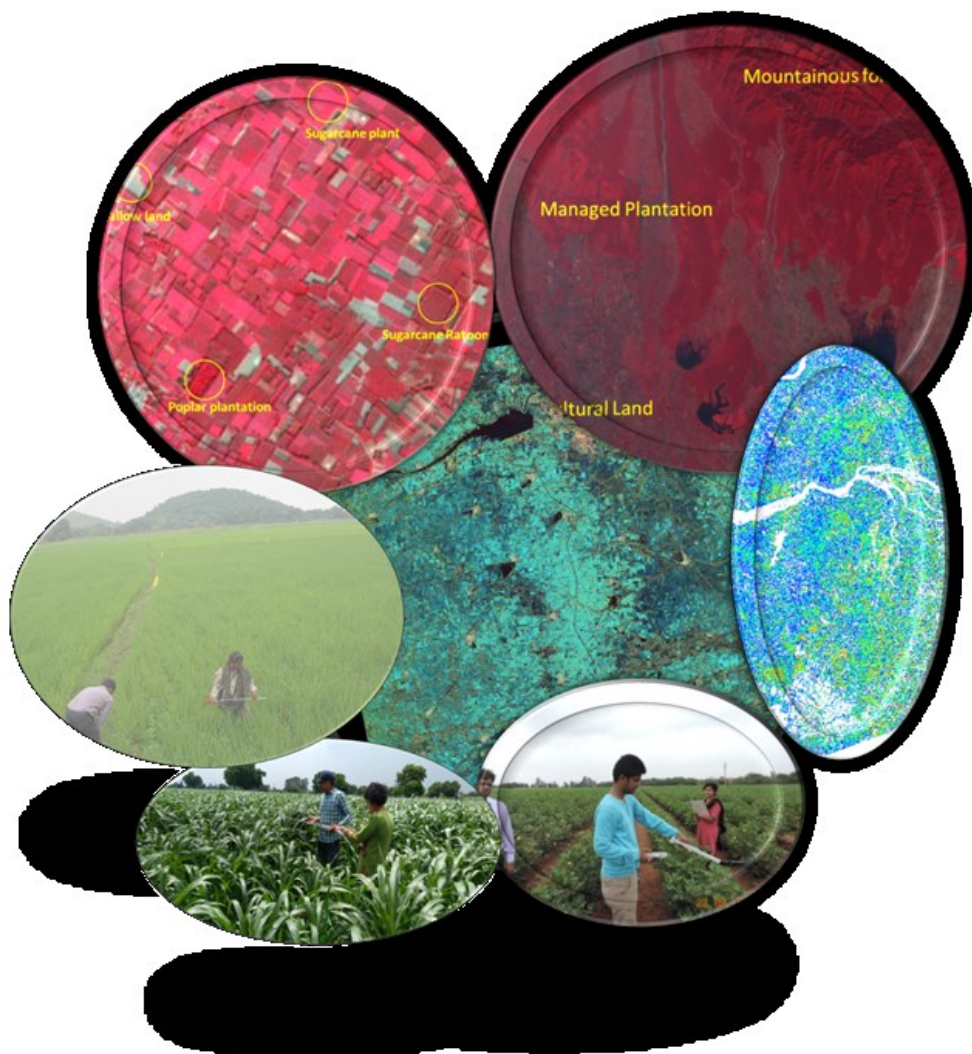CEOS — Committee on Earth Observation Satellites

WGCapD-Distance Education Course:

Webinar Series on Remote Sensing in Crop Monitoring and Assessment
19 May – 09 June, 2020

Working Group on Capacity Building and Data Democracy,
Committee on Earth Observation Satellites

WGCapD-Distance Education Course
Remote Sensing in Crop Monitoring and Assessment

1- Overview

1.1. Background

The Committee on Earth Observation Satellites (CEOS) mission is to ensure international coordination of civil space-based Earth observations programs and promote exchange of data to optimize societal benefit and inform decision making for securing a prosperous and sustainable future for humankind. CEOS supports effective societal decision-making in the areas of climate monitoring and research; carbon observations, including observations to support the effective monitoring and management of the world's forested regions; food security; disaster risk management; biodiversity; capacity building; data availability and access, and more.

