochefort	18	15	15	17	15	12	13	14	12	16	18	19	184	40
Angoulême	17	13	14	15	14	11	11	11	10	14	16	17	163	40
Bordeaux	17	14	12	16	15	14	12	10	12	14	16	18	170	40
Biarritz	16	15	16	18	16	14	10	9	9	13	14	15	165	40
INTERIOR HIGHLANDS:														
Metz	15	13	12	15	13	12	13	14	15	15	16	17	170	40
Strasbourg	16	12	12	16	15	14	14	14	13	14	15	16	171	40
Dijon	14	13	13	15	14	12	11	12	11	15	16	15	161	40
La Courtine	17	13	15	15	16	14	12	11	11	16	19	18	177	40
Clermont-Ferrand	11	11	13	15	14	12	10	10	11	11	12	12	142	40
Lyon	13	11	13	14	14	12	11	11	11	12	14	14	150	40
Grenoble	13	10	12	15	14	11	9	8	9	11	12	12	136	40
Montagne de L'Aigoual	14	13	15	16	15	12	10	9	12	16	16	15	162	40
Mont Ventoux	15	15	13	18	16	11	7	9	10	12	14	18	158	40
Toulouse	15	12	12	16	14	10	8	8	9	11	13	16	144	40
Mont-Louis	7	8	9	11	11	9	7	7	8	8	9	8	102	40
MEDITERRANEAN COAST:														
Nimes	7	7	8	9	8	6	3	5	6	8	10	9	86	40
Perpignan	6	7	8	8	9	5	4	5	6	7	8	7	80	40
Marseille	9	7	8	8	8	4	2	4	6	8	9	9	82	40
Antibes	7	7	8	8	6	5	3	3	7	8	9	8	79	40
CORSICA:														
Ersa	8	7	8	6	3	2	1	2	4	6	9	8	64	*n a*
Ajaccio	10	9	10	8	5	3	1	2	5	8	11	10	82	15
Bonifacio	9	8	9	6	5	2	1	1	4	8	11	10	74	*n a*

n a Data not available.

FIGURE 23–28. MEAN NUMBER OF DAYS WITH PRECIPITATION ≧0.04 INCH

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	14	11	10	10	9	8	10	10	11	13	13	13	132	15
Cherbourg	15	10	11	11	10	5	8	11	10	13	14	15	133	15
Le Havre	15	10	10	11	10	7	8	7	10	12	14	14	128	15
Argentan	13	8	9	11	11	7	9	8	8	12	11	14	121	15
Paris	13	9	11	10	11	8	11	10	8	10	11	12	124	15
Reims	10	6	8	9	8	10	11	7	10	10	8	9	106	15
Brest	17	12	12	13	12	7	9	11	9	12	15	16	145	15
Rennes	13	10	9	11	11	7	9	8	8	10	12	12	120	15
Nantes	12	10	10	12	10	7	8	9	8	10	11	12	119	15
Tours	11	8	9	11	10	8	8	10	8	10	11	12	116	15
Avord	11	10	9	11	11	10	10	10	7	11	12	11	123	15
Rochefort	14	12	12	13	11	9	10	10	8	12	14	15	140	15
Angoulême	13	10	11	12	11	9	9	8	7	10	12	13	125	15
Bordeaux	13	11	10	13	12	12	10	8	10	11	13	14	137	15
INTERIOR HIGHLANDS:														
Metz	12	10	10	11	11	10	10	11	12	12	13	13	136	15
Strasbourg	10	8	8	12	12	10	11	11	10	10	9	10	121	15
Dijon	10	9	9	11	10	10	9	9	8	11	11	11	118	15
Clermont-Ferrand	6	7	9	11	10	9	8	8	9	8	8	7	100	15
Lyon	8	7	9	10	10	9	9	9	8	8	10	9	106	15
Toulouse	11	9	9	13	11	8	6	6	7	7	8	11	106	15
MEDITERRANEAN COAST:														
Nîmes	5	5	6	6	6	4	3	4	5	5	7	6	62	15
Perpignan	4	5	6	6	6	3	3	4	4	5	5	4	55	15
Marseille	5	4	6	6	5	3	1	2	2	2	7	7	54	15
Antibes	5	6	7	7	5	4	2	2	5	6	7	6	62	15
CORSICA:														
Ajaccio	8	7	8	7	5	3	1	2	4	7	10	8	70	15

