भारत सरकार
Government of India
पृथ्वी विज्ञान मंत्रालय (एम. ओ. ई. एस.)
Ministry of Earth Sciences (MoES)
भारत मौसम विज्ञान विभाग
INDIA METEOROLOGICAL DEPARTMENT

Monthly Rainfall and Temperature Outlook for July, 2023

Highlights

a) **Rainfall–** The monthly rainfall over the country as a whole during July 2023 is most likely to be normal (94 to 106 % of Long Period Average (LPA)) and most probably within positive side of the normal. The spatial distribution suggests that normal to above normal rainfall is most likely over most areas of central India and adjoining south peninsular and east India and some areas of Northeast and Northwest India. Below normal rainfall is most likely over many areas of northwest, northeast and southeast peninsular India.

b) **Temperature –** During July 2023, normal to above normal maximum temperatures are likely over most parts of the country except some areas of northwest and peninsular India where below normal maximum temperatures are likely. Normal to above normal minimum temperatures are likely over most parts of the country except some areas of northwest India where below normal minimum temperatures are likely.

c) **SST** - There are high probabilities for the development of El Niño conditions over the equatorial Pacific Ocean and positive Indian Ocean Dipole (IOD) conditions over the Indian Ocean during July to September 2023.

   As sea surface temperature (SST) conditions over the Pacific and the Indian Oceans are known to have strong influence on Indian monsoon, IMD is carefully monitoring the evolution of sea surface conditions over these Ocean basins.

   IMD will issue the **forecast for the rainfall during the second half of the season (August + September 2023) and for the month of August towards the end of July 2023.**

1.   Background

Since 2021, IMD has been issuing monthly and seasonal operational forecasts for the southwest monsoon rainfall over the country based on the Multi-Model Ensemble (MME) forecasting system. The MME approach uses the coupled global climate models (CGCMs) from different global climate prediction and research centers including IMD's Monsoon Mission Climate Forecasting System (MMCFS) model.

IMD had issued the first stage forecast for the 2023 southwest monsoon seasonal (June to September) rainfall over the country on 11th April and update for the forecast on 26st May 2023. IMD also issued the forecast for rainfall during June on 26th May, 2023.

Now, the forecast outlook for the monthly rainfall and temperatures for July 2023 is presented here.

2.   Probabilistic Forecast of Monthly Rainfall Distribution over the Country

The monthly rainfall averaged over the country as a whole during July 2023 is most likely to be normal (94 to 106 % of LPA) and most probably within positive side of the normal. The LPA of rainfall over the country during July based on the data of 1971-2020 is about 280.4 mm.

The spatial distribution of probabilistic forecasts for the tercile categories (above normal, normal and below normal) for the rainfall during July, 2023 is shown in Fig.1. The spatial distribution suggests that normal to above normal rainfall is most likely over most parts of central India and adjoining south peninsular and east India and some areas of Northeast and Northwest India. Below normal rainfall is most likely over many parts of northwest, northeast and southeast peninsular India. The white shaded areas within the land area represent climatological probabilities.

3.   Probabilistic Forecast of Monthly Temperatures over the Country

Fig.2a and Fig.2b show the spatial distribution of probabilistic forecasts for the tercile categories of the maximum and minimum temperatures respectively during July 2023. During July 2023, normal to above normal maximum temperatures are likely over most parts of the country except some areas of northwest and peninsular India where below normal maximum temperatures are likely. (Fig.2a). Similarly, normal to above normal minimum temperatures are likely over most parts of the country except some areas of northwest India where below normal minimum temperatures are likely (Fig. 2b).

4.   SST conditions in the Pacific and the Indian Oceans

Currently, warm ENSO neutral conditions are prevailing over the equatorial Pacifc. The sea surface temperatures (SSTs) across most of the equatorial Pacific Ocean are warmer than normal and near El Nino threshold value. The latest forecasts from MMCFS and other global models indicate high probabilities for the El Niño conditions to develop during the middle of the monsoon season and continue till the first quarter of 2024.