The CEOS Working Group on Capacity Building & Data Democracy (WGCapD) (formed at the 25th CEOS Plenary in 2011) undertakes a variety of activities based on the four pillars of the Data Democracy Initiative, as depicted below:
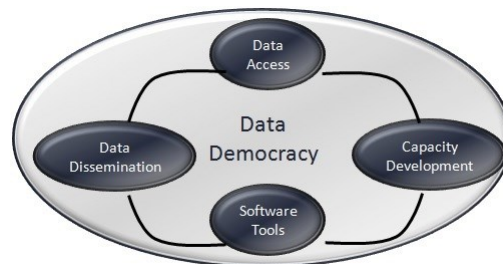

Figure 1 - Data Democracy Pilars

The WGCapD builds upon this Initiative in an effort to increase the capacity of institutions in less developed countries for effective use of Earth Observation data for the benefit of society and to achieve sustainable development.

The overall objective of the WGCapD is building capacity for the effective use of Earth Observation data as well as providing wider and easier access to those data. It aims to unify CEOS efforts toward:

- Providing wider and easier access to Earth Observation data
- Increasing the sharing of software tools such as the use of open source software and open systems interface
- Increasing data dissemination capabilities and transferring relevant technologies to end users
- Providing intensive capacity building, education, and training (including awareness and outreach) for enabling end users to gather the information they need and for increasing communication on achieved results

Crop monitoring and assessment is an extremely important and the oldest aspect in Remote Sensing Applications. When it comes to keep a finger on the health of the crops, remote sensing proves to be the handiest tool. Crop area estimations, cropping pattern and systems analysis including the rainy season (kharif) crop monitoring using Microwave Remote sensing will be the focus area in this webinar. Knowing early about an infestation or stress can be the key to good productivity. Different factors such as lack of moisture leading to agricultural drought, including biotic and abiotic stress need to be detected early so that the farmers/policy makers can deal with the problem. Crops seldom grow evenly all over a field and therefore, productivity is lesser in one area of the field compared to another. This may be because of differences in soil nutrition or other stresses. With remote sensing, the farmer can see these problems and manage locally; this will be the key in precision agriculture. Global researchers playing key role in Global Agriculture and ecosystem monitoring like GEOGLAM, ASIA RICE, HARVEST, CES-BIO and major operational monitoring are our esteemed instructors in this Webinar.

1.2. Course Coordinator

NAME	INSTITUTION	ROLE
Dr. Suresh Kumar Group Head Agriculture & Soils Deptt.	**Indian Institute of Remote Sensing (IIRS), ISRO, India**	**Coordinator**

1.3. Language
- The entire distance education course is delivered in English.

1.4. Target Region
- The course is open to participants from all countries.
- All course materials will be provided in English.

1.5. Target Participants
- Academician, scientists, researchers and professionals interested in crop monitoring and assessment using Remote Sensing.

1.6. Methodolgy
- This course is an online distance education program that allows participants to fully engage with program content, their peers, and their instructors via live lectures, through discussion forums, online chat, question/answer session and feedback mechanisms.

- The Learning Platform Moodle (acronym for modular object-oriented dynamic learning environment) will be used for the course administration, documentation, tracking, reporting and delivery system. It will be hosted at the Indian Space Research Organization – ISRO LMS Platform

- GoToMeeting (GTM) will be used for synchronous communication among teachers and students and live sessions.

