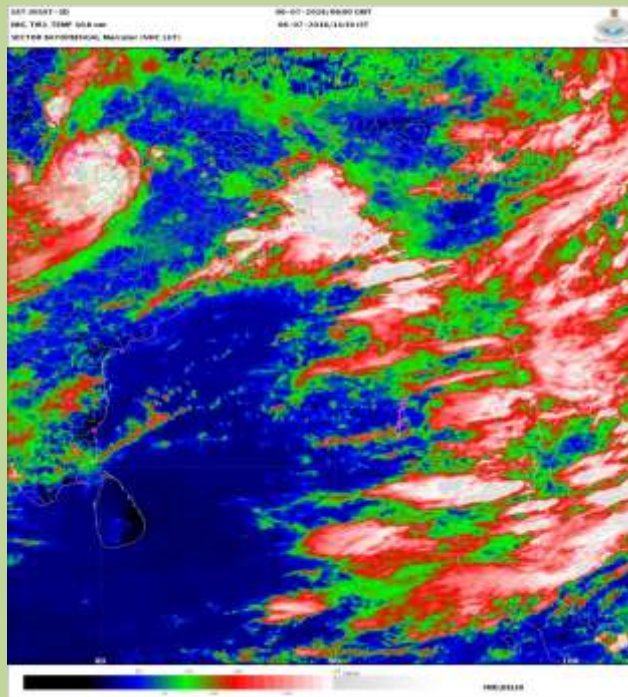




**GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
INDIA METEOROLOGICAL DEPARTMENT**

**Land Depression over north Madhya Pradesh
(06-07 July 2016): A Report**



INSAT-3D enhanced colored IR imagery based on 0600 UTC of 6th July

**Cyclone Warning Division
India Meteorological Department
New Delhi
December 2016**

Land Depression over North MadhyaPradesh (6-7 July 2016)

1. Introduction :

A depression formed over north Madhya Pradesh in the morning of 6th July 2016 in association with active Monsoon conditions and southward location of active Monsoon Trough. It moved westwards and maintained the intensity of depression till morning of 07th July. It then weakened into a well- marked low pressure area over the same region. It caused heavy to very heavy rainfall over MadhyaPradesh and adjoining areas of Maharashtra. The salient features of the system including genesis, intensification and movement as well as associated adverse weather are discussed in following sections.

2. Genesis :

Under the influence of an upper air cyclonic circulation over westcentral Bay of Bengal off north Andhra Pradesh - south Odisha coast, a low pressure area formed over west central and adjoining northwest Bay of Bengal & north Andhra Pradesh - south Odisha coast with associated upper air cyclonic circulation extending upto mid-tropospheric level on 30th June. It lay centred over northwest Bay of Bengal off Odisha Coast with associated upper air cyclonic circulation extending upto 7.6 km above mean sea level on 1st July; over northwest Bay of Bengal and adjoining areas of Odisha & Gangetic West Bengal with associated upper air cyclonic circulation extending upto mid-tropospheric level on 2nd ; over Jharkhand and adjoining Odisha & Gangetic West Bengal on 3rd; and over south Bihar & neighbourhood on 4th. It became well marked low pressure area over East Uttar Pradesh and adjoining Bihar with associated upper air cyclonic circulation extending upto 7.6 km above mean sea level on 5th and concentrated into a depression over northeast Madhya Pradesh & neighbourhood and Lay centred at 0300 UTC near latitude 24.8⁰N and longitude 81.5⁰E. The environmental parameters like low level relative vorticity, lower level convergence, upper level divergence and vertical wind shear were favourable for the genesis of the system.

3. Intensification and movement :

As the depression lay far to the south of the upper tropospheric ridge in association with Tibetan High, it moved westwards along the monsoon trough and lay centred 0530 IST at of 7th July over northeast MadhyaPradesh near latitude 24.8⁰N and longitude 81.0⁰E. The movement of the system was slow as it moved only about 60 Km in 24 hours. The slow movement can be attributed to the mid-latitude trough in westerlies to the west of the system which hindered the westwards movement of the system. Due to high vertical wind shear, the system intensify further and weakened into a well-mar ked low pressure area over northeast MadhyaPradesh and neighbourhood at 0830 IST at of 7th July.