FIGURE 23–29. MEAN NUMBER OF DAYS WITH PRECIPITATION ≧0.4 INCH

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	2	1	0	1	1	1	2	2	3	4	4	3	24	15
Cherbourg	4	2	2	2	1	1	2	2	2	4	4	4	30	15
Le Havre	2	1	1	2	2	1	1	2	2	2	2	3	21	15
Argentan	1	1	1	1	1	1	1	1	2	3	2	1	16	15
Paris	3	3	2	2	1	1	2	1	3	2	1	2	23	15
Reims	2	0	1	1	1	1	2	2	1	1	1	1	14	15
Brest	3	2	2	3	2	1	2	2	2	2	3	3	27	15
Rennes	3	3	2	2	2	1	1	1	2	2	2	2	23	15
Nantes	2	2	2	3	2	1	2	2	2	2	2	2	24	15
Tours	1	1	1	2	2	2	2	2	2	2	2	2	21	15
Avord	1	1	1	2	3	2	2	2	1	2	2	1	20	15
Rochefort	3	2	2	2	2	2	2	2	2	3	4	4	30	15
Angoulême	3	2	2	3	3	2	2	2	1	2	3	3	28	15
Bordeaux	2	2	2	3	3	3	2	1	2	3	4	3	30	15
INTERIOR HIGHLANDS:														
Metz	1	2	2	1	2	2	3	2	2	3	3	2	25	15
Strasbourg	0	0	0	1	3	2	2	2	2	4	2	1	19	15
Dijon	2	1	1	2	2	2	2	2	2	2	3	3	24	15
Clermont-Ferrand	1	1	2	2	2	2	2	2	3	2	1	1	21	15
Lyon	1	1	2	2	2	2	3	3	2	2	3	2	25	15
Toulouse	2	2	2	3	2	2	1	1	2	1	2	2	22	15
MEDITERRANEAN COAST:														
Nîmes	2	2	2	2	2	1	1	1	2	2	2	2	21	15
Perpignan	1	1	2	2	1	1	1	1	1	2	2	1	16	15
Marseille	1	1	2	2	1	1	0	0	2	2	3	3	18	15
Antibes	2	2	2	2	2	1	0	1	2	3	3	3	23	15
CORSICA:														
Ajaccio	3	2	2	2	2	1	1	1	1	3	4	4	26	15

FIGURE 23–30. MEAN NUMBER OF DAYS WITH SNOWFALL

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	3	4	2	1	0	0	0	0	0	0	1	2	12	15
Cherbourg	1	2	2	1	0	0	0	0	0	*	*	1	6	22
Le Havre	2	2	2	1	*	0	0	0	0	0	1	1	9	35
Paris	4	3	2	*	0	0	0	0	0	*	1	2	12	10
Reims	3	4	2	1	0	0	0	0	0	0	*	3	7	13
Brest	*	1	1	0	0	0	0	0	0	0	0	*	3	14
Rennes	1	1	2	1	*	0	0	0	0	0	0	1	6	39
Nantes	1	2	1	0	0	0	0	0	0	0	*	1	4	10
Tours	2	2	1	1	0	0	0	0	0	0	1	1	7	25
Rochefort	*	1	1	*	0	0	0	0	0	0	*	*	3	40
Angoulême	1	2	1	*	0	0	0	0	0	0	1	1	6	21
Bordeaux	1	1	*	0	0	0	0	0	0	0	0	1	3	11
Biarritz	1	2	1	0	0	0	0	0	0	0	*	1	4	8
INTERIOR HIGHLANDS:														
Metz	5	5	3	1	0	0	0	0	0	*	2	4	20	11
Strasbourg	6	6	5	2	*	0	0	0	0	*	2	3	24	11
Dijon	3	2	1	*	0	0	0	0	0	0	*	1	8	14
Clermont-Ferrand	7	5	5	1	*	0	0	0	0	*	2	4	24	*n a*
Lyon	4	4	1	1	0	0	0	0	0	*	1	4	14	10
Grenoble	3	2	3	*	1	*	0	0	0	*	1	2	11	9
Montagne de L'Aigoual	7	8	8	9	2	*	0	0	*	3	6	7	51	19
Mont Ventoux	8	8	12	10	4	1	0	0	*	2	8	11	65	11
Toulouse	2	3	1	0	0	0	0	0	0	0	*	1	7	10
Mont-Louis	5	6	6	5	1	*	0	0	*	1	4	5	33	12
MEDITERRANEAN COAST:														
Nimes	1	1	*	0	0	0	0	0	0	0	*	1	3	16
Perpignan	1	1	*	0	0	0	0	0	0	0	0	*	2	10
Marseille	1	1	1	*	0	0	0	0	0	0	0	*	3	30
Antibes	*	*	0	0	0	0	0	0	0	0	0	*	1	14
CORSICA:														
Ersa	1	1	0	0	0	0	0	0	0	0	0	*	2	*n a*
Ajaccio	*	1	0	0	0	0	0	0	0	0	0	*	1	*n a*
Bonifacio	1	1	0	0	0	0	0	0	0	0	0	*	2	*n a*

n a Data not available.

* <0.5 day.

