

**Short Course on
Environmental Pollution Monitoring through
Satellite Observations and Advanced Modelling**

17-28 November, 2025



**Last date for receipt of application
30 July, 2025**

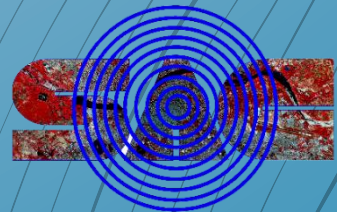


Organised by



**Centre for Space Science and Technology Education
in Asia and the Pacific (CSSTEAP)
(Affiliated to the United Nations)
www.cssteapun.org**

Conducted by



**Space Applications Centre (SAC)
Indian Space Research Organization
(ISRO)
Ahmedabad, India
www.sac.gov.in**

Background

Satellite observations are of paramount importance in monitoring air quality and trace gas concentration by providing global coverage and real-time measurements of atmospheric pollutants. Since some of the air pollutants are SLCPs (Short-Lived Climate Pollutants) contributing to the global warming and climate change, air quality observations are equally important for monitoring the changing climate of our planet. Satellites equipped with advanced sensors, such as NASA's MODIS, ESA's Sentinel-5P, and ISRO's OCM3, can detect pollutants like nitrogen dioxide (NO₂), sulfur dioxide (SO₂), carbon monoxide (CO), and aerosol optical depth (measure for particulate matter - PM2.5 and PM10). These observations help to track pollution sources, identify hot-spots, assess long-term changes, and support policymaking for air quality management. Additionally, satellite data enhances early warning systems for pollution-related health risks and environmental hazards, such as wildfires and industrial emissions. By integrating satellite-based monitoring with ground-based measurements, scientists and governments can develop the more effective strategies to mitigate the impact of air pollution and climate change.

About CSSTEAP and SAC

CSSTEAP was established in India in November 1995 with its headquarters at Dehradun and over the past 29 years, the center has emerged as a Centre of Excellence in capacity building in the field of space science and technology applications. For more information, visit www.cssteapun.org

The Space Applications Centre (SAC), located in Ahmedabad, Gujarat, India, is one of the major centres of the Indian Space Research Organization (ISRO). This centre is engaged in the research and development of applications of Space Technology in the field of Communications, Remote Sensing, Meteorology, Planetary Science and Satellite Navigation.

It has major contributions in the recent Chandrayaan-3 mission, that demonstrated soft landing on moon. The other achievements of the centre include development of communication, navigation and meteorological payloads and designing various applications. SAC provides its infrastructure to conduct training courses to the students of CSSTEAP and will be the host centre for this course. For more information on SAC, visit www.sac.gov.in

Objective of the course

This course provides a comprehensive understanding of environmental pollution monitoring using satellite remote sensing, ground-based sensors, and advanced modelling techniques. It covers fundamentals of atmospheric aerosols and trace gases, retrieval of aerosol and trace gases, Lidar-based techniques, radiative transfer modelling, and the impact of forest fires on the air quality.

Faculty and Medium of Instruction

The core faculty is drawn from SAC and premier institutes of India. They have rich experience in the field. The medium of instruction shall be in English. Participants having competence in spoken and written English language will be given preference.

Course Content

1. Introduction to Environmental Pollution Monitoring

- Overview of air pollution, its emission sources, impact on climate and human health
- Role of satellite and ground-based sensors in pollution monitoring
- Introduction to key atmospheric pollutants: aerosols, trace gases and greenhouse gases

2. Fundamentals of Satellite Remote Sensing for Air Quality

- Principles of optical and thermal remote sensing for environmental monitoring

- Overview of major satellite sensors (MODIS, OMI, TROPOMI, VIIRS, OCM, INSAT and upcoming missions) being used for environmental remote sensing
- Data retrieval techniques for atmospheric aerosol and gas measurements

3. Aerosol Retrieval Techniques from Optical Sensors

- Optical properties of aerosols and their role in the atmosphere
- Techniques for retrieving Aerosol Optical Depth (AOD) from satellite sensors
- Retrieval of aerosols using the optical polarimetry

4. Lidar-Based Techniques for Air Quality Monitoring

- Working principles and types of Lidar systems (ground-based and spaceborne)
- Lidar applications in aerosol and trace gas retrieval
- Synergy of Lidar, satellite, and ground-based observations for improved air quality assessment