The best track parameters of the system are presented in Table1 and the best track is presented in fig.1. The typical satellite imageries are shown in Fig.2. The GFS model analyses at 0000 UTC of 6th and 7th July are shown in Fig.3.

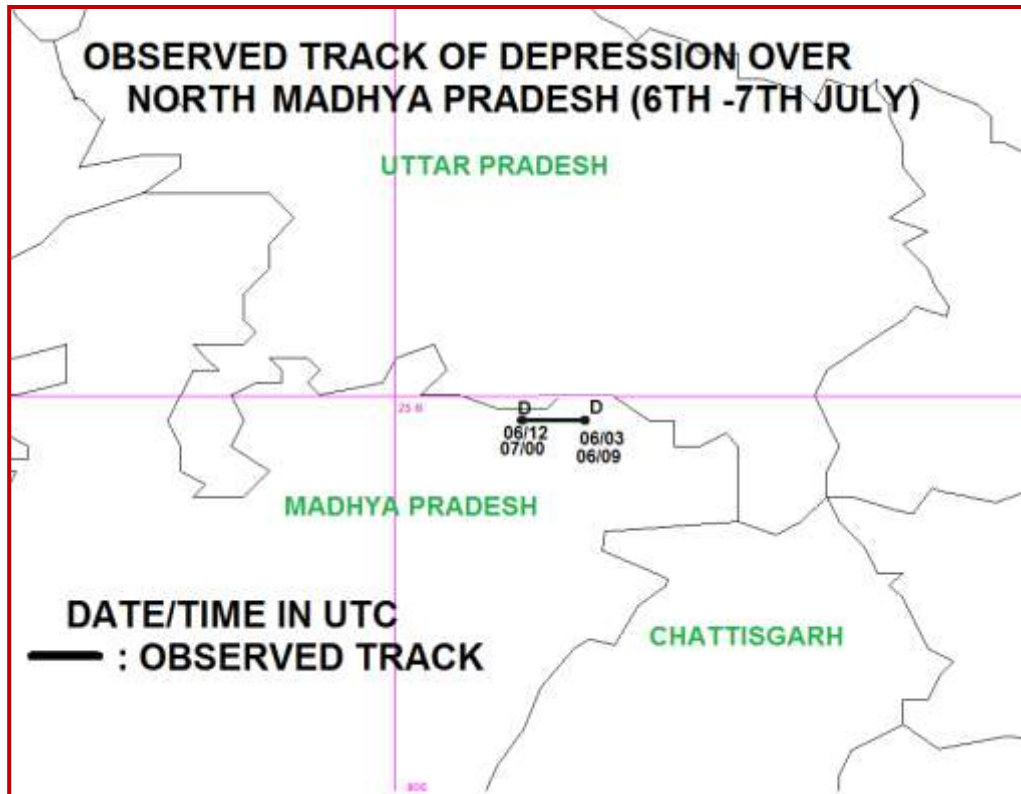


Fig. 1: Observed Track of depression during 6th – 7th July

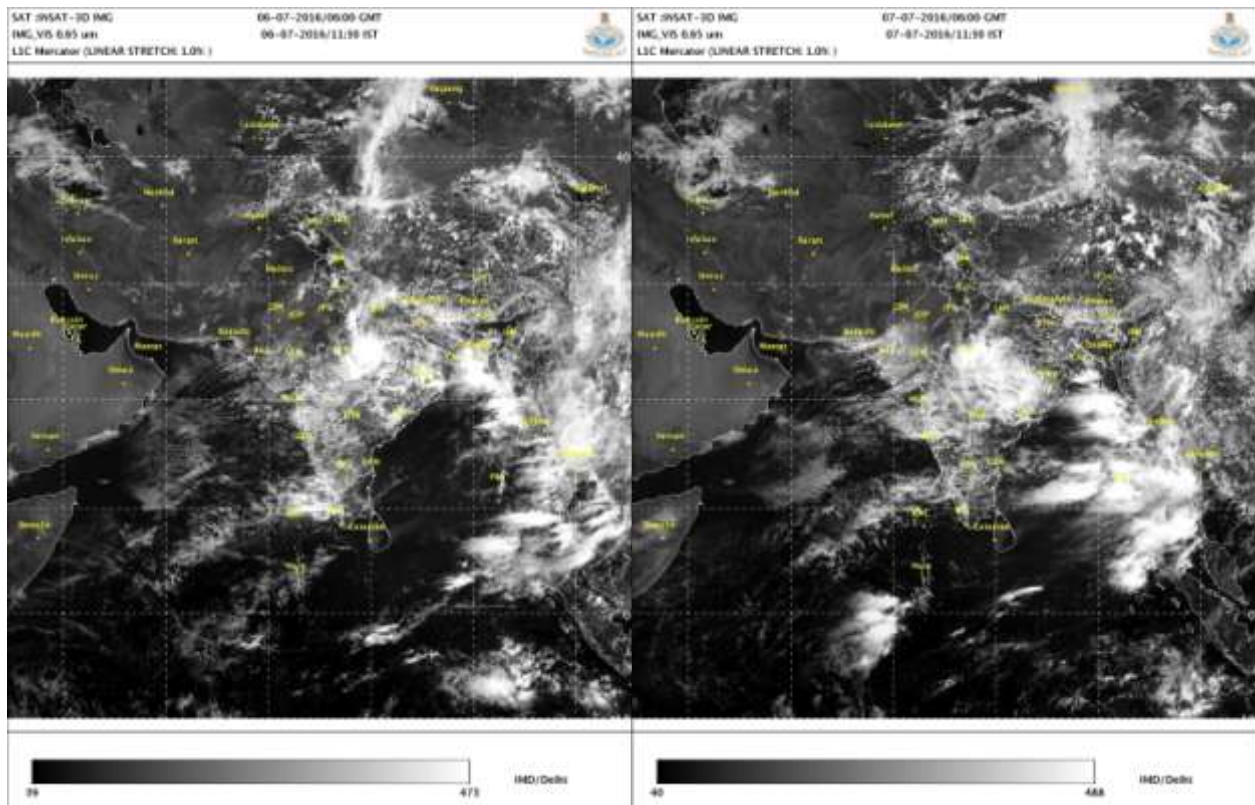


Fig. 2 (i): Typical Visible imageries of Depression based on 0600UTC of 6th and 7th July 2016

