



INDIA METEOROLOGICAL DEPARTMENT
(MINISTRY OF EARTH SCIENCES)
SOUTHWEST MONSOON-2023
END OF SEASON REPORT
FOR
UTTARAKHAND STATE
HIGHLIGHTS

- For the state as a whole, the rainfall for the season (June-September) was **103%** of its long period average (LPA) and thus categorized as a '**Normal**' monsoon.
- Monthly rainfall over Uttarakhand as a whole was 85% of LPA in June, 131% of LPA in July, 92% of LPA in August and 83% of LPA in September respectively.
- Out of the total 13 districts of Uttarakhand, 01 district received 'Large Excess', 04 districts received 'Excess', 05 districts received 'Normal' and 03 districts received 'Deficient' seasonal rainfall.
- Monsoon current advanced over Uttarakhand on 24th June, 2023 and covered the entire state on the **25th June, 2023**.
- The monsoon activity over Uttarakhand was 'Normal' during the season (June-September).
- South-West Monsoon withdrew from the entire state on **06th October, 2023** (Withdrawal).

1. ONSET OF SOUTHWEST MONSOON – 2023

The southwest (SW) monsoon 2023 set in over Kerala on 08th June against the normal date of 1st June i.e. 7-days after its normal date. It advanced in different states and thereafter advanced into most parts of Uttarakhand on 24th June, 2023 and covered the entire Uttarakhand state on **25th June 2023**. Fig.1 shows the isochrones of advance of SW Monsoon 2023.

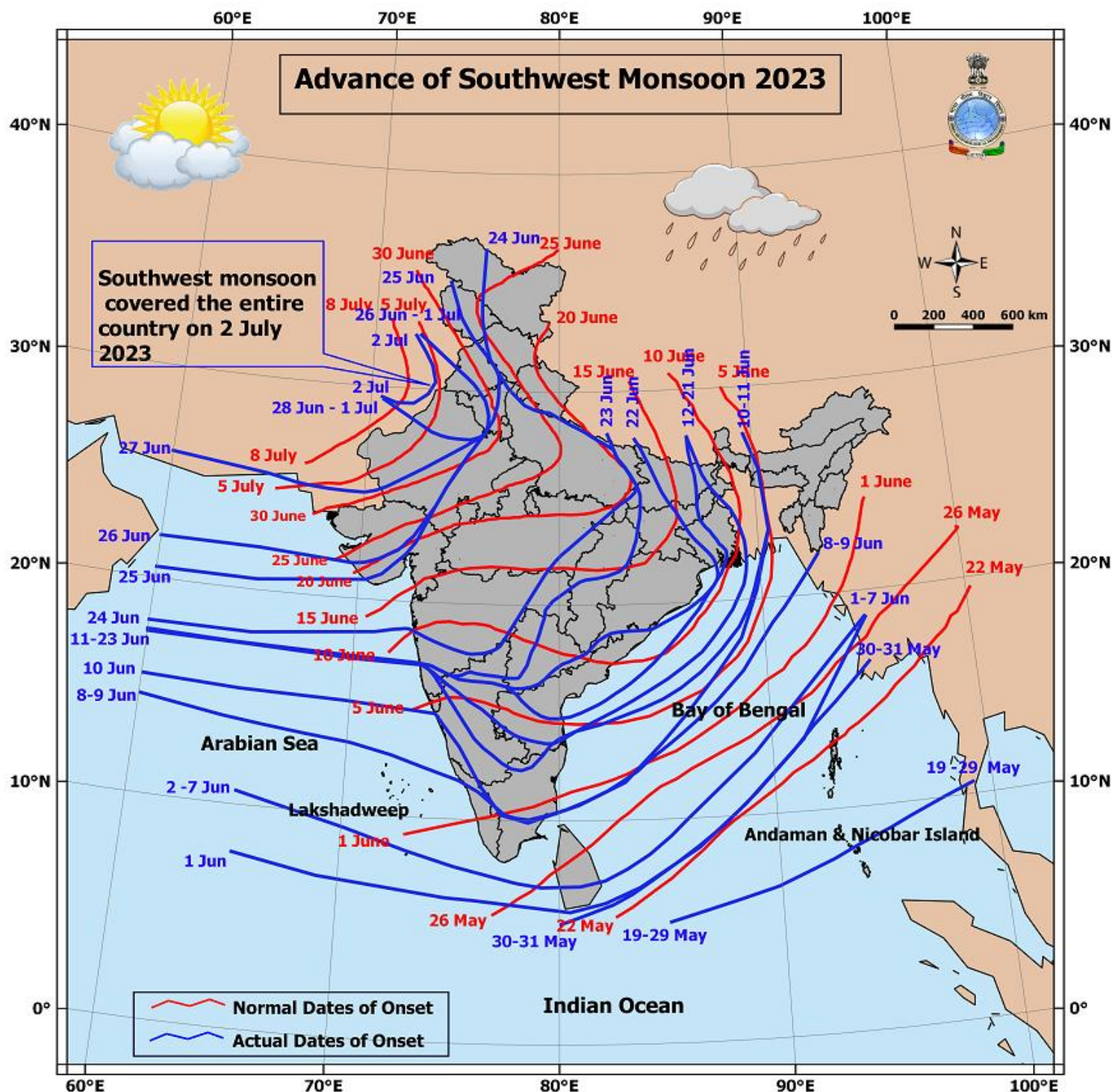


Fig.1 Isochrones of advance of SW-Monsoon 2023

2. CHIEF SYNOPTIC FEATURES OF SW MONSOON - 2023:

S.No.	Date	Synoptic Situation	Monsoon activity and significant rain (7 cm and above) (at 08:30 Hours IST. of Next Day)
1	24-Jun-23	<ul style="list-style-type: none"> •The cyclonic circulation over central parts of Uttar Pradesh persists and now extends up to 0.9 km above mean Sea level. •The cyclonic circulation over Northwest Bay of Bengal adjoining north Odisha-West Bengal coasts extending up to 7.6 km above mean Sea level tilting southwestwards with height persists. Under its influence, a Low Pressure Area is likely to form over the same region during next 24 hours. •The east-west trough from north Punjab to the above cyclonic circulation over Northwest Bay of Bengal across the cyclonic circulation over central parts of Uttar Pradesh and extends up to 0.9 km above mean Sea level. •The cyclonic circulation over Northeast Arabian Sea & adjoining Gujarat coast persists and now seen between 3.1 km & 5.8 km above mean Sea level. 	<p>Very light to moderate rain occurred at many places with heavy to very heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Active.</p> <p>MANUAL RAIN: Haridwar-13, Narendernagar-12, Roshnabad-11, Uttarkashi-8, Jollygrant/Kotdwar-8, Uttarkashi-7</p> <p>AWS/ARG RAIN: Rani Mazra-14, Chalthi-12, Kotdwar-9, Pandukeshwar-8, Dhanauri-8, Jollygrant-8, Uttarkashi-8, Laksar-7, Rishikesh-7</p>
2	25-Jun-23	<ul style="list-style-type: none"> •The Low Pressure Area over Northwest Bay of Bengal & adjoining north Odisha-West Bengal coasts with associated cyclonic circulation extending up to 7.6 km above mean Sea level persists. It is very likely to move west-northwestwards across north Odisha & Jharkhand during next 2 days. •The cyclonic circulation over central parts of Uttar Pradesh now lies over central parts of south Uttar Pradesh and extends up to 1.5 km above mean Sea level. •The east-west trough now runs from north Punjab to the Low Pressure Area over Northwest Bay of Bengal across Haryana, south Uttar Pradesh, northeast Madhya Pradesh & north Chhattisgarh and extends up to 0.9 km above mean Sea level. •The cyclonic circulation over Northeast Arabian Sea & adjoining Gujarat coast between 3.1 km & 5.8 km above mean Sea level persists. 	<p>Very light to moderate rain occurred at most places with heavy to very heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Active.</p> <p>MANUAL RAIN: Koteshwer(CWC)-19, Rishikesh(CWC)-15, Devprayag(CWC)-9, Ranichauri-11</p> <p>AWS/ARG RAIN: Ranichauri-12, Chamba-11, Jakhinder-9, Devprayag-7, Rishikesh-7, Lansdown-7, Vikasnagar-7</p>
3	26-Jun-23	<ul style="list-style-type: none"> •The Low Pressure Area over north Odisha & neighbourhood now lies over north interior Odisha and adjoining south Jharkhand & north Chhattisgarh. Associated cyclonic circulation extends up to 7.6 km above mean Sea level. It is very likely to move towards north Madhya Pradesh during next 2 days. •The east-west trough now runs from northwest Rajasthan to Northeast Bay of Bengal across south Haryana, south Uttar Pradesh, north-east Madhya Pradesh, Low Pressure Area over north interior Odisha and adjoining south Jharkhand & north Chhattisgarh and extends up to 1.5 km above mean Sea level. •The cyclonic circulation over central parts of south Uttar Pradesh extending up to 1.5 km above mean Sea level has merged with the above trough. •The cyclonic circulation over Northeast Arabian Sea & adjoining Gujarat coast between 3.1 km & 5.8 km above mean Sea level persists. 	<p>Very light to moderate rain occurred at many places in Uttarakhand. Monsoon activity remained Normal.</p>
4	29-Jun-23	<ul style="list-style-type: none"> •The Low Pressure Area over central parts of north Madhya Pradesh & neighbourhood with the associated cyclonic circulation extending up to 7.6 km above mean Sea level persists. •The east-west trough through northwest Rajasthan, East Rajasthan, Low Pressure Area over central parts of north Madhya Pradesh, Jharkhand, Gangetic West Bengal and thence eastwards towards Nagaland extending up to 1.5 km above mean Sea level persists. •The cyclonic circulation over south Gujarat coast & neighbourhood between 4.5 km & 5.8 km above mean Sea level persists. •The Western Disturbance as a trough in middle tropospheric westerlies with its axis at 5.8 km above mean Sea level roughly along Long. 74°E to the north of 32°N persists. 	<p>Very light to moderate rain occurred at many places with heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Active.</p> <p>MANUAL RAIN: Loharkhet/Khatima-9, Kathgodam-8</p> <p>AWS/ARG RAIN: Chalthi-10, Tanakpur-9, Song-7, Bhimtal-7, Haldwani-7</p>

