WEATHER IN PAKISTAN
NORTEAST MONSOON SEASON (JAN - MAR 2005)

Akhlaq Jameel*, Arif Mahmood* & S. Anzar Ali Jafri*

Introduction:
Northeast monsoon season of 2005, commenced over northern and central parts of the country on the very first day of the season i.e. 1st January. After three days of wet spell, rainfall activity ceased and restarted on 21st January. Two subsequent western disturbances affected the country from 3rd to 21st February later on third and fourth prevailed over the region form 1st to 6th & 15th to 22nd March respectively. Under the influence of these weather systems moderate to heavy rainfalls and a few dust storms in plains were reported almost at all the places in northern and central parts of the country and at many places in southern parts of the country. Heavy snowfall also occurred over the mountains of northern areas in association with these strong western disturbances. The peculiar feature of this winter was a heavy spell of snowfall over the margalla hill and even in Islamabad / Rawalpindi.

Seasonal rainfall (mm) (January-March):
Seasonal rainfall recorded at meteorological observing stations in the whole country was in large excess at 37, moderate excess at 9, slight excess at 4, normal at 1 and slight deficit at 1, moderate deficit at 1 and in large deficit at 3.

Rainfall remained in excess over northern areas, NWFP, Punjab and Balochistan whereas deficit was reported from the most meteorological stations of Sindh. On the country wide scale, rainfall during the winter season the principal amounts of rainfall during the month of January, February and March 2005 stayed in excess. The principal amounts of rainfall during the month of January February and March 2005 are given in Annex-1. Seasonal station wise percentage rainfall departures are given in Fig. 1 and percentage departures in Table 2 whereas province wise graphic representation of rainfall is given in Fig 2.

* Pakistan Meteorological Department.
Monthly features:

January:

Weather and associated synoptic features:

Details of weather systems formed during the month are given in Table-3. Rain/thundershowers occurred almost at all the places or at a number of places on 6–9 days in Malakand, Hazara, Kohat and Peshawar regions, on 3–5 days in FATA, Bannu, D.I.Khan, Rawalpindi, Gujranwala, Sargodha and Lahore regions, on 1–2 days in Faisalabad, Multan, D.G.Khan, Bahawalpur, Zhob, Sibbi, Kalat and Karachi regions. Rain/thunderstorms also occurred at a few places or at isolated places on 6-9 days in Rawalpindi, Quetta and Kalat regions, on 3-5 days in FATA, Hazara, Peshawar, Faisalabad, Mekran and Hyderabad regions, on 1-2 days in Malakand, Bannu, D.I.Khan, Gujranwala, Lahore, Multan, D.G.Khan, Bahawalpur, Sibbi, Sukkur and Mirpurkhas regions.

Rainfall distribution:

The rainfall was in large excess at 38 meteorological observing stations (Gupis, Gilgit, Skardu, Bunji, Chilas, Astor, Muzaffarabad, Garhi Dupatta, Kotli, Parachinar, Dir, Drosh, Saidu Sharif, Kakul, Balakot, Kohat, Peshawar, Risalpur, Cherat, D.I.Khan, Chaklala, Murree, Jhelum, Sialkot, Mianwali, Sargodha, Faisalabad, Shorekot, Lahore (PB0), Lahore (A/P), Multan, Bahawalnagar, Jiwani, Hyderabad, Badin, Chhor, Karachi (A/P) and Karachi (Masroor); in slight excess in 1 meteorological observing station (Sibbi); normal in 3 meteorological observing stations (Quetta, Pasni and Moenjodaro); in slight deficit in 1 meteorological observing station (Kalat); in moderate deficit in 3 meteorological observing stations(Chitrail, Bahawalpur and Nawabshah) and in large deficit in 10 meteorological observing stations (Khanpur, Dalbandin, Nokkundi, Zhob, Barkhan, Khuzdar, Panjgur, Jacobabad, Rohri and Padidan).
Annex-1: Principal amounts of rainfall (30 mm and above) during the winter 2005.