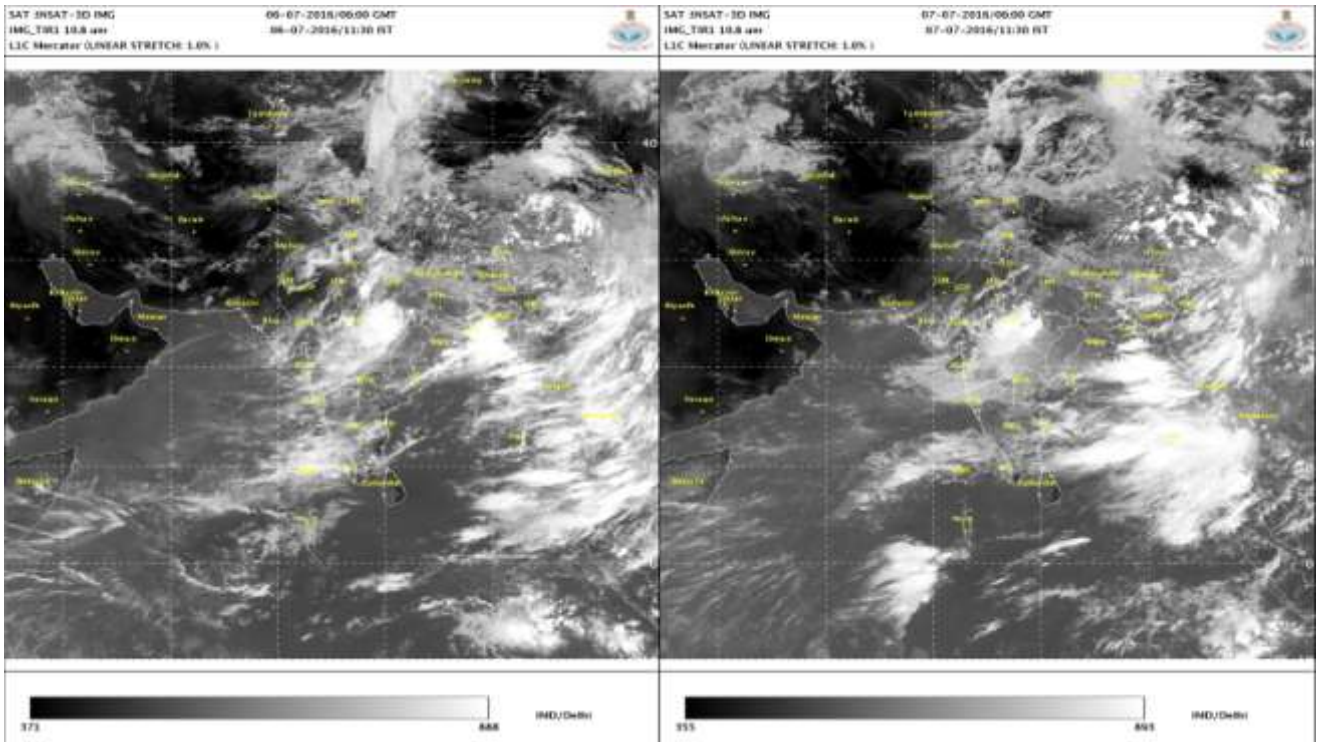


Fig.2 (ii): IR imageries of Depression based on 0600UTC of 6th and 7th July 2016

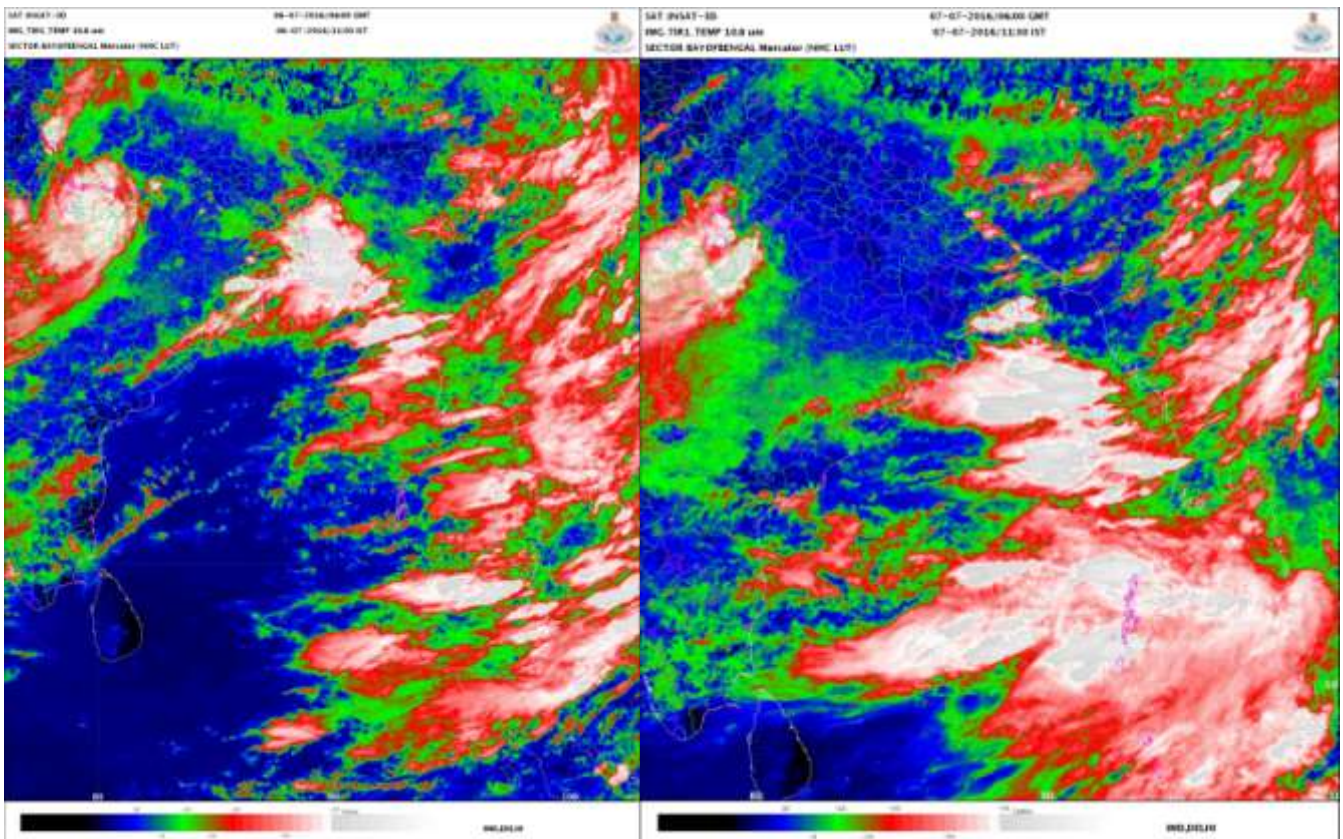


Fig.2 (iii): Enhanced Colour imageries of Depression based on 0600UTC of 6th and 7th July 2016

4. Dynamical Features

To analyse the dynamical chart, the Mean Sea Level Pressure (MSLP), surface winds at 10 m height and winds at 850 hPa, 500 hPa and 200 hPa levels charts during the 6th -7th July are presented in Fig. 3 based on IMD-GFS analysis.

