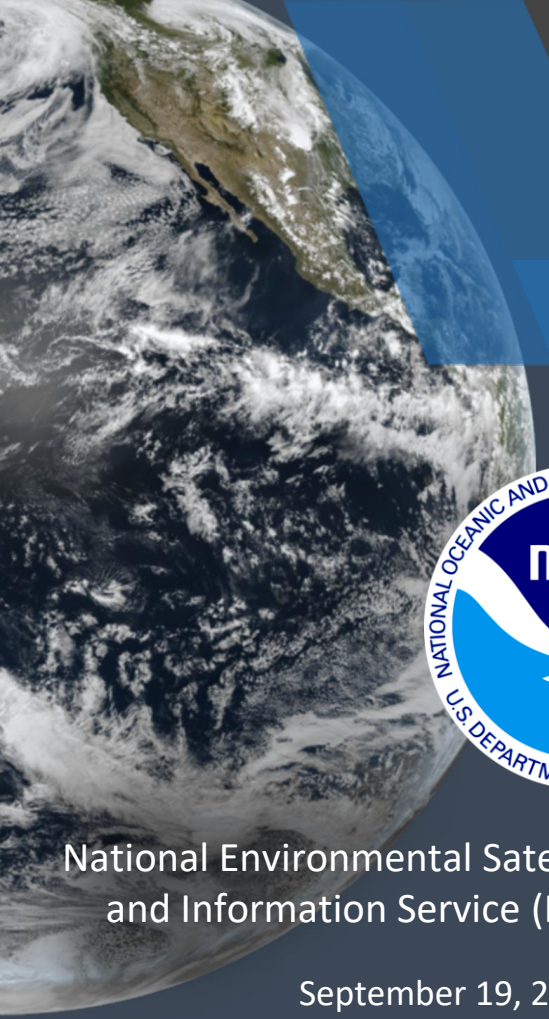


Virtual International Satellite Training Experiences for weather, marine, climate, and environmental applications

National Environmental Satellite, Data, and Information Service (NESDIS)

September 19, 2022

Sherrie Morris, Bernadette Connell, José Galvez, Michel Davison, Eric Madsen, Albert DeGarmo, Jennifer Lewis, Steve Goodman, Dan Lindsey

Who are the Partners?

- Federal agencies
  - NOAA: National Weather Service (NWS), Weather Prediction Center (WPC), International Affairs (IAA), CoastWatch, Center for Satellite Applications and Research (STAR), Office of Satellite and Product Operations (OSPO)
  - NOAA/NASA: GOES-R and JPSS Satellite Joint Program Offices
- Cooperative Institutes: CIRA and CIMSS
- Key partners: COMET, Subject Matter Experts (SME), instructors
- International partners: hosts for the workshops, Satellite Data Requirements Working Group, WMO-CGMS VLab Centres of Excellence, WMO Regional Training Centers

Training and User Engagement Sessions

In-person training pivoted to virtual in 2020 and provided over 15,000 hours of user training, in English and Spanish, to participants in more than 50 countries

- Joint Satellite Short Courses
- GOES-R Hackathon
- Special topic sessions
- SatMOC Virtual Summer Series
- Monthly Regional Focus Group sessions
- World Meteorological Organization (WMO) Regional Association (RA) III and RA IV Multi Day workshops

Training and User Engagement Sessions

- GOES-R/JPSS Joint Satellite Short Courses - 7 hour sessions focused on a specific topic coordinated through AMS
- GOES-R Hackathon for undergraduate student to inspire innovative solutions to environmental challenges

The first-place team developed an app to allow users to use GOES-R satellite data to 3D print images of storms, hurricanes and other natural phenomena