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<th>February (3)</th>
<th>March (4)</th>
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<td>1190</td>
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<td>Jan Normal (mm)</td>
<td>Jan Dep %</td>
<td>Feb Actual (mm)</td>
<td>Feb Normal (mm)</td>
<td>Feb Dep %</td>
<td>Mar Actual (mm)</td>
<td>Mar Normal (mm)</td>
<td>Mar Dep %</td>
<td>Season Actual (mm)</td>
<td>Season Normal (mm)</td>
</tr>
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<td>120</td>
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<td>5</td>
<td>-100</td>
<td>11</td>
<td>11</td>
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<td>1</td>
<td>100</td>
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<td>4</td>
<td>-25</td>
<td>0</td>
<td>5</td>
<td>100</td>
<td>5</td>
<td>10</td>
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<td>1</td>
<td>100</td>
<td>0</td>
<td>4</td>
<td>-100</td>
<td>0</td>
<td>2</td>
<td>-100</td>
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<td>7</td>
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<td>-100</td>
<td>0</td>
<td>5</td>
<td>-100</td>
<td>2</td>
<td>8</td>
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<td>55</td>
<td>Karachi (A/P)</td>
<td>11</td>
<td>6</td>
<td>83</td>
<td>13</td>
<td>10</td>
<td>30</td>
<td>0</td>
<td>12</td>
<td>-100</td>
<td>24</td>
<td>28</td>
</tr>
<tr>
<td>56</td>
<td>Karachi (Masroor)</td>
<td>16</td>
<td>4</td>
<td>300</td>
<td>20</td>
<td>6</td>
<td>233</td>
<td>0</td>
<td>8</td>
<td>-100</td>
<td>36</td>
<td>18</td>
</tr>
</tbody>
</table>
Figure 1

Temperature distribution:
Severe cold wave conditions prevailed on 1-2 days in FATA and Kalat regions. Night temperatures were below normal for 7-9 days in Hazara, Quetta, Mekran and Sukkur regions, for 4-6 days in Peshawar, Kalat, Mirpurkhas and Karachi regions, for 1-3 days in FATA, Malakand, Multan, Bahawalpur, Gujranwala, Faisalabad, Lahore, Zhob and Hyderabad regions. They were above normal for 10-12 days in Lahore, Quetta and Mekran regions, for 4-7 days in Sibbi, Kalat, Larkana, Sukkur, Hyderabad and Karachi regions, for 1-2 days in FATA, Peshawar, Zhob, Multan, Bahawalnagar, Mirpurkhas, Sibbi, D.I.Khan, Rawalpindi, Gujranwala and Sargodha regions. They were slightly above normal on 1 day each in Quetta and Sibbi regions. The month’s lowest minimum
temperature over the plains of the country was – 0.6 °C recorded at Chaklala (Rawalpindi region) on 20th January.

Table 3: Details of the weather systems during January 2005

<table>
<thead>
<tr>
<th>S.No</th>
<th>System</th>
<th>Period</th>
<th>Place of the first location</th>
<th>Direction of Movement</th>
<th>Place of final location</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low pressure area</td>
<td>1-2</td>
<td>South Punjab &amp; adjoining Upper Sindh</td>
<td>Stationary</td>
<td>South Punjab &amp; adjoining areas</td>
<td>Became less-marked on 3.</td>
</tr>
<tr>
<td>2</td>
<td>Low pressure area extended up to mid-tropospheric level</td>
<td>1-3</td>
<td>Upper NWFP &amp; adjoining areas</td>
<td>Eastwards</td>
<td>Kashmir &amp; adjoining areas</td>
<td>Moved away eastwards on 4.</td>
</tr>
<tr>
<td>3</td>
<td>Low pressure area</td>
<td>12-13</td>
<td>Southeast Iran &amp; adj. areas</td>
<td>Southeastwards</td>
<td>North Arabian Sea &amp; adjoining areas</td>
<td>Moved away southeastwards on 14.</td>
</tr>
<tr>
<td>4</td>
<td>Low pressure area extended up to mid-tropospheric level</td>
<td>13-14</td>
<td>Northeast Afghanistan &amp; adjoining areas</td>
<td>Northeastwards</td>
<td>North of NWFP</td>
<td>Moved away northeastwards on 15.</td>
</tr>
<tr>
<td>5</td>
<td>Low pressure area</td>
<td>20-22</td>
<td>West Balochistan &amp; adjoining areas</td>
<td>Do</td>
<td>Northeast Balochistan</td>
<td>Became less-marked on 23.</td>
</tr>
<tr>
<td>6</td>
<td>Low pressure area extended up to mid-tropospheric level</td>
<td>21-24</td>
<td>Upper NWFP &amp; adjoining areas</td>
<td>Eastwards</td>
<td>Kashmir &amp; adjoining areas</td>
<td>Moved away eastwards on 25.</td>
</tr>
<tr>
<td>7</td>
<td>Low pressure area</td>
<td>24-26</td>
<td>Northwest Arabian Sea &amp; adj. areas</td>
<td>Do</td>
<td>Lower Sindh &amp; adjoining areas</td>
<td>Moved away eastwards on 27.</td>
</tr>
<tr>
<td>8</td>
<td>Low pressure area extended up to mid-tropospheric level</td>
<td>26-29</td>
<td>Upper NWFP &amp; adjoining areas</td>
<td>Do</td>
<td>Kashmir and adjoining areas</td>
<td>Moved away eastwards on 30.</td>
</tr>
</tbody>
</table>