FIGURE 23–31. MEAN NUMBER OF DAYS WITH SNOW COVER

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	1	1	*	0	0	0	0	0	0	0	0	1	4	14
Cherbourg	1	*	*	0	0	0	0	0	0	0	0	*	1	14
Le Havre	1	1	*	0	0	0	0	0	0	0	0	1	4	14
Paris	3	2	1	0	0	0	0	0	0	0	*	1	7	11
Brest	*	*	*	0	0	0	0	0	0	0	0	*	1	14
Nantes	1	1	*	0	0	0	0	0	0	0	0	0	2	14
Rochefort	*	*	*	0	0	0	0	0	0	0	0	*	1	14
Angoulême	1	1	*	0	0	0	0	0	0	0	0	*	2	14
Bordeaux	*	*	*	0	0	0	0	0	0	0	0	*	1	11
Biarritz	*	1	0	0	0	0	0	0	0	0	0	*	2	3–4
INTERIOR HIGHLANDS:														
Metz	3	3	1	*	0	0	0	0	0	0	1	3	11	14
Strasbourg	7	3	1	*	0	0	0	0	0	*	1	2	15	11
Clermont-Ferrand	3	3	1	*	0	0	0	0	0	0	*	3	11	13
Lyon	3	2	*	*	0	0	0	0	0	0	*	2	8	27
Montagne de L'Aigoual	26	20	27	15	3	*	0	0	0	2	8	15	115	13
Mont Ventoux	30	28	31	21	1	0	0	0	*	2	13	21	147	21–34
Toulouse	1	1	*	0	0	0	0	0	0	0	0	1	3	12
Mont-Louis	23	23	13	5	1	0	0	0	*	1	7	18	91	12
MEDITERRANEAN COAST:														
Nimes	*	1	0	0	0	0	0	0	0	0	0	*	1	14
Perpignan	*	*	*	0	0	0	0	0	0	0	0	*	1	14
Marseille	1	*	*	0	0	0	0	0	0	0	0	*	1	13
Antibes	*	*	0	0	0	0	0	0	0	0	0	*	1	12

* <0.5 day.

FIGURE 23-32. GREATEST 24-HOUR PRECIPITATION (INCHES)

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
WESTERN LOWLANDS:														
Saint-Inglevert	1.0	1.0	0.8	0.9	1.3	1.6	2.5	1.6	1.3	2.1	1.5	1.1	2.5	14
Cherbourg	1.5	2.8	1.4	2.4	1.1	0.9	1.8	2.2	1.3	1.4	3.0	1.2	3.0	10
Le Havre	0.9	1.0	0.6	0.8	1.4	1.0	2.0	1.7	1.7	1.0	1.1	1.0	2.0	10
Paris	0.5	0.9	0.6	0.9	1.4	1.0	1.4	1.3	1.1	1.4	1.1	0.8	1.4	10
Reims	0.6	0.4	0.7	0.7	1.0	2.6	0.9	1.0	1.1	0.8	0.8	1.1	2.6	6
Brest	1.6	1.3	1.0	0.8	1.1	1.7	2.7	1.3	1.7	1.6	1.7	1.4	2.7	10
Rennes	0.8	0.8	0.6	1.1	0.9	1.1	1.4	1.4	0.9	1.5	1.1	1.1	1.5	13
Nantes	1.1	0.9	1.1	1.3	1.2	1.7	1.8	2.6	1.7	1.8	1.3	1.7	2.6	14
Tours	0.8	0.9	0.8	1.2	1.5	1.4	1.2	2.5	1.3	1.1	1.1	1.0	2.5	10
Rochefort	1.0	1.0	1.1	1.2	1.[illegible]	1.9	1.8	1.8	1.4	1.8	1.7	1.3	1.9	14
Angoulême	0.8	1.3	1.2	1.7	1.2	1.9	1.8	2.2	1.5	1.4	1.5	1.2	2.2	13
Bordeaux	1.4	1.5	1.4	1.2	1.2	2.1	1.6	1.9	1.1	1.5	1.8	1.1	2.1	10
Biarritz	1.4	1.9	1.0	1.8	1.3	1.5	2.4	2.2	3.9	2.7	1.6	1.3	3.9	5
INTERIOR HIGHLANDS:														
Metz	0.7	1.0	0.8	0.8	1.7	1.3	1.3	1.7	1.8	2.0	1.3	0.8	2.0	10
Strasbourg	1.2	0.7	0.8	0.8	1.3	1.7	1.7	2.2	1.4	1.0	1.7	1.1	2.2	24
Dijon	1.3	1.3	1.1	1.0	1.9	1.9	1.7	1.7	1.3	1.5	1.6	1.3	1.9	14
Clermont-Ferrand	1.4	1.3	1.9	2.1	1.8	1.9	1.8	2.8	2.2	1.7	1.5	1.6	2.8	30
Lyon	0.9	2.4	2.2	2.2	3.1	2.9	2.9	4.1	3.4	4.4	3.4	1.5	4.4	50
Montagne de L'Aigoual	2.3	3.7	6.0	4.9	4.7	3.3	3.3	4.9	7.8	6.6	9.3	5.2	9.3	14
Toulouse	0.9	1.2	1.3	1.5	1.3	1.4	1.2	3.9	5.5	1.2	2.2	1.5	5.5	14
Mont-Louis	2.3	3.0	1.8	1.1	2.6	1.1	2.4	1.5	1.6	1.3	1.9	1.7	3.0	12
MEDITERRANEAN COAST:														
Nimes	3.7	1.9	2.6	2.8	3.4	1.7	2.1	3.1	5.4	3.7	4.8	3.1	5.4	14
Perpignan	3.4	3.9	6.5	2.2	1.1	1.6	1.8	4.8	2.5	4.3	6.7	7.2	7.2	14
Marseille	1.9	2.3	2.0	1.9	2.9	1.8	4.1	2.9	8.3	8.7	5.9	3.6	8.7	30
Antibes	3.0	2.9	2.1	2.1	2.6	1.9	1.3	2.2	4.8	2.9	4.5	1.8	4.8	12

