4. Land depression over Jharkhand (22-23 July 2011)

4.1 Introduction:

A land depression formed over Jharkhand on 22nd July 2011. It moved west-northwestwards upto north Madhya Pradesh and weakened there into a well marked low pressure area on 23rd July 2011. It was a short lived system with life period of about 20 hours. It caused good rainfall over central parts of the country.

4.2 Genesis

As the Madden Julian Oscillation (MJO) entered into phase 3 on 17th July, phase 4 on 19th July and phase 5 on 21st July and the typhoon Ma-on over northwest Pacific Ocean gradually moved southeastward after touching Japan coast and weakened gradually, the large scale environment over the Bay of Bengal and adjoining areas became favouable for active monsoon conditions over the Indian region. The eastern end of monsoon trough ran to east central Bay of Bengal across north Bay of Bengal 17th July. There was gradual increase in embedded convection and its organisation over north Bay of Bengal and adjoining Gangetic West Bengal and Bangladesh. Under these conditions, an upper air cyclonic circulation extending upto mid tropospheric level lay over Bangladesh and adjoining Gangetic West Bengal at 0000 UTC of 20th July 2011. Under its influence, a low pressure area formed over Gangetic West Bengal and neighbourhood on 21st July morning. It concentrated into a depression and lay centred at 0300 UTC of 22nd July 2011 over Jharkhand about 50 km southeast of Daltanganj.

4.3 Intensification and movement:

It moved west-northwestwards along the monsoon trough and lay centred at 0000 UTC of 23rd July 2011 east Madhya Pradesh, about 150 Km east of Sagar. It further moved west-northeastwards and weakened into a well marked low pressure area over north Madhya Pradesh and neighbourhood at 0300 UTC of 23rd July 2011. The best track parameters of the system are shown in Table 4.1. The best track of the system and typical Satellite imageries are shown in Fig. 4.1 & 4.2 respectively. The ECMWF model analysis of upper level divergence, low level relative vorticity, wind at 200 hPa level and vertical wind shear between 200 and 850 hPa level based on 0000 UTC of 22nd and 23rd July are shown in fig.4.3.

4.4 Realised weather:

Under the influence of the system, widespread rainfall with isolated heavy to very heavy falls occurred over Madhya Pradesh, Madhya Maharashtra, Konkan & Goa and Rajasthan. The significant amount of rainfall (>7 cm) are follows:

23 July, 2011

East Madhya Pradesh:

Kurwai 12, Dewas 11, Ganjbasoda, Guna and Begumganj 10 Each; Salwani/Silvani and Ashoknagar 9 each; Mungaoli 8; Narsingarh, Kolaras, Udaipura, Lateri, Sirinj and Puchhore 7 each.

West Madhya Pradesh:

Narsinghpur 16; Tendukheda 15; Gotegaon 13; Deori, Rehli Jabalpur (New) 11 each; Kaneli Sagar and Khurai 10 each; Bichhia and Umaria 9 each; Nowgoan 8 Sidhi; Buxwaga, Patan and Garhakota 7 each.

Madhya Maharashtra:

Gaganbavada 9; Mahabaleshwar 7.

Konkan & Goa: Lanja 7.

24 July, 2011

East Rajasthan:

Tadaraisingh 10; Anta 9; Bakani, Manohar Thana and Gangapur 8 each;

Nagrarfort, Bagidora, Kotri and Arnod 7 each.

West Madhya Pradesh:

Tarana 11; Bhanpura and Shujalpur 7 each.

Konkan & Goa:

Sawantwadi, Vaibhavwadi and Lanja 11 each; Kudai 9; Sangamneshwar and Rajapur 8 each; Kankavli, Khed, Bhira 7 each.

Madhya Maharashtra:

Radhanagari 15; Chandgad and Bhudargad 12 each; Mahabaleshwar 7.

Damage:

No damage was reported due to this system.

Warnings Issued:

(i) No. of national bulletins issued to disaster management agencies:; 4

Table- 4.1 Best track positions and other parameters of the depression over Jharkhand during 22-23 July, 2011

Date	Time (UTC)	Centre lat.^{0} N/ long.^{0} E	C.I. NO.	Estimated Central Pressure (hPa)	Estimated Maximum Sustained Surface Wind (kt)	Estimated Pressure drop at the Centre (hPa)	Grade
22.07.2011	0300	23.5/84.5	--	990	20	3	D
	0600	24.0/84.0	--	990	20	3	D
	0900	24.0/84.0	--	990	20	3	D
	1200	24.083.0	--	990	20	3	D
	1800	24.081.5	--	992	20	3	D
23.07.2011	0000	24.5/80.5	--	992	20	3	D
	0300	Weakened into a well marked low pressure area over north Madhya Pradesh and neighbourhood.					