5	30-Jun-23	<ul style="list-style-type: none">•The Low Pressure Area over Northwest Madhya Pradesh & neighbourhood has become less marked. However, the associated cyclonic circulation now lies over central parts of south Uttar Pradesh & neighbourhood and extends up to 5.8 km above mean Sea level.•The east-west trough now runs from northwest Rajasthan to Nagaland across cyclonic circulation over central parts of south Uttar Pradesh, south Bihar, Sub-Himalayan West Bengal and extends up to 0.9 km above mean Sea level.•A trough runs from the cyclonic circulation over central parts of south Uttar Pradesh & neighbourhood to northeast Arabian Sea across West Madhya Pradesh & Gujarat between 4.5 & 5.8 km above mean Sea level.•The cyclonic circulation over south Gujarat coast & neighbourhood between 4.5 km & 5.8 km above mean Sea level has merged with the above system.•A cyclonic circulation lies over southeast Bay of Bengal & neighbourhood between 4.5 & 5.8 km above mean Sea level.•The Western Disturbance as a trough in middle tropospheric westerlies with its axis at 5.8 km above mean Sea level roughly along Long. 74°E to the north of 32°N persists.	<p>Very light to moderate rain occurred at most places with heavy to very heavy rain at isolated places in Uttarakhand. Monsoon activity remained Normal.</p> <p>MANUAL RAIN: Banbasa-17, Khatima-10, Sama-7</p> <p>AWS/ARG RAIN: Khatima/Tanakpur-9, Lansdown-7</p>
6	01-Jul-23	<ul style="list-style-type: none">•The east-west trough at mean Sea level now runs from northwest Rajasthan to Manipur across south Haryana, Uttar Pradesh, Bihar, Sub-Himalayan West Bengal and south Assam.•The cyclonic circulation over central parts of south Uttar Pradesh & neighbourhood now lies over northwest Uttar Pradesh & neighbourhood and extends up to 5.8 km above mean Sea level.•The trough now runs from the cyclonic circulation over northwest Uttar Pradesh & neighbourhood to northeast Arabian Sea across East Rajasthan & Gujarat between 3.1 & 5.8 km above mean Sea level.•The cyclonic circulation over southeast Bay of Bengal & neighbourhood between 4.5 & 5.8 km above mean Sea level persists.•The Western Disturbance as a trough in middle tropospheric westerlies with its axis at 5.8 km above mean Sea level now runs roughly along Long. 74°E to the north of 30°N.	<p>Very light to moderate rain occurred at most places with heavy to very heavy rain at isolated places in Uttarakhand. Monsoon activity remained Active.</p> <p>MANUAL RAIN: Nainital-9, Jollygrant-8, Haldwani-7</p> <p>AWS/ARG RAIN: Bhimtal-12, Lansdown-9, Syunsi/Bajpur-8, Jollygrant/Jeolikot-7</p>
7	02-Jul-23	<ul style="list-style-type: none">•The Monsoon trough at mean Sea level passes through Bikaner, Dausa, Gwalior, Sidhi, Ambikapur, Balasore and thence eastwards to Northwest Bay of Bengal.•The cyclonic circulation over northwest Uttar Pradesh & neighbourhood now lies over central parts of Uttar Pradesh and extends up to 5.8 km above mean Sea level.•The cyclonic circulation over central parts of south Bay of Bengal & adjoining central Bay of Bengal now lies over central parts of Southwest Bay of Bengal between 4.5 & 5.8 km above mean Sea level.•A cyclonic circulation lies over north Andaman Sea between 1.5 & 5.8 km above mean Sea level.•A cyclonic circulation lies over Sub-Himalayan West Bengal & Sikkim at 3.1 km above mean Sea level.•The Western Disturbance as a trough in middle tropospheric westerlies with its axis at 5.8 km above mean Sea level roughly along Long. 76°E to the north of 30°N has moved away.•The trough from the above cyclonic circulation over northwest Uttar Pradesh & neighbourhood to northeast Arabian Sea across East Rajasthan & Gujarat between 3.1 & 5.8 km above mean Sea level has become less marked.	<p>Very light to moderate rain occurred at a few places in Uttarakhand. Monsoon activity remained Weak.</p>
8	05-Jul-23	<ul style="list-style-type: none">•The Monsoon trough at mean Sea level now passes through Bikaner, Churu, Guna, Sidhi, Ambikapur, Balasore and thence southeastwards to Central Bay of Bengal.•The east-west shear zone roughly along Lat. 15°N between 4.5 & 7.6 km above mean Sea level persists.•The cyclonic circulation over Westcentral Bay of Bengal adjoining north Andhra Pradesh coast now lies over North & adjoining Central Bay of Bengal between 1.5 & 7.6 km above mean Sea level tilting southwestwards with height.•The cyclonic circulation over central parts of Uttar Pradesh persists and now seen at 3.1 km above mean Sea level.•A fresh Western Disturbance in mid-tropospheric westerlies with	<p>Light to moderate rain occurred at most places with heavy to very heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Active.</p> <p>MANUAL RAIN: Kashipur-13, Laksar-13, Mohkampur-12, Jaspur-10, Kotdwar-9, Haridwar(CWC)-8, Roshnabad-7, Pantnagar-7, Jollygrant-7</p> <p>AWS/ARG RAIN: Rani Majra-17, Laldhaang-13, Khanpur-13, Roorkee-12, Lansdown-9, Devidhura-8, Dangoli-7, Karanpur-7, Agastyamuni-7</p>

		<p>its axis at 5.8 km above mean Sea level runs roughly along Long. 68°E to the north of Lat. 30°N.</p> <ul style="list-style-type: none"> •A cyclonic circulation lies over north Pakistan & adjoining Punjab extending up to 1.5 km above mean Sea level. •A fresh Western Disturbance is likely to affect Western Himalayan Region from the night of 8th July. •The cyclonic circulation over south Gujarat Region & neighborhood extending up to 3.1 km above mean Sea level has become less marked. 	
9	06-Jul-23	<ul style="list-style-type: none"> •The Monsoon Trough at mean Sea level now passes through Bikaner, Kota, Raisen, Mandla, Ambikapur, Balasore and thence east-southeastwards to eastcentral Bay of Bengal. •The cyclonic circulation over North & adjoining Central Bay of Bengal now lies over Gangetic West Bengal & adjoining north Odisha between 1.5 & 7.6 km above mean Sea level tilting southwestwards with height. •A cyclonic circulation lies over northeast Arabian Sea & adjoining south Gujarat and extends up to 3.1 km above mean Sea level tilting southwards with height. •The east-west shear zone now runs roughly along Lat. 17°N between 4.5 & 7.6 km above mean Sea level. •The Western Disturbance in mid-tropospheric westerlies with its axis at 5.8 km above mean Sea level now runs roughly along Long. 70°E to the north of Lat. 28°N. •The cyclonic circulation over north Pakistan & adjoining Punjab extending up to 1.5 km above mean Sea level persists. •The cyclonic circulation over central parts of Uttar Pradesh at 3.1 km above mean Sea level has become less marked. 	<p>Very light to moderate rain occurred at most places with heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Normal.</p> <p>MANUAL RAIN: Kashipur-10, Nainital-7</p> <p>AWS/ARG RAIN: Kashipur-10</p>
10	09-Jul-23	<ul style="list-style-type: none"> •The Monsoon Trough at mean Sea level now passes through Jaisalmer, Ajmer, Shivpuri, Sidhi, Daltonganj, Shanti Niketan and thence eastwards to Manipur and extends up to 1.5 km above mean Sea level. •The cyclonic circulation over West Rajasthan now lies over central Rajasthan & neighbourhood and extends up to 3.1 km above mean Sea level. •The Western Disturbance as a trough between 3.1 & 9.5 km above mean Sea level with its axis at 5.8 km above mean Sea level now runs roughly from Lat. 35°N./ Long. 68°E to Lat. 23°N./ Long. 65°E. 	<p>Light to moderate rain occurred at most places with heavy to very heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Active.</p> <p>MANUAL RAIN: Bhagwanpur-9, Roorkee(CWC)-8, Tyuni-8, Chakrata-7, Rishikesh(CWC)-7, Haripur-7</p> <p>AWS/ARG RAIN: Koti-16, Purola-14, Bhagwanpur-8, Roorkee-8, Dhanauri-7, Vikasnagar-7</p>
11	10-Jul-23	<ul style="list-style-type: none"> •The Low Pressure Area over southwest Rajasthan & neighbourhood now lies over northeast Rajasthan & neighbourhood and the associated cyclonic circulation extends up to 4.5 km above mean Sea level. •The Monsoon Trough at mean Sea level now passes through Bikaner, the centre of Low Pressure Area over northeast Rajasthan & neighbourhood, Lucknow, Patna, Balurghat and thence eastwards to Manipur and extends up to 3.1 km above mean Sea level. •The Western Disturbance as a trough seen between 5.1 & 9.5 km above mean Sea level with its axis at 5.8 km above mean Sea level now runs roughly from Lat. 37°N./ Long. 71°E to Lat. 24°N./ Long. 66°E. 	<p>Light to moderate rain occurred at many places with heavy to very heavy rain/thunderstorm at a few places and extremely heavy rain at isolated places in Uttarakhand. Monsoon activity remained Active.</p> <p>MANUAL RAIN: Rishikesh(CWC)-31, Roshnabad-23, Haridwar(CWC)-21, Laksar-15, Narendranagar-12, Jollygrant-12, Bhagwanpur-9, Roorkee-9, Haripur-9, Tuini-9, Kotdwar-9, Gairsain-9, Kotdwar-9, Dhanulti-8, Dunda-8, Chakrata-8, Dehradun-8, Mussorrie-7, Yamkeshwer-7</p> <p>AWS/ARG RAIN: Dhanauri-22, Asharori-21, Rani Mazra-20, Rishikesh-19, Bhagwanpur-17, Vikasnagar-16, Raiwala-16, Ucost-15, Laksar-14, Purola-13, Khanpur-7, Shastradhara-7, Nagthat-6</p>
12	11-Jul-23	<ul style="list-style-type: none"> •The cyclonic circulation Northeast Rajasthan & adjoining northwest Madhya Pradesh extending up to 5.8 km above mean Sea level. •The Monsoon Trough at mean Sea level now passes through Jaisalmer, Sikar, Orai, Sultanpur, Patna, Malda and thence eastwards to Arunachal Pradesh and extends up to 0.9 km above mean Sea level. •The Western Disturbance as a trough now seen between 3.1 & 9.5 km above mean Sea level with its axis at 5.8 km above mean Sea level now runs roughly along Long. 68°E to the north of Lat. 28°N. •A cyclonic circulation lies over south Haryana & neighbourhood at 1.5 km above mean Sea level. 	<p>Light to moderate rain occurred at most places with heavy to very heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Active.</p> <p>MANUAL RAIN: RISHIKESH(CWC)-17, KOSHYA KUTAU LI - 12, NARENDRANAGAR-11, NAINITAL (SNOW VIEW)- 9, NAINITAL-8, THAILISAIN-7, RUDRAPRAYAG(CWC)-7, HARIDWAR(CWC)-7, RANIKHET-7, DUNDA-7</p> <p>AWS/ARG RAIN: BHARSAR-11, SATPULI-11, RIKHNIKHAL-10, LANSDOWN-8, THAILISAIN-8, NAINITAL-8, DEVIDHURA-8, SYUNSI-7, RUDRA _PRAYAG-7</p>
13	12-Jul-23	<ul style="list-style-type: none"> •The Monsoon Trough at mean Sea level now passes through Bikaner, Gwalior, Sidhi, Gaya, Balurghat and thence northeastwards to Arunachal Pradesh. 	<p>Light to moderate rain occurred at most places with heavy to extremely heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Active.</p>

