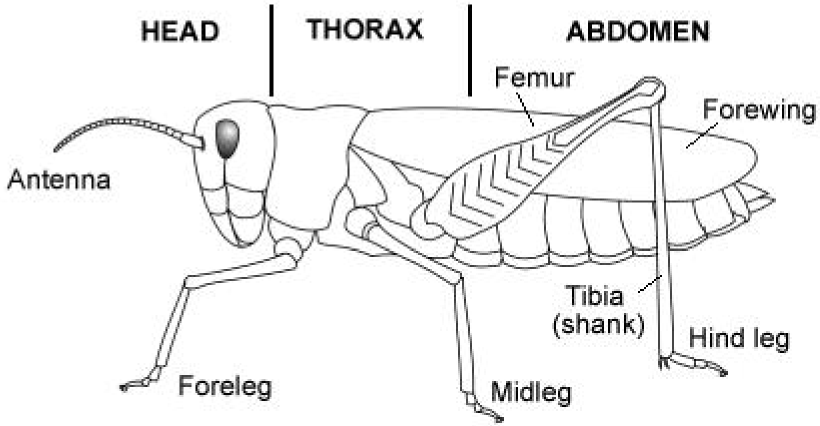
Locust Surveillance Using Geospatial Technology

No. 2020/16
Period: 01-30 Nov.

nrsc



Source: www.agriculture.gov.au

Contents

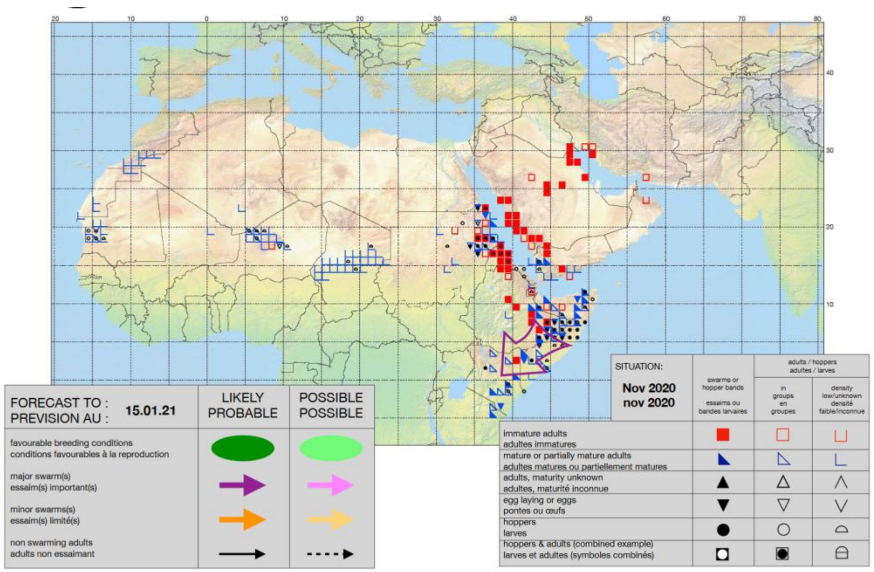
Locust Surveillance Using Geospatial Technology Bulletin is issued by Regional Remote Sensing Centre (West), NRSC/ISRO – Jodhpur. RRSC-W continuously monitors the weather and ecology to provide early warning based on survey and control results from Locust Warning Organisation (LWO), Jodhpur combined with remote sensing inputs.

Please send your feedback to rrsc_w@nrsc.gov.in or ssrao@nrsc.gov.in

Locust Update by Food and Agriculture Organisation, UN.	Locust Update by Locust Warning Organisation, India.