5. Trace Gas Retrieval and Radiative Transfer Modelling

- Satellite-based retrieval of key pollutants (NO_2 , SO_2 , CO , O_3)
- Retrieval of elevated CO_2 and CH_4 from point sources using high-resolution radiative transfer modelling and airborne observations
- Interpretation of trace gas datasets and validation with in-situ measurements

6. Chemistry Transport and Air Quality Modelling

- Introduction to air quality models (WRF-Chem, GEOS-Chem)
- Coupling satellite observations with chemical transport models
- Model evaluation using satellite and ground-based data

7. Impact of Forest Fires on Air Quality

- Satellite-based detection and tracking of forest fires

- Analysis of biomass burning emissions and their atmospheric transport
- Case studies on major fire events and their impact on regional air quality

8. Practical Sessions and Case Studies

- Hands-on analysis of satellite datasets for air pollution monitoring
- Processing and interpretation of various satellite products of aerosol and gases
- Running air quality models with real-world scenarios

Number of seats: 20

(Government Nominated Candidates)

: 05 Paid Seats

(Private & Self- Sponsored Candidates)

Course Fee & Accommodation

A course fee of US\$300 (equivalent to INR for Indian participants) is applicable for paid seats which includes course materials. However, for government sponsored candidates from Asia Pacific region, the Director CSSTEAP may waive off the course fee. Preference in admission will be given to the candidates who are financially supported by their organizations. Accommodation for the participants will be arranged in the International Guest house, in Bopal on chargeable basis of Rs.120/day. Course fee may be sent through on line transfer / NEFT /RTGS/ SWIFT in favour of CSSTEAP, payable at Dehradun with following bank details:

Banking Institution: Punjab National Bank

Account Name: Centre for Space Science and Technology Education in Asia and the Pacific

Account Number: 0111032100000236

SWIFT: PUNBINBBDPR

IFSC Code: PUNB0445600

Address Bank: Survey of India Branch, New Cantt. Road, Dehradun, India

Fellowship

A few fellowships covering to and fro international air travel, domestic travel in India and living expenses (INR15,500 for two weeks) in India are available from the Government of India.

However, first preference will be given to the fully self-sponsored candidates and then to the candidates whose sponsoring organization will be bearing international to and fro travel.

Medical Insurance

Medical, life, and disability insurance should be undertaken before leaving their country for India by the participants themselves or on their behalf by their sponsoring institute/organization for covering entire health and disability risks. No medical expenses will be borne by the Centre. Candidates in sound physical and mental health only need to apply.

Medical fitness certificate from Authorised Government Medical Officer covering status of Eye, Chest (Tuberculosis), Vaccinations, heart, lungs, liver, spleen, Hydrocele, skin & V.D., Hepatitis, HIV, Yellow fever and other contagious diseases been enclosed with the application form. Incase if any information requiring medical attention is hidden and if found during the course, the Centre will be obliged to send the candidate back to their home country anytime. The travel cost will be borne either by the nominating/sponsoring authority or by the candidates themselves.

Eligibility and Selection Procedure

- The course is aimed at users, decision-makers, researchers, and professionals working in the field of air quality monitoring.
- The candidate should have a Master's degree in Science or Bachelor's degree in Engineering and / or equivalent qualification (Essential Qualification)
- 5 years of experience in the relevant field (Desirable)
- Limited seats are available for this course, which will be filled with participants from different Asia-Pacific countries
- Five paid seats are available for Private & Self sponsored candidates from different Asia Pacific countries.
- The candidates have to pay full course fee of US\$300 (equivalent to INR for Indian participant) which includes course materials and field trips.

- For Paid Seats or Self-Sponsored Participants travel from place of work to Ahmedabad, Gujarat and back, tour allowance and daily allowance during the entire period of training will be borne by the candidate/organization.
- Government employees and professionals working in the field of air pollution and related fields would be given priority
- Candidate should have proficiency in the English Language as the course will be conducted in English.
- The selection of candidates will be carried out by a designated selection committee.

How to Apply

- Eligible candidates can apply online through the CSSTEAP website.
<https://admissions.cssteapun.org>
- Applicants are requested to send the application forwarded by the Head of their respective Institute/ Organization for consideration.
- Self Sponsored candidates can directly submit the application.
- Incomplete applications will not be considered for selection

Last date for receipt of application:
July 30, 2025

Contact Details

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