February

Weather and associated synoptic features:-

Details of weather systems formed during February 2005 are given in table 4.

Rain/thundershowers occurred almost at all the places or at a number of places for 13-16 days in FATA, Malakand and Hazara regions, for 7-11
days in upper and central parts of Punjab, NWFP and Balochistan and for 1-6 days in lower NWFP, southern Punjab and Sindh

**Rainfall Distribution:**

The rainfall was in large excess in 44 meteorological observing stations (Gupis, Gilgit, Skardu, Chilas, Astor, Muzaffarabad, Garhi Dupatta, Kotli, Parachinar, Chitral, Saidu Sharif, Kakul, Balakot, Kohat, Peshawar, Risalpur, D.I.Khan, Chaklala, Murree, Sialkot, Mianwali, Sargodha, Faisalabad, Shorkot, Lahore (PBO), Lahore (A/P), Multan, Bahawalpur, Bahawalnagar, Khanpur, Quetta, Dalbandin, Nokkundi, Zhob, Barkhan, Sibi, Kalat, Khuzdar, Panjgur, Moenjodaro, Jacobabad, Rohri, Padidan and Karachi (Masroor); in moderate excess in 4 meteorological observing stations (Dir, Drosh, Jhelum and Karachi (A/P); in slight deficit in 2 meteorological observing stations (Bunji and Hyderabad); in moderate deficit in 1 meteorological observing station (Pasni) and in large deficit in 5 meteorological observing stations (Cherat, Jiwani, Nawabshah, Badin and Chhor).

**Temperature distribution:**

Severe cold wave conditions prevailed for 3-4 days in Mekran and Quetta regions, for 1-2 days in Hazara, Kalat, Sukkur, Mirpurkhas and Karachi regions. Night temperatures were appreciably below normal for 6-9 days in Hazara, Peshawar and Sukkur regions, for 3-5 days in Zhob, Mekran, Hyderabad, Karachi, Mirpurkhas, Quetta, Multan, Bahawalpur, Sibi, Larkana and Gujranwala regions, for 1-2 days in FATA, Faisalabad, Kalat, D.I.Khan, Sargodha and Rawalpindi regions. They were appreciably to markedly above normal for 11-14 days in Quetta, Rawalpindi, Lahore, Hyderabad, Sibi, Kalat, Mekran, Sukkur and Karachi regions, for 6-9 days in Mirpurkhas, Faisalabad, Larkana, Multan and Bahawalpur regions, on 1-4 days in Sargodha, Gujranwala and D.I.Khan regions. They were considerably above normal for 1-3 days in Bahawalpur, Mirpurkhas, Karachi, Sukkur, Multan and Hyderabad regions.

The month’s lowest minimum temperature in plains of the country was – 2.0° C recorded at Nokkundi (Quetta region) on 18th February.

