



CRECTEALC

***Centro Regional de Enseñanza de Ciencia y Tecnología del
Espacio para América Latina y el Caribe***

***Regional Centre for Space Science and Technology Education
for Latin America and the Caribbean***



International initiative led by UN-OOSA

Institutional setting

- Established by the governments of Brazil and Mexico (1997)
- Has a Governing Board, General Secretariat, Campuses in Brazil and Mexico;
- Brazil Campus was established in 1998; hosted by INPE;
- Mexico Campus was established in 2002, hosted by INAOE
- Affiliated to the United Nations (2003)



Mission: To prepare highly qualified personnel from countries in Latin America and the Caribbean in:

- Earth Observation (Remote Sensing, GIS)
- Satellite Communications
- Satellite Meteorology
- Basic Space Sciences
- GNSS
- Space Policy and Space Law

Education activities: 1-week workshops, 11-9 month courses, Master's degree (with INAOE, from 2014)



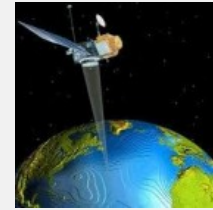
Profile of participants:

- Have completed first-level (bachelor's) university degree (engineers, computer scientists, biologists, geographers, disaster managers, environmentalists, agronomists, etc.)
- Some have work experience at their institutions, others are recent graduates
- Until last year all received scholarships during their education/training period
- **More than 100 students of the region have completed the long term courses.**

Remote sensing and GIS (12 months)

1. Remote Sensing Module

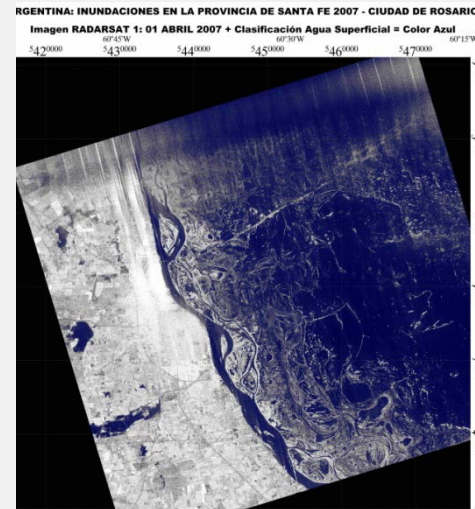
- Tele observation
- Interpretation and analysis of images
- Photogrammetry



2. GIS Module

- Geographic Information Systems
- Photogrammetry

3. Application Project



Satellite Communications (9 months)

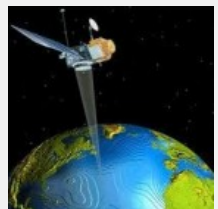
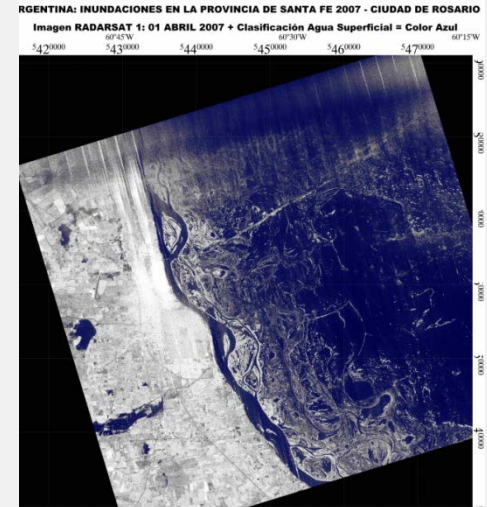
Module 1

- Communications systems theory
- Fundamentals of information theory
- Basic theory of microwave systems
- Modulation techniques and multi-channeling
- Theory of antennas and propagation

Module 2

- Satellite Communications Systems
- Elements and modules of a satellite communications system
- Satellite links and transmission techniques and satellite access
- Applications of satellite communications
- Regulation and standardization

Module 3: Application Project



Developing capabilities in the use of space tools



Workshop on the Use of Space Science and Technology for the Prevention of and Response to Disasters in Mesoamerica

19th – 22th November 2013, Tuxtla Gutiérrez, México

Objective: Demonstrate and build capacity in the use of Earth observation images from various satellites for disaster prevention and relief

Developing capabilities in the use of space tools



Workshop on the use of Open-Source Software and Satellite Data in the Prevention of, and Response to, Disasters in Mesoamerica

19 – 23 May 2014, Tonantzintla, Puebla, México

- **Objective: Hands-on training in the use of open-source software QGIS and TerraMA2 (model developed by INPE to estimate risk)**

