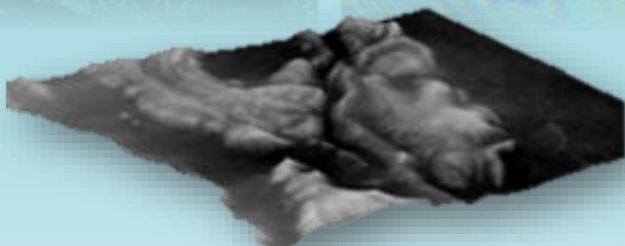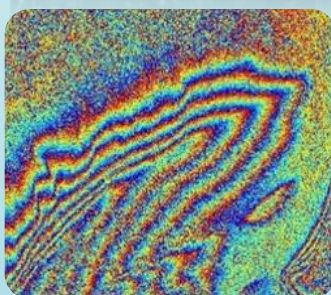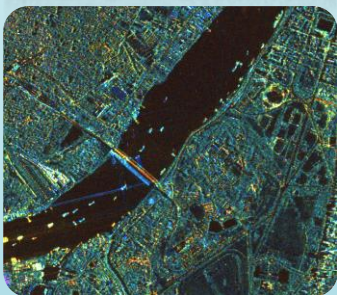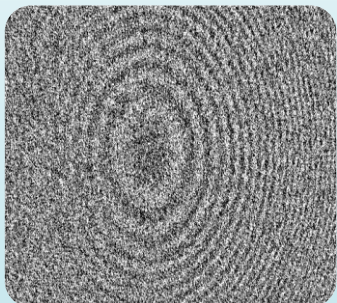# SAR Remote Sensing: Data Processing and Analysis

October 27 – November 7, 2025

About Course

This Courses focuses upon the concepts of SAR remote sensing , data processing , analysis and its applications. With the advancement of spaceborne sensors, remote sensing has become an effective method for the detection of various features on the earth's surface both for civilian and strategic applications. Optical Infrared (OIR) remote sensing is mainly used to image the earth's surface using the OIR sensor. However, OIR sensors are limited by the availability of sunlight and interference of the atmospheric conditions such as haze and cloud cover. Therefore, the use of microwave or SAR remote sensing is much useful for imaging the earth's surface. Radar imaging through Synthetic Aperture Radar (SAR) systems has expanded the technology of Microwave remote sensing in various applications. To understand the SAR imagery, the physics phenomenon behind the interaction of the electromagnetic wave with the earth's surface features needs to be understood. SAR data processing is also different from optical data processing as it involves many signal processing techniques. The SAR data processing uses the pulse compression techniques, Linear Frequency Modulation (LFM) concepts, Range & Doppler information, and various other SAR parameters. The Range-Doppler algorithm (RDA) is a common technique to focus the SAR data. Since SAR is a ranging instrument, geometric distortions are more prevalent in SAR Image as compare to the optical image. Thus, geometric corrections need to be done using SAR geolocation, geocoding, and orthorectification techniques. SAR geolocation is also very much different from optical sensors as it uses the range and Doppler equations to geolocate the target.

Objective & Course Curriculum

The primary objective of this training is to raise awareness among users, researchers, and professionals about the concept and advancements in SAR data processing, and to disseminate knowledge and practical applications of SAR data. The major topics of the course is as follows:

- **SAR Remote Sensing Concepts**: SAR Imaging concepts SAR Geometry , Imaging modes, SAR resolution , Geometric Distortions, SAR Image Properties and interpretation , Different SAR sensors.
- **SAR Data Processing Concepts**: SAR Data Processing concepts, Pulse Compression technique, Synthetic Aperture Concept , Range Cell Migration (RCM), Range Doppler algorithm.
- **SAR Geolocation & Geocoding Concepts** : SAR Geometric and Radiometric Correction Techniques ,Ground Range, Geolocation & Geocoding.
- **Speckle Filters** : Speckle in SAR image , Different type of speckle filters: Lee , Gamma , Kuan & Advance speckle filters
- **SAR Polarimetry** : Basic Concepts of SAR Polarimetry, Polarimetric Decompositions, Hybrid Polarimetry, Quad Polarimetry , Polarimetric signatures.
- **SAR Interferometry**: Interferogram generation & Processing ,Coregistration, Phase Unwrapping concepts, Baseline concepts, Across track and Along track Interferometry ,DInSAR , PSInSAR & SBAS
- **SAR Image Exploitation and Applications** : Ship detection , Oil Spill detection , Coherent Change Detection , Polarimetric Applications.