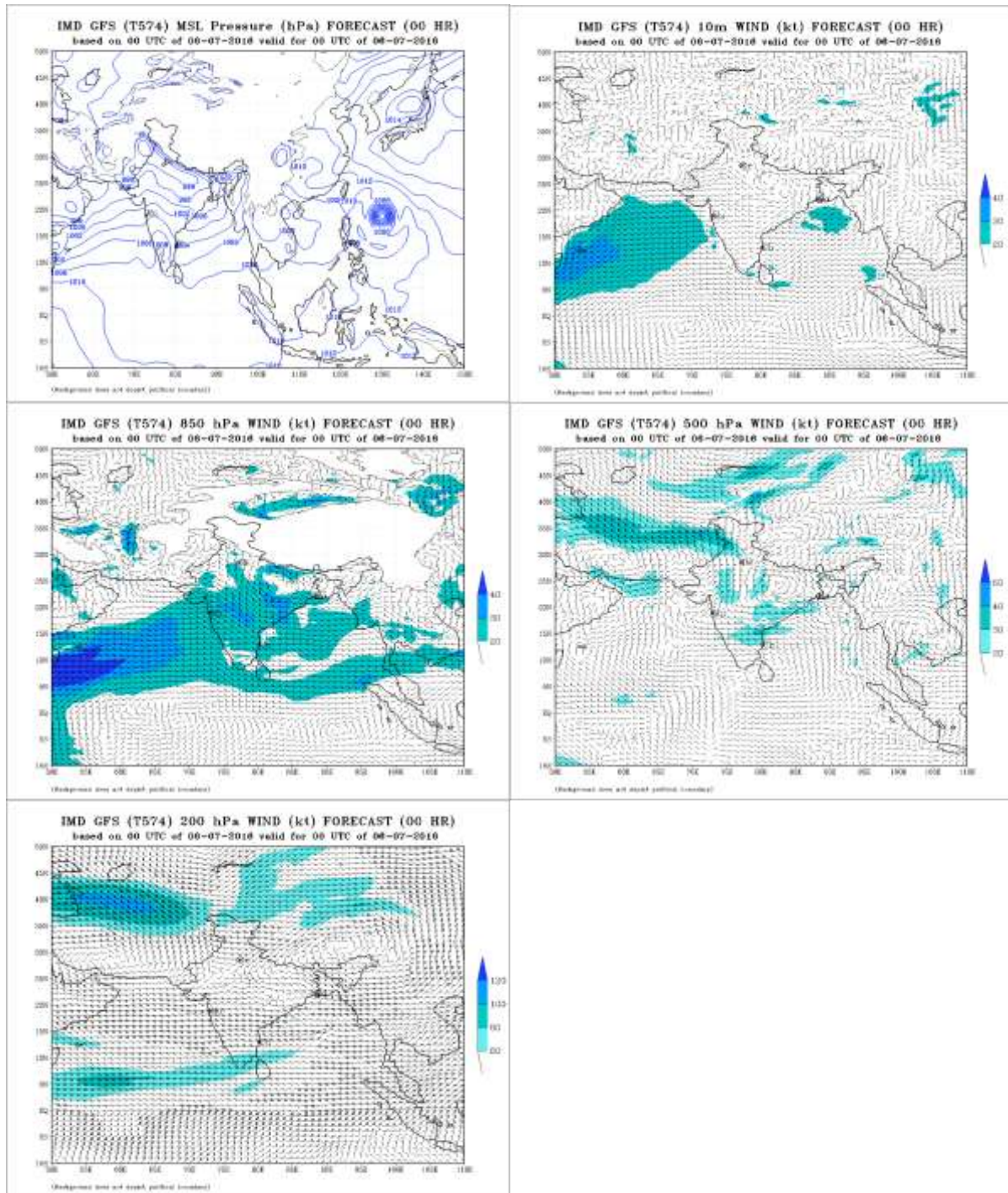


Fig.3 (i): IMD-GFS model analysis of MSLP, 10m wind, winds at 850hPa, 500hpa & 200 hPa levels based on 0000UTC of 6th July 2016.