		<ul style="list-style-type: none"> •The cyclonic circulation over Northeast Rajasthan & adjoining northwest Madhya Pradesh now lies over central parts of south Uttar Pradesh & neighbourhood and extends up to 3.1 km above mean Sea level. •The Western Disturbance as a trough between 3.1 & 7.6 km above mean Sea level with its axis at 5.8 km above mean Sea level now runs roughly along Long. 77°E to the north of Lat. 28°N. •The cyclonic circulation over south Haryana & neighbourhood at 1.5 km above mean Sea level has become less marked. 	<p>MANUAL RAIN: Laksar-22, Roorkee(CWC)-19, Roshnabaad-17, Narendernagar-11, Rudraprayag(CWC)-10, Bhagwanpur-10, Rishikesh(CWC)-9, Dehradun-7, Mussorie-7, Munsiyaari-7, Koteswar(CWC)-7, Srinagar(CWC)-7, Kotdwar-7</p> <p>AWS/ARG RAIN: ROORKEE_AMFU-27, BHAGWANPUR-21, RANI MAZRA-20, DHANAURI-14, KHANPUR-10, PUROLA-9, RUDRA_PRAYAG-9, UCOST-8, ASHARORI-7, RAIWALA-7, VIKAS NAGAR-7, KOTI-7, KOTDWAR-7</p>
14	13-Jul-23	<ul style="list-style-type: none"> •The Monsoon Trough at mean Sea level now passes through Jaisalmer, Delhi, Lucknow, Muzaffarpur, Balurghat and thence northeastwards to Arunachal Pradesh across Assam. •A fresh Western Disturbance as a cyclonic circulation between 5.8 km & 9.5 km above mean Sea level lies over North Pakistan & neighbourhood. •The cyclonic circulation over central parts of south Uttar Pradesh & neighbourhood extending up to 3.1 km above mean Sea level persists. •A trough extends from this cyclonic circulation to south Gujarat across Madhya Pradesh between 2.1 & 3.1 km above mean Sea level. •A cyclonic circulation is likely to form over Northwest Bay of Bengal around 16th July, 2023. •The Western Disturbance as a trough between 3.1 km & 7.6 km above mean Sea level with its axis at 5.8 km above mean Sea level roughly along Long. 77°E to the north of Lat. 28°N has moved away eastwards. 	<p>Light to moderate rain occurred at most places with heavy to very heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Normal.</p> <p>MANUAL RAIN: Kotdwar-18, Narendranagar-8, Jaspur-7</p> <p>AWS/ARG RAIN: Kotdwar-12, Bajpur-9, Ramnagar-9, Kaladhungi-8</p>
15	17-Jul-23	<ul style="list-style-type: none"> •The Monsoon Trough at mean Sea level now passes through Bikaner, Sikar, Orai, Sidhi, Ambikapur, Balasore and thence southeastwards to eastcentral Bay of Bengal and extends up to 1.5 km above mean Sea level. •The low pressure area over west Jharkhand and adjoining north Chhattisgarh & north interior Odisha has become less marked. However, the associated cyclonic circulation now lies over south Jharkhand & neighbourhood and extends up to 7.6 Km above mean Sea level tilting southwestwards with height. •A shear zone runs roughly along Lat. 20° N between 4.5 km & 7.6 km above mean Sea level tilting southwards with height. •The Western Disturbance now seen as a cyclonic circulation over central Pakistan & adjoining Punjab at 5.8 Km above mean Sea level. •A cyclonic circulation is likely to form over Northwest Bay of Bengal within 48 hours. 	<p>Light to moderate rain occurred at many places with heavy to extremely heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Active.</p> <p>MANUAL RAIN: Sama-22, Mussoorie-18, Kapkot-17, Laksar-15, Loharkhet-12, Dehradun(CWC)-12, Pantnagar-11, Haripur-10, Roshnabad-10, Chamoli-9, Dehradun-8, Haridwar(CWC)-7, Kotdwar-7, Dhanaulti-7, Nandprayag-7</p> <p>AWS/ARG RAIN: Mussoorie(UKG)-25, Koti-20, Laksar-16, Massouri-15, Rani Mazra-12, Gular Bhoj-11, Utt. Tech. Uni.-10, Song-10, Kotdwar-9, Pantnagar_Amfu-8, Dhanolti-7</p>
16	18-Jul-23	<ul style="list-style-type: none"> •The Monsoon Trough at mean Sea level now passes through Bikaner, Narnaul, Shivpuri, Mandla, Ambikapur, Chandbali and thence southeastwards to Westcentral Bay of Bengal. •A cyclonic circulation lies over northwest Bay of Bengal & adjoining Coastal Odisha and extends up to 7.6 km above mean Sea level tilting southwards with height. Under its influence, a low pressure area likely to form northwest Bay of Bengal during next 48 hours. •The cyclonic circulation over south Jharkhand & neighbourhood now lies over south Chhattisgarh and extends up to 1.5 km above mean Sea level. •A cyclonic circulation lies over northwest Madhya Pradesh & neighbourhood at 0.9 km above mean Sea level. •A cyclonic circulation lies over Haryana & neighbourhood at 3.1 km above mean Sea level. •The shear zone now runs roughly along Lat. 18° N between 4.5 km & 7.6 km above mean Sea level tilting southwards with height. •The Western Disturbance as a cyclonic circulation over central Pakistan & adjoining Punjab over Kashmir & neighbourhood at 5.8 Km above mean Sea level has moved away eastwards. 	<p>Light to moderate rain occurred at most places with heavy to very heavy rain/thunderstorm occurred at isolated places in Uttarakhand. Monsoon activity remained Normal.</p> <p>MANUAL RAIN: Rishikesh(CWC)-13, Uttarkashi-7</p>
17	21-Jul-23	<ul style="list-style-type: none"> •The Low Pressure Area over south Odisha – north Andhra Pradesh and adjoining northwest & Westcentral Bay of Bengal with associated cyclonic circulation extending up to 7.6 km above 	<p>Light to moderate rain occurred at many places with Heavy to very heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Active.</p>

		<p>mean Sea level persists. It is likely to move slowly westnorthwestwards across south Odisha - north Andhra Pradesh coasts during next 2 days.</p> <ul style="list-style-type: none">•The Monsoon Trough at mean Sea level continue to pass through Jaisalmer, Kota, Raisen, Chhindwara, Durg, center of the low pressure area over south Odisha–north Andhra Pradesh and thence east-southeastwards to Eastcentral Bay of Bengal extending up to 2.1 km above mean Sea level.•The cyclonic circulation over south Chhattisgarh & neighbourhood extending up to 2.1 km above mean Sea level persists.•The shear zone roughly along Lat. 20° N between 3.1 & 7.6 km above mean Sea level persists.•The Western Disturbance as a trough with its axis at 5.8 km above mean Sea level roughly along Long. 62° E to the north of 28° N persists.	<p>MANUAL RAIN: Haripur-13, Haldwani-12, Mussorrie-11, Champawat-10, Berinag-10, Dunda-9, Purola-9, Karanprayag-9, Gairsain-8, Didihat-8, Pithoragarh-8, Chakrata-8, Mori-8, Barkot-7, Shama-7, Loharkhet-7</p> <p>AWS/ARG RAIN: Mussorrie-16(8 cm in 1 hour), Chalthi-14, Koti/Kalsi-13,Didihat-11, Thariali-11, Ganai-gangoli-11, Nainidanda-10, Nainbagh-10, Nagthat-9, Vikashnagar-9, Jauljibi-9, Berinag-9, Purola-9, Dunda-8, Rajgarhi-8, Thal-8, Gangolihat-8, Pokhari-8, Karnprayag-7, Jhulaghat-7, Bhimtal/Kaladhungi-7, Chorgalia-7</p>
18	22-Jul-23	<ul style="list-style-type: none">•The Monsoon Trough at mean Sea level now passes through Jaisalmer, Deesa, Ratlam, Betul, Chandrapur, Kondagaon, Gopalpur and thence southeastwards to north Andaman Sea and extends up to 2.1 km above mean Sea level.•The Low Pressure Area over south Odisha–north Andhra Pradesh and adjoining northwest & Westcentral Bay of Bengal has become less marked. However, the associated cyclonic circulation now lies over southeast Vidarbha & adjoining south Chhattisgarh and extends up to 4.5 km above mean Sea level.•The cyclonic circulation over south Chhattisgarh & neighbourhood extending up to 2.1 km above mean Sea level has merged with the above cyclonic circulation.•A cyclonic circulation lies over west-central & adjoining northwest Bay of Bengal and extends up to 7.6 km above mean Sea level.•The shear zone now runs roughly along Lat. 20° N between 3.1 & 5.8 km above mean Sea level tilting southwards with height.•The Western Disturbance as a trough with its axis at 5.8 km above mean Sea level now runs roughly along Long. 66° E to the north of 32° N.•A cyclonic circulation lies over southwest Madhya Pradesh & adjoining southeast Rajasthan and northeast Gujarat Region and extends up to 1.5 km above mean Sea level.•A fresh Low Pressure Area is likely to form over Northwest & adjoining Westcentral Bay of Bengal off south Odisha-north Andhra Pradesh around 24th July	<p>Very light to moderate rain occurred at most places with Heavy rain/thunderstorm at one places in Uttarakhand. Monsoon activity remained Normal.</p> <p>MANUAL RAIN: Gangolighat-8</p>
19	08-Aug-23	<ul style="list-style-type: none">•The cyclonic circulation over north Bangladesh persists and now extends up to 7.6 km above mean Sea level tilting southwards with height.•Western end of the Monsoon Trough at mean Sea level runs along the foothills of Himalayas and the eastern end passes through Baharaich, Gorakhpur, Supaul, Cooch Behar and thence eastwards towards Manipur.•The Western Disturbance as a trough in middle tropospheric westerlies with its axis at 5.8 km above mean Sea level now runs roughly along Long. 74°E to the north of Lat. 32°N.•The cyclonic circulation over north Gujarat & neighbourhood at 5.8 Km above mean Sea level has become less marked.	<p>Very light to moderate rain occurred at many places with heavy to extremely heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Active.</p> <p>MANUAL RAIN: Kotdwar-27, Kathgodam-24, Banbasa-22, Kaladhungi-20, Nainital-17, Sama-16, Khatima-14, Loharkhet-13, Pantnagar-12, Haripur-9, Yamkeshwar-9, Narendranagar-8</p> <p>AWS/ARG RAIN: Kotdwar-28, Chorgalia-23, Banbasa-21, Kaladhungi-20, Nainital(Jeolikot)_Kvk-19, Nainital-19, Tanakpur-19, Ramnagar-18, Haldwani-17, Yamkeshwar-15, Pantnagar_Amfu-11, Bhainsiya Chhana-11, Khatima-11, Soneprayag-8, Song-7, Bastia-7, Kalsi-7</p>
20	09-Aug-23	<ul style="list-style-type: none">•The cyclonic circulation over north Bangladesh now lies over northeast Bihar & neighbourhood and extends up to 7.6 km above mean Sea level tilting southwards with height.•The Monsoon Trough at mean Sea level now passes through Amritsar, Chandigarh, Najibabad, Gorakhpur, Supaul, Balurghat and thence eastwards towards Manipur.•A fresh Western Disturbance as a trough in middle tropospheric westerlies with its axis at 5.8 km above mean Sea level runs roughly along Long. 60°E to the north of Lat. 32°N.•The Western Disturbance as a trough in middle tropospheric westerlies with its axis at 5.8 km above mean Sea level roughly along Long. 74°E to the north of Lat. 32°N has moved away east-northeastwards.	<p>Light to moderate rain occurred at many places with heavy to extremely heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Active.</p> <p>MANUAL RAIN: Rishikesh-43, Haripur-14, Jollygrant-11, Narendra nagar-9, Kashipur-9, Banbasa-8, Pantnagar-8, Yamkeshwar-8, Kotdwar-7, Mussoorie-7</p> <p>AWS/ARG RAIN: Rishikesh-Neelkanth-24, Kalsi-17, Yamkeshwar-13, Gular Bhoj-13, Tanakpur-12, Raiwala-12, Jollygrant-10, Kashipur-9, Bajpur-8, Sahastradhara-8, Mussoorie(Ukg)-8, Kotdwar-7, Jakholi-7</p>

