In his discussion on "Bioclimates of the Himalaya" Legris (1963) groups valleys of Jammu and Kashmir under "climates of Mediterranean type and sub-desert cold" and records the following information:

(a) temperature of coldest month between 0 and 5
(b) rainfall between 500 and 1,000 mm ...... Srinagar
(c) rainfall between 100 and 500 mm ........ Drosh, Gilgit, Leh.
(d) temperature of coldest month between -5 and 0
(e) rainfall 500 - 1,000 mm ............... Drass
(f) rainfall 100 - 5,000 mm ........ Skardu, Kargil.

The terrain of the area has pronounced effect on the climate, which varies according to aspect and elevation. Owing to the orientation, ridges in the south, inspite
of their height, do not completely obstruct the rain bearing monsoon winds, so that the region is not out from the influence of the southwest monsoon. Lying in the extratropical 34° North latitudinal belt, the region enjoys extratropical mountain climate, temperature with moderate monsoon conditions. The chief features of the climate are (1) severe winter (2) considerable winter precipitation and (3) moderate southwest monsoon (summer rains). Severe winter conditions arise partly due to above mentioned geographical features and partly due to the influence of the western disturbances affecting the area in the season. Winter precipitation occurs in association with the passage of the disturbances which are a low pressure system which approach the area from the west.

The monsoon rains occur as a result of penetration into this region of the monsoon current through the trenched valleys, either in association with storms/ depressions which, forming in the Bay of Bengal, approach and affect this region from the south or southeast during their passage across north India.

Rain and snow

Precipitation during winter is mostly in the form of snow, although at lower elevations rain may also occur. It occurs in association with the passage of western disturbances. In this highly mountainous region, forceful
ascent of moist air along the mountain slopes causes clouding and consequent precipitation. On the windward sides of the mountains, the precipitation usually increases up to the elevation of 1.5 km above which it decreases due to reduced moisture in the air.

In the mountainous region the cool dominating Sheshnag lake (ca 4,000 m) is entirely without snow in August and it continues only on little above 4,000 m. On the other hand Gupta (1972) records 4,900 m as the limit. Here the upper limit of the forest (timber line) reaches 3,300 and 4,000 m on the south slopes and 3,900 - 4,200 m on the north slopes. On the south slopes (Lidder valley) the last birches are found at around 3,000 m but Legris (1963) observes the forests to climb to 3,600 m in Garhwal.

Owing to the complexity of relief, the distribution pattern of rain is also complex. Towards the west where the valley of Kashmir is open, falls maximum rainfall in winter and spring and have a regime of Mediterranean type (Legris, 1963) and "it is in the valley of Srinagar and the Indus that the extreme limit of the Mediterranean influence exist ".

Srinagar valley may be considered as the area of the lowest rainfall of about 60 cm usually. Precipitation rapidly increases towards north and less rapidly towards the south. The northeastern part receives the highest precipitation of over 150 cm. In the extreme southeastern part rainfall exceeds 10 cm. March and April are the
rainest months, the two preceeding months of January and February coming next. About 10% of annual rainfall occurs in the month of May. Southwest monsoon rains occur mostly in July and September contributing slightly above 10% of the annual, November is the least rainy when the rainfall is hardly 2% of the annual. The precipitation during these rainy periods expressed as percentage of the annual total for the three districts of Kashmir may be broadly summarised as follows:

Normal seasonal rainfall expressed as percentage of the annual.

<table>
<thead>
<tr>
<th>District</th>
<th>Jan-Feb.</th>
<th>Mar.-May</th>
<th>June-Sep.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anantnag</td>
<td>25</td>
<td>35</td>
<td>30</td>
</tr>
<tr>
<td>Srinagar</td>
<td>23</td>
<td>38</td>
<td>28</td>
</tr>
<tr>
<td>Baramulla</td>
<td>25</td>
<td>40</td>
<td>22</td>
</tr>
</tbody>
</table>

Heavy snowfall occurs in January to March over the entire region. In February, Srinagar valley is often in the grip of snow. Snow accumulation may reach 3 meters. Sufficient snow also falls in April. In winter the snowline is lowest and comes lower to below 2 km, s.s.l. June and July are generally free from snowfall, although it may still occur over high peaks. Snow begins to melt in April when snowline begins to ascend.
Variability of rainfall

The law of variation in rainfall is as valuable in Kashmir as in the rest of the Himalayas, despite the regime of spring rains in Srinagar and Drass; but with rise in altitude, in general, the climate becomes dry.