FIGURE 23-33. NORMAL PERIODS DURING WHICH SPECIFIED PASSES OR ROADS ARE BLOCKED BY SNOW

PASS	LATITUDE	LONGITUDE	ELEVATION	PERIOD WHEN BLOCKED
	° ′N.	° ′E.	*feet*	
VOSGES MOUNTAINS:				
Col du Bonhomme	45 44	06 43	3,114	Intermittent Dec–Mar
Col de la Schlucht	48 04	07 01	3,737	Nov–Apr
Col de Bramont	48 00	06 55	3,173	Intermittent Dec–Feb
Ballon d'Alsace	47 50	06 51	3,865	Late Nov–early Apr
MASSIF CENTRAL:				
Col de Guéry	45 38	02 51	4,147	Nov–Apr
JURA MOUNTAINS:				
Col de la Faucille	46 22	06 02	4,331	Intermittent Dec–Mar
ALPS MOUNTAINS:				
Col des Montets	46 00	06 55	4,793	Mid Nov–early May
Col des Aravis	45 52	06 28	4,915	Mid Nov–May
Col du Petit Saint-Bernard	45 40	06 55	7,178	Late Oct–mid Jun
Col de l'Iseran	45 26	07 02	9,088	Mid Oct–late Jun
Col du Mont Cenis	45 16	06 53	6,834	Late Oct–late Jun
Col de la Porte	45 17	05 45	4,347	Intermittent Dec–Mar
Col du Glandon	45 14	06 10	6,401	Mid Oct–mid Jun
Col de la Croix-de-Fer	45 13	06 12	6,850	Mid Oct–mid Jun
Col du Galibier	45 04	06 23	8,399	Mid Oct–late Jun
Col du Lautaret	45 02	06 24	6,790	Early Nov–mid Jun
Col du Mont Genèvre	44 56	06 44	6,083	Intermittent Dec–Apr

LIST OF STATIONS

STATION	LATITUDE*	LONGITUDE*	ELEVATION
	° ′N.	° ′	*ft.*
WESTERN LOWLANDS:			
Saint-Inglevert	50 52	1 44 E.	404
Cherbourg	49 39	1 38 W.	26
Le Havre	49 29	0 05 E.	49
Argentan	48 45	0 01 W.	*n a*
Paris	48 48	2 30 E.	164
Reims	49 15	4 02 E.	272
Brest	48 24	4 30 W.	89
Rennes	48 07	1 43 W.	197
Nantes	47 15	1 33 W.	135
Tours	47 24	0 42 E.	315
Avord	47 02	2 39 E.	574
Rochefort	45 55	0 59 W.	13
Angoulême	45 39	0 10 E.	272
Bordeaux	44 50	0 34 E.	154
Biarritz	43 29	1 34 W.	95
INTERIOR HIGHLANDS:			
Metz	49 07	6 11 E.	620
Strasbourg	48 33	7 38 E.	505
Dijon	47 16	5 06 E.	732
La Courtine	45 42	2 16 E.	2,592
Clermont-Ferrand	45 47	3 06 E.	1,083
Lyon	45 45	4 47 E.	571
Grenoble	45 11	5 43 E.	702
Montagne de L'Aigoual	44 07	3 35 E.	5,141
Mont Ventoux	44 09	5 17 E.	6,234
Toulouse	43 37	1 26 E.	636
Mont-Louis	42 31	2 07 E.	5,249
MEDITERRANEAN COAST:			
Nîmes	43 50	4 22 E.	194
Perpignan	42 42	2 53 E.	138
Marseille	43 17	5 22 E.	246
Antibes	43 34	7 07 E.	26
CORSICA:			
Ersa	42 58	9 22 E.	79
Ajaccio	41 55	8 44 E.	4
Bonifacio	41 22	9 10 E.	110
Bastia	42 42	9 27 E.	7
Alistro	42 15	9 33 E.	71
Vivario	42 10	9 10 E.	1,050
Bastelica	42 00	9 03 E.	800

n a Data not available.

* Coordinates give locations of weather stations and do not correspond necessarily with those for populated places.