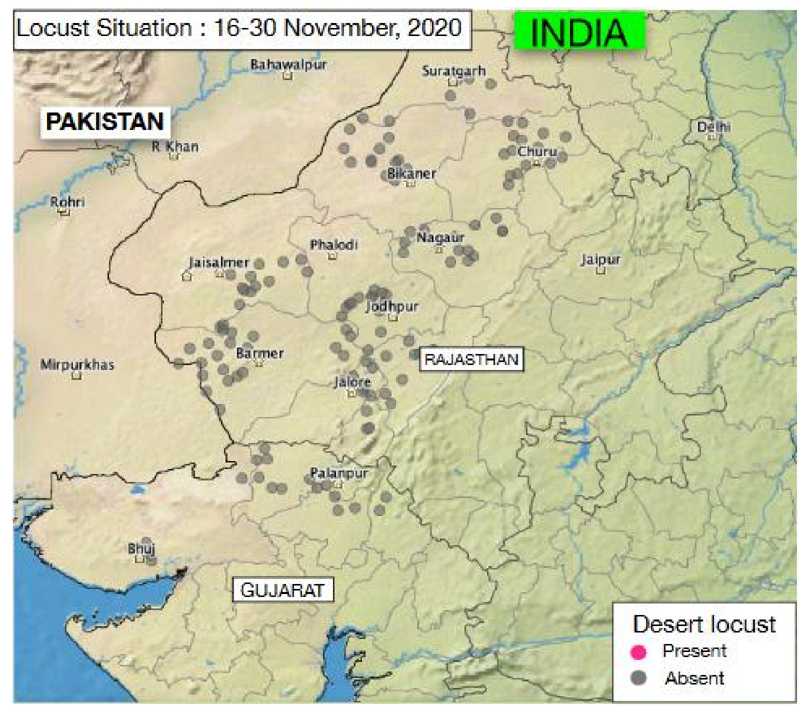
Status & Forecast

During November, a group of immature adults persisted in Hormozgan province (Iran). Surveys conducted in Sindh, Punjab, Baluchistan, & Khyber regions of Pakistan, Rajasthan & Gujarat states of India confirmed presence of no locust. The forecast shows no significant developments are likely in these regions.



Status & Forecast

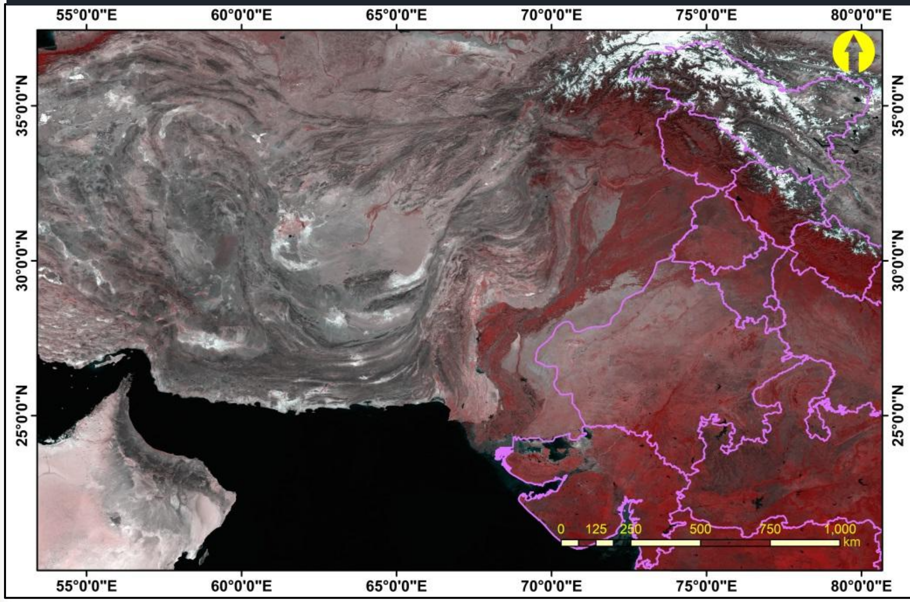
During the routine survey, it has been observed that India is free from gregarious as well as solitary desert locust activities during the 2nd fortnight of November, 2020. A total 139 nos. of spots were observed during this survey.



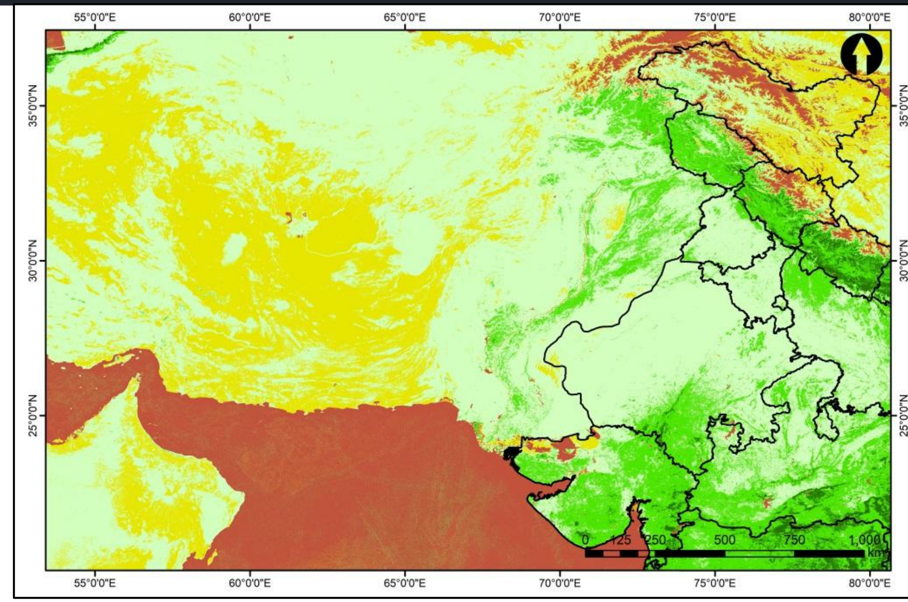
Source: Desert Locust Global Situation update 3rd December 2020 by Food and Agriculture Organisation, UN.