In addition to ENSO conditions over Pacific, other factors such as the Indian Ocean Sea Surface Temperatures (SSTs) have also some influence on Indian monsoon. Currently,

neutral Indian Ocean Dipole (IOD) conditions are prevailing over Indian Ocean. The latest forecasts from MMCFS and other global models indicate positive IOD conditions likely to develop during the remaining period of the monsoon season.

5. Extended Range Forecast and short to medium range forecasting services

IMD also provides extended range forecasts (7–day averaged forecasts for the next four weeks) of rainfall and maximum and minimum temperatures over the country updated every week on Thursday. This is based on the Multi-model ensemble dynamical Extended Range Forecasting System currently operational at IMD. The forecasts are available through the IMD website https://mausam.imd.gov.in/imd_latest/contents/extendedrangeforecast.php).

The extended range forecast is followed by a short to medium range forecast issued daily by IMD.
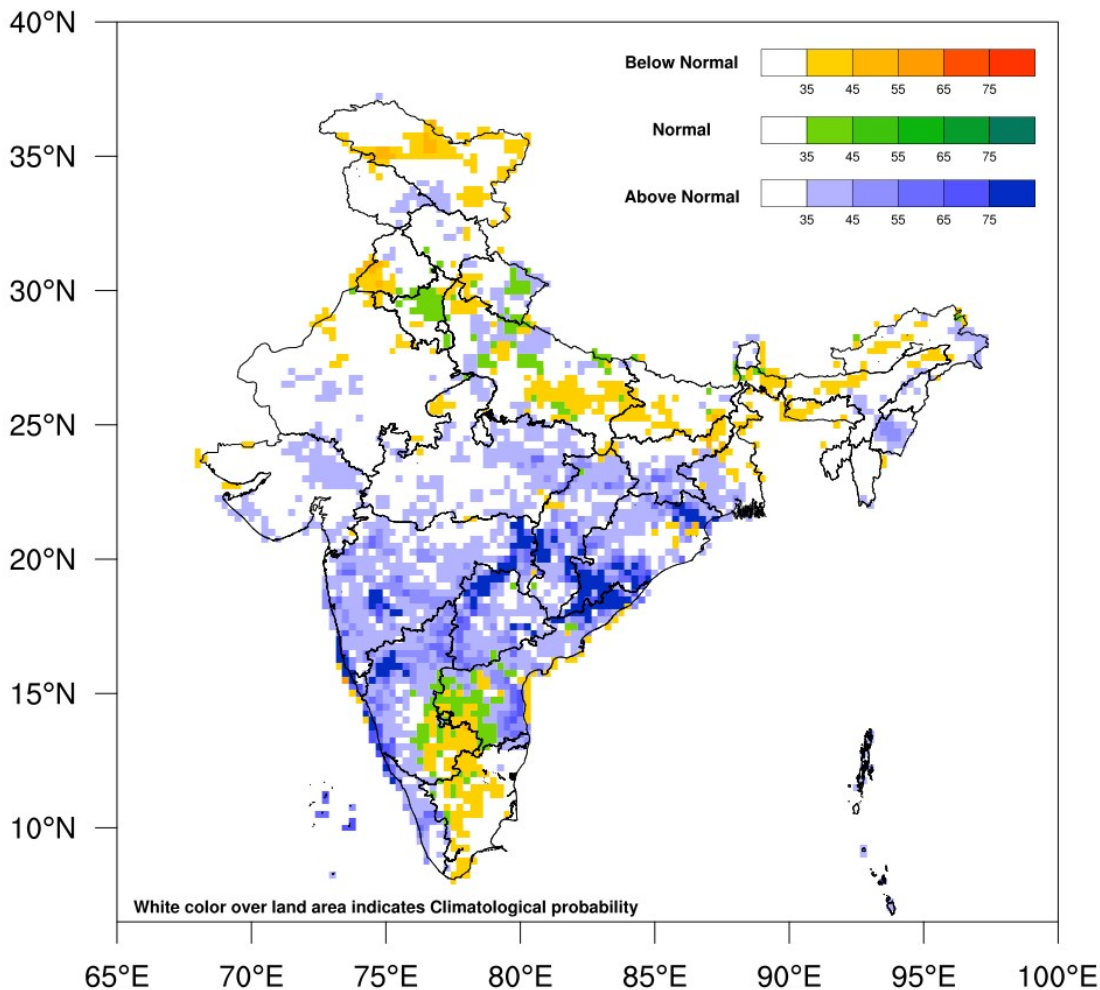