21	10-Aug-23	<ul style="list-style-type: none">•The cyclonic circulation over northeast Bihar & neighbourhood now lies over northeast Uttar Pradesh and adjoining northwest Bihar and extends up to 3.1 km above mean Sea level.•The Monsoon Trough at mean Sea level now passes through Amritsar, Chandigarh, Najibabad, Gorakhpur, Muzaffarpur, Malda and thence eastwards towards Mizoram.•The Western Disturbance as a trough in middle tropospheric westerlies with its axis at 5.8 km above mean Sea level now runs roughly along Long. 64°E to the north of Lat. 30°N.•A cyclonic circulation lies over West Rajasthan at 1.5 km above mean Sea level.	<p>Light to moderate rain occurred at most places with heavy to very heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Normal.</p> <p>MANUAL RAIN: Rishikesh-11, Jollygrant-9, Haripur-8, Narendranagar-7, Loharkhet-7</p> <p>AWS/ARG RAIN: Bajpur-11, Haldwani-10, Raiwala-9, Jollygrant-8, Utt. Tech. Uni.-7, Ucost-7, Kotdwar-7</p>
22	11-Aug-23	<ul style="list-style-type: none">•The Monsoon Trough at mean Sea level now passes through Amritsar, Chandigarh, Baharaich, Muzaffarpur, Balurghat and thence eastwards towards Manipur.•The cyclonic circulation over northeast Uttar Pradesh and adjoining northwest Bihar persists at 3.1 km above mean Sea level.•The Western Disturbance as a trough in middle tropospheric westerlies with its axis at 5.8 km above mean Sea level now runs roughly along Long. 68°E to the north of Lat. 30°N.•A trough runs from east Bihar to northwest Bay of Bengal across West Bengal up to 1.5 Km above mean Sea level.•A cyclonic circulation lies over Gujarat at 5.8 km above mean Sea level.•The cyclonic circulation over West Rajasthan at 1.5 km above mean Sea level has become less marked.	<p>Light to moderate rain occurred at many places with heavy rain at isolated places in Uttarakhand. Monsoon activity remained Normal.</p> <p>MANUAL RAIN: Narendranagar-10, Dharchula-7</p>
23	13-Aug-23	<ul style="list-style-type: none">•The western end of Monsoon Trough runs close to foothills of the Himalayas and its eastern end at mean Sea level now passes through Gorakhpur, Darbhanga, Malda and thence eastwards towards Nagaland.•The trough from Sub-Himalayan West Bengal & Sikkim to northwest Bay of Bengal now seen as a cyclonic circulation over east Bangladesh & neighbourhood at 0.9 km above mean Sea level with a trough between 1.5 & 3.1 km above mean Sea level and runs roughly along Long. 90°E to the north of Lat. 20°N.•The Western Disturbance as a trough in middle tropospheric westerlies with its axis at 5.8 km above mean Sea level now runs roughly along Long. 75°E to the north of Lat. 32°N.•A cyclonic circulation lies over northwest Bay of Bengal & neighbourhood at 5.8 km above mean Sea level.	<p>Light to moderate rain occurred at many places and Heavy to very heavy rain occurred at a few places with extremely heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Active.</p> <p>MANUAL RAIN: Rishikesh-42, Mohkampur-18, Jollygrant-17, FRI-17, Mussoorie-16, Devprayag-14, Sama-12, Tehri-12, Loharkhet-11, Kotdwar-11, Jaspur-10, Lansdown-10, Kathgodam-10, Srinagar-9, Koteshtwer-8, Narendranagar-8, Marora-8, Yamekeshwar-8, Nainital-8, Chamoli-8, Champawat-8, Chakrata-8, Lohaghat-7, Haripur-7, Haridwar-7, Berinag-7, Dharchula-7, Dhanolti-7, Ghansali-7</p> <p>AWS/ARG RAIN: Sahastradhara/Iti-25, Ucost-21, Utt. Tech. Uni.-19, Mussoorie(Ukg)-19, Raiwala-19, Lansdown-17, Liti-16, Chalthi-16, Yamkeshwar-15, Rani_Chawri-15, Jollygrant-15, Bastia-14, Massouri-14, Nagthat-11, Kotdwar-11, Kotdwar-11, Rikhnikhal-10, Kaladhungi-10, Nainbagh-10, Tanakpur-10, Satpuli-9, Champawat-9, Vikas Nagar-9, Haldwani-9, Champawat-8, Lohaghat-8, Song-8, Devprayag-8, Kanda-8, Chamoli-8, Didihat-8, Berinag-7, Jauljibi-7, Ganai Gangoli-7, Kirtinagar-7, Bajpur-7, Chakrata-7, Srinagar_Arg-7</p>
24	14-Aug-23	<ul style="list-style-type: none">•The Monsoon Trough at mean Sea level now passes through Amritsar, Karnal, Meerut, Lucknow, Sabour, Golpara and thence eastwards towards Nagaland.•The cyclonic circulation over east Bangladesh & neighbourhood now lies over south Bangladesh & neighbourhood extending up to 5.8 km above mean Sea level tilting southwestwards with height.•The cyclonic circulation over northwest Bay of Bengal & neighbourhood at 5.8 km above mean Sea level has merged with the above cyclonic circulation.•The Western Disturbance as a trough in middle tropospheric westerlies with its axis at 5.8 km above mean Sea level runs roughly along Long. 68°E to the north of Lat. 32°N.•A cyclonic circulation lies over west Madhya Pradesh between 3.1 & 5.8 km above mean Sea level.•The Western Disturbance as a trough in middle tropospheric westerlies with its axis at 5.8 km above mean Sea level roughly along Long. 75°E to the north of Lat. 32°N has moved away east-northeastwards.	<p>Light to moderate rain occurred at many places in Uttarakhand. Monsoon activity remained Weak.</p>

25	22-Aug-23	<ul style="list-style-type: none"> •The Monsoon Trough at mean Sea level now passes through Amritsar, Karnal, Meerut, Lucknow, Gaya, Malda and thence eastwards to Nagaland across Assam. •The Western Disturbance as a trough in middle tropospheric westerlies with its axis at 5.8 km above mean Sea level now runs roughly along Long.60°E to the north of Lat. 30°N. •The cyclonic circulation over northwest Madhya Pradesh & neighbourhood now lies over central parts of Madhya Pradesh between 3.1 & 4.5 km above mean Sea level. 	<p>Light to moderate rain occurred at most places with heavy to very heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Active.</p> <p>MANUAL RAIN: Sama-18, Loharkhet-14, Kotdwar-10, Kashipur-10, Karanprayag-9</p> <p>AWS/ARG RAIN: Kashipur-11, Song-10, Karnaprayag-9, Gular Bhoj-8, Tharali-7, Kotdwar-7</p>
26	23-Aug-23	<ul style="list-style-type: none"> •The Monsoon Trough at mean Sea level now passes through Firozpur, Ambala, Bareilly, Patna, Balurghat and thence east-southeastwards to Mizoram. •A cyclonic circulation lies over northwest Uttar Pradesh at 0.9 km above mean Sea level. •A trough runs from northwest Uttar Pradesh to south Assam across Bihar, Sub-Himalayan West Bengal & Sikkim and extends up to 1.5 km above mean Sea level with embedded cyclonic circulation over northwest Uttar Pradesh at 0.9 km above mean Sea level. •The cyclonic circulation over central parts of Madhya Pradesh now lies over central parts of south Uttar Pradesh between 3.1 & 5.8 km above mean Sea level tilting southwards with height. •The Western Disturbance as a trough in middle tropospheric westerlies with its axis at 5.8 km above mean Sea level now runs roughly along Long. 65°E to the north of Lat. 28°N. •A cyclonic circulation lies over South Gujarat between 4.5 & 5.8 km above mean Sea level. 	<p>Light to moderate rain occurred at most places with heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Active.</p> <p>MANUAL RAIN: Loharkhet-9, Rishikesh-7</p>
27	24-Aug-23	<ul style="list-style-type: none"> •The Monsoon Trough at mean Sea level now passes through Firozpur, Karnal, Meerut, Azamgarh, Patna, Deoghar, Diamond Harbour and thence southeastwards to eastcentral Bay of Bengal. •The trough from northwest Uttar Pradesh to south Assam, now runs from northeast Uttar Pradesh to east Assam across Bihar, Sub-Himalayan West Bengal at 0.9 km above mean Sea level. •The cyclonic circulation over central parts of south Uttar Pradesh now lies over West Uttar Pradesh between 3.1 & 7.6 km above mean Sea level tilting southwards with height. •A cyclonic circulation lies over central Pakistan & adjoining West Rajasthan and extends up to 1.5 km above mean Sea level. •A cyclonic circulation lies over Sub-Himalayan West Bengal & Sikkim between 3.1 & 5.8 km above mean Sea level. •The Western Disturbance as a trough in middle tropospheric westerlies with its axis at 5.8 km above mean Sea level now runs roughly along Long. 69°E to the north of Lat. 28°N. •The cyclonic circulation over South Gujarat between 4.5 & 5.8 km above mean Sea level has become less marked. •The cyclonic circulation over northwest Uttar Pradesh at 0.9 km above mean Sea level has become less marked. 	<p>Light to moderate rain occurred at many places with heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Normal.</p> <p>MANUAL RAIN: Didihat-9</p> <p>AWS/ARG RAIN: Didihat-8, Haldwani-7, Chorgalia-7</p>
28	25-Aug-23	<ul style="list-style-type: none"> •The western end of Monsoon Trough lies along the foothills of the Himalayas. However, its eastern end passes through Gorakhpur, Patna, Bankura, Digha and thence southeastwards to eastcentral Bay of Bengal at mean Sea level. •The cyclonic circulation over West Uttar Pradesh now lies over Northeast Uttar Pradesh & neighbourhood between 3.1 & 5.8 km above mean Sea level. •The cyclonic circulation over Sub-Himalayan West Bengal & Sikkim now lies over North Bangladesh & neighbourhood and extends up to 1.5 km above mean Sea levelwith trough aloft roughly along Long. 88°E to the north of Lat. 20°N between 3.1 & 5.8 km above mean Sea level. •The Western Disturbance as a trough in middle tropospheric westerlies with its axis at 5.8 km above mean Sea level now runs roughly along Long. 70°E to the north of Lat. 32°N. •The trough from northeast Uttar Pradesh to east Assam across Bihar, SubHimalayan West Bengal at 0.9 km above mean Sea level has become less marked. •The cyclonic circulation over central Pakistan & adjoining West Rajasthan extending up to 1.5 km above mean Sea level has become less marked. 	<p>Light to moderate rain occurred at a few places with thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Weak.</p>