Developing capabilities in the use of space tools

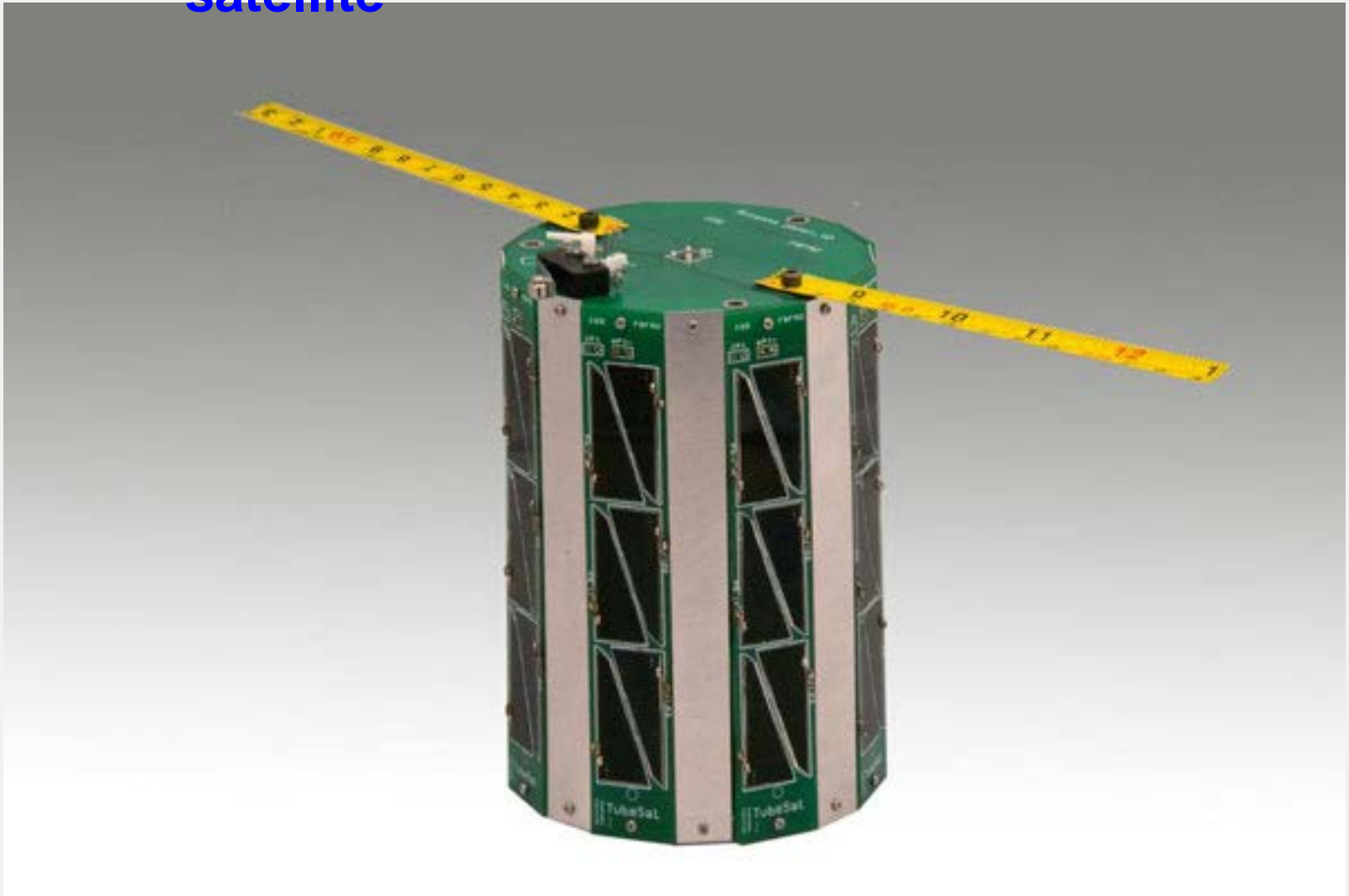


Higher Resolution SRTM Data & Flood Modelling Workshop

May 25th – 29th 2015, Tonantzintla and Puebla, México

Objective: Build capacity in the use of the DEM-30m derived from the SRTM-2 data in two open-source flood models, TerraHidro and CREST and make data available to LAC countries

CRECTEALC Projects - Ulises I nano satellite

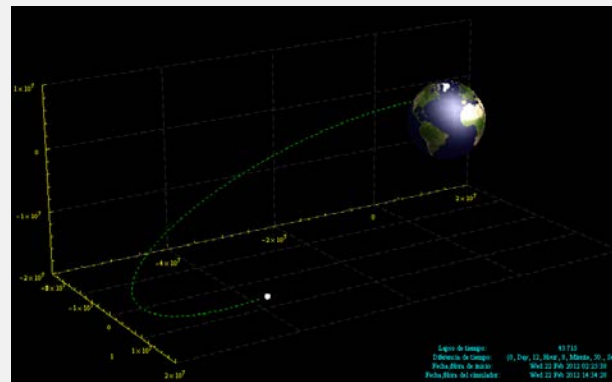


Designed and integrated at CRECTEALC/INAOE 2013-2014

CRECTEALC Projects

➤ Developments in GNSS

- Control of trajectories, rotations and direction of spacecrafts
- Quadrotor testing
- Space flight simulator
 - Satellite orbits
 - Formation flying