In the northwest part of the subcontinent the winter rains from western disturbances become a decisive feature of the climate and coupled with the low temperature create a bioclimatic similar to that of Mediterranean countries. Srinagar falls under moderate degree of Mediterraneanity (Meher-Homji, 1971). However, variants exist in terms of aridity, temperature and intensity of estival dryness. The coefficient of variation of annual rainfall is about 30 percent for Kashmir. The variation of seasonal rainfall is about more, being 50 percent for the period during Jan-Feb and 40 percent for March to May. Monthly rainfall is highly variable.

Temperature

As the insulation at high altitudes is intense due to rarefied and transparent atmosphere, soils and rocks absorb radiation, and heat up rapidly with the result that the temperature in open are considerably higher than those in the shade, especially in summer. Mountain slopes turned away from the sun may be considerably cooler compared to those exposed to the sun. In the same way, east
facing slopes experience warm mornings and cold evenings, while reverse is the case on the west facing slopes. Variations in temperature from place to place, therefore, are considerable depending upon elevation and exposure to sun. Immediately after the sunset, ground begins to cool rapidly owing to outgoing radiation through the rarefied atmosphere. Cold air drains down the mountain slopes into the valleys below, where it may remain stagnant during night. All these factors cause diurnal variation in temperature to be considerable, particularly in the valleys.

January is the coldest month after which temperature rise rapidly till June and slightly till July, which is the warmest month. The Srinagar valley is the warmest portion of the region, the mean maximum temperature in the warmest month of July touches 31°C while at the slightly higher station, Qazi Gund, though situated to the south of the valley, the temperature is lower by 3°C. In winter also the mean maximum at Srinagar is higher by 3°C than that at Qazi Gund. Fall in temperature is conspicuous after September. December to February is the coldest part of the year when the minimum temperature do not rise above 0°C.

The influence of monsoon air is noticeable during June-September when both the maximum and minimum temperatures remain substantially steady, particularly during July and August. During the cold season, cold waves in the rear of the western disturbances may cause the
temperatures to fall appreciably, when minimum temperature as low as -20°C may be registered. Frost is common during December to February.

**Humidity**

Humidity is high in the morning throughout the year, maximum (ca 90%) during December to February; and lowest in the afternoon (40-45%). During May and June accordingly air in the afternoon carries moisture upwards and often results in the afternoon humidity being maximum at high elevations.

**Clouds**

Skies are more than 5/8th covered with clouds from December to April. Clouding is least in June and October when it is less than 3 okta, clouding occurring mostly in the afternoon.

Moisture, carried upwards by the ascending currents, results in the cloud formation in the afternoon. Katabolic winds carry moisture downwards and the clouds tend to disappear at high elevations during night offering a clear view of the mountain peaks under favourable conditions in the early morning.

**Winds**

Winds are mostly light to moderate, with
some strengthening in January to April. In the southwest portion winds increase strength during July and August also. In the wake of western disturbances, however, strong cold winds blow. Various types of local winds originate in the terrain. Katabolic flow in the valley is strong. They become very strong when blown over snow fields and glaciers due to the added cooling in contact with ice as well as due to reduced friction. These winds are more pronounced when the general wind field is weak. Winds blow through mountain gaps as strong current. Under certain favourable conditions, leewaves are caused by mountain barriers.

Weather Phenomena

Thunderstorms mostly occur during March to October and are most frequent during April to July or August with atleast seven days with thunder in each of the months. A few of the thunderstorms may be accompanied with fall, particularly in March and April. The period November to February is relatively free from thunder. Ascending moisture tends to cause development of thundery conditions in the afternoons. Fog is common in December to March. Thick radiant on fog may occur in winter months in the wake of western disturbances, particularly when the sky clears up after a spell of precipitation. During nights, moisture is carried down into the valley which are therefore, fog covered in the nights and early mornings.
Radiation

Ramdas and Yegnanarayan (1965) have calculated the energy of the radiation and found that on an average it is from 500 cal/cm\(^2\) daily. The lowest values are in January-February in Kashmir and in the north of Pakistan, compared to the light values at Jodhpur which in May-June are 697 cal/cm\(^2\) per day.

In regions of strong isolation of Kashmir under Mediterranean climate the longest days are also the least cloudy and insulation is then maximum. In the Himalayas, generally, a difference of four hours between long days and short days creates a contrast between the south and the north slopes and certain valleys have only few hours of insulation in winter.