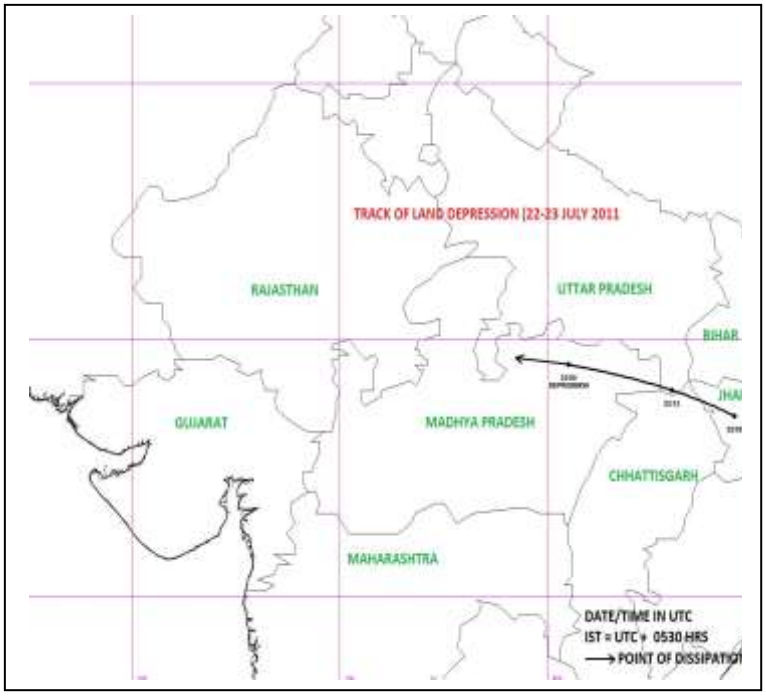


Fig. 4.2. Track of the land depression formed over Chhattisgarh during 22-23 July, 2011

