

**agMOOCs**

# **Genesis of weather forecast in India and Abroad**

**Dr. R. Nagrajan**

(Tamil Nadu Agricultural University, Coimbatore)

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Dr. R.Nagrajan

(Tamil Nadu Agricultural University, Coimbatore)

Dear students in the last class we have seen crop weather interaction for sunflower and mustard. In this class we will like to see genesis of weather forecast in India and abroad.

## Genesis of weather forecast in India and abroad

### PART I

- Historically the science meteorology in India was written in **Upanishads** early 3000 B.C., which provides the information such as formation of cloud, rain and seasonal cycles as caused by the movement of earth around the sun.
- **Brihatsamhita**, written around 500 A.D., by Varahamihir, provides deep knowledge on atmospheric processes
- Kautilya's **Arthashastra** contains records of scientific measurements of rainfall and its application to the country's revenue and relief work.
- Kalidasa has written **Meghdoot** during 700 AD and this provides the information on onset of monsoon over central India and traces the path of the monsoon clouds.

Historically the science meteorology in India was written in several ancient texts namely Upanishad which was written around 3000 B.C. which provides the information such as formation of a cloud, rain, as well as the seasonal changes as caused by the movement of Earth around the Sun. second one is the Brihatsamhita written around 500 A.D. by Varahamihir that provides the knowledge on the atmospheric process. And the third one is the Kautilya's Arthashastra that contains records of scientific measurement of a rainfall which can be used for the country revenue as well as relief operation. And the fourth one is the Kalidasa who has written the Meghdoot which contains the information related to prediction of onset of monsoon in central India and also it predicts the traces the path of the monsoon clouds.

### Genesis of weather forecast in India and abroad

- The scientific meteorology began in Europe between 15<sup>th</sup> and 16<sup>th</sup> centuries with the **inventions of barometer, thermometer, hygrometer and wind measuring instruments.**
- In India, the **meteorological observatory** was established by The British East India Company in Calcutta during 1785; and in Madras (now Chennai) during 1796 to study the weather and climate
- **The Asiatic Society of Bengal** was founded in 1784 at Calcutta, and in 1804 at Bombay (now Mumbai) and it promoted scientific studies in meteorology.

Then we go to the scientific metrology development. The scientific metrology began in Europe between 15th and 16th century with the invention of a barometer, hygrometer, thermometer as well as the wind measuring instruments. Similarly in India the Meteorological Observatory was established by the British East India Company in Calcutta during 1785 and in Madras; now it is called the Chennai, during 1796 to study the weather and climate which is one of the oldest observatory in the world. Followed by they also established the Asiatic Society of Bengal was initially founded at Kolkata in the year 1784 by Sir John Williams and also another places the Asiatic Society was also established at Bombay in the year 1804 to promote the scientific studies related to metrology.

### Genesis of weather forecast in India and abroad

- A severe cyclone struck Calcutta in 1864 and this was followed by failures of the monsoon rains in 1866 and 1871. In the year 1875, **India Meteorological Department** was established to bring all meteorological work in the country under a central authority
- **Mr. H. F. Blanford** was appointed as Meteorological Reporter to the Government of India
- **Sir John Eliot** was appointed as Director General of Observatories in May 1889 at Calcutta headquarter
- The headquarter of IMD was later shifted to Shimla, then to Poona (now Pune) and finally to New-Delhi.

Let us see the establishment of the India Meteorological Department. A severe cyclone struck Calcutta in the year 1864 and this was followed by the failure of monsoon trends in the year 1866 and 1871. in the year 1875 the India Meteorological Department was established to bring all the meteorological work in the country under a central authority. After the establishment Mr. H.F. Blanford was appointed as a meteorological reporter to the Government of India followed by Sir John Eliot was also appointed as a Director General of the Observatories in May 1889 at Calcutta headquarter. Later this headquarter was shifted to Shimla then to Pune now it is called Pune and finally placed at New Delhi.

## Genesis of weather forecast in India and abroad

### PART II

- **Mr. H.F. Blanford**, initiated the system of Long Range Forecasting (LRF) for monsoon seasonal rainfall
- The Long Range Forecasting system was later improved through several evolutionary phases by eminent pioneers like **Sir John Eliot** and **Sir Gilbert Walker** (Directors-General of Observatories)
- **Sir Gilbert Walker** has identified a phenomina of linking monsoon with global meteorological situations and discovered **Southern Oscillation phenomenon**.