29	09-Sep-23	<ul style="list-style-type: none"> •The Monsoon Trough at mean Sea level now passes through Jaisalmer, Ajmer, Guna, Mandla, Pendra Road, Jharsuguda, Digha and thence east-southeastwards to Northeast Bay of Bengal and extends up to 3.1 km above mean Sea level. •The cyclonic circulation over central Madhya Pradesh & neighbourhood now lies over central parts of north Madhya Pradesh and extends up to 7.6 km above mean Sea level tilting southwards with height. •A trough runs from above cyclonic circulation over central parts of north Madhya Pradesh to south Madhya Maharashtra between 1.5 & 4.5 km above mean Sea level. •The Western Disturbance as a trough in westerlies with its axis at 5.8 km above mean Sea level now runs roughly along Long. 71° E to the north of Lat. 30° N. •A cyclonic circulation lies over north Andaman Sea at 5.8 km above mean Sea level. •A fresh cyclonic circulation likely to form over northwest & adjoining westcentral Bay of Bengal around 12th September'23. •The east-west shear zone roughly along Lat. 21° N between 3.1 & 7.6 km above mean Sea level has become less marked. 	<p>Light to moderate rain occurred at most places with Very Heavy & Heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Vigorous.</p> <p>MANUAL RAIN: Nainital-12, Champawat-9, Lohaghat-8, Haldwani-8, Pantnagar-7, Jaspur-7</p> <p>AWS/ARG RAIN: Nainital-13, Jaspur-10, Nainital(Jeolikot)_Kvk-9, Lohaghat-8, Rudrapur(Ukg)-7, Pokhari-7, Pati-7, Chalthi-7, Haldwani-7, Mukteshwar-7</p>
30	10-Sep-23	<ul style="list-style-type: none"> •The Monsoon Trough at mean Sea level now passes through Jaisalmer, Kota, Sidhi, Jamshedpur, Digha and thence east-southeastwards to Northeast Bay of Bengal. •The cyclonic circulation over northwest Madhya Pradesh & adjoining northeast Rajasthan extending up to 7.6 km above mean Sea level persists. •A trough runs from cyclonic circulation over northwest Madhya Pradesh & adjoining northeast Rajasthan to south Chhattisgarh across East Madhya Pradesh and extends up to 4.5 km above mean Sea level. •The Western Disturbance as a trough in westerlies with its axis at 5.8 km above mean Sea level now runs roughly along Long. 75° E to the north of Lat. 30° N. •The cyclonic circulation over north Andaman Sea at 5.8 km above mean Sea level persists. •A fresh cyclonic circulation is likely to form over northwest & adjoining westcentral Bay of Bengal around 12th September, 2023. •The trough from cyclonic circulation over northwest Madhya Pradesh & adjoining northeast Rajasthan to south Madhya Maharashtra between 1.5 & 4.5 km above mean Sea level has become less marked. 	<p>Light to moderate rain occurred at many places with heavy to very heavy rain/thunderstorm at isolated places in Uttarakhand. Monsoon activity remained Vigorous.</p> <p>MANUAL RAIN: Nainital-12, Betalghat-12, Champawat-11, Lohaghat-10, Ranikhet-10, Almora-10, Kathgodam-10, Pantnagar-9, Kashipur-9, Mukteshwar-8, Berinag-8</p> <p>AWS/ARG RAIN: Pati-14, Chalthi-14, Gular Bhoj-14, Bastia-13, Nainital-13, Kichha-13, Bajpur-12, Jainti-12, Rudrapur(Ukg)-11, Mukteshwar-11, Tanakpur-11, Lohaghat-11, Sitlakheth-11, Nainital(Jeolikot)_Kvk-10, Devidhura-9, Ganai Gangoli-9, Kashipur-9, Matela_Kvk-8, Jageshwar-8, Haldwani-8, Pithoragarh_Kvk-7, Jauljibi-7, Berinag-7, Jhulaghat-7, Pantnagar_Amfu-7, Didihat-7</p>
31	11-Sep-23	<ul style="list-style-type: none"> •The Monsoon Trough at mean Sea level now passes through Jaisalmer, Kota, Guna, Sagar, Pendra Road, Jharsiguda, Balasore and thence east-southeastwards to Northeast Bay of Bengal. •The cyclonic circulation over northwest Madhya Pradesh & neighbourhood extending up to 7.6 km above mean Sea level persists. •The east-west trough now runs from cyclonic circulation over northwest Madhya Pradesh & neighbourhood to Westcentral Bay of Bengal off north Coastal Andhra Pradesh across East Madhya Pradesh, Vidarbha & south Chhattisgarh extending up to 3.1 km above mean Sea level. •The cyclonic circulation over north Andaman Sea now lies over Eastcentral Bay of Bengal adjoining Myanmar Coast between 3.1 km & 7.6 km above mean Sea level tilting southwestwards with height. Under its influence, a Low Pressure Area is likely to form over Northwest Bay of Bengal during next 72 hours. •The Western Disturbance as a trough in westerlies with its axis at 5.8 km above mean Sea level roughly along Long. 78° E to the north of Lat. 30°N persists. 	<p>Very light to moderate rain occurred at isolated places in Uttarakhand. Monsoon activity remained Weak.</p>

3. WITHDRAWAL OF SOUTHWEST MONSOON:

The rainfall activity was normal in Uttarakhand during the SW Monsoon season. The withdrawal of southwest monsoon from Northwest India commenced on **25th September, 2023** against normal date of 17th September. SW monsoon withdrew from some parts of **Uttarakhand** on **30th September, 2023**. SW monsoon withdrew from some more parts of **Uttarakhand** on **3rd October, 2023**. SW monsoon withdrew from remaining parts of **Uttarakhand** on **6th October,**

2023. Subsequently, SW monsoon withdrew from the entire country on **19th October 2023**. Fig.2 shows the isochrones of withdrawal of SW Monsoon 2023.

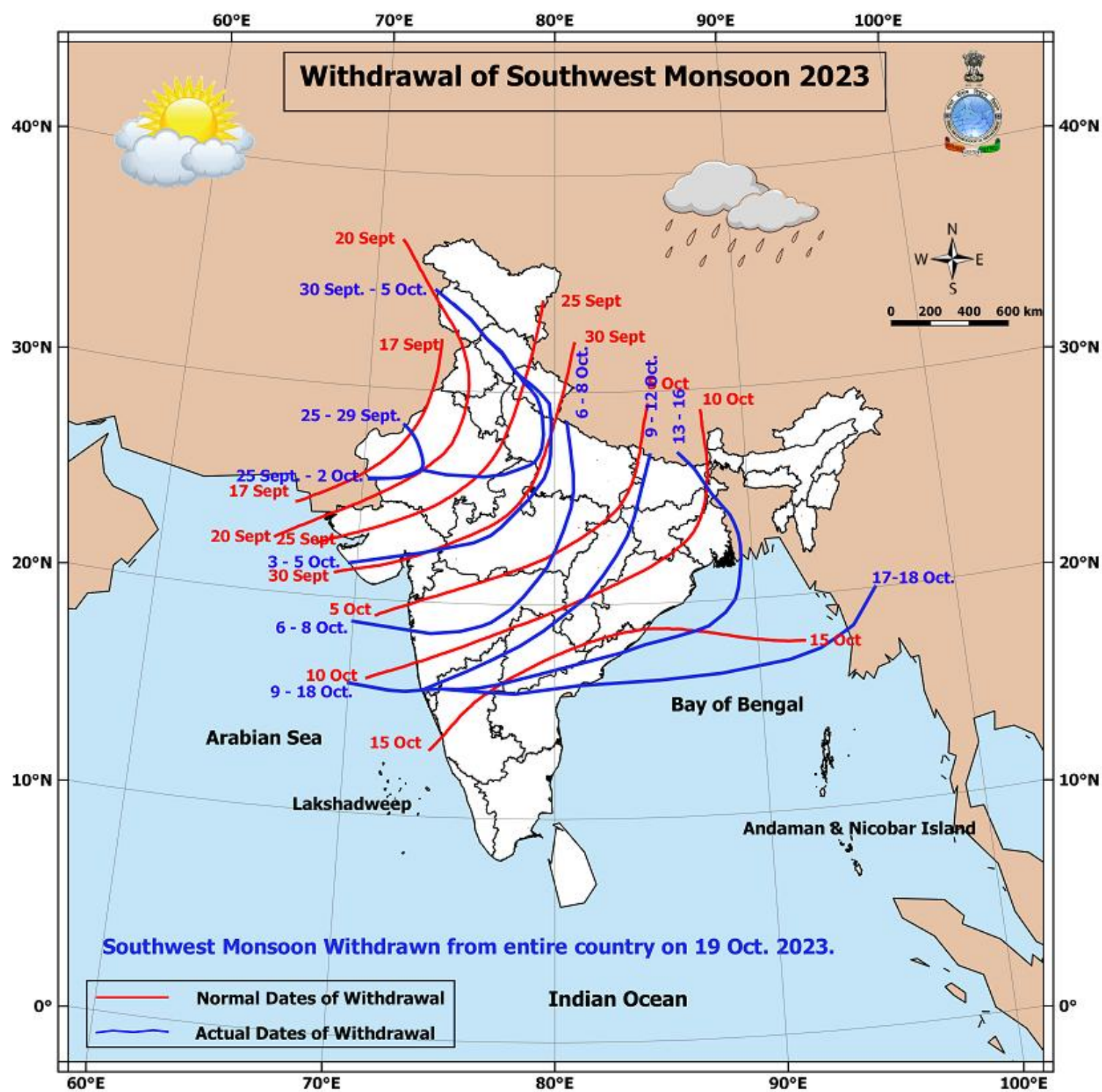


Fig.2: Isochrones of withdrawal of SW-Monsoon 2023

4. RAINFALL DISTRIBUTION OVER UTTARAKHAND DURING MONSOON – 2023:

The rainfall during SW monsoon season (June to September) for the State as a whole is as follows:

Met. Sub-division/ State	Actual Rainfall June-September(in mm)	Normal/Long Period Average (LPA) Rainfall June-September(in mm)	Departure from normal (in %)
Uttarakhand	1203.3	1162.7	+3

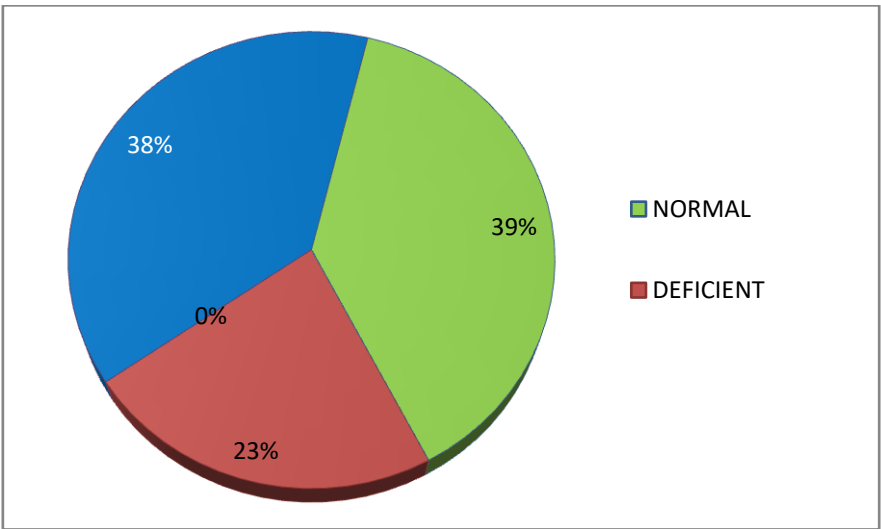


Fig. 3 Rainfall Distribution over the area of Uttarakhand

The LPA rainfall based on 1951 to 2000 for Uttarakhand was 1229.2 mm which was revised in 2019 to 1176.9 mm based on 1961 to 2010 observed rainfall data series. It was further revised in 2022 to 1162.7 mm based on 1971 to 2020 observed rainfall data series. As seen in the table above, the seasonal rainfall over Uttarakhand State / sub-division as a whole was 103% of its LPA. The seasonal rainfall intensity distribution over the State was in the categories of large excess, normal and deficient. Out of 13 districts of Uttarakhand, 01district received large excess, 04 districts received excess, 05 districts received normal and 03 districts received deficient seasonal rainfall. In terms of area, 38% area received excess to large excess, 39% area received normal and 23% area received deficient rainfall. In totality, the monsoon rainfall was normal (+3%) over the state.