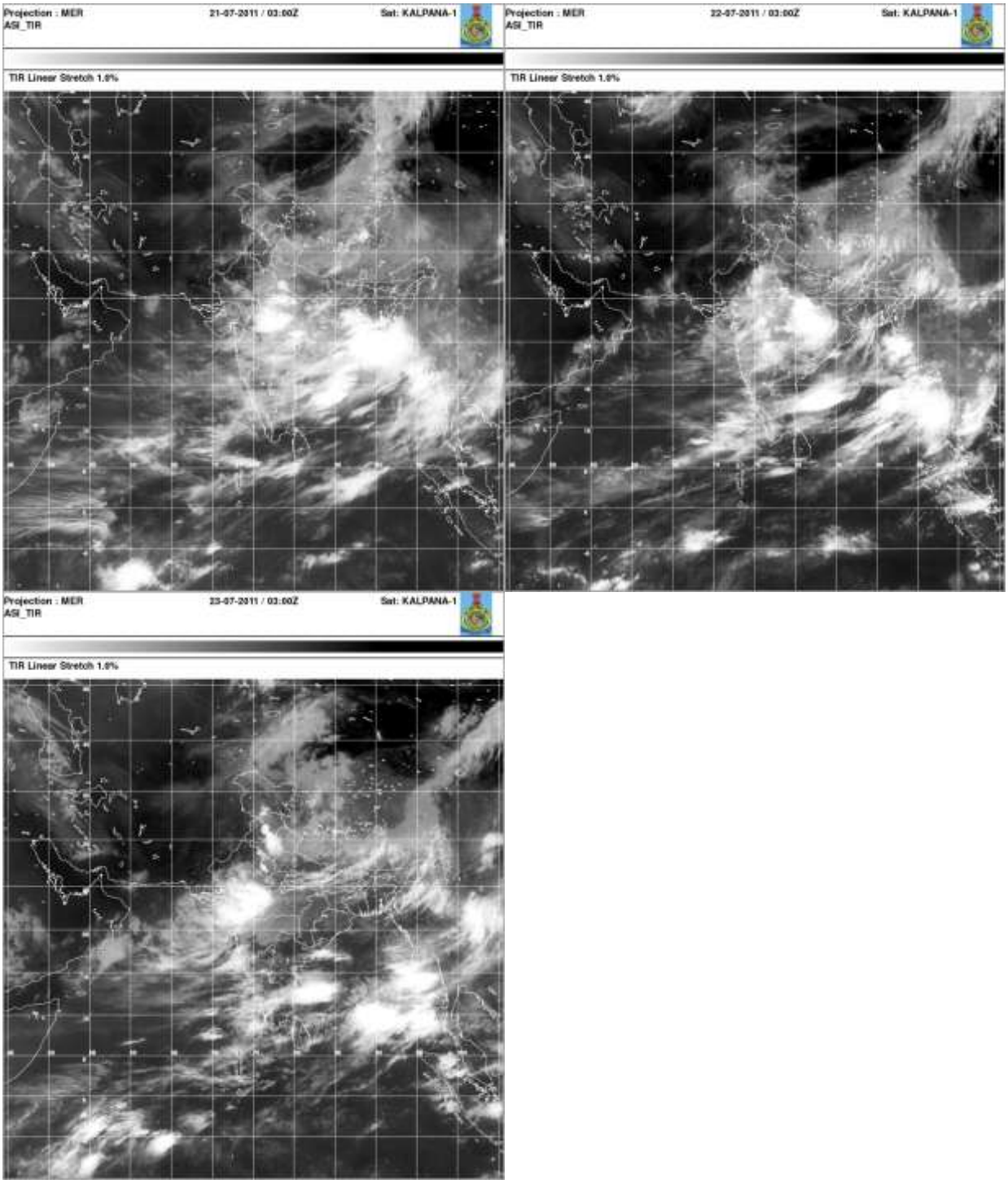


Fig. 4.2 Satellite imageries (a) 21st July showing deep convection over north Bay of Bengal and adjoining West Bengal and Orissa before the genesis of the depression (b) at 0300 UTC of 22nd July and 23rd July 2011 showing intense convection in the southwest sector of the depression and (i) at 0300 UTC of 23rd July 2011 showing weakening and disorganization of convection due to weakening of depression.