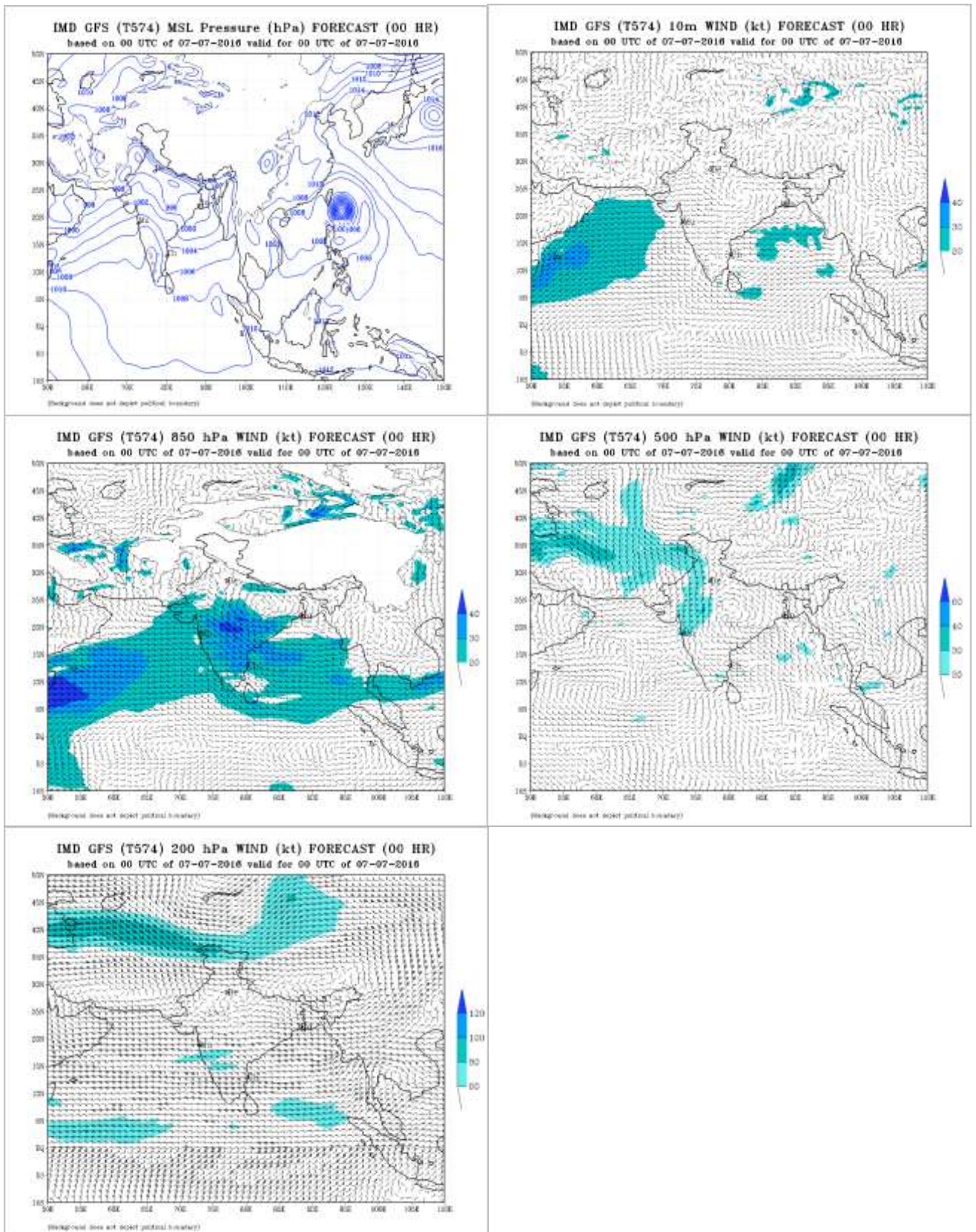


Fig.3 (ii): IMD-GFS model analysis of MSLP, 10m wind, winds at 850hPa, 500hpa & 200 hPa levels based on 0000UTC of 7th July 2016

5. Realised Weather

The system caused *isolated heavy to very heavy rainfall* over Bihar, East Uttar Pradesh, West Madhya Pradesh, East Rajasthan during 6th-8th and isolated heavy to very heavy rainfall and extremely isolated heavy falls over Narsinghpur on 7th (Description of rainfall terminologies: **Heavy**: 64.5 to 124.4 mm; **Very Heavy**: 124.5 to 244.4 mm and **Extremely Heavy**: ≥ 244.5 mm) as well as spatial distribution [**Isolated (ISOL)**: (1-25% of stations reporting rainfall); **Scattered (SCT / A few places)** : 26-50% of stations reporting rainfall; **Fairly WideSpread (FWS/ Many places)**: 51-75% of stations reporting rainfall; **Widespread (WS/ Most places)**: 76-100% of stations reporting rainfall during the last 24 hours ending at 0300 UTC of every day).

The chief amounts of past 24 hr rainfall realised (≥ 7 cm) ending at 0830 IST of date during the life cycle of system are furnished below:

6 July 2016

Bihar: Jhajha-11, Rosera, Nawada- each 9, Garhi, Bodh Gaya-each 8,