Eligibility

This course is primarily meant to train working professionals from Central and State Govt. Departments, Universities and Educational Institutions, private industry and researchers (JRF/SRF/RA).Candidates nominated by government organizations & professionals working in related fields will be given preference for admission. This special course will be conducted for Indian nationals only. In the case of a large number of applications being received, the selection will be done based on the criteria decided by IIRS.
Essential Qualification: a) Post graduates in science/Bachelors in engineering OR
b) Bachelors in Science for working professionals.
Note : All Candidates should have basic knowledge of Remote Sensing and GIS/ Geo-informatics/ Geomatics

Duration

The training course will be conducted at Indian Institute of Remote Sensing (IIRS), ISRO, Dehradun, India in offline mode from October 27 to November 7, 2025. The course will be done through a combination of lectures, practical demonstrations and hands on sessions.

About IIRS

Indian Institute of Remote Sensing (IIRS) under Indian Space Research Organisation (ISRO), Department of Space, Govt. of India is a premier Training and Educational Institute set up for developing trained professionals in the field of Remote Sensing, Geoinformatics and GNSS Technology for Natural Resources, Environmental and Disaster Management. Formerly known as Indian Photo-interpretation Institute (IPI), founded in 1966, the Institute boasts to be the first of its kind in entire South-East Asia. While nurturing its primary endeavour to build capacity among the user community by training mid-career professionals, the Institute has enhanced its capability and evolved many training and education programmes that are tuned to meet the requirements of various target groups, ranging from fresh graduates to policy makers including academia.

Location & Accessibility

Indian Institute of Remote Sensing (IIRS) is located in Dehradun, the capital city of the State of Uttarakhand, at a distance of about 260 km from Delhi and is well-connected by air, rail and road. The city is famous for its picturesque landscape, pleasant climate, high quality school education and is the gateway to several places of religious and tourist importance, such as Haridwar, Rishikesh, Mussoorie, etc.

Course fees

Rs. 12,000/- (Rs. 4,000: Tuition Fee + Rs. 8,000: Registration & Other Charges). Boarding & lodging charges in IIRS Golden Jubilee Hostel are extra and will have to be paid by the candidate as per the IIRS hostel rules & regulations.

Accommodation

The lodging and boarding facilities are provided to all course participants at IIRS in IIRS Golden Jubilee Hostel as per the IIRS hostel rules & regulations.All hostel rooms are well furnished and are allotted on single/double occupancy basis. No accommodation will be provided to the accompanying person/ children. Indian cuisine is served in the hostel mess. The expenditure towards boarding and lodging will have to be borne by the participants as per IIRS hostel's policy.

How to Apply

- Interested participants are encouraged to complete the online form available on the IIRS website https://admissions.iirs.gov.in/
- Offline applications will not be considered.
- For complete course information, applicants can refer to course code SP-SAR2 at sl. No.22 in the IIRS course calendar (https://admissions.iirs.gov.in/coursecalender)
- Participants can also download the PDF, where course information is available on Page 10, Code SP-SAR2 at sl. No. 22, from the link: https://admissions.iirs.gov.in/documents/AcademicCalendar.pdf
- The start date to apply for the course is 01.06.2025 and the last date to apply for the course is 07.09.2025 (17:30 Hrs)
- Both government-sponsored and self-financed candidates are required to pay the full course fee on or before the specified date by IIRS to confirm their seats. Failure to do so will result in seats being offered to wait-listed candidates

Important Dates

Start date to apply	**01.06.2025 [10:00 Hrs]**
Last date to apply	**07.09.2025 [17:30 Hrs]**
Announcement of Results	**12.09.2025**
Course Start date	**27.10.2025**
Course End date	**07.11.2025**

Contact Details

Ashish Joshi **Course Coordinator &** **Scientist/Engineer 'SF'**	Photogrammetry & Remote Sensing Department (PRSD) Indian Institute of Remote Sensing, Department of Space, Govt. of India, 4, Kalidas Road, Dehradun - 248001, Uttarakhand Tel: 0135-2524112 Fax: 0135-2741987 Email: ashish@iirs.gov.in

Organised by

Indian Institute of Remote Sensing
Indian Space Research Organisation
Department of Space, Govt. of India
Dehradun

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