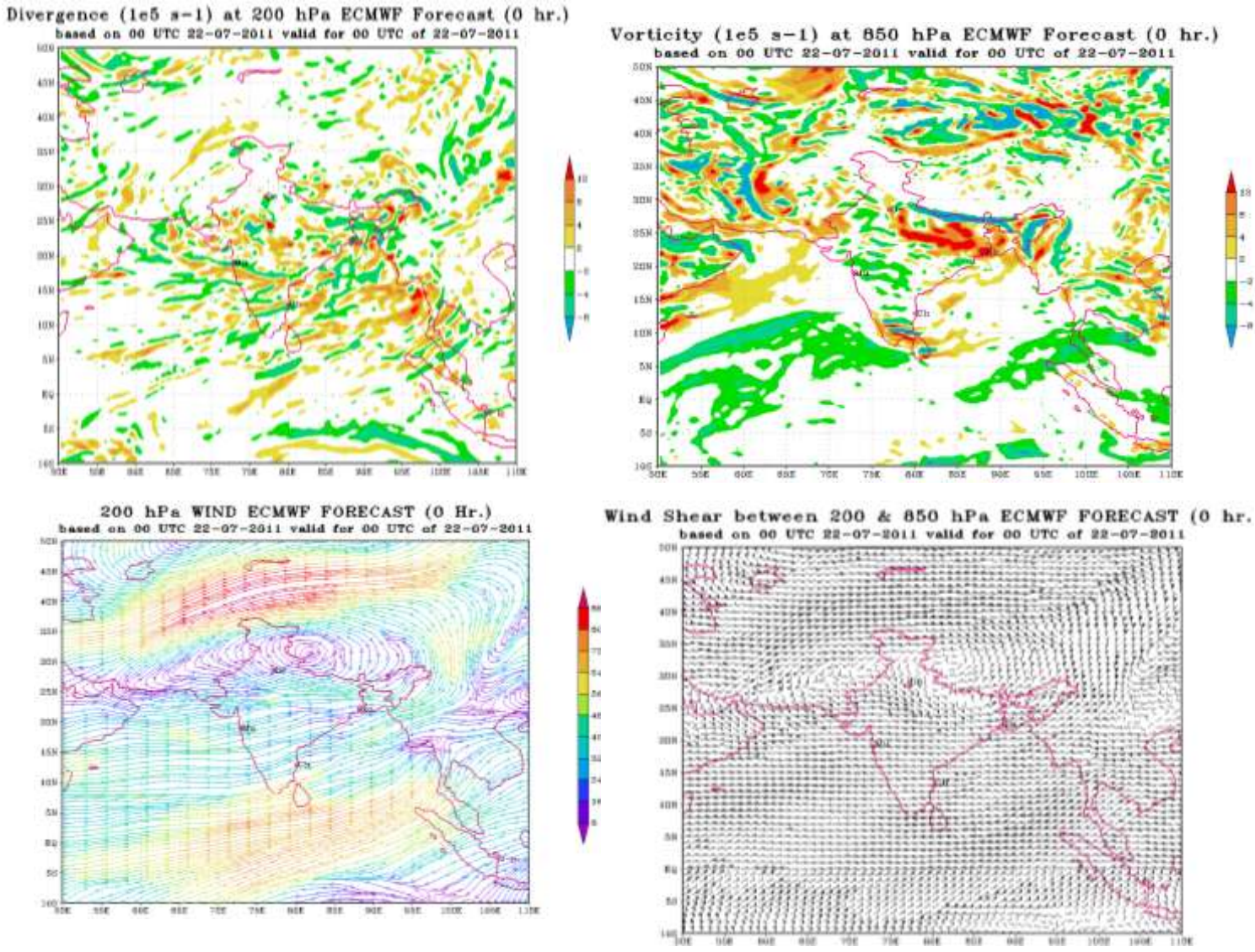
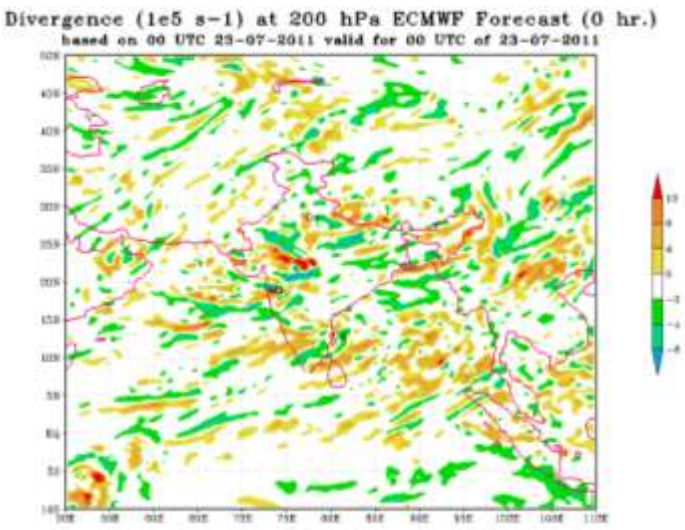
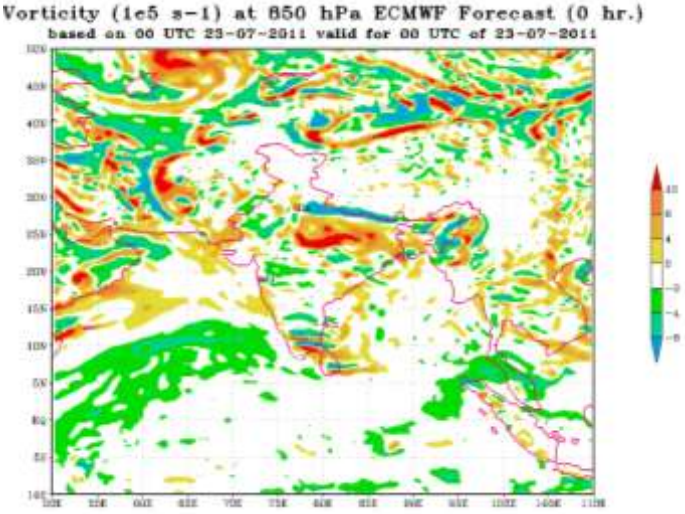
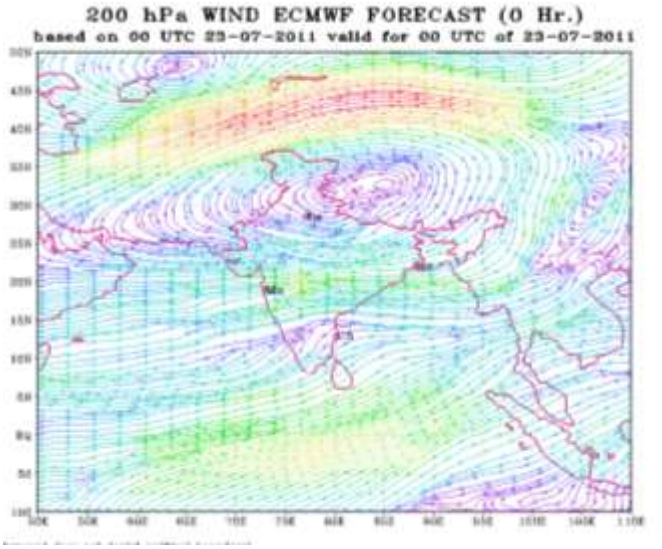