1.7. System Requirements

- ▪ Recommended Browsers: most browsers will handle the Moodle pages without problem. Some individual modules may require special software or plugins. Minimum recommended browser: Google Chrome 11, Firefox 4, Safari 5, Internet Explorer 8
- ▪ Recommended Settings
  - o Make sure that the browser is set to accept cookies
  - o Javascript must be enabled

1.8. Number of Participants:

- 250-300 participants

1.9. Instructors

- CEOS Members: ISRO, CNES-CNRS, GEOGLAM & other agencies

1.10. Commitment by Instructors

- Preparation of 1-hour presentation using CEOS template
- Preparation of questions for quiz
- Preparation of instructional material or links of interest to be sent to participants
- Availability to participate live on the correspondent webinar session
- Answer possible questions and doubts from participants via discussion forum inside Moodle platform

1.11. Certificate for Instructors

- Since instructors are volunteers, they will be rewarded in some way: certificates of participation, proposing to write a joint paper etc.
- Certificates will be issued by CEOS SEO

1.12. Announcement

- CEOS website
- List of practitioners provided by ISRO and CEOS
- Virtual Laboratory for Training and Education
- Regional Centers for Space Science and Technology Education (affiliated with United Nations)
  - ▪ Latin America and the Caribbean (Mexico and Brazil): CRECTEALC (Regional Center for Space Science and Technology Education for Latin America and the Caribbean)
  - ▪ Asia and the Pacific (India): CSSTEAP (Centre for Space Science and Technology Education in Asia and the Pacific)
  - ▪ Africa (Morocco): CRASTE-LF (African Regional Centre for Space Science and Technology Education in French Language)
  - ▪ Africa (Nigeria): ARCSSTE-E (African Regional Centre for Space Science and Technology Education in English Language)
  - ▪ Western Asia (Jordan): Regional Centre for Space Science and Technology Education for Western Asia

- Regional Centers
  - Regional Centre for Mapping Resource for Development (RCMRD) IN Nairobi, Kenya
  - Regional Centre for Training in Aerospace Surveys (RECTAS) located within the campus of Obafemi Awolowo University, Ile-Ife, Nigeria.

1.13. Registration
- ISRO LMS (http://elearning.iirs.gov.in/wgcapd/CEOS/)

1.14. Certificate of participation
- Designed and distributed by CEOS SEO

1.15. Instructional Material
- Presentation given via Power Point
- Recorded online sessions
- Data source and reading material links
- Frequently Asked Questions (FAQ)
- All materials will be made available inside Moodle

1.16. Copyrights
- WGCapD, CEOS

1.17. Feedback
- Through Feedback submitted by candidates

1.18. Schedule
- 19 May – 09 June 2020 at 1300 UTC (at 6:30 PM in India)

1.19. Prerequisite
- Elementary knowledge about Remote Sensing and Digital Image Processing with Agricultural Applications

1.20. Webinar Objectives

By the end of this webinar series, students should:
- Understand the concept of various Remote Sensing techniques in crop monitoring and appreciate the techniques and approaches
- Decide and able to plan for data acquisition and modes from various types of multispectral, hyperspectral, thermal, microwave platforms from both airborne and space borne domain.
- Be able to understand the processing steps of various types of data widely used for crop monitoring.

1.21. Themes of Webinar

The themes of the four webinars are listed

1. **Experts /Instructors: ISRO**

   Dr. K. R. Manjunath
   Deputy Director- Agriculture, Indian Space Research Organisation (ISRO) H. Q.
   Bengaluru, India
   Email: krmanjunath@isro.gov.in

   Topic: **Remote Sensing Basis of Crop Monitoring**

   Time: **Date: 19/05/2020**

   Worked for more than 25 years in the Space Applications Centre (ISRO) on Remote
   Sensing Applications in Agriculture. His research interest includes Environment,
   Agriculture, Sustainable Agriculture, Plant Physiology, Crop Production, Remote
   Sensing, Crop Management, Crop Science, Crop Physiology, Methane, Cropping
   Systems, and Agricultural Crops.

