Online Training Program
on
Role of Geo-Spatial Technique in Assessment of Climate Change Scenario

Virtual Classroom Training Program (Through 'VIDYO' software)

18th May, 2024 (Time: 14:00 to 16:30 Hrs.)

Concept Note:

Satellite remote sensing (SRS) — which acquires information about the Earth's surface, subsurface and atmosphere remotely from sensors on board satellites (including geodetic satellites) — is an important component of climate system observations.

The use of satellites allows the observation of states and processes of the atmosphere, land and ocean at several spatio-temporal scales. For instance, it is one of the most efficient approaches for monitoring land cover and its changes through time over a variety of spatial scales.

Satellite data are frequently used with climate models to simulate the dynamics of the climate system and to improve climate projections. Satellite data also contribute significantly to the improvement of meteorological reanalysis products that are widely used for climate change research, Despite the aforementioned contributions of SRS, there are concerns about the suitability of satellite data for monitoring and understanding climate change. Climate change studies require observations to be calibrated/validated and consistent, and to provide adequate temporal and spatial sampling over a long period of time. However, satellite data often contain uncertainties caused by biases in sensors and retrieval algorithms, as well as inconsistencies between continuing satellite missions with the same sensors. The use of satellite observations in climate change studies requires a clear identification of such limitation.

Conventional land-based observations are typically collected at fixed intervals with limited spatial coverage, whereas SRS allows for continual monitoring on the global scale. This has greatly enhanced our understanding of the climate system and its variations.

Global warming: The warming trend of the Earth's mean surface temperature since the late nineteenth century has provided evidence for anthropogenic influences on global climate. This trend was first identified by analyzing anomalies in time series of near surface air temperature over the land that were recorded by weather stations. However, the existence of the trend was consistently challenged due to the biases in weather records caused by such things as poor siting of the instrumentation and the influence of land-use/land-cover changes.

Satellite data provides an independent way to investigate global temperature trends, particularly at the ocean surface and in the atmosphere. The sea surface temperatures (SSTs) of the oceans — which are directly related to heat transfer between the atmosphere and oceans — serve as

important indicators of the state of the climate system. The Advanced Very High Resolution Radiometer on board the National Oceanic and Atmospheric Administration (NOAA) satellites allows us to monitor the SST worldwide. An increase in SST has been observed in all ocean basins since the 1970s, with an average estimated increase of 0.28 °C from 1984 to 2016.

Snow and ice: The retreat of snow- and ice-cover is an important indicator of global warming. Melting of seasonal snow- and ice cover can cause a positive feedback by lowering the albedo of the Earth's surface, and the latter contributes to sea-level rise (SLR). Data from SRS has played a crucial role in monitoring the dynamics of snow extent and ice covers.

Sea-level change: Sea level is driven by climate conditions which are influenced by climate change and variability. On the basis of monitoring sites with good-quality tide-gauge records, the global averaged SLR was estimated as 1.9±0.4 mm yr–1 since 1961. Satellite altimetry observations using the TOPEX/Poseidon satellite launched by NASA and Centre National d'Études Spatiales (CNES), which mapped ocean surface topography from 1992 to 2016, as well as its follow-on and other missions, observed a global mean SLR of around 3.2±0.8 mm yr–1 between 1992 and 2016.

Aerosols: Particles in the atmosphere known as aerosols can generate a cooling effect on the climate system, counteracting the warming effects of anthropogenic greenhouse gases by affecting both atmospheric radiation and cloud–precipitation processes.

Recent changes in atmospheric aerosol concentration have been identified through aerosol optical depth (AOD), which is derived from observations recorded by visible and infrared optical sensors on board various satellites. Since 1982 these data show a negative trend in the troposphere over North America and most of Europe, and a positive trend over South and East Asia. The overall combined effect of these regional changes probably amounts to a small negative trend.

Water vapour and precipitation: Water vapour is an important greenhouse gas as it contributes around 50% of the present-day global greenhouse effect. Models predict that climate warming will increase atmospheric specific humidity (resulting in a positive feedback) and, in turn, strongly amplify the warming74. From 1988 to 2003, an increase of 0.4±0.09 mm per decade of precipitable water in the troposphere over the ocean has been observed.

To make aware the participants about the basics about the prediction made that would boost the knowledge and confidence in the participants and certainly that would helpful for better convincing in implementation. Keeping these views in mind training has been enlisted in GIDM calendar and scheduled to conduct the training on 17th Jan., 2019 with the following objectives

Objectives:

1. To understand concept of Remote Sensing
2. To understand the Components of Climate Change Observations
3. To illustrate the Satellite Remote Sensing in developmental & implications practices

These all concept, mechanism and practices going on in India will be discussed in detail in this training program.

Target Audience for Proposed Online Training

S. No.	Department	Designation
1.	Agriculture, Farmers Welfare & Cooperation Department	Agriculture Extension Officer, Block Technology Managers, Assistant Technology Managers & Farmers Friend
2.	Forest and Environment Department	Range forest office, Forester & Beat Guards

Resource Persons:

1. **Dr. Shashi Kant Sharma,** Group Head, VEDAS, SAC (ISRO), Ahmedabad
2. **Shri M.S. Kalubarme**, Former Project Director, BISAG
3. **Dr. Sandeep Pandey,** APSPM, GIDM

Expected outcome:

This will potentiate the employee to boost concept and reliability of space technology, that will make them more confident in their execution

Participants & Venue:

1. 30 Participants from each district
2. Support staff or other technical experts who are involved or responsible for DRR work
3. Venue will be decided by District Authority where basic facility is available to conduct the program.