**Disastrous weather events and associated damages:**

1. According to press reports torrential rains and flash floods in Balochistan caused heavy loss of lives damaged many bridges and burst “Shadi Kour Dam” in Pasni area. Atleast 378 people lost their lives while 2000 other were missing and tens of thousands left homeless in different areas of Balochistan.
2. In another report, heavy rains and snowfall claimed 120 lives and more than 5000 mud houses were collapsed in different areas of the NWFP.

<table>
<thead>
<tr>
<th>S.No</th>
<th>System</th>
<th>Period</th>
<th>Place of first location</th>
<th>Direction of movement</th>
<th>Place of final location</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low pressure area extended upto mid-tropospheric level</td>
<td>3-8</td>
<td>Upper NWFP &amp; adjoining areas</td>
<td>Eastwards</td>
<td>Kashmir &amp; adjoining areas</td>
<td>Moved away eastwards on 9</td>
</tr>
<tr>
<td>2</td>
<td>Low pressure area</td>
<td>4-6</td>
<td>Balochistan &amp; adjoining areas</td>
<td>Stationary</td>
<td>Balochistan &amp; adjoining areas</td>
<td>Became less-marked on 7</td>
</tr>
<tr>
<td>3</td>
<td>Low pressure area extended upto mid-tropospheric level</td>
<td>8-13</td>
<td>Northeast Balochistan &amp; adj. areas</td>
<td>Northeastwards</td>
<td>Kashmir &amp; adj. areas</td>
<td>Moved away northeastwards on 14</td>
</tr>
<tr>
<td>4</td>
<td>Low pressure area</td>
<td>9-11</td>
<td>Northwest Arabian Sea &amp; adjoining areas</td>
<td>Eastwards</td>
<td>Eastern Sindh &amp; adj. areas</td>
<td>Moved away eastwards on 12</td>
</tr>
<tr>
<td>5</td>
<td>Low pressure area extended upto mid-tropospheric level</td>
<td>14-16</td>
<td>Upper NWFP &amp; adjoining areas</td>
<td>Eastwards</td>
<td>Kashmir &amp; adj. areas</td>
<td>Moved away eastwards on 17</td>
</tr>
<tr>
<td>6</td>
<td>Do</td>
<td>17-20</td>
<td>Do</td>
<td>Do</td>
<td>Do</td>
<td>Moved away eastwards on 21</td>
</tr>
<tr>
<td>7</td>
<td>Low pressure area</td>
<td>24-25</td>
<td>Northeast Balochistan &amp; adj. areas</td>
<td>Northeastwards</td>
<td>Do</td>
<td>Moved away northeastwards on 26</td>
</tr>
<tr>
<td>8</td>
<td>Do</td>
<td>26-28</td>
<td>Balochistan &amp; adj. Coastal areas</td>
<td>Stationary</td>
<td>Balochistan &amp; adj. areas</td>
<td>Became less-marked on 1 of next month</td>
</tr>
<tr>
<td>9</td>
<td>Do</td>
<td>27-28</td>
<td>South Punjab &amp; adj. areas</td>
<td>Do</td>
<td>South Punjab &amp; adj. areas</td>
<td>Became less-marked on 1 of next month</td>
</tr>
</tbody>
</table>
March

Weather and associated synoptic features: -

Details of weather systems formed during the month are given in Table 5.

Rain/thundershowers occurred almost at all the places for 10-14 days in Malakand, Hazara, Kohat, Peshawar and Zhob regions, on 4-8 days in FATA, Bannu, Rawalpindi, Gujranwala, Sargodha, Faisalabad, D.G.Khan, Quetta, Sibbi and Kalat regions, for 1-3 days in D.I.Khan, Lahore, Multan, Bahawalpur, Mekran and Larkana regions. Rain/thunderstorms also occurred at a few places or at isolated places for 9-11 days in Malakand, Rawalpindi and Quetta regions, for 5-8 days in FATA, Hazara, Bannu, Peshawar, D.I.Khan, Faisalabad, Lahore, Multan, Bahawalpur and Kalat regions, for 1-4 days in Kohat, Gujranwala, Sargodha, D.G.Khan, Zhob, Sibbi, Mekran, Larkana, Sukkur and Hyderabad regions.