GENERAL BASIC INFORMATION

International boundary

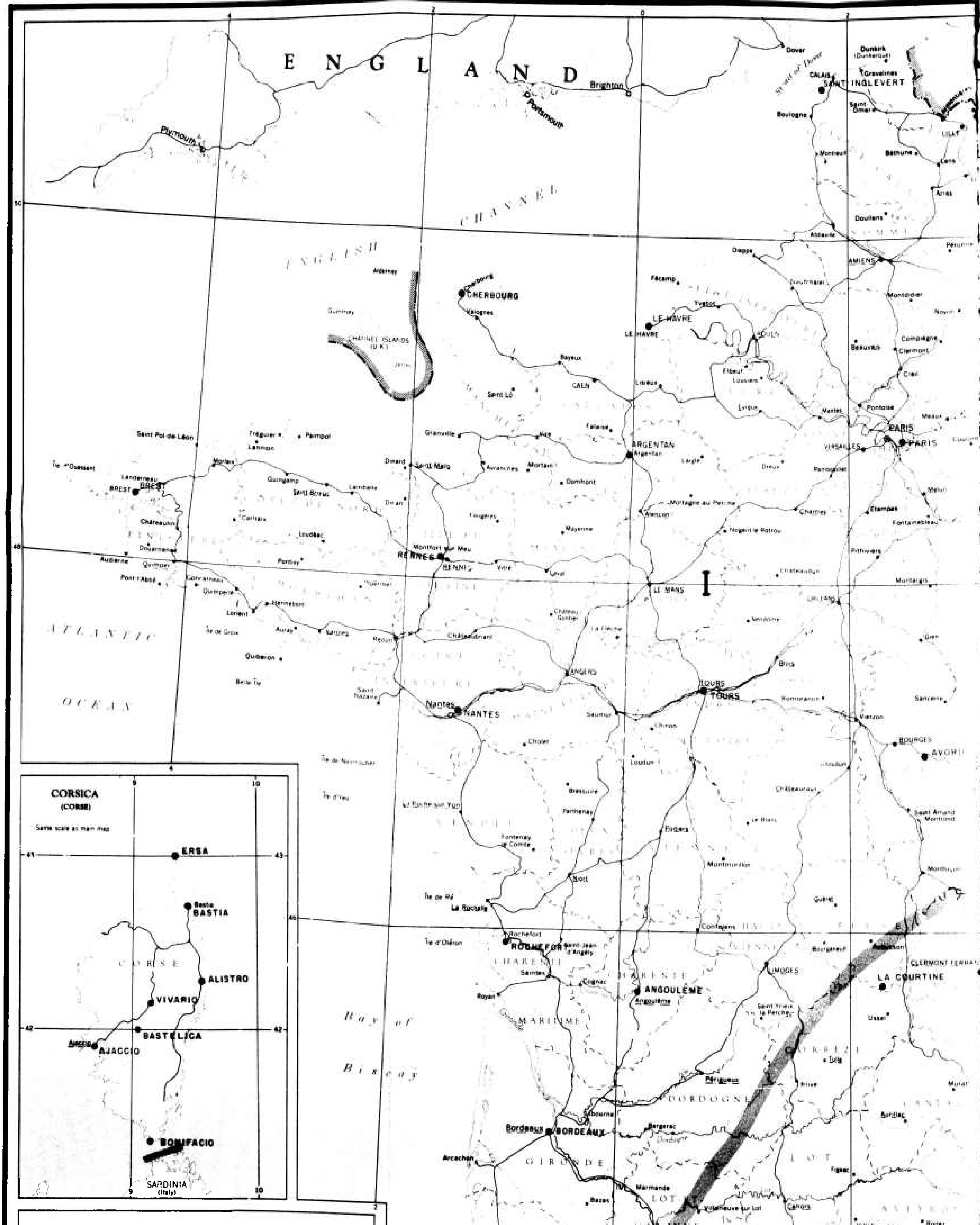
Département boundary

National capital

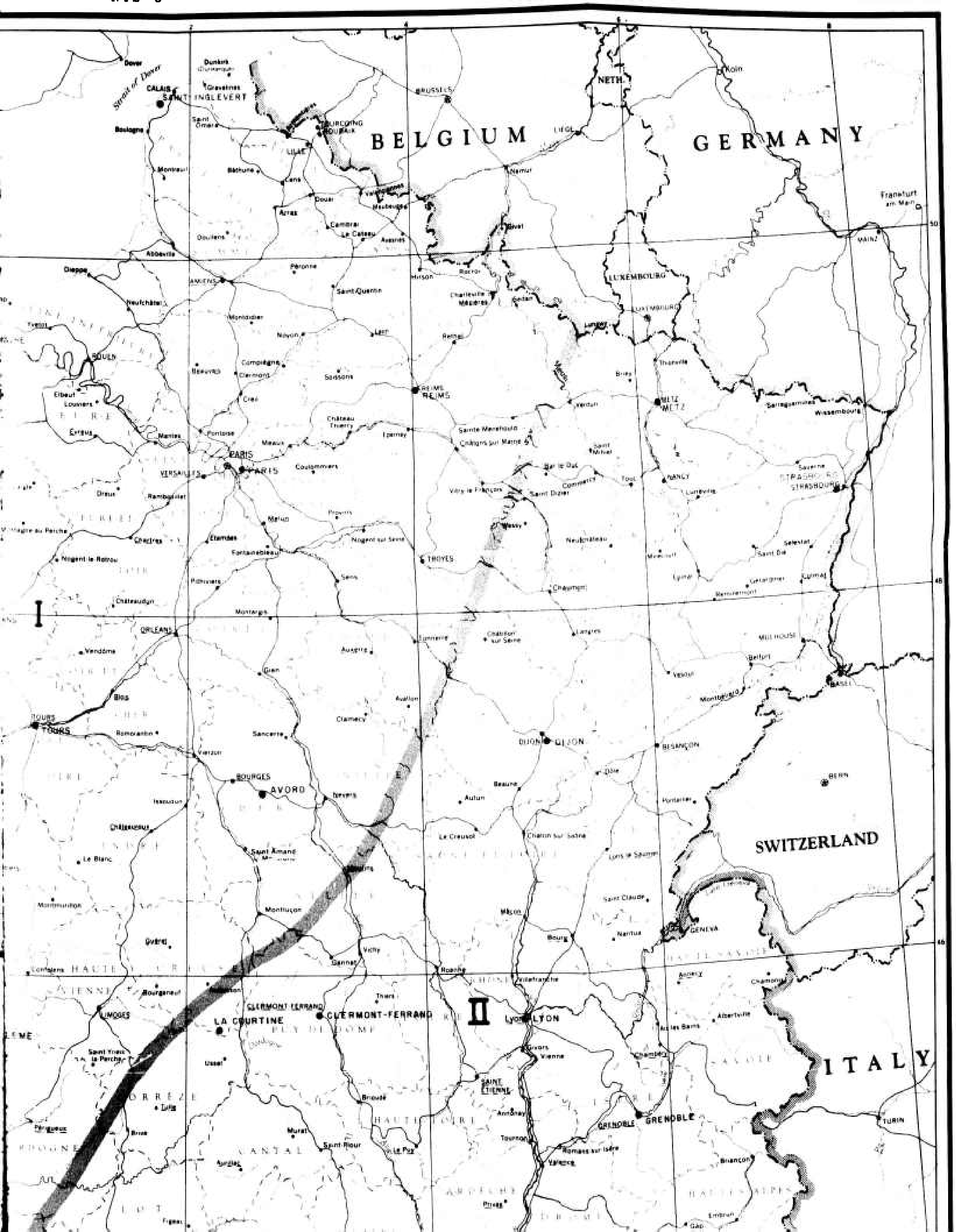
Melun Département capital

Railroad (selected)

Tunnel


ENGLAND
Plymouth
Portsmouth
Brighton
Dover
Strait of Dover
CALAIS
SAINT INGLEVERT
Dunkirk (Dunkerque)
Gravelines
Boulogne
Saint-Omer
LILLE
Béthune
Lens
Arras
Doullens
Abbeville
AMIENS
Péronne
Montdidier
Noyon
Beauvais
Compiègne
Clermont
Creil
Pontoise
Meaux
PARIS
VERSAILLES
Rambouillet
Dreux
Chartres
Étampes
Melun
Fontainebleau
Pithiviers
Montargis
ENGLISH
CHANNEL
Alderney
Guernsey
CHANNEL ISLANDS (U.K.)
Cherbourg
CHERBOURG
Valognes
Bayeux
CAEN
Saint-Lô
Dieppe
Fécamp
Yvetot
LE HAVRE
Le Havre
Elbeuf
Louviers
Lisieux
Évreux
Mantes
ARGENTAN
Argentan
Falaise
Vire
Granville
Avranches
Mortain
Domfront
Laigle
Alençon
Mortagne au Perche
Nogent le Rotrou
Mayenne
Saint Pol-de-Léon
Tréguier
Paimpol
Lannion
Morlaix
Île d'Ouessant
Landerneau
BREST
Brest
Guingamp
Saint Brieuc
Lamballe
Dinard
Saint-Malo
Dinan
Carhaix
Châteaulin
Douarnenez
Loudéac
Fougères
Montfort sur Meu