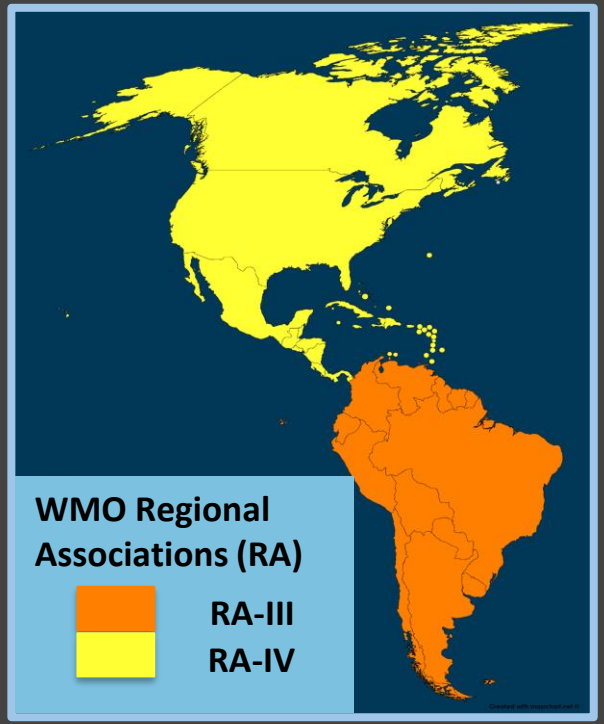
Training and User Engagement Sessions

- Special topic sessions, such as Amazon Web Services Education Seminar "Using the cloud to monitor the weather and environment in near-real time"
- SatMOC Virtual Summer Series - Four 2-hour sessions geared towards students and early career on a wide range of topics
- Monthly Regional Focus Group (RFG) sessions to view satellite and other imagery, and share information on global, regional, and local weather patterns, hurricanes, severe weather, flooding, and other interesting phenomena

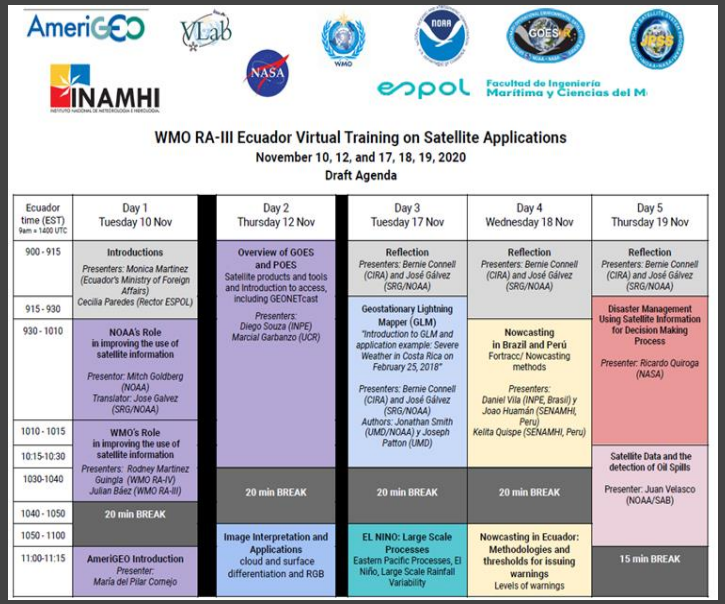
Satellite International Training Working Group (SITWG)

Members across Federal agencies, line offices, and Cooperative Institutes coordinate international training for the GOES-R and JPSS series satellites

WMO international partners use case studies and regional events to guide agenda topics based on in-country needs and staff skill sets



SITWG WMO RA III & RA IV Workshops



WMO RA-III Ecuador Virtual Training on Satellite Applications
November 10, 12, and 17, 18, 19, 2020
Draft Agenda

