Analysis of Weather Features of Uttarakhand during 4-7 February 2021 in association with Western Disturbance

1. Introduction

Movement of Western Disturbances is the major cause of weather over Western Himalayan Region including Uttarakhand. In this report, the weather scenario of Uttarakhand during the period from 4th to 7th February is analysed and a brief report is prepared containing the synoptic features, the forecast given and its comparison with the realized weather during the period and the same is presented here.

2. Synoptic features

Movement of a Western Disturbance (WD) has caused rainfall/snowfall activity over Western Himalayan Region during 4-6 February 2021. This Western Disturbance was seen as a cyclonic circulation over North Pakistan & neighbourhood extending upto 7.6 km above mean sea level on 4th February 2021; it lay as a cyclonic circulation over Jammu & Kashmir and neighbourhood between 5.8 km & 7.6 km above mean sea level on 5th; it has moved away eastwards on 6th February 2021.

3. Forecasted and Realised Rainfall features

As per practice, forecasts and warnings are issued for five days with an outlook for another two days. From National Weather Forecasting Centre (NWFC) New Delhi, the forecasts are issued in sub divisional scale. The forecast issued from NWFC for Uttarakhand and the realized features are analysed here.

The forecasted and realized spatial distribution of weather for Uttarakhand during the period from 4-7 February 2021 is given in Table 1.

Table1: Spatial Distribution of Rainfall over Uttarakhand, 4-7 February 2021

Date	Realised Distribution	Forecasted Spatial Distribution				
		D1 (24 hrs. before)	D2 (48 hrs. before)	D3 (72 hrs. before)	D4 (96 hrs. before)	D5 (120 hrs. before)
04-02-2021	SCT	ISOL	ISOL	ISOL	ISOL	SCT

05-02-2021	WS	FWS	FWS	FWS	FWS	FWS
06-02-2021	SCT	ISOL	SCT	FWS	FWS	FWS
07-02-2021	DRY	DRY	DRY	DRY	DRY	DRY
LEGENDS FOR SPATIAL DISTRIBUTION						
WS - WIDE SPREAD / MOST PLACES (76-100%)				FWS - FAIRLY WIDE SPREAD / MANY PLACES (51% to 75%)		
SCT - SCATTERED / FEW PLACES (26% to 50%)		ISOL - ISOLATED (up to 25%)		DRY - NO STATION REPORTED RAINFALL		

From the table it is found that, rainfall at a few places had been reported over Uttarakhand on 4th and 6th February whereas, widespread rainfall had been reported on 5th February. However, dry weather had been reported over the subdivision on 7th February 2021 and the same was predicted even five days before.

The intensity of the observed rainfall along with the warning issued (if any) for five days for Uttarakhand for 4-7 February are presented in Table 2. The station wise actual rainfall (in mm) over Uttarakhand during the period from 4 to 7 February along with terminology for rainfall category is given in the Annexure. It is found that, very light to light rainfall had been reported on 4th and 6th over Uttarakhand whereas light to moderate rainfall had been reported on 5th.

After analyzing, it is found that the forecast and the realized weather over Uttrakhand were in agreement for all the days from 4-7 February 2021. It is also observed that even though heavy rainfall warning was issued on 2nd February for 5th; the same was downgraded to NIL warning in the forecast issued on 3rd and 4th February for that day. Since the realized rainfall for 5th was in the light to moderate category only, the said down grading to NIL warning for 5th is justified.

Table 2: Intensity of rainfall over Uttarakhand, 4-7 February 2021

Date	Realised Intensity	Heavy Rainfall Warning Issued				
		D1 (24 hrs. before)	D2 (48 hrs. before)	D3 (72 hrs. before)	D4 (96 hrs. before)	D5 (120 hrs. before)

04-02-2021	**Very Light to Light**	**NIL**	**NIL**	**NIL**	**NIL**	**NIL**
05-02-2021	**Light to Moderate**	**NIL**	**NIL**	**Heavy Rainfall**	**NIL**	**NIL**
06-02-2021	**Very Light to Light**	**NIL**	**NIL**	**NIL**	**NIL**	**NIL**
07-02-2021	**No Rainfall**	**NIL**	**NIL**	**NIL**	**NIL**	**NIL**

It is mentioned that with respect to spatial distribution as well intensity, the maximum weather had been reported on 5th October but with no heavy rainfall activity. There had been considerable reduction in both spatial distribution and intensity of weather during the next twenty four hours itself.

4. Summary and Conclusion

The weather scenario of Uttarakhand during the period from 4th to 7th February is analysed and accordingly, the following conclusions are made.

I. Movement of a Western Disturbance has caused rainfall/snowfall activity over Uttarakhnad during 4-6 February 2021. However this WD has moved away from the region on 6th February 2021 causing considerable reduction in the weather activity over that area.