East Uttar Pradesh: Attarra-18, Beberu-12, Naraini-9, Rae Bareli CWC-8, Banda-8, Banda CWC, Fatehpur Obsy, Mirzapur CWC, Phoolpur - 7 each

West Uttar Pradesh: Baheri-17, Sahaswan-7

East Rajasthan: Shahabad-18, Chabra-7

West Madhya Pradesh: Guna-AWS-13, Vidisha-AWS-11, Lisagarh-10, Chicholi, Lateri-10, Shivpuri-AWS-9, Narsingarh, Sironj, Lichhavar- each 8, Ashoknagar-AWS, Raisen-AWS, Nusrulgunj, Kurwai-7,

Narsinghpur-AWS-31, Ajaigarh-19, Sidhi-AWS-16, Khurai-15,

Lakhnadon, Satna-AWS and Kareli-13 each, Panna-AWS and Rewa-AWS- 11 each, Deori, Umariya-AWS- 10 each, Gudh, Sagar-AWS-8 each, Gadarwara and Hanumana-7 each

7 July 2016

Bihar: Sripalpur-9

West Uttar Pradesh: Lalitpur-7

East Rajasthan: Shahabad-7,

West Madhya Pradesh: Panchmarhi-17, Udaipur-13, Salwani-Silvani-10, Mungaoli-10, Bbegumganj, Ganjbasoda, Bareili- 9 each, Vidisha-AWS-8, Raisen-AWS, Kurwai- 8 each

8 July 2016

East Uttar Pradesh: Nighasan-16, Hardoi Tehsil, Hardoi obsy-11 each

West Uttar Pradesh: Mahroni-17, Rath-7

West Madhya Pradesh: Raisen and Vidisha-9 each

Damage :

No damage has been reported due to the system.