2. **Instructor:**

   Dr. Thuy Le Toan
   Head, Remote Sensing Centre for the Study of the Biosphere from Space (CESBio)
   CESBio (CNES- CNRS), University of Toulouse, France.
   Email: Thuy.Letoan@cesbio.cnes.fr
   thuy.letoan@yahoo.fr

   Topic: **SAR Applications in Rice Mapping**

   Time: **Date 26/05/2020**

   She is currently the Head of the research team in Remote Sensing in the Center for the
   Study of the Biosphere from Space (CESBio), a joint research centre of the university
   of Toulouse, the National Center of Scientific Research (CNRS) and the National
   Center of Spatial Studies (CNES). Her research activity has been in the area of
   microwave remote sensing applied to natural surfaces, including experimentation and
   modeling of microwave interaction with agricultural and forested media, and analysis of
   SAR images for land applications. She has been a Project Coordinator and Principal
   Investigator on many of the European SAR campaigns , and PI of several ERS, JERS-1,
   SIR-C/XSAR, RADARSAT projects.

3. **Instructors:**

   Ian Jarvis
   Programme Director GEOGLAM
   GEO Secretariat, 7bis, avenue de la Paix, Case postale 2300
   CH-1211 Geneva 2, Switzerland
   Email: ijarvis@geosec.org

   He had 25 years' experience within the Canadian public service, including over 10
   years leading Canada's Earth observation based agricultural monitoring capacity. His
   area of interest includes Satellite-based Agricultural Monitoring, Land Use and Land

Cover Change, EO-Based Decision Support Systems, Terrestrial Observing Systems/Remote Sensing.

Along with

Dr. Andy Nelson
Professor and GEOGLAM Capacity Development Co-Lead
ITC - Faculty of Geo-Information Science and Earth Observation of the University of Twente. PO Box 217, 7500 AE Enschede, the Netherlands.
Email: a.nelson@utwente.nl

He has worked in several countries for international, multi-disciplinary research institutes such as IRRI, the European Commission's Joint Research Centre, the World Bank, CIAT, UNEP, FAO and now the University of Twente. His research covers agricultural and natural resource applications that require innovative spatial solutions, including; integrated modelling of environmental and socio-economic issues, environmental alert systems, access to markets, population modelling, poverty mapping and protected area monitoring.

Topic: **GEOGLAM: Global Agricultural Monitoring**

Time: **1300 UTC and Date 04/06/2020**

The session will provide an overview of the GEOGLAM program and discuss policy drivers, crop monitoring at the national to global scales, the research foundation, including the Joint Experiment for Crop Assessment and Monitoring, and the development of Essential Agricultural Variables for GEOGLAM. Finally, the presentation will look at GEOGLAM's capacity development strategy with a focus on the co-development of national crop monitoring, and the impact this work is having on global food security.

4. **Instructor: ISRO**

Dr. S. S. Ray
Director, Mahalanobis National Crop Forecast Centre (MNCFC)
Department of Agriculture, Cooperation & Farmers Welfare, Govt. of India, New Delhi.

Topic: **Operational Use of Remote Sensing in Crop Assessment**

Time: Date 09/06/2020

He worked for more than 20 years in the Space Applications Centre (ISRO) on Remote Sensing Applications in Agriculture. Currently, as the Director of the Mahalanobis National Crop Forecast Centre (MNCFC), Department of Agriculture, Cooperation & Farmers Welfare, since its inception, is leading a team of scientists and researchers for operational national level agricultural programmes on Crop Forecasting (FASAL), Drought Assessment (NADAMS), Horticulture Inventory & Development (NADAMS), Crop Insurance (KISAN), Rice-Fallow Area Characterisation, etc. His areas of interest

also include Agricultural applications using hyperspectral remote sensing and precision farming using high resolution airborne and space borne sensors.

a. **Student Assessment**

- Through assignments and quizzes