II. If the spatial distribution of rainfall is considered, rainfall at a few places had been reported over Uttarakhand on 4th and 6th February and widespread rainfall had been reported over the subdivision on 5th February 2021.

III. With respect to the intensity, very light to light rainfall had been reported on 4th and 6th February 2021 whereas light to moderate rainfall had been reported on 5th.

IV. Maximum spatial distribution and intensity of weather had been reported on 5th February however no heavy rainfall occurred on that day.

V. Dry weather had been reported on 7th February 2021.

Note:This report is prepared with reference to the All India Weather Forecast bulletins and Weekly Weather Reports issued from National Weather Forecasting Centre, IMD ,New Delhi and the details of observed rainfall of Uttarakhand during the period of study.

Annexure I

Realised rainfall over Uttarakhand (in MM) during 4-7 February 2021

4 February 2021:-- PUROLA-7.0, MORI-6.0, MET.SUB/DISTRICT/STATION-4, JOSHIMATH-3.6, TIUNI-3.0, BHATWARI-3.0, PAURI-2.5, HARIPUR-2.4, UTTAR KASHI-2.0, UTTAR KASHI (CWC)-2.0, TEHRI (CWC)-1.6, JOLLYGRANT-1.2, TEHRI-1.0, BARKOT-1.0, DUNDA-1.0, DEHRA DUN-0.8, RUDRAPRAYAG-0.6, THARALI-0.5, MUSSOORIE-0.4, CHAMOLI-0.2.

5 February 2021:- MUSSOORIE-28.7, TIUNI-28.0, LOHARKHET-24.0, HARIPUR-21.8, DEHRA DUN-20.3, PAURI-18.0, UTTAR KASHI-17.0, ROORKEE-17.0, CHAKRATA-17.0, UTTAR KASHI (CWC)-16.8, TEHRI (CWC)-16.8, TEHRI-16.0, JAKHOLI-15.0, DHANAULTI-15.0, RANIKHET (G)-15.0, PITHORAGARH-13.5, DEOPRAYAG-13.2, UKHIMATH-12.4, RISHIKESH-12.2, PUROLA-12.0, ROSHNABAD-12.0, SRINAGAR-12.0, GAIRSAIN-12.0, SOMESHWAR-12.0, MUKTESHWAR-11.9, RUDRAPRAYAG-11.4, KARNAPRAYAG-11.2, MORI-11.0, KASHIPUR-11.0, HARDWAR-10.6, JOLLYGRANT-10.6, HALDWANI-10.2, BARKOT-10.0, YAMKESHWAR-10.0, KOTDWAR-10.0, JOSHIMATH-10.0, ALMORA-9.5, GANGANAGAR-9.4, CHAMOLI-9.2, BHATWARI-9.0, BHAGWANPUR-9.0, THARALI-8.5, KEERTINAGAR-8.0, BERINAG-7.3, NARENDRANAGAR-7.1, DHARCHULA-6.6, NAINITAL-6.5, MUNSIYARI-6.3, DUNDA-6.0, GANGOLIHAT-6.0, DIDIHAT-6.0, LOHAGHAT-6.0, CHAMPAWAT-5.0, KAPKOT-5.0, PANTNAGAR-4.1, BETALGHAT-3.8, LAKSAR-3.0, THALISAIN-3.0, LANSDOWN-3.0, BANBASA-3.0, GARUD-2.5, BAGESHWAR (THMO)-2.5, KHATIMA-2.0, RAMNAGAR-1.0, GHANSALI-1.0, PATI-1.0.

6 February 2021:- HALDWANI-11.0, ALMORA-9.0, BETALGHAT-7.2, RANIKHET (G)-6.0, NAINITAL-5.0, GANGANAGAR-4.8, CHAMPAWAT-3.0, TEHRI (CWC)-2.4, UKHIMATH-2.2, MUSSOORIE-2.2, SOMESHWAR-2.0, KARNAPRAYAG-1.6, DIDIHAT-1.5, LOHAGHAT-1.5, BERINAG-1.0, PATI-1.0, MUKTESHWAR-0.8, DHARCHULA-0.6, SRINAGAR-0.6, RUDRAPRAYAG-0.2.

7 February 2021:- No rainfall.

NB: The spatial distribution as well as amount of rainfall of any day is based on the rainfall from 0830 hours IST of previous day to 0830 hours IST of the day

LEGEND	
Rainfall Category	**Limit of rainfall in MM**
Very light rain	0.1 mm - 2.4 mm
Light rain	2.5 mm - 15.5 mm
Moderate rain	15.6 mm - 64.4 mm
Heavy rain	64.5 mm - 115.5 mm
Very heavy rain	115.6 mm - 204.4 mm
Extremely heavy rain	204.5 mm or more