RENNES
Rennes
Vitré
Laval
Audierne
Quimper
Pont l'Abbé
Concarneau
Quimperlé
Lorient
Hennebont
Pontivy
Ploërmel
Île de Groix
Auray
Vannes
Redon
Châteaubriant
Quiberon
Belle Île
ATLANTIC
OCEAN
LE MANS
Châteaudun
ORLÉANS
Vendôme
Château Gontier
La Flèche
ANGERS
Blois
TOURS
Tours
Saint Nazaire
Nantes
NANTES
Saumur
Chinon
Romorantin
Vierzon
Gien
Sancerre
BOURGES
AVORD
Île de Noirmoutier
Cholet
Loudun
Issoudun
Châteauroux
Île d'Yeu
La Roche sur Yon
Bressuire
Parthenay
Poitiers
Le Blanc
Saint Amand Montrond
Fontenay le Comte
Montluçon
Montmorillon
Niort
Île de Ré
La Rochelle
Guéret
Confolens
Rochefort
ROCHEFORT
Saint-Jean d'Angély
Île d'Oléron
Aubusson
Bourganeuf
CLERMONT FERRAND
Saintes
Cognac
ANGOULÊME
Angoulême
LIMOGES
LA COURTINE
Royan
Saint Yrieix la Perche
Ussel
Bay of Biscay
Tulle
Périgueux
Brive
Libourne
Bergerac
DORDOGNE
Bordeaux
BORDEAUX
GIRONDE
Arcachon
Marmande
Bazas
Villeneuve sur Lot
Cahors
Figeac
Aurillac
LOT
Villefranche de-Rouergue
Rodez
CORSICA
(CORSE)
Same scale as main map
ERSA
Bastia
BASTIA
CORSE
ALISTRO
VIVARIO
BASTELICA
Ajaccio
AJACCIO
BONIFACIO
SARDINIA
(Italy)