False Colour Composite (FCC)

Normalized Difference Vegetation Index (NDVI)

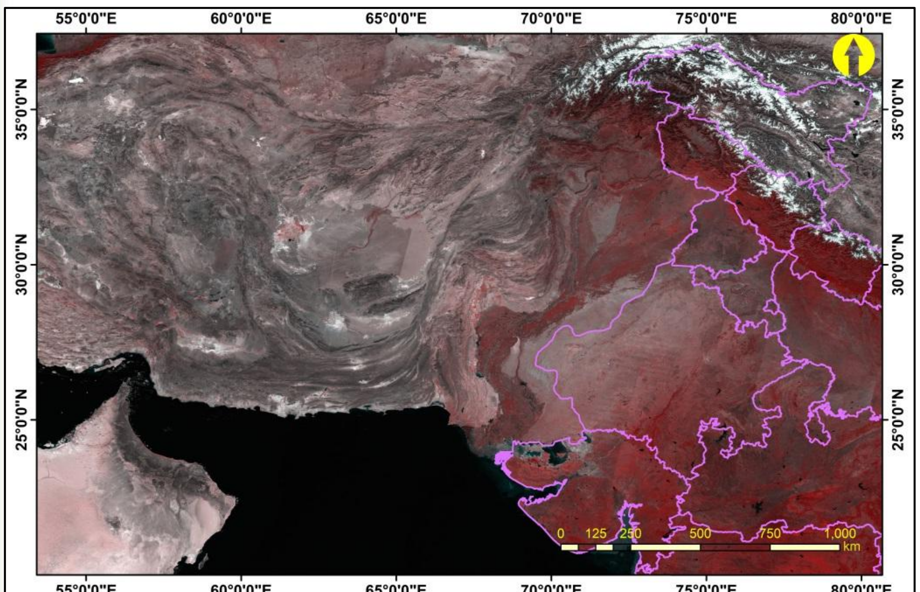


31 Oct – 7 Nov, 2020

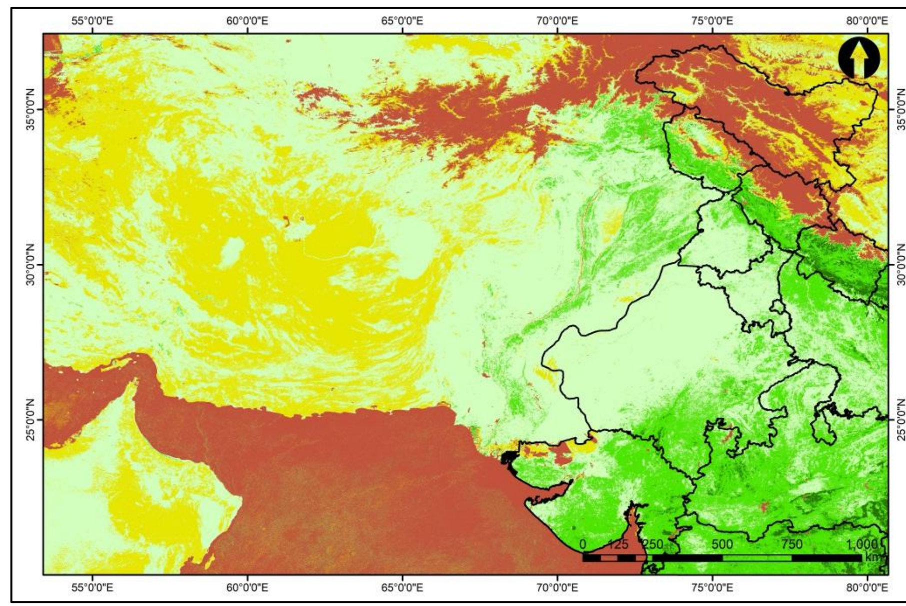


1 Nov – 10 Nov, 2020

< 0.0 | 0.0 - 0.1 | 0.1 - 0.4 | 0.4 - 0.7 | 0.7 - 1.0



16 Nov - 24 Nov, 2020