5. INTENSITY DISTRIBUTION OF RAINFALL DURING MONSOON-2023 OVER UTTARAKHAND:

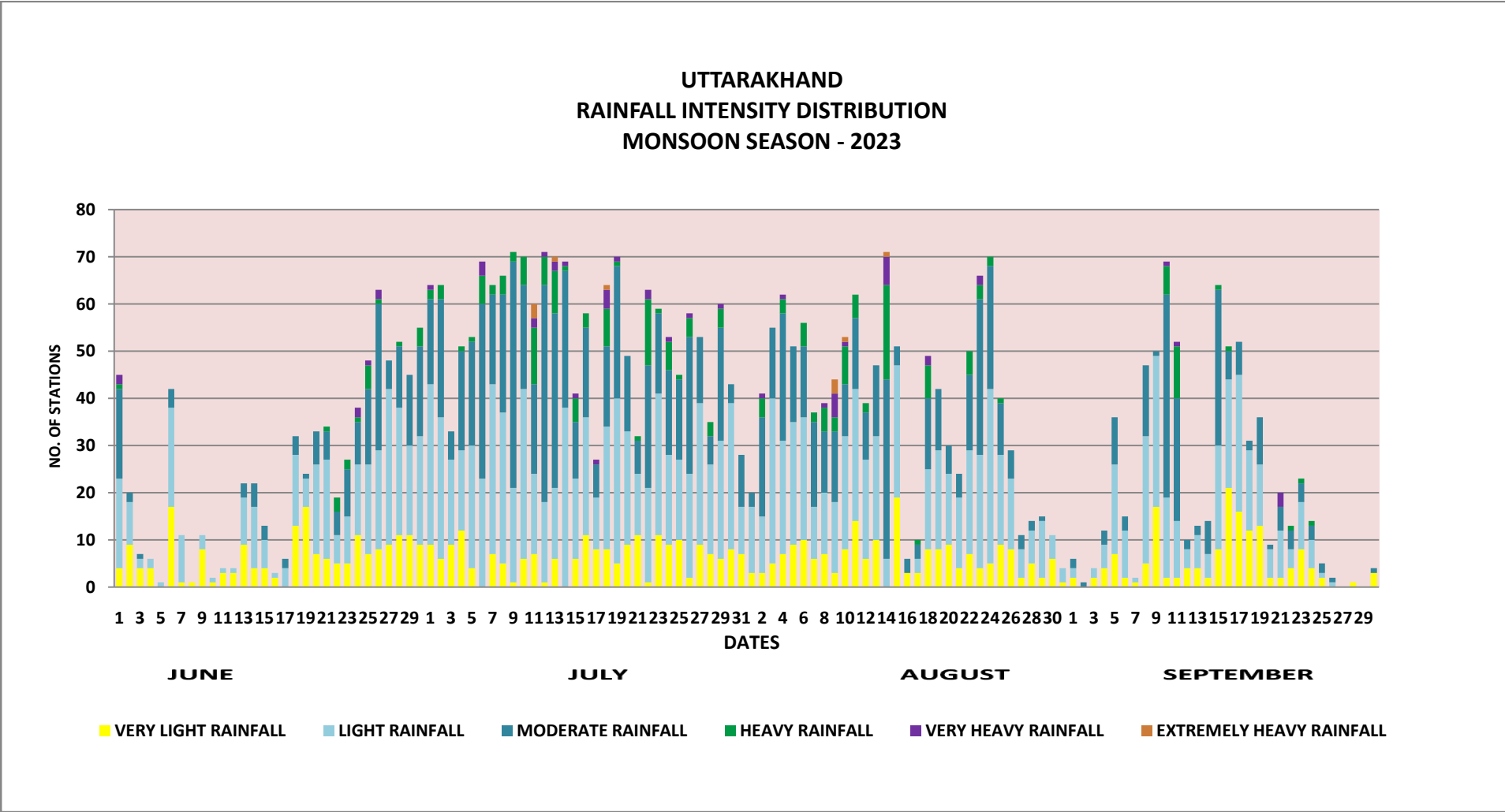


Fig. 4 Rainfall Intensity Distribution

6. MONTHLY DISTRIBUTION OF RAINFALL OVER THE STATE:

The monthly rainfall distribution of the state is given in a table below:

Met. Sub-division/ State	Month	Actual Rainfall (in mm)	Normal or Long period average(LPA) (in mm)	Departure from normal (in %)
Uttarakhand	June-2023	150.5	176.8	-15
	July- 2023	547.1	417.8	+31
	August- 2023	353.9	385.7	-8
	September-2023	151.8	182.4	-17

From the above table, the monthly rainfall was excess over the state in July, normal during June, August and September. The June rainfall was 85%, July 131%, August 92% and September 83% of the respective monthly LPAs. The amount of rainfall (in terms of % of LPA) was maximum in July and minimum in September. This year 38% area of Uttarakhand received excess to large excess, 39% area received normal and 23% area received deficient rainfall. In this way, the performance of monsoon 2023 was normal (103%) over the State.

7. WEEKLY RAINFALL DISTRIBUTION:

Weekly rainfall distribution and departure over Uttarakhand Meteorological sub-divisions is shown in Fig. 5 and Fig. 6 below respectively:

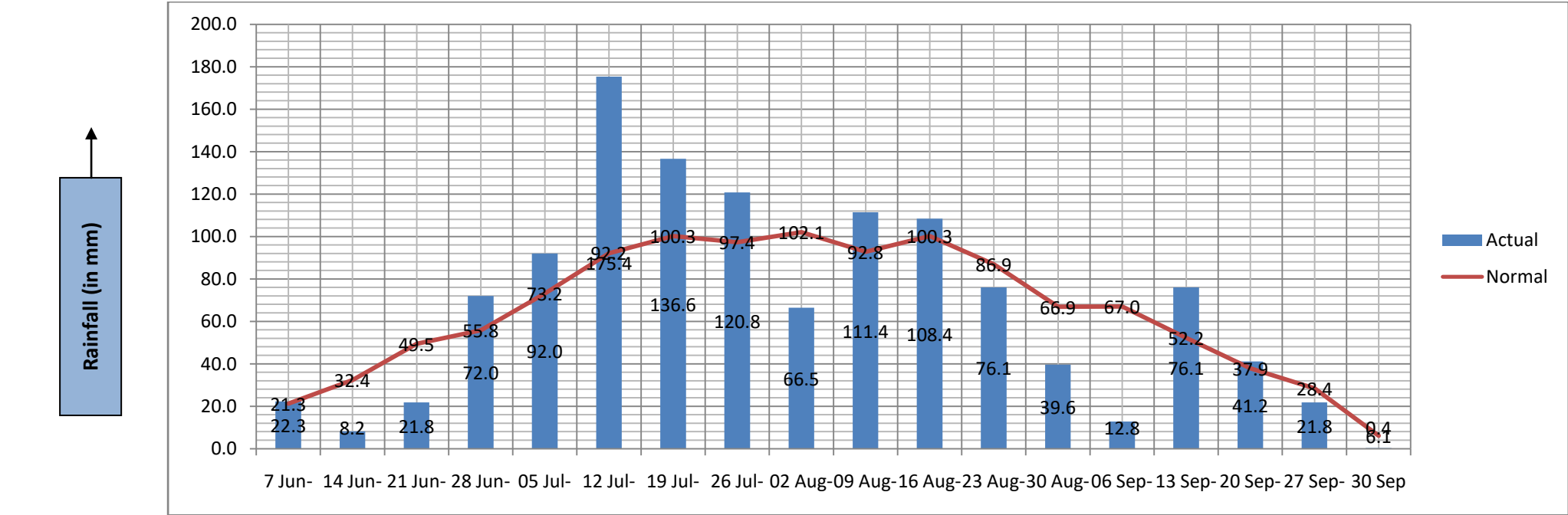
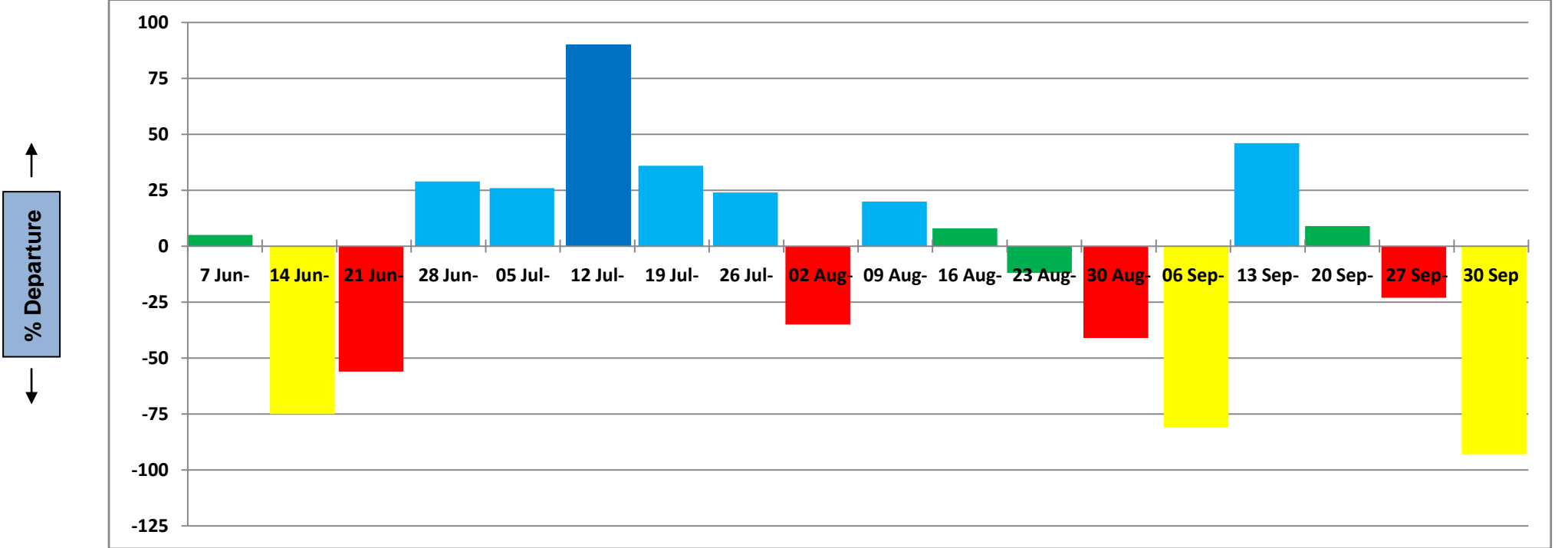


Fig.5 Weekly Monsoon Rainfall-2023 over Uttarakhand

The weekly monsoon rainfall was more than normal over the State on 7 occasions, 4 in July and 1 each in June, August & September; normal on 4 occasions, 1 in June, 2 in August and 1 in September, and it was less than normal on other weeks. In terms of percentage departure from normal, the weekly rainfall was large excess ($\geq +60\%$) during 1week, excess (+20 to +59 %) during 6 weeks, normal (-19% to +19%) during 4 weeks, deficient (-20% to -59%) during 4 weeks and large deficient (-60% to -99%) during 3 weeks. Thus, week by week monsoon rainfall performance was average.