Fig. 2.4.3(a) (i) upper level divergence at 200 hPa level (ii) low level relative vorticity at 850 hPa level (iii) wind at 200 hPa level (iv) vertical wind shear of horizontal wind between 200 & 850 hPa level based on the ECMWF model analysis of 0000 UTC of 22rd July 2011.







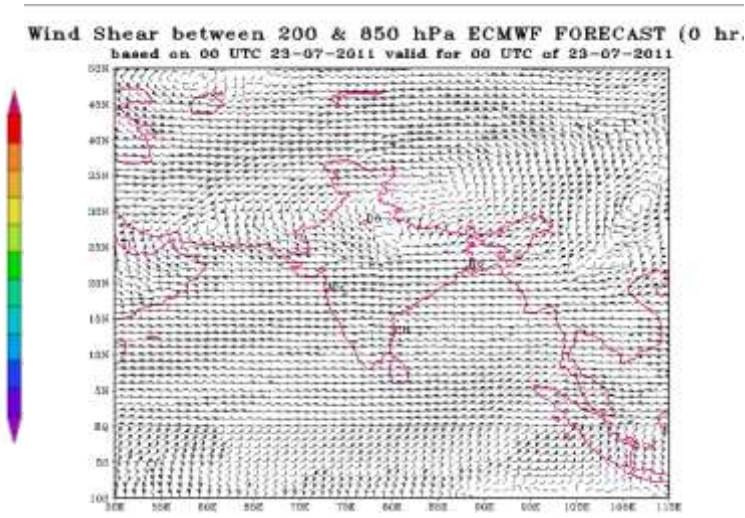


Fig. 4.3(b) (ii) upper level divergence at 200 hPa level (ii) low level relative vorticity at 850 hPa level (iii) wind at 200 hPa level (iv) vertical wind shear of horizontal wind between 200 & 850 hPa level based on the ECMWF model analysis of 0000 UTC of 23rd July 2011.

4.5 Warnings:

The following warnings were issued in connection with the land depression.
(i) No. of national bulletins issued to disaster management agencies: 04
(ii) No. of RSMC/Special Tropical Weather Outlook: NIL

The verification of heavy rainfall warnings is given in Table 4.2.

Table 4.2 Verification of heavy rainfall forecast issued in association with land depression during 22-23 July, 2011

F/C Date	Sub-Division	F/C Valid for 12*/ 24 hrs.	F/C Valid for 48 hrs.	Realized wx during 24 hrs.	Realized wx during 48 hrs.
22.07.11	Madhya Pradesh	ISOL H-VH	ISOL H-VH	ISOL H-VH	ISOL H-VH
	East Rajasthan	ISOL H-VH	ISOL H-VH	-	ISOL H-VH
	Gujarat	ISOL H-VH	ISOL H-VH	-	-
	Chattisgarh	ISOL H-VH	-	-	-
	Vidarbha	ISOL H-VH	-	ISOL H	-
23.07.11	Gujarat	ISOL H-VH	-	-	-
	S.Rajasthan	ISOL H-VH	-	ISOL H-VH	-
	SW Madhya Pradesh*	ISOL H-VH	-	ISOL H-VH	-

Legend:
H: Heavy (7-12 cm), VH: Very Heavy (13-24 cm)
ISOL: Isolated (25% or less numbers stations reporting heavy rain)
SCT; Scattered (25-50% of stations reporting heavy rain)