



# Doppler Weather Radars

## Why in News

Recently, the Union Minister for Earth Sciences commissioned two of the ten indigenously built **X-Band Doppler Weather Radars (DWR)** which will closely monitor the **weather changes over the Himalayas**.

- A multi-mission meteorological data receiving and processing system developed in collaboration with [Indian Space Research Organisation \(ISRO\)](#) was also launched.
  - This new system will **capture, process and make available for use satellite data within seven minutes as opposed to 20 minutes taken by earlier systems.**

## Key Points

- **Developed By :** The DWR has been designed and developed by **ISRO** and manufactured by [Bharat Electronics Limited \(BEL\)](#), Bengaluru.
- **Significance:**
  - Covering the central and western Himalayas, these dual polarised radars will **gather atmospheric variations and pick signals of extreme weather events.**
  - Uttarakhand and Himachal Pradesh are **highly prone to cloud bursts, landslides, heavy rain and snowfall.** Timely weather forecasts and warnings would **ensure the governments make advance plans and initiate rescue measures.**

## Radars

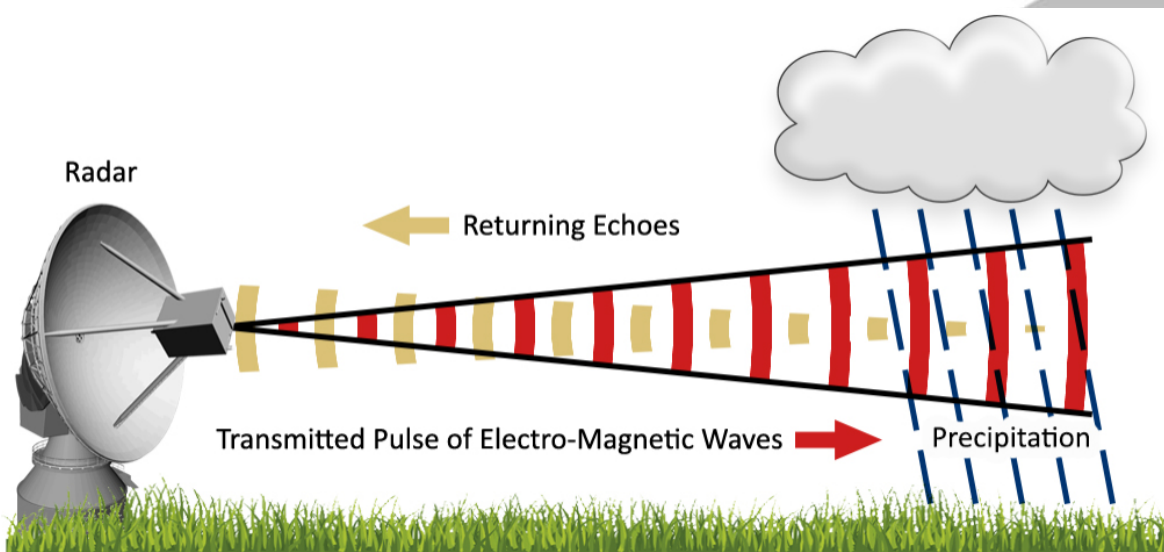
- **Radar (Radio Detection and Ranging):**
  - It is a device which **uses electromagnetic waves in the microwaves region** to detect location (range & direction), altitude, intensity and movement of moving and non-moving objects.
- **Doppler radar :**
  - It is a specialized radar that uses the **Doppler effect** to produce velocity data about objects at a distance
    - **Doppler effect:**
      - When the **source and the signal are in relative motion to each other there is a change in the frequency** observed by the observer. If they are **moving closer frequency increases and vice versa.** //



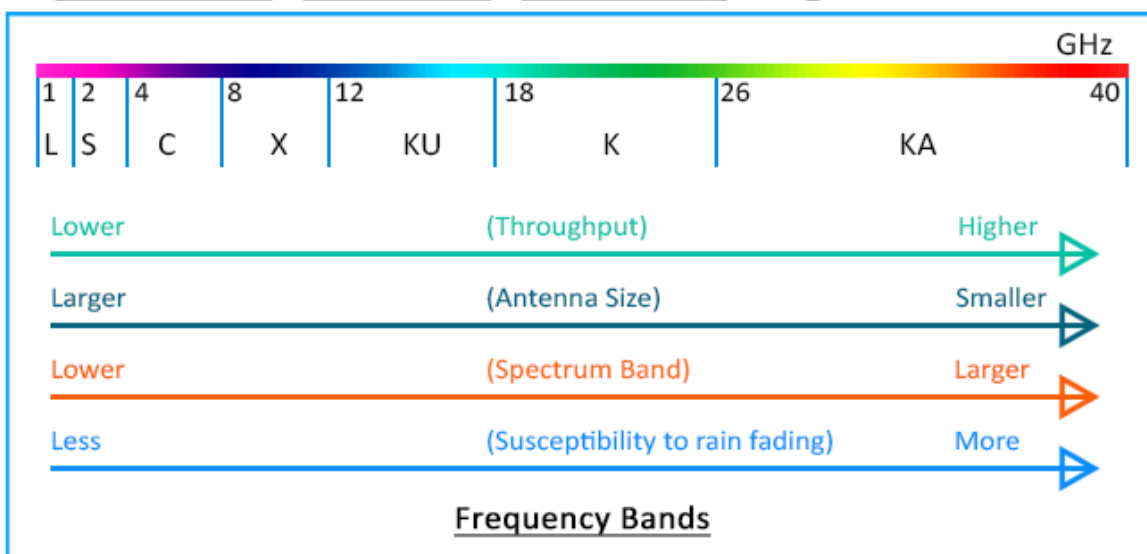
- It does this by **bouncing a microwave signal off a desired target and analyzing how the object's motion has altered the frequency of the returned signal.**
- This **variation gives direct and highly accurate measurements** of the radial component of a target's velocity relative to the radar.

▪ **Doppler Weather Radar:**

- Based on Doppler principle the radar is **designed to improve precision in long-range weather forecasting and surveillance** using a parabolic dish antenna and a foam sandwich spherical radome.
- DWR has the equipment to **measure rainfall intensity, wind shear and velocity and locate a storm centre and the direction of a tornado or gust front.**



- **Types Of Doppler Radars :** Doppler radar can be divided into several different categories according to the wavelength which are **L,S,C,X,K.**



- **X band radars:** They operate on a wavelength of **2.5-4 cm** and a frequency of **8-12 GHz.** Because of the smaller wavelength, the X band radar is more sensitive and can detect smaller

particles.

▪ **Application:**

- These radars are used for studies on **cloud development** because they can detect the tiny water particles and also used to detect light **precipitation such as snow.**
- X band radars also attenuate (become less effective) very easily, so they are used for only very **short range weather observation.**
- Due to the small size of the radar, it can therefore be portable like the Doppler on Wheels (DOW). Most major **airplanes are equipped with an X band radar to pick up turbulence and other weather phenomena.**
- This band is also shared with some **police speed radars and some space radars.**

**Source:IE**

PDF Refernece URL: <https://www.drishtias.com/printpdf/doppler-weather-radars>