Rainfall distribution:

The rainfall was in large excess at 23 meteorological observing stations (Gupis, Peshawar, Mianwali, Sargodha, Faisalabad, Shorkot, Lahore (PBO), Multan, Bahawalpur, Bahawalnagar, Dalbandin, Nokkundi, Zhob, Barkhan, Sibbi, Kalat, Khuzdar, Panjgur, Pasni, Jiwani, Moenjodaro, Rohri and Hyderabad); in moderate excess at 3 meteorological observing stations (Kakul, Kohat and Sialkot); in slight excess in 3 meteorological observing stations (Dir, Cherat and Quetta); normal in 10 meteorological observing stations (Gilgit, Muzaffarabad, Garhi Duppatta, Balakot, Risalpur, D.I.Khan, Chaklala, Murree, Jhelum and Lahore(A/P)); in slight deficit at 5 meteorological observing stations (Kotli, Parachinar, Chitral, Saidu Sharif and Khanpur); in moderate deficit at 3 meteorological observing stations (Chilas, Drosh and Jacobabad) and in large deficit in 9 meteorological observing stations (Skardu, Bunji, Astor, Nawabshah, Padidan, Badin, Chhor, Karachi (A/P) and Karachi (Masroor).
Table 5: Details of weather system during March 2005

<table>
<thead>
<tr>
<th>S.No</th>
<th>System</th>
<th>Period</th>
<th>Place of first location</th>
<th>Direction of movement</th>
<th>Place of final location</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low pressure area extended upto mid-tropospheric level</td>
<td>1-6</td>
<td>Balochistan and adjoining areas</td>
<td>Stationary</td>
<td>Balochistan and adjoining areas</td>
<td>Became less marked on 7.</td>
</tr>
<tr>
<td>2</td>
<td>Do</td>
<td>2-6</td>
<td>North of NWFP</td>
<td>Eastsoutheastwards</td>
<td>Kashmir &amp; adjoining areas</td>
<td>Moved away eastwards on 7.</td>
</tr>
<tr>
<td>3</td>
<td>Do</td>
<td>8-10</td>
<td>Northeast Afghanistan &amp; adjoining NWFP</td>
<td>Northeastwards</td>
<td>North of Kashmir</td>
<td>Moved away northeast-wards on 11.</td>
</tr>
<tr>
<td>4</td>
<td>Low pressure area</td>
<td>8-10</td>
<td>Upper Sindh &amp; adj. areas</td>
<td>Do</td>
<td>South Punjab &amp; adj. areas</td>
<td>Became less marked on 11</td>
</tr>
<tr>
<td>5</td>
<td>Low pressure area extended upto mid-tropospheric level</td>
<td>15-22</td>
<td>Upper NWFP &amp; adjoining areas</td>
<td>Eastwards</td>
<td>Kashmir &amp; adjoining areas</td>
<td>Moved away eastwards on 23.</td>
</tr>
<tr>
<td>6</td>
<td>Low pressure area</td>
<td>16-22</td>
<td>Balochistan and adjoining areas</td>
<td>Do</td>
<td>Upper Sindh and adj. areas</td>
<td>Moved away eastwards on 23.</td>
</tr>
<tr>
<td>7</td>
<td>Do</td>
<td>25-28</td>
<td>Northeast Afghanistan &amp; adj. areas</td>
<td>Do</td>
<td>Kashmir &amp; adjoining areas</td>
<td>Moved away eastwards on 29.</td>
</tr>
</tbody>
</table>

**Temperature distribution:**

Severe cold wave conditions prevailed for a single day in Hazara region. Night temperatures were appreciable for below normal for 5-7 days in Peshawar and Sukkur regions, on 1-4 days in Hazara, Sargodha, Mekran, Zhob and Mirpurkhas regions. They were appreciably above normal for 10-13 days in Bahawalpur, Quetta, Kalat, Sukkur, Lahore and Mekran regions, for 6-9 days in Multan, Larkana, Mirpurkhas, Karachi, Rawalpindi, Sibbi and Faisalabad regions, for 4-5 days in Sargodha and Hyderabad regions, for 1-3 days in Peshawar, FATA, Malakand, D.I.Khan and Zhob regions. They were considerably above normal on 4 days in Quetta region, for 1-2 days in FATA, Lahore and Larkana regions.