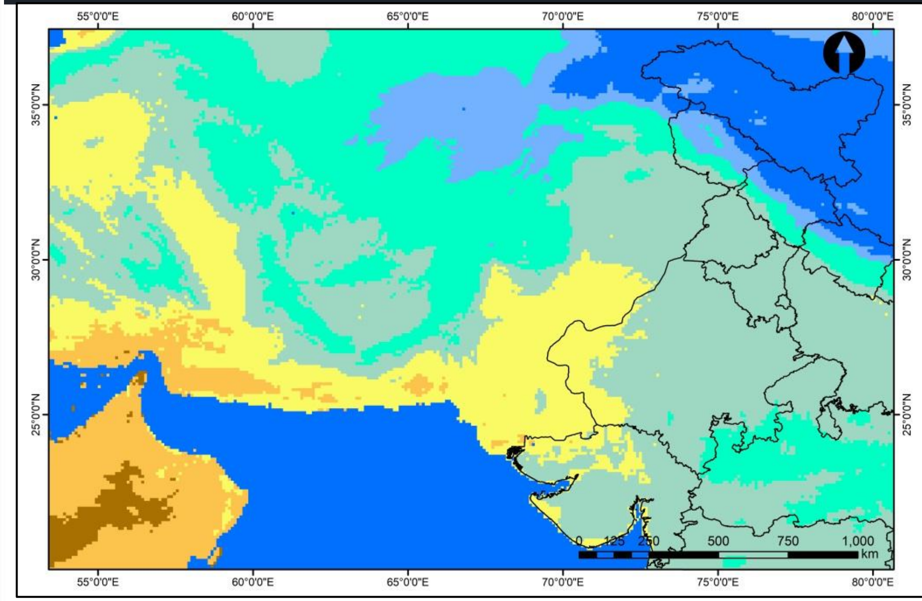
20 Nov - 30 Nov, 2020

Source: MODIS 8 day Composite

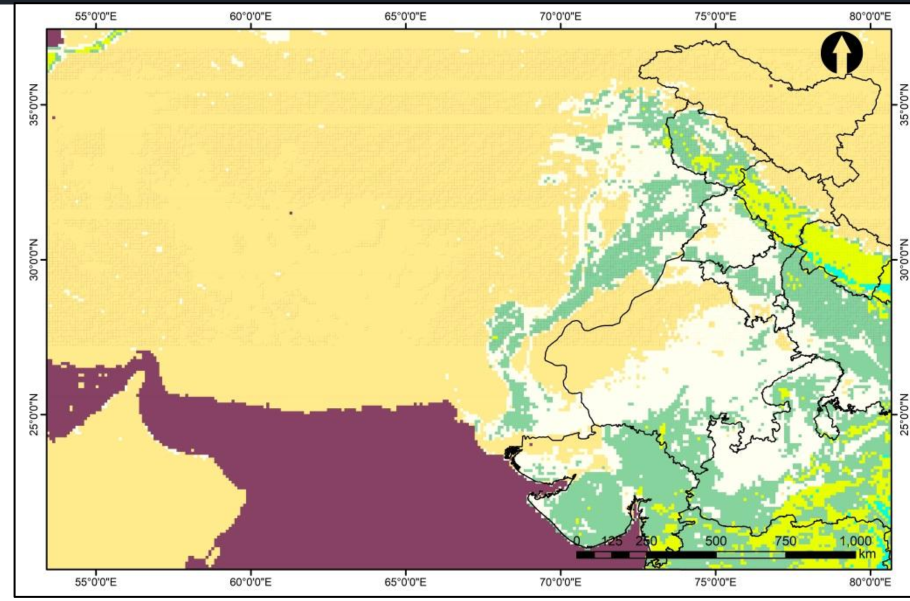
Source: eMODIS Ver. 6

Land Surface Temperature (⁰C)

Leaf Area Index (LAI)



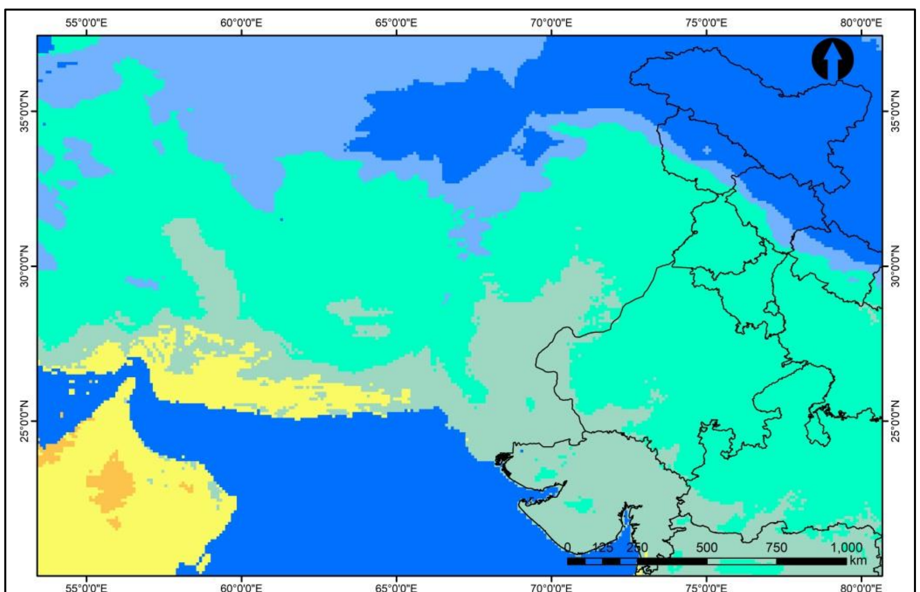
19:00 Hrs. IST of 1th Nov - 2020



19:00 Hrs. IST of 1th Nov 2020.