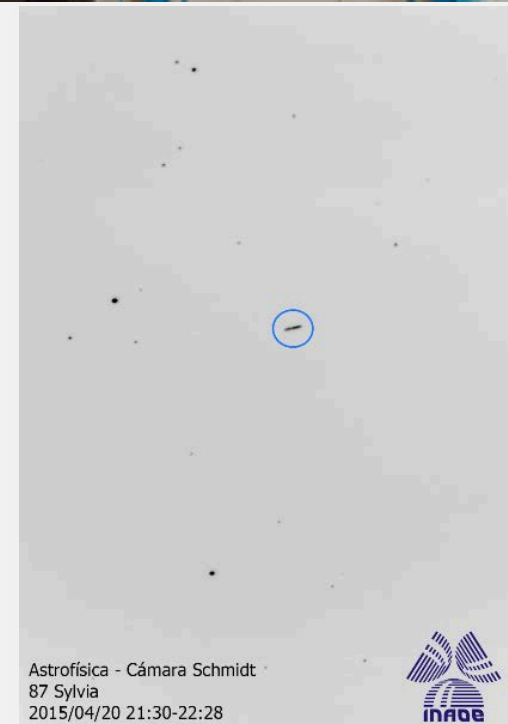
CRECTEALC Projects

Asteroid Monitoring with the INAOE Schmidt Camera

The INAOE Schmidt Camera has been enabled with a renewed optical system and modernized electronics and acquisition system to establish an asteroid monitoring program.



- Astrometric observations of NEOs and PHAs
- Photometric observations (light curves) of asteroids of the Main Belt to determine their physical parameters (periods of rotation, shape, size, orientation of the axis of rotation, etc.)
- In January 2016 INAOE/CRECTEALC joined the International Asteroid Warning Network (IAWN), sponsored by the UN.



Initial Signatories to IAWN

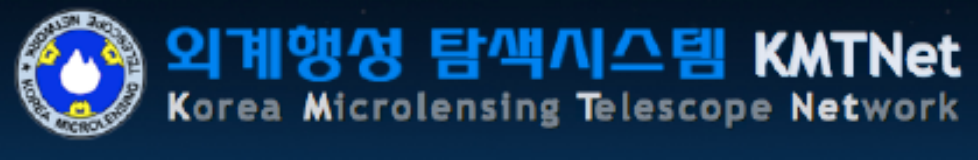


**National Institute of
Astrophysics, Optics & Electronics**

**Peter Birtwhistle (*amateur follow-up observer,
UK*)**



European Southern Observatory (ESO)



**Korean Astronomy & Space Science Institute
(KASI)**



**Institute of Astronomy Russian Academy
of Science (INASAN)**

**and, NASA Planetary Defense
Coordination Office (PDCO)**



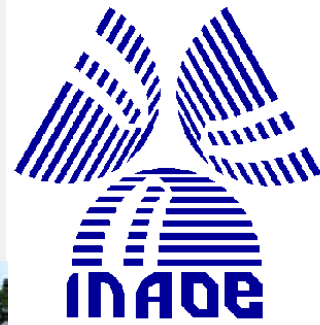
Courses for the 2016 – 2017 term

- In 2017, Mexico Campus CRECTEALC offers:
- The course in remote sensing and GIS , launched in September 2016.
- The course on satellite communications, beginning in September 2016.
- Proposals for new courses (2017-2018):
 - Meteorology and global climate via satellite (Campus Brazil?)
 - Basic science of space and atmosphere (Campus Mexico?)
 - Space law
 - GNSS

M. Sc. In Space Science and Technology in collaboration with INAOE:

- Starting on August 2014
- In its 15 years of existence at INAOE, CRECTEALC has:
 - Established a reputation of providing quality capacity-building and of being an honest broker, both among space agencies and space related-entities in the space-faring nations as among the emerging space nations and those who are the potential beneficiaries of the use of space science and technology in the Latin America and Caribbean region.
 - Brought to the forefront the need for high level education and research programs in space science and technology; and
 - The awareness that the capacities exist at the local level
- INAOE has the physical facilities and human resources needed for the implementation of a space science program, including research and education at the graduate level (M. Sc. & PhD) in Astrophysics, Optics, Electronics, Computer Science and Instrumentation.

Instituto Nacional de Astrofísica, Óptica y Electrónica



140 researchers

120 engineers and technicians

400 graduate students

10 graduate programs



M. Sc. in Space Science and Technology: 25 active students

The education program includes :

- Space and interplanetary environment
- Earth Observation
- Positioning, Navigation and Timing Systems
- Satellite Systems.



For the near future

- National and regional levels
 - Search the accession of more countries to the Agreement establishing CRECTEALC (Ecuador)
 - Optimize the use of national and regional resources (industrial, academic, government)
 - Participate in the training of human resources at INAOE and other institutions.
 - Promote the exchange of students, professors and experts between campi (2017 - 2018)

CRECTEALC

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