Fig.1. Probability forecast of tercile categories[*] (below normal, normal and above normal) of the rainfall over India during July 2023. The figure illustrates the most likely categories as well as their probabilities. The white shaded areas within the land area represent climatological probabilities.

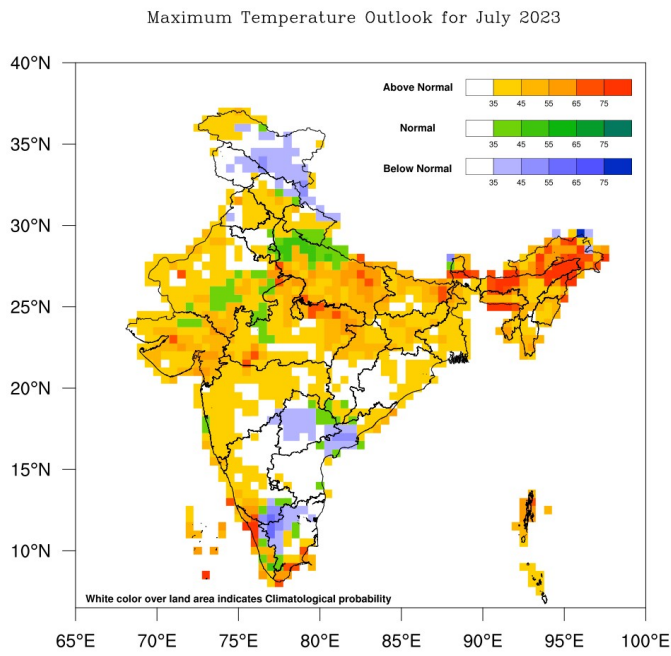*Tercile categories have equal climatological probabilities of 33.33% each.

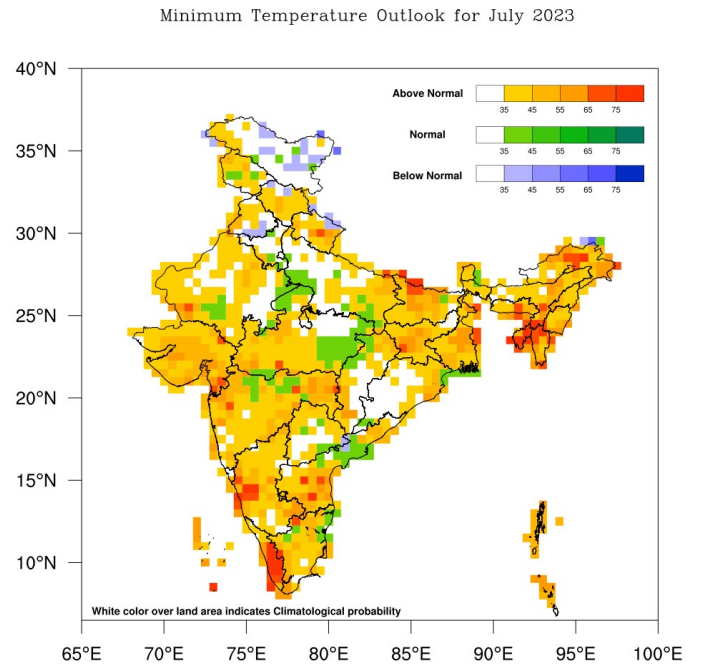**Fig.2a.** Probability forecast of Maximum Temperature during July 2023.

Fig.2b. Probability forecast of Minimum Temperature during July 2023.