Ecuador time (EST) 9am = 1400 UTC	Day 1 Tuesday 10 Nov	Day 2 Thursday 12 Nov	Day 3 Tuesday 17 Nov	Day 4 Wednesday 18 Nov	Day 5 Thursday 19 Nov
900 - 915	**Introductions** *Presenters: Monica Martinez (Ecuador's Ministry of Foreign Affairs) Cecilia Paredes (Rector ESPOL)*	**Overview of GOES and POES** Satellite products and tools and Introduction to access, including GEONETcast *Presenters: Diego Souza (INPE) Marcial Garbanzo (UCR)*	**Reflection** *Presenters: Bernie Connell (CIRA) and José Gálvez (SRG/NOAA)*	**Reflection** *Presenters: Bernie Connell (CIRA) and José Gálvez (SRG/NOAA)*	**Reflection** *Presenters: Bernie Connell (CIRA) and José Gálvez (SRG/NOAA)*
915 - 930			**Geostationary Lightning Mapper (GLM)** *"Introduction to GLM and application example: Severe Weather in Costa Rica on February 25, 2018" Presenters: Bernie Connell (CIRA) and José Gálvez (SRG/NOAA) Authors: Jonathan Smith (UMD/NOAA) y Joseph Patton (UMD)*	**Nowcasting in Brazil and Perú** Fortracc/ Nowcasting methods *Presenters: Daniel Vila (INPE, Brasil) y Joao Huamán (SENAMHI, Peru) Kelita Quispe (SENAMHI, Peru)*	**Disaster Management Using Satellite Information for Decision Making Process** *Presenter: Ricardo Quiroga (NASA)*
930 - 1010	**NOAA's Role in improving the use of satellite information** *Presentor: Mitch Goldberg (NOAA) Translator: Jose Galvez (SRG/NOAA)*				
1010 - 1015	**WMO's Role in improving the use of satellite information** *Presenters: Rodney Martinez Guingla (WMO RA-IV) Julian Báez (WMO RA-III)*				
10:15-10:30					**Satellite Data and the detection of Oil Spills** *Presenter: Juan Velasco (NOAA/SAB)*
1030-1040		**20 min BREAK**	**20 min BREAK**	**20 min BREAK**	
1040 - 1050	**20 min BREAK**				
1050 - 1100		**Image Interpretation and Applications** cloud and surface differentiation and RGB	**EL NIÑO: Large Scale Processes** Eastern Pacific Processes, El Niño, Large Scale Rainfall Variability	**Nowcasting in Ecuador: Methodologies and thresholds for issuing warnings** Levels of warnings	
11:00-11:15	**AmeriGEO Introduction** *Presenter: María del Pilar Cornejo*				**15 min BREAK**

Workshops were presented in Spanish

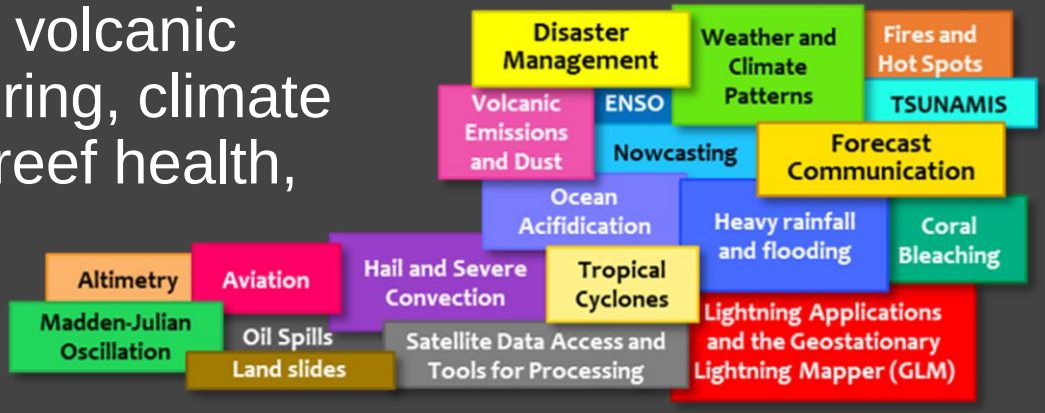
- Four workshops hosted by Costa Rica, Ecuador, Colombia, Chile / Peru - many other partners, including Brazil and Argentina had active roles
- Agenda developed based on weather, marine, climate, and environmental applications requested by partners
- Regional case events identified
- User interaction
  - Hands-on exercises
  - Participant groups presenting results