The month’s lowest minimum temperature of 7.8° C recorded at Islamabad (Rawalpindi region) on 11 March.
Disastrous weather events and associated damages:

According to press reports heavy rains and floods in different areas of Balochistan claimed at least 39 lives and damaged hundreds of houses.

Acknowledgment:
The authors are grateful to Mr. Nadeem Faisal, A.M, CDPC, Mr. Farooq Dar, Met. Assistant, Mr. Abu Saad Khan, Met. Assistant and Mr. Muhammad Zahoor, S.O, MAC, Karachi for their help in data collection, rainfall tables and computers work for the preparation of this paper.

Figure 2
### Annex-II

#### Rainfall

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Large excess</strong></td>
<td>Percentage departure from normal rainfall is + 51% or more.</td>
</tr>
<tr>
<td><strong>Moderate excess</strong></td>
<td>Percentage departure from normal rainfall is + 26% to + 50%.</td>
</tr>
<tr>
<td><strong>Slight excess</strong></td>
<td>Percentage departure from normal rainfall is + 11% to + 25%.</td>
</tr>
<tr>
<td><strong>Normal</strong></td>
<td>Percentage departure from normal rainfall is - 10% to + 10%.</td>
</tr>
<tr>
<td><strong>Slight deficit</strong></td>
<td>Percentage departure from normal rainfall is - 11% to - 25%.</td>
</tr>
<tr>
<td><strong>Moderate deficit</strong></td>
<td>Percentage departure from normal rainfall is - 26% to - 50%.</td>
</tr>
<tr>
<td><strong>Large deficit</strong></td>
<td>Percentage departure from normal rainfall is - 51% or less.</td>
</tr>
<tr>
<td><strong>Almost at all</strong></td>
<td>66% or more stations of a places meteorological division reporting at least 2.5 mm rainfall.</td>
</tr>
<tr>
<td><strong>At a number of</strong></td>
<td>33% to 66% stations of a places meteorological division reporting at least 2.5 mm rainfall.</td>
</tr>
<tr>
<td><strong>At a few places</strong></td>
<td>33% or less stations of a places meteorological division reporting at least 2.5 mm rainfall.</td>
</tr>
<tr>
<td><strong>Isolated places</strong></td>
<td>One or two stations of a meteorological division.</td>
</tr>
<tr>
<td><strong>Heavy rain</strong></td>
<td>Rainfall amount is from 44.5 mm to 88.9 mm in 24 hours.</td>
</tr>
<tr>
<td><strong>Very heavy</strong></td>
<td>Rainfall amount is 89.0 mm</td>
</tr>
</tbody>
</table>

#### Temperature

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Severe Heat wave</strong></td>
<td>Departure of maximum temperature from normal is + 8° C or more for the regions where normal max temp. is more than 40° C. Declared only when the max. temp. of a station reaches at least 40° C for plains and at least 35° C for Hilly regions.</td>
</tr>
<tr>
<td><strong>Heat wave</strong></td>
<td>Departure of max. temp. from Conditions normal is between + 4° C to + 7° C (appreciable + where the normal max. temp. is moderate) more than 40° C.</td>
</tr>
<tr>
<td><strong>Hot day conditions</strong></td>
<td>Whenever the max. temp remains 40° C or more and minimum remains 5° C or more above normal, provided, it is not satisfying the heat wave criteria.</td>
</tr>
<tr>
<td><strong>Markedly above</strong></td>
<td>Departure of max. temperature from normal is between + 6° C to + 7° C.</td>
</tr>
<tr>
<td><strong>Appreciably</strong></td>
<td>Departure of max. temperature from above normal is between + 4° C to + 5° C.</td>
</tr>
<tr>
<td><strong>Markedly below</strong></td>
<td>Departure of max. temperature from below normal is between - 4° C to - 5° C.</td>
</tr>
<tr>
<td><strong>Considerably</strong></td>
<td>Departure of max temperature below normal is between - 6° C to 7° C.</td>
</tr>
</tbody>
</table>

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**Considerably**

Departure of max temperature below normal is - 8° C or less.