Week Ending

Fig.6 Weekly departure of the Monsoon Rainfall 2023 over Uttarakhand

Week Ending	7 Jun-	14 Jun-	21 Jun-	28 Jun-	05 Jul-	12 Jul-	19 Jul-	26 Jul-	02 Aug-	09 Aug-	16 Aug-	23 Aug-	30 Aug-	06 Sep-	13 Sep-	20 Sep-	27 Sep-	30 Sep
Actual	22.3	8.2	21.8	72.0	92.0	175.4	136.6	120.8	66.5	111.4	108.4	76.1	39.6	12.8	76.1	41.2	21.8	0.4
Normal	21.3	32.4	49.5	55.8	73.2	92.2	100.3	97.4	102.1	92.8	100.3	86.9	66.9	67.0	52.2	37.9	28.4	6.1
% Departure	5	-75	-56	29	26	90	36	24	-35	20	8	-12	-41	-81	46	9	-23	-93

8. DISTRICT-WISE SPATIAL DISTRIBUTION OF RAINFALL DURING MONSOON2023:

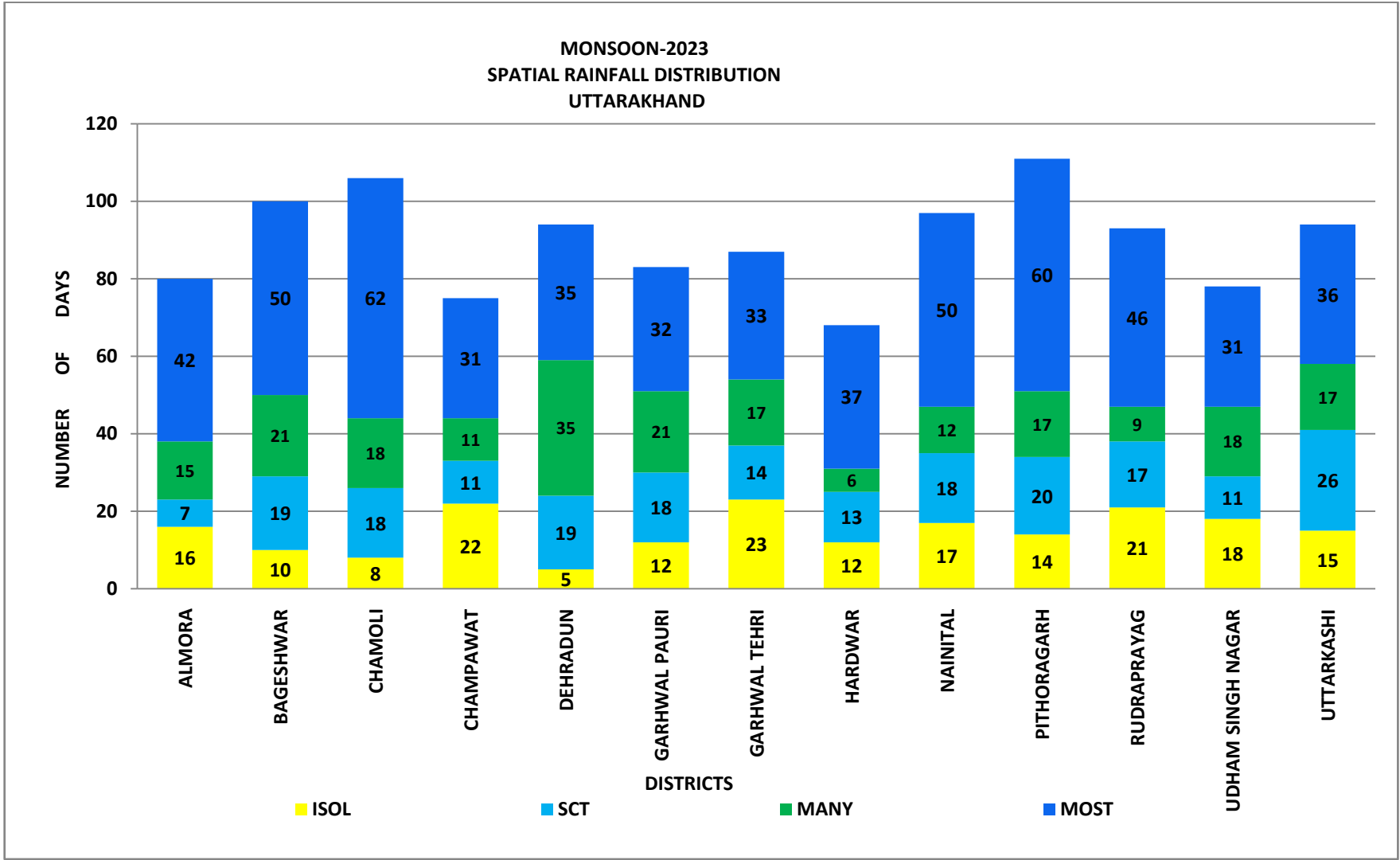


Fig.7 District wise Spatial Distribution of Rainfall during monsoon 2023 over Uttarakhand

The maximum number of rainfall days was over Pithoragarh district (111 days) and minimum number of rainfall days was over Haridwar district (68 days). Widespread to fairly widespread rainfall occurred on 80 days (maximum) over Chamoli and 42 days (minimum) over Champawat district.

9. DISTRICT-WISE HEAVY RAINFALL DISTRIBUTION DURING MONSOON 2023:

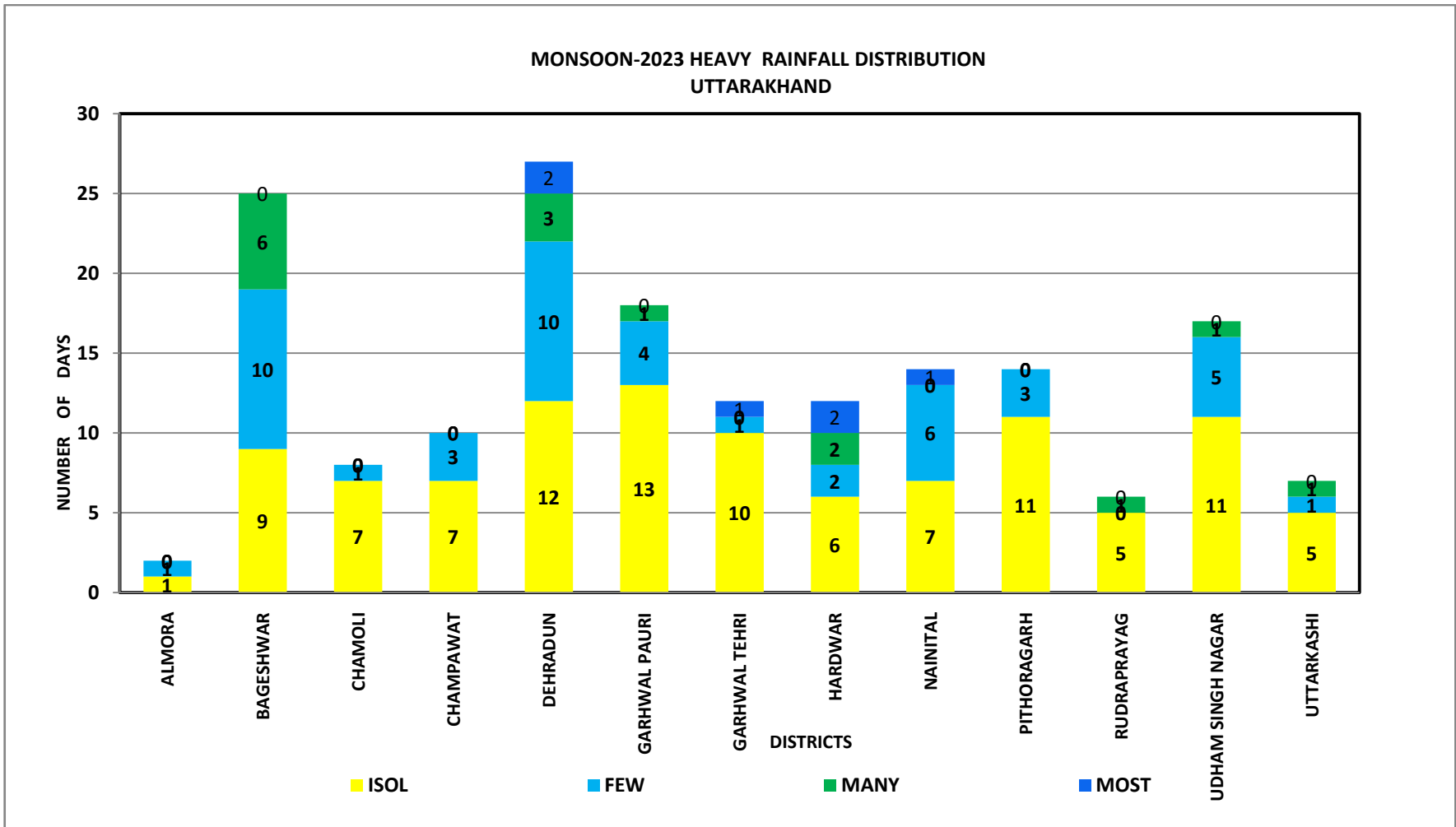


Fig.8 District wise Heavy Rainfall distribution during monsoon 2023 over Uttarakhand

The maximum number of heavy rainfall days was over Dehradun district (27 days) and minimum over Almora district (2 days).