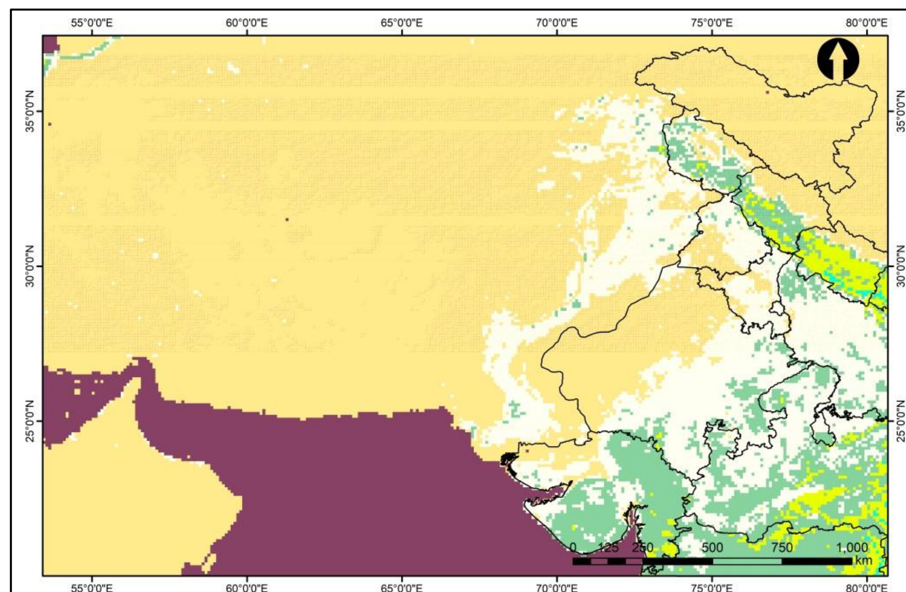
< 0 | 0 - 10 | 10 - 20 | 20 - 25 | 25 - 30 | 30 - 35 | 35 - 40

< 0 | 0 - 0.25 | 0.25 - 0.50 | 0.50 - 1.00 | 1.00 - 3.00 | 3.00 - 5.00



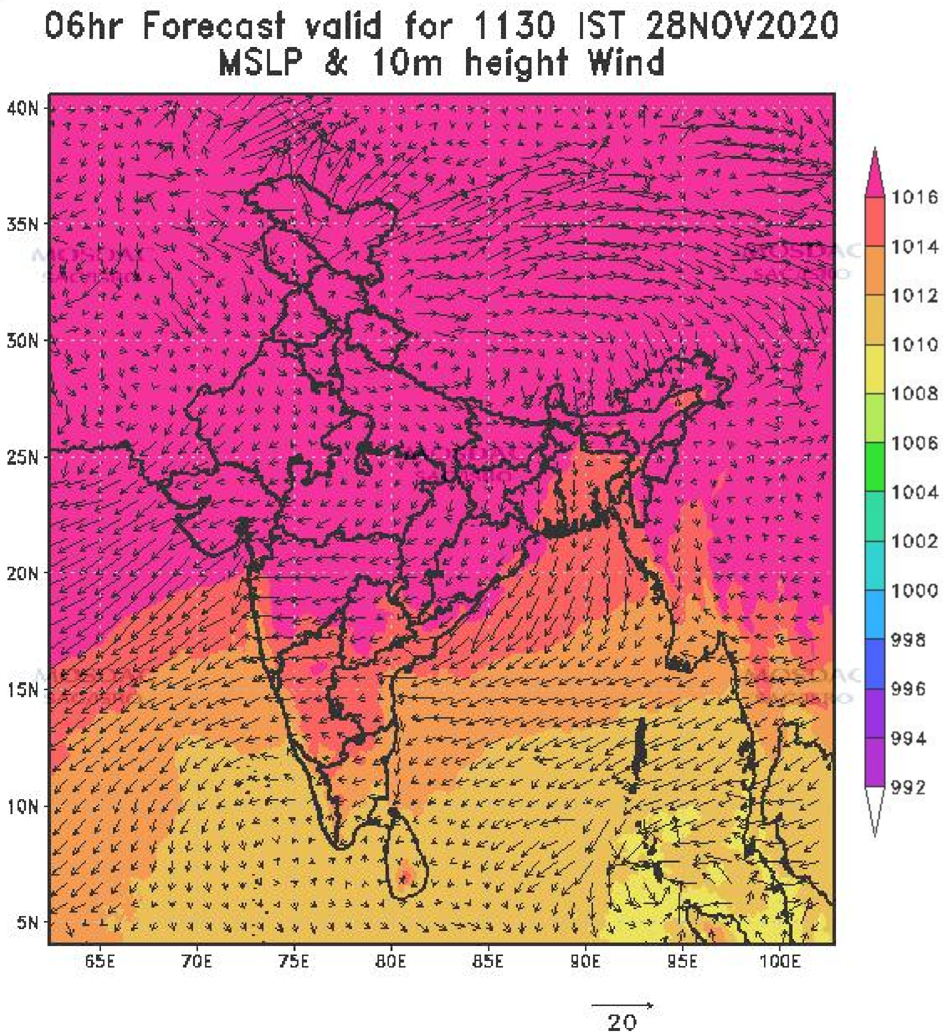
Source: SMAP Enhanced L4 Global 3 Hourly 9 km Product