FRANCE


BELGIUM
GERMANY
NETH.
LUXEMBOURG
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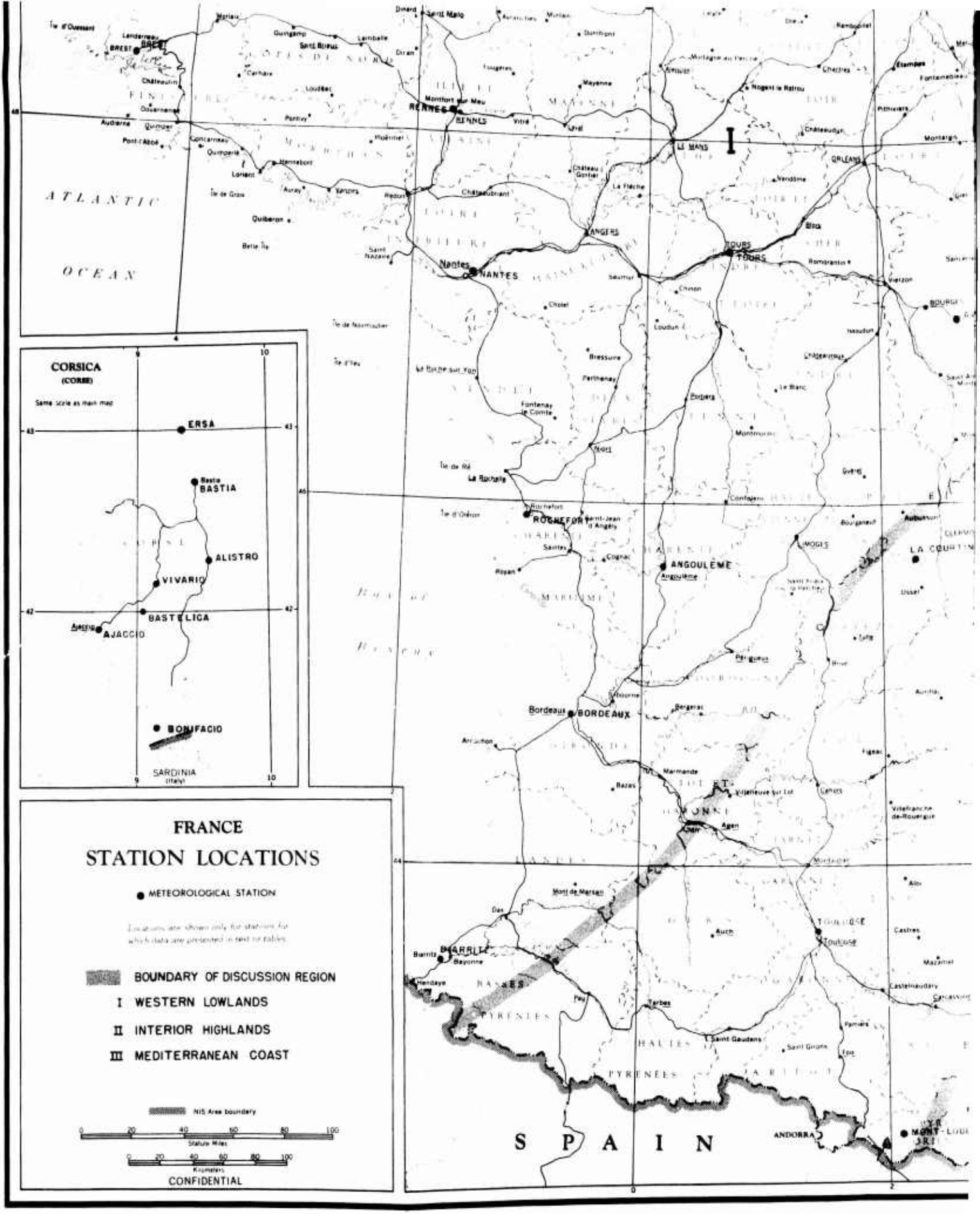
I
II
Dover
Strait of Dover
CALAIS
SAINT INGLEVERT
Boulogne
Dunkirk
Gravelines
Saint Omer
LILLE
TOURCOING
ROUBAIX
BRUSSELS
LIEGE
Namur
Koln
Frankfurt am Main
MAINZ
Bethune
Lens
Douai
Arras
Valenciennes
Maubeuge
Cambrai
Le Cateau
Avesnes
Givet
Doullens
Abbeville
Dieppe
AMIENS
Peronne
Saint Quentin
Hirson
Rocroi
Sedan
Neufchatel
Montdidier
Noyon
Laon
Rethel
Longwy
ROUEN
Elbeuf
Louviers
Evreux
Beauvais
Compiegne
Clermont
Creil
Soissons
REIMS
Thionville
Briey
METZ
Verdun
Chateau Thierry
Epernay
Sainte Menehould
Chalons sur Marne
Saint Mihiel
Mantes
Pontoise
Meaux
PARIS
VERSAILLES
Coulommiers
Bar le Duc
Commercy
Saint Dizier
Toul
NANCY
Luneville
Saverne
STRASBOURG
Sarreguemines
Wissembourg
Dreux
Rambouillet
Chartres
Etampes
Melun
Provins
Fontainebleau
Nogent sur Seine
TROYES
Vitry le Francois
Wassy
Neufchateau
Epinal
Saint Die
Selestat
Colmar
Remiremont
Nogent le Rotrou
Pithiviers
Sens
Chaumont
Chateaudun
Montargis
ORLEANS
Vendome
Auxerre
Chatillon sur Seine
Langres
MULHOUSE
Belfort
BASEL
Vesoul
Montbeliard
Gien
Blois
TOURS
Romorantin
Avallon
Clamecy
Sancerre
Vierzon
DIJON
BESANCON
BERN
BOURGES
AVORD
Nevers
Beaune
Autun
Dole
Pontarlier
Issoudun
Chateauroux
Le Creusot
Chalon sur Saone
Lons le Saunier
Le Blanc
Saint Amand
Moulins
Saint Claude
Montmorillon
Montlucon
Macon
Nantua
GENEVA
Gueret
Bourg
Vichy
Gannat
Roanne
Villefranche
Annecy
Chamonix
Confolens
Bourganeuf
Thiers
CLERMONT FERRAND
CLERMONT-FERRAND
LIMOGES
LA COURTINE
LYON
Albertville
Aix les Bains
Chambery
Givors
Vienne
Ussel
Saint Yrieix la Perche
SAINT ETIENNE
Brioude
Annonay
GRENOBLE
Tulle
Brive
Perigueux
Murat
Saint-Flour
Le Puy
Tournon
Romans sur Isere
Valence
Aurillac
Briancon
TURIN
Privas
Figeac
Embrun
Gap