10. DISTRICTS WISE RAINFALL DISTRIBUTION (JUNE-SEPTEMBER) 2023:

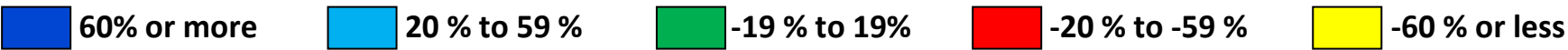
The following table shows the district wise rainfall distribution for Uttarakhand:

Serial No	State/ Districts	Actual Rainfall June-September(in mm)	Normal/ Long period average(LPA) Rainfall June-September (in mm)	Departure from normal (in %)
1.	Almora	760.4	792.3	-4
2.	Bageshwar	2095.4	792.3	164
3.	Chamoli	1071.8	721.4	49
4.	Champawat	1003.9	1313.8	-24
5.	Dehradun	1969.8	1442.9	37
6.	Pauri Garhwal	949.0	1273.3	-25
7.	Tehri Garhwal	1097.5	948.0	16
8.	Haridwar	1404.2	989.8	42
9.	Nainital	1270.6	1537.9	-17
10.	Pithoragarh	1260.9	1502.5	-16
11.	Rudraprayag	1220.5	1549.1	-21
12.	Udham Singh Nagar	1411.3	1125.5	25
13.	Uttarkashi	985.1	1151.2	-14

Out of 13 districts, 5 districts viz. Almora, Tehri Garhwal, Nainital, Pithoragarh and Uttarkashi received normal rainfall; 3 districts viz. Champawat, Pauri Garhwal and Rudraprayag received deficient rainfall; 4 districts viz. Chamoli, Dehradun, Haridwar and Udham Singh Nagar received excess rainfall and 1 district viz. Bageshwar received large excess rainfall in varying intensity. The actual rainfall of the season was highest over Bageshwar (2095.4mm) and lowest over Almora (760.4 mm) district. However, in terms of % of the normal rainfall/ LPA, Bageshwar district received the maximum 164% and Pauri Garhwal received minimum-25%.Thus, monsoon 2023has been a normal (+3%) monsoon year for Uttarakhand.

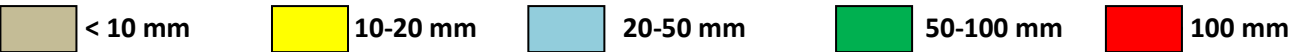
11. MONTHLY DISTRICT-WISE RAINFALL (IN MM) OVER UTTARAKHAND DURING MONSOON SEASON-2023

S. No.	State/ Districts	June (in mm)	Departure (%) June	July (in mm)	Departure (%) July	Aug (in mm)	Departure (%) Aug	Sept (in mm)	Departure (%) Sept
1	Almora	76.7	-48	351.9	28	146.8	-39	185.0	42
2	Bageshwar	245.7	68	869.1	217	692.7	186	287.9	121
3	Chamoli	142.9	37	565.5	115	253.4	2	110.0	5
4	Champawat	110.8	-48	398.1	-16	312.7	-21	182.3	-21
5	Dehradun	247.7	28	845.3	58	737.4	48	139.4	-36
6	Pauri Garhwal	85.2	-44	411.0	-8	375.2	-21	77.7	-62
7	Tehri Garhwal	153.7	19	440.8	33	391.7	18	111.3	-27
8	Hardwar	233.1	74	834.4	150	258.3	-27	78.3	-53
9	Nainital	92.3	-65	445.1	-21	453.0	2	280.2	7
10	Pithoragarh	157.6	-37	460.0	-15	424.0	-11	219.3	-7
11	Rudraprayag	182.7	-17	630.8	14	279.7	-51	127.3	-39
12	Udham Singh Nagar	141.9	-19	566.8	45	499.1	33	203.5	10
13	Uttarkashi	170.2	-4	600.2	41	134.1	-65	80.7	-52



12. WEEKLY DISTRICT-WISE RAINFALL (IN MM) OVER UTTARAKHAND DURING MONSOON SEASON-2023:

Week Ending	7 Jun-	14 Jun-	21 Jun-	28 Jun-	05 Jul-	12 Jul-	19 Jul-	26 Jul-	02 Aug-	09 Aug-	16 Aug-	23 Aug-	30 Aug-	06 Sep-	13 Sep-	20 Sep-	27 Sep-	30 Sep
ALMORA	14.3	10.4	1.0	11.3	107.2	146.4	51.0	58.6	44.3	44.7	55.8	11.6	18.8	16.2	123.9	44.9	0.0	0.0
BAGESHWAR	11.5	6.7	14.0	146.7	155.8	110.2	304.2	256.7	186.2	235.6	132.9	165.6	80.4	61.0	93.1	89.4	45.4	0.0
CHAMOLI	30.1	16.1	36.7	26.6	98.9	110.3	148.7	171.4	80.4	76.5	66.0	69.2	30.7	22.1	65.9	18.5	3.3	0.2
CHAMPAWAT	17.7	7.0	5.3	47.9	142.0	137.0	64.7	69.0	70.8	113.1	93.6	25.8	27.8	0.0	141.5	10.3	30.5	0.0
DEHRADUN	66.0	0.0	18.9	143.8	96.4	345.3	230.6	140.0	70.7	142.6	350.1	177.9	47.9	1.3	49.6	71.3	17.2	0.0
PAURIGARHWAL	7.1	0.3	7.8	62.5	43.8	143.3	113.6	56.0	69.9	136.2	126.6	89.4	14.8	0.4	37.8	37.4	2.1	0.0
TEHRIGARHWAL	33.6	0.0	5.6	105.4	46.5	183.6	103.8	88.4	31.4	80.8	157.1	98.5	51.5	1.4	51.5	53.8	4.6	0.0
HARIDWAR	1.2	0.0	4.6	209.2	60.9	435.9	270.7	46.4	38.7	87.5	80.9	64.2	25.7	0.0	19.2	51.0	8.1	0.0
NAINITAL	6.8	2.5	19.7	26.7	122.4	185.8	80.3	43.3	81.3	243.8	107.3	35.6	31.9	8.9	157.0	51.9	65.4	0.0
PITHORAGARH	6.4	13.2	22.8	79.0	114.9	85.4	102.6	145.9	76.1	126.4	110.4	69.1	88.3	17.9	97.0	42.0	63.4	0.1
RUDRAPRAYAG	25.4	29.8	33.2	79.2	74.3	175.4	148.3	200.6	51.4	92.6	72.2	74.8	36.1	24.8	69.7	21.7	11.1	0.0
U.S NAGAR	6.3	0.0	14.8	64.5	149.7	239.7	145.0	24.2	99.0	163.0	145.8	133.7	22.3	1.5	151.2	12.6	38.2	0.0
UTTARKASHI	44.6	11.3	45.0	65.1	58.5	202.3	140.4	179.5	23.7	22.2	38.7	46.7	26.5	12.4	20.9	44.5	0.3	2.6



13. RAINFALL MAP OF MONSOON-2023 OF DIFFERENT DISTRICTS OF UTTARAKHAND MET SUB-DIVISION:

PERIOD: 01.06.2023 – 30.09.2023

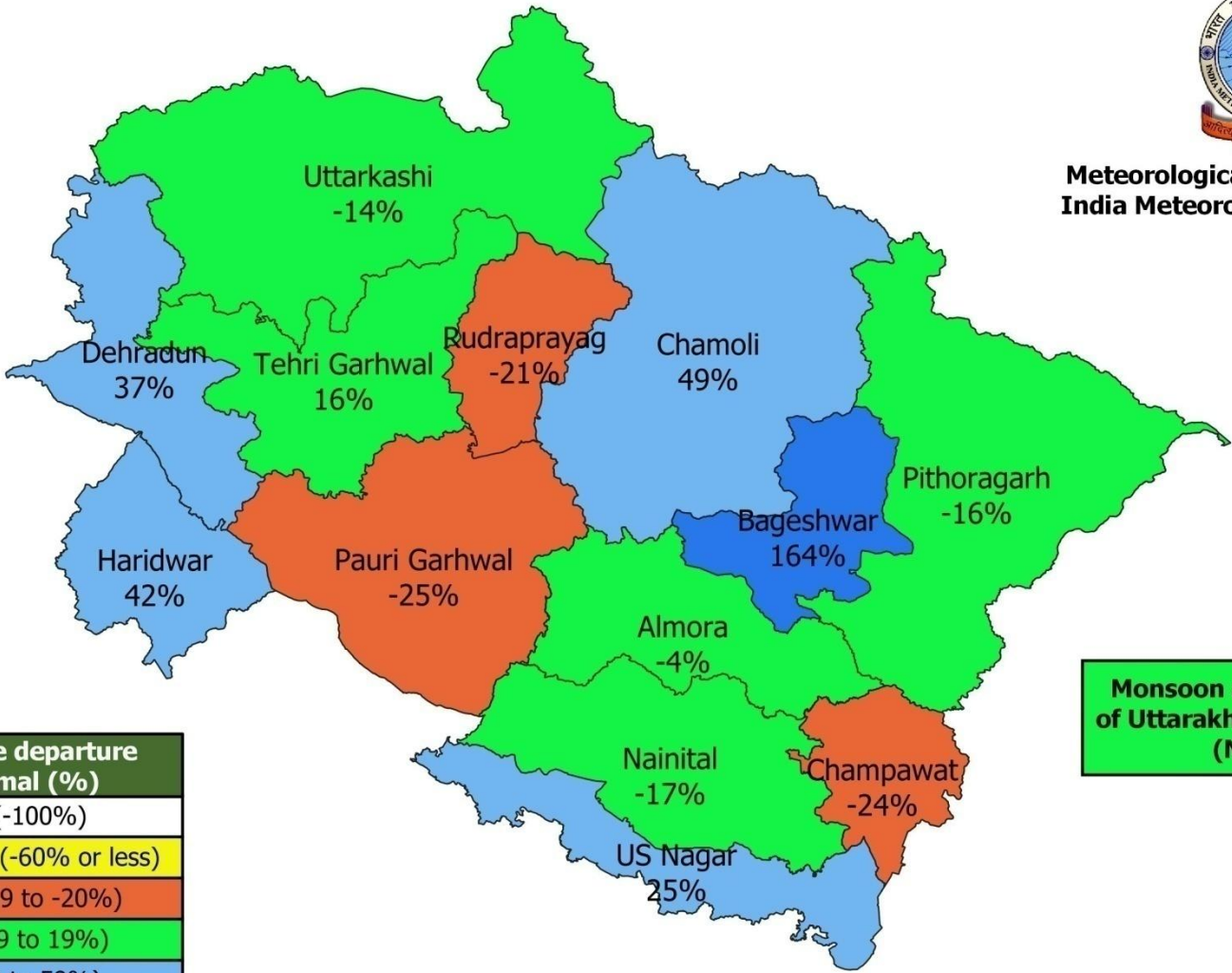
Monsoon rainfall (June-Sept 2023) in Uttarakhand (mm)

(From 0830 IST of 01-06-2023 to 0830 IST of 30-09-2023)

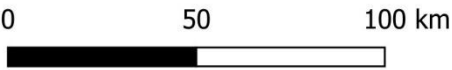


Meteorological Centre Dehradun
India Meteorological Department

District-wise departure from normal (%)
No Rain (-100%)
Large Deficient (-60% or less)
Deficient (-59 to -20%)
Normal (-19 to 19%)
Excess (20 to 59%)
Large Excess (60% or more)



Monsoon average rainfall of Uttarakhand: 1203.3 mm (Normal)



Date of Issue: 30-09-2023