Let us see the improvement in the weather forecasting system. Mr. H. F. Blandford who initiated the system called the Long Range Forecasting to predict the monsoon seasonal rainfall. Later the Long Range Forecasting system was continuously improved by the eminent scientists called Sir John Eliot as well as Sir Gilbert Walker. Both of them were the director general of the observatories. Sir Gilbert Walker an eminent mathematician was appointed as director general of the IMD he identified the phenomena of linking monsoon with world meteorological situations and discovered the phenomena of Southern oscillation which was later called the El Niño.

### Genesis of weather forecast in India and abroad

- The first weather service *viz.*, **'Farmers Weather Bulletin'** was issued by the India Meteorological Department in collaboration with All India Radio on daily basis (afternoon) and broadcasted in 26 regional languages
  - The main limitations are the forecast issued for a large scale and does not meet the requirements of crop cultural operations at block level
  - There was no advisory given to crop planning and agricultural operations
- To overcome this problem, IMD has introduced **Agricultural Meteorological Advisory Services** to prepare special weather charts on weekly, monthly and seasonal basis

Let us see the development of the weather services. In first weather service mainly Farmers Weather Bulletin was issued by the India Meteorological Department in association with All India Radio on daily basis and broadcasted in 26 regional languages. The main limitation are the forecast issued for a large scale and does not meet the requirement of a crop cultural operations at a local level. There was no advisory also given to the crop planning as well as the agricultural operations. To work on this problem IMD has introduced Agricultural Meteorological Adversary Service to prepare special weather charts on weekly and monthly and seasonal basis.

Likewise they developed bulletin called Agrometeorological Adversary Bulletin was issued for a week or twice a week. There is another bulletin news called Tentative Crop Outlook which provides the information such as what is the crop stage in the country that will be issued to the crop planners or agriculture planners as well as for the policy planners to know the status of the agricultural situation in India. Likewise the Crop Yield Forecast was also issued by the Drought Research Unit of IMD based on the statistical empirical formulae for rice and wheat growing area.

### Genesis of weather forecast in India and abroad

- Based on the crop stage and rainfall data **'Agrometeorological Advisory Bulletin'** was issued for a week or twice a week
- The other services include **'Tentative Crop Outlook'** for the country to benefit the agricultural planners and policy planners
- **Crop Yield Forecast** was also issued by the Drought Research Unit based on the statistical empirical formulae for rice and wheat growing area

Let us see the current activity of IMD related to our subject. First one is the National Center for Medium Range Weather Forecasting was established by the India Meteorological Department at New Delhi to provide the medium range weather forecast for five days period. Initially it was developed with agro climatic zone resolution level. Later it was forecasted to district resolution on five day basis. The second one is the Numerical Weather Prediction. It's being used to generate the medium-range weather forecasts using a global forecast system at 35 kilometers resolution level.

## Current Activity of IMD Part III

1. **National Centre for Medium Range Weather Forecasting (NCMRWF)** was established at New Delhi to issue medium range forecast along with agro advisory at agro climatic resolution level and later forecast is issued for five days at district resolution level
2. **Numerical Weather Prediction (NWP)** is being used to generate medium range weather forecast by using Global Forecast System (GFS) at 35km resolution scale at IMD Delhi

The third one is the Now casting is being used by the IMD to provide the very short duration forecasting within the period of six hours using a Doppler Weather Radar Observations. First time it is implemented in New Delhi during a Commonwealth Games in the year 2010. The fourth one is the Radar Metrology which also use the same Doppler Weather Radar to provide the weather forecasting system for a methodological, hydrological, as well as the aviation. It is useful for the forecasters to locate the storm center and predicting its future path. The fifth one is the Monsoon Monitoring and Forecasting issued by the IMD to provide the forecasting information on the onset of monsoon in pre and early monsoon periods.

### Genesis of weather forecast in India and abroad

**3. Now casting**

Now casting is one kind of weather forecasting for a period of very short duration (up to 6 hours) by using the Doppler Weather Radar Observation and it was implemented during Delhi Commonwealth Games 2010.

**4. RADAR Meteorology** is being adopted for Now casting using Doppler Weather Radar (DWR). Which also provides various meteorological, hydrological and aviation products to be useful for the forecasters to locate the storm's center and predicting its future path

**5. Monsoon Monitoring & Forecasting** is also issued by the IMD during pre and early monsoon season

This is about the genesis of weather forecasts in India and abroad. In the next class we will see the types of weather forecast information.

Thank you.