IC INFORMATION
national boundary
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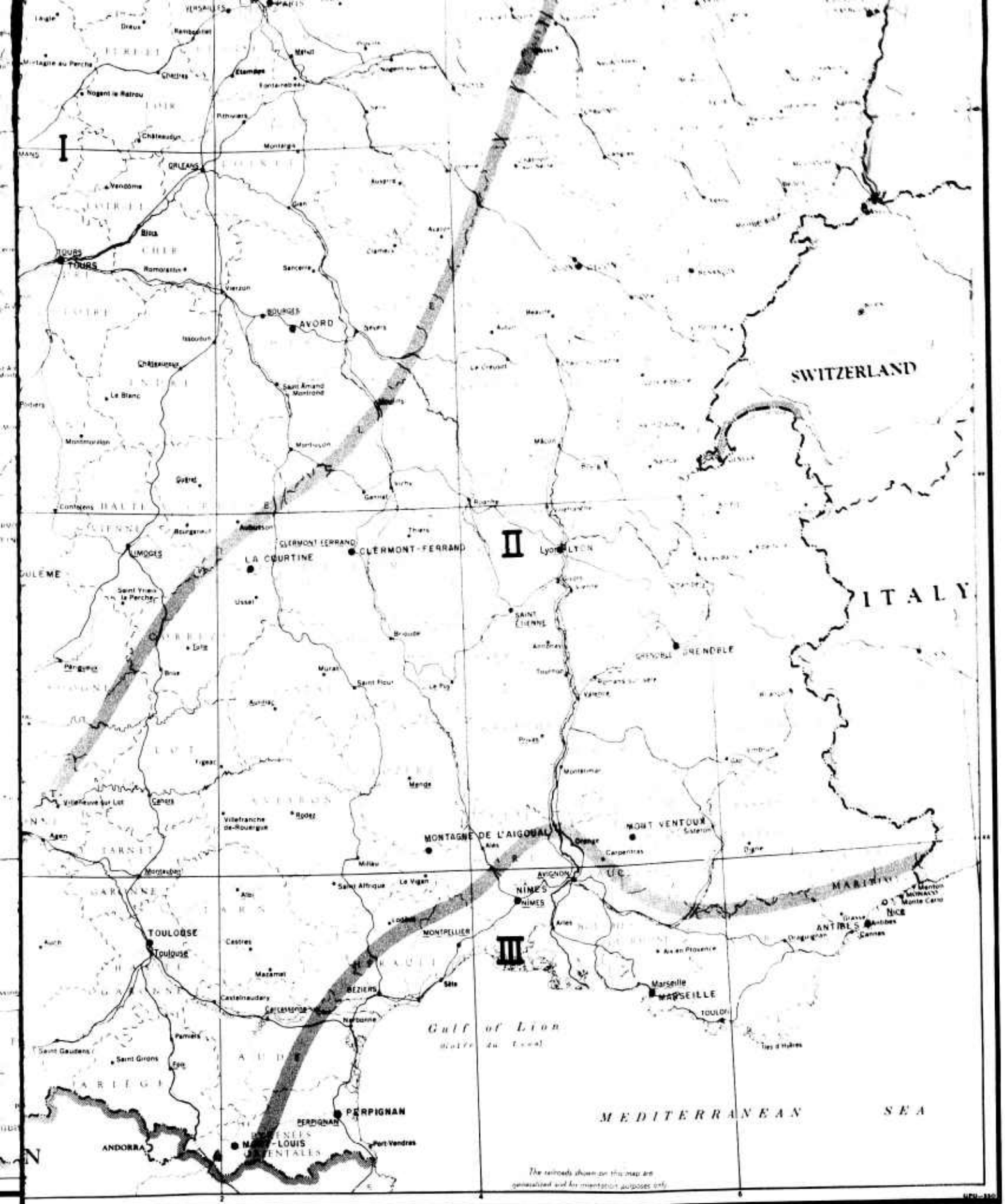

STATION LOCATIONS FIGURE 23-34