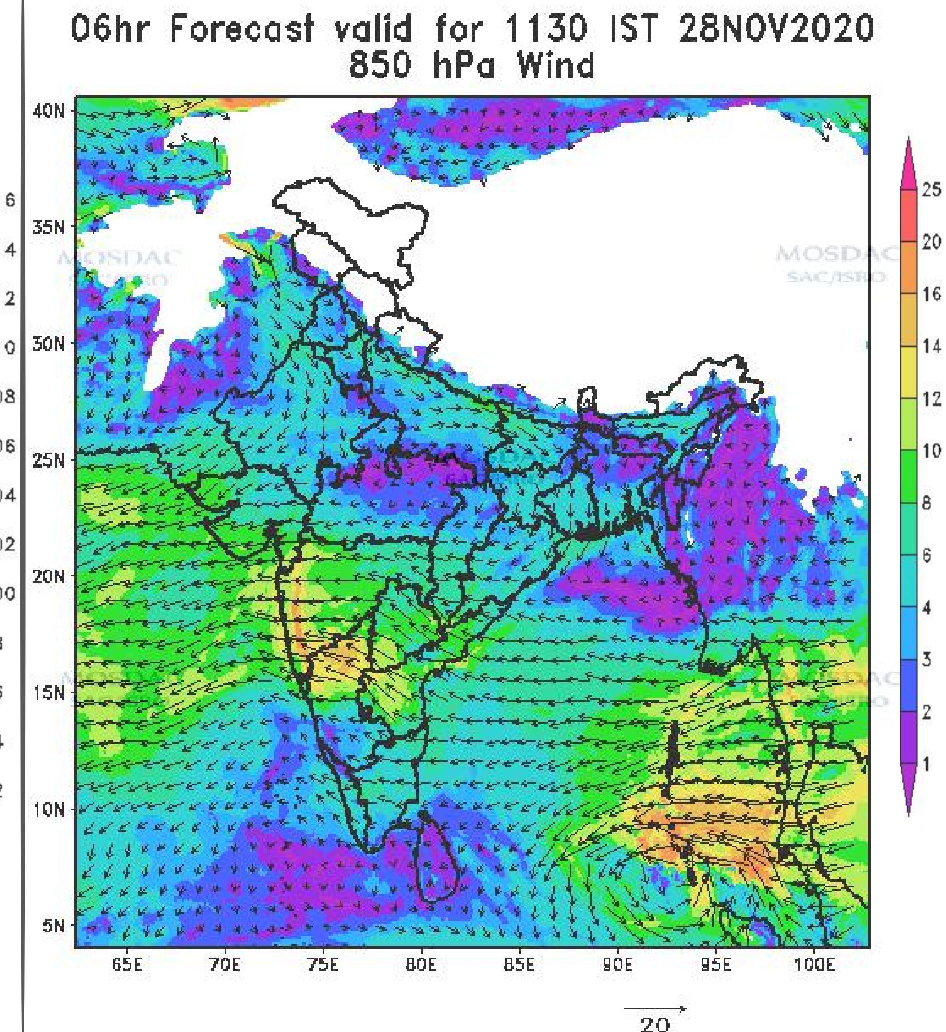
19:00 Hrs. IST of 29th Nov 2020.



19:00 Hrs. IST of 28th Nov 2020.