Certificates of Training

- Many organizations require proof of training
  - Certificate track: based on hours of participation and submission of homework assignments
  - Non-Certificate track: live-streamed providing access to a wider audience
    - Instructors monitor the live-stream chat and convey questions to the presenters
- The satellite skills addressed in the training are listed on the back
- Software to generate the certificate and streamline the process

Training Topics

- Incorporate case studies and real-time imagery analyses, GOES-R, JPSS and other satellite capabilities, data access using GEONETCast, data display, and user applications
- Instruction and hands-on exercises emphasized the operational application of satellite observations for cross-disciplinary topics like heavy rain and hail events, aviation hazards, fire and smoke detection, volcanic eruptions and ash monitoring, climate indices, monitoring coral reef health, and in tsunami preparedness.



Considerations for Effective Training

- Participants learn better in their native language
  - Consecutive translation alternating English followed by Spanish
  - A translator needs to have the specific technical background for the topic; weather terminology is different from oceanography terminology
- Need both staff and time commitment from partner organizations to identify case studies/specific events, organization and staff priorities, what kind of training they want, and where the gaps are in their staff skill set
- Virtual branch offices / regional pods for hybrid training
  - Have bases in different regions or countries to minimize travel
  - Have facilitators

Virtual and now Hybrid Training

Advantages	Challenges
• Reach a larger community at the same time. • Reduces the need for travel, reducing emissions and the need for travel funds. In some countries it may cost a year's salary to travel. • Instructors and attendees can interact and network in a larger community, sharing lessons learned and products that work best for an event.	• Larger number of attendees decreases interaction with instructors and potential decrease of successful retention. • Community capacity limitations such as limited data access (radar, internet, etc.), and computing capability. • Need more staff to manage online and in-person components; it is like running two meetings.

Future Training Topics

- Surveys can ask users what they want, but they don't generally know what is available or possible
- Users ask for GLM training but do they really mean: What tools/products do I use to predict a severe event or communicate a forecast?
- Combine topics for a scenario approach, combining multiple data sources so forecasters can tap into these products based on real-time situations
- Training programs have insight on what other countries have found as useful
- Want attendees to continue to use the knowledge from the sessions to train others in their organization

Future Satellite Training (various planning stages)

- WMO RA IV: November 2022 (English) Barbados/Trinidad and Tobago Workshop (hybrid)
  - Nov 28 – Dec 2 GEONETCastAmericas (GNC-A) SHOWCast, severe weather events, tsunamis, algal blooms, communicating the forecast, etc.
  - Dec 5-9 WMO follow up to EUREC4A- Severe Weather Forecast Programme Workshop with a Disaster Risk Reduction exercise, including applications and disaster management
- WMO RA IV El Salvador ~February/March 2023, Spanish
- WMO RA III Uruguay ~November 2023, Spanish

Future Satellite Training (various planning stages)

- Ongoing Monthly Regional Focus Group sessions
- Joint Satellite Short Course "Making Beautiful Images of GOES-R & JPSS Satellite Data using Python"
  - Sunday, January 7, 2023 (hybrid) before AMS Meeting
  - Registration opens early October
- SatMOC Virtual Summer Series
  - Four 2-hour sessions focused on satellite lake products, jobs in industry, cryosphere, land process/drought
- 2024 Short course Satellite Data Availability in the Cloud (hybrid)
  - Three main Cloud Service Providers (CSP) / case studies

GOES-R DataJam

GOES-R DATAJAM COMING MARCH 2023!

A two-week virtual competition for **undergraduate and graduate students** to show off your best use of GOES-R Series data

Students interested in participating:
Send an email to goesr.hackathon@noaa.gov to be added to our mailing list and we will send you more information when it becomes available

We are also looking for volunteers!

- Instructors
- Subject Matter Experts
- Mentors
- Judges

Check out last year's **GOES-R Hackathon**

Thank you!!

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Steve Goodman (Thunderbolt Global Analytics) *GOES-R/GEOXO Program Senior Advisor* (steven.j.goodman@noaa.gov)

Matthew Seybold (NOAA/NESDIS/OSPO) *GOES-R Data Operations Manager* (matthew.seybold@noaa.gov)