Wind Vectors



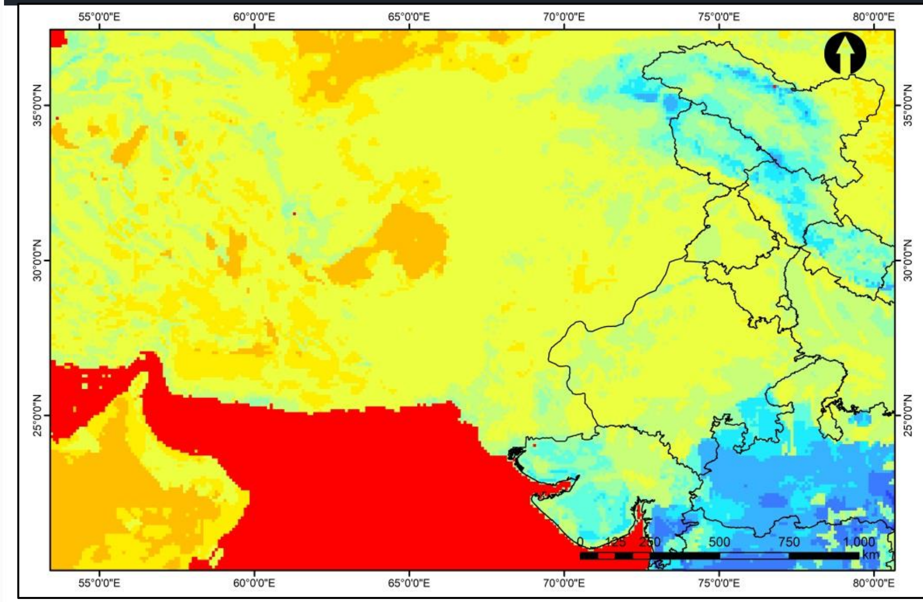


Source: MOSDAC web portal

Wind speed @ 1.46 km from msl.

Surface Soil Moisture Map (%)

Root-Zone Soil Moisture Map (%)



19:00 Hrs. IST of 1th Nov 2020.

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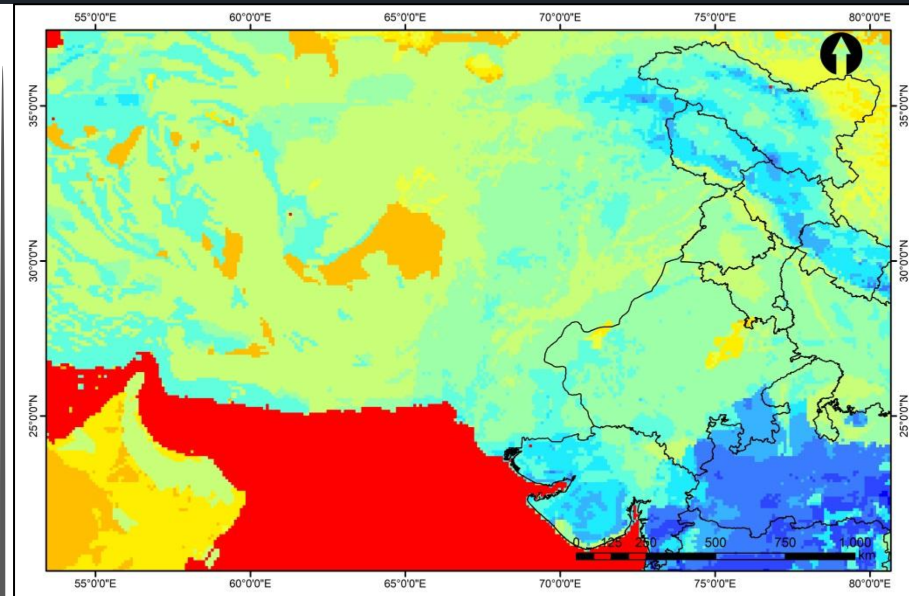
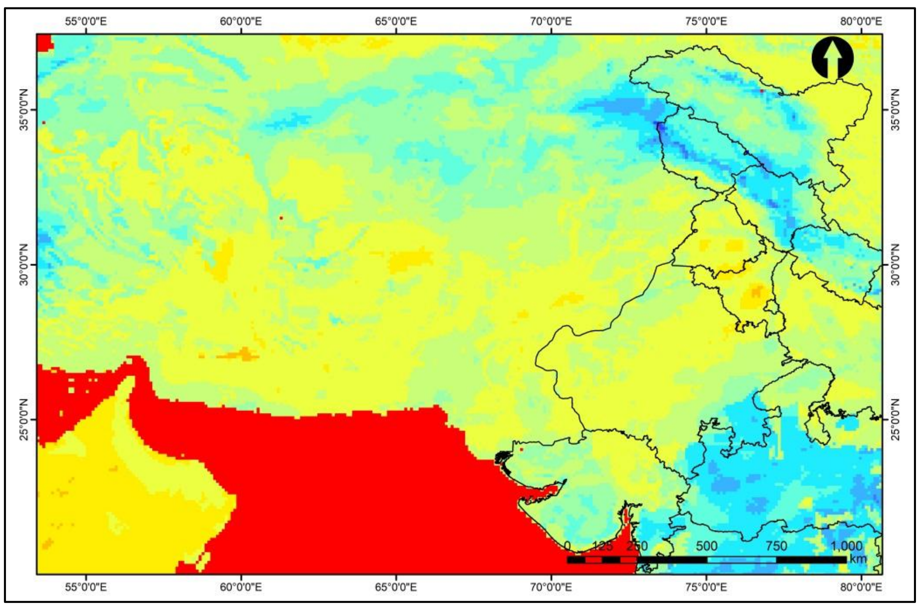


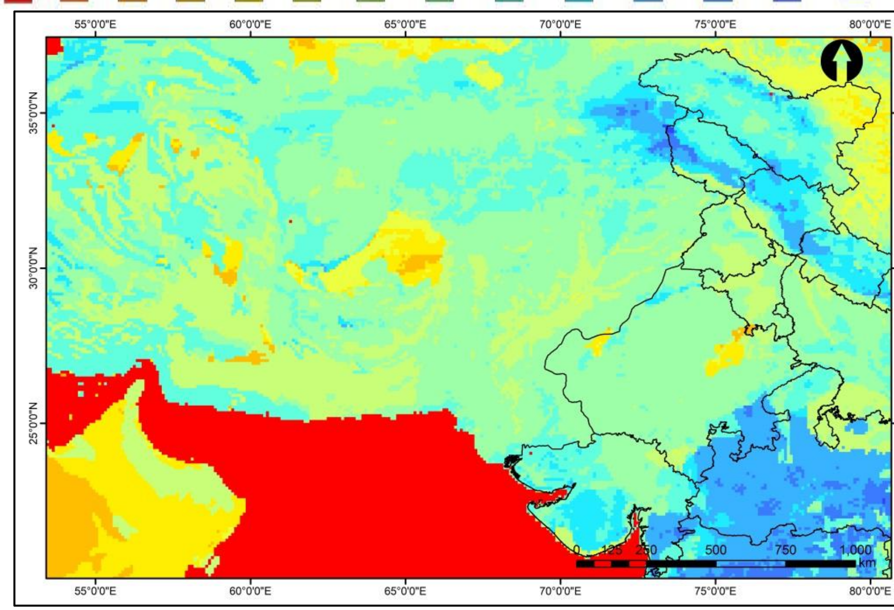
19:00 Hrs. IST of 1th Nov 2020.

0-1 | 1 - 2 | 2 - 3 | 3 - 4 | 4 - 5 | 5 - 10 | 10 - 15 | 15 - 20 | 20 - 25 | 25 - 30 | 30 - 35 | 35 - 40 | 40 - 45 | 45 - 50



Source: SMAP Enhanced L4 Global 3 Hourly 9 km Product

19:00 Hrs. IST of 28th Nov 2020.



19:00 Hrs. IST of 28th Nov 2020.

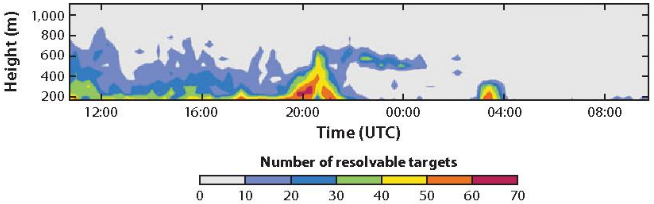
Radar Entomology – A Brief Introduction

Radar entomology is the technique and science of using radar to study insect movement. Initial investigations were performed by various research during 1968. G W Schaefer built the first radar specifically to observe Desert Locusts and operated in the Sahara regions of West Africa.

Locust migration is a significant ecological phenomenon in nature and lead to huge exchange of biomass and nutrients across the Earth surface with the impacts on ecosystems, such as food security. Radar remains one of the most effective tools for observing insect flight; it works in all-weather and all-time conditions. The basic principle of the radar is to transmit radio-frequency electromagnetic (EM) waves into a region of interest and receive echoes backscattered by targets.

The scanning insect radar is a type of non-coherent pulse radar that operates at a wavelength of 3.2 cm in the X-band. It uses a parabolic antenna with a beamwidth of 1–2°. It employs horizontal polarization because, in most cases, migratory insects are flat flying and the radar cross section (RCS) for most insects can reach a maximum for the horizontal polarization. Radar entomologists have performed several experiments using the X-band radar to investigate the relationship between the RCS of insects and their body mass. Aldhous proposed an estimate formula by observing that insect mass has a logarithmic linear relationship to the average RCS and thereon many researchers have proposed advanced formulas.

A typical Entomological Radar setup.



A typical processed output from Entomological Radar.

Special-purposed insect radars, including the scanning insect radar and VLR achieve the retrieval of the insect parameters, such as density, mass, orientation, wingbeat frequency. These parameters are valuable for the trajectory analysis and species identification of migratory insects. Recently, it has been proved that the coherent and multifrequency techniques can improve the performance of the parameter measurement on orientation, wingbeat frequency, and mass estimation. With the development of modern radars, some advanced radar techniques have great potential to be applied to address existing issues in insect radar and to extend the capability of insect parameter retrievals. Therefore, radar entomology has now entered an exciting phase, in which insect radars will be fully upgraded based on the modern radar techniques and lead to a significant promotion of the discipline.

Source: Chapman et al. 2011; Drake, 2001; Roffey, 1969, Scaefer 1969