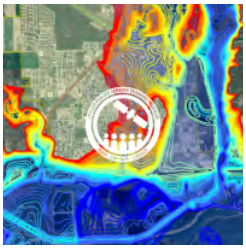
Disasters

Floods

Monitoring Urban Floods using Remote Sensing



According to the UNDP, by 2050, two thirds of the world's population is likely to live in cities. Urban flooding is already a major risk for cities. Increasing impervious surface area, inadequate storm water drainage, and aging infrastructure all contribute. As a result, growing urban populations will face a greater risk of flooding from extreme weather events. This training series focuses on the components of urban flooding that satellite data can track extreme precipitation, flooding, and waterlogged and ponded surfaces.

Introductory

2018

Monitoring and Predicting Floods Using Earth Observations for Planning and Preparedness

This three-part training includes an overview and demonstration of flood monitoring tools based on remotely sensed optical observations, NASA's near real-time Global Flood Product, and several Observational Products for End-users from Remote Sensing Analysis (OPERA). Additionally, the training introduced a streamflow prediction tool — the Group on Earth Observations Global Water Sustainability (GEOGLOWS) model — which provides global, historical, and 15-day streamflow predictions.

Intermediate

2026

Monitoring and Modeling Floods using Earth Observations

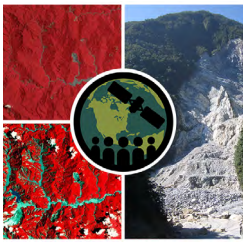
ARSET has offered several trainings on flood monitoring based on optical and SAR observations in the past. This two-part training focuses on recent developments and updates in flood monitoring tools and flood modeling techniques. Specifically, an overview of the Hydrological Modeling and Analysis Platform (HyMAP), a routing model used with NASA's Land Information System (LIS), and examples of flood modeling cases is presented in this training.

Intermediate

2022

Landslides

Landslide Monitoring and Risk Assessment Using NASA Earth System Data



This three-part training, in collaboration with the NASA Disasters Program, covers a number of topics relating to landslides, demonstrating a wide variety of NASA Earth science data uses to characterize landslides and their impacts. The training provides the scientific background of landslides to answer important questions such as: What is a landslide? Where do they occur? What causes them? And why?

Introductory

2025

Disasters

Populations

Humanitarian Applications using NASA Earth Observations

This four-part introductory training focuses on using NASA data products for monitoring human settlements and landscapes during armed conflict and forced displacement. This ARSET training is the first dedicated to humanitarian applications of NASA satellite imagery with topics including monitoring urban damage, mapping refugee settlement dynamics, and gauging climate hazards at refugee settlements.

Introductory

2022

Introduction to Population Grids and their Integration with Remote Sensing Data

This two-part training, developed and presented by members of the POPGRID Data Collaborative, focuses on the different global population grids and their application to a range of topics related to development planning and monitoring of the SDGs (e.g., environment, hazards, and access to resources). Attendees are exposed to the latest data and methods used to produce global grids, how the grids incorporate remote sensing inputs, and how population grids can be used in conjunction with other types of data.

Introductory

2021

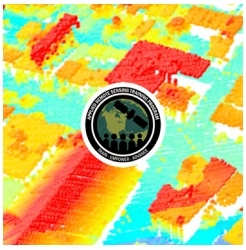
Earth Observations for Humanitarian Applications

The training focuses on flood risk assessments and specific challenges for assessing flood risk in refugee and IDP camps; gauging long-term heat stress in refugee camps and the challenges with decision making surrounding heat risk; and monitoring drought effects on agricultural landscapes in refugee settings using Earth observations (EO) to explore the correlations between anomalies in crop productivity and weather-based factors.

Intermediate

2024

Transforming Earth Observation (EO) Data into Building Infrastructure Data Sets for Disaster Risk Modeling



In this short course, we cover the basics of natural hazard risk modeling and exposure development with a focus on fusing data from multiple datasets expressly for the purposes of risk assessment. We also present examples of applying the techniques to applications related to flood risk assessment, climate adaptation, and earthquake modeling.

Intermediate

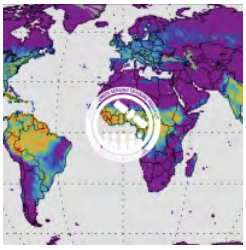
Bilingual (Spanish)

2023

Disasters

Solar Induced Fluorescence (SIF)

Use of Solar Induced Fluorescence and LiDAR to Assess Vegetation Change and Vulnerability



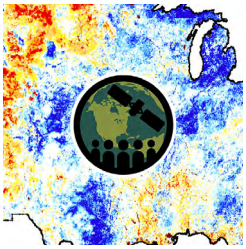
This introductory webinar series covers the fundamentals of Solar Induced Fluorescence (SIF) and LIDAR, their applications, and an overview of different satellite data sources that are openly available. In addition, it also includes a step-by-step guide on how to access, open, and interpret SIF and LIDAR data.

Introductory

Bilingual (Spanish)

2021

Agricultural Flash Drought Detection using Solar-Induced Fluorescence (SIF) and Soil Moisture Data



This intermediate training focuses on the use of solar-induced fluorescence (SIF) observations from satellites to detect the early vegetation stress associated with flash droughts and to assess their impacts on natural and managed ecosystems. Participants will learn how SIF measurements from the Orbiting Carbon Observatory-2 (OCO-2) provide insights on changes in photosynthetic activity, enabling the early detection of vegetation stress before visible changes occur.

Intermediate

2026

Solar Induced Fluorescence (SIF) Observations for Assessing Vegetation Changes Related to Floods, Drought, and Fire Impacts

This three-part, bilingual (English and Spanish) training demonstrates how SIF data can be used to study the impact of floods and droughts on agricultural systems and the impacts of fire on forested ecosystems. Participants gain hands-on experience analyzing SIF datasets from NASA missions including the Orbiting Carbon Observatory-2 (OCO-2) and Orbiting Carbon Observatory-3 (OCO-3), as well as using gap-filled data products derived using machine learning techniques.

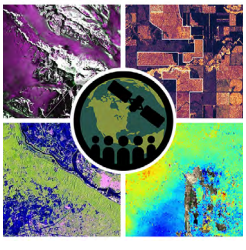
Intermediate

Bilingual (Spanish)

2025

Synthetic Aperture Radar (SAR)

Harnessing NISAR: Next-Generation Radar Observations for Earth Applications



NISAR provides a wealth of data for both scientific research and practical applications, but it can be challenging for users to interpret and apply. This course is designed to help users understand the unique characteristics of NISAR data and learn how to access, visualize, and analyze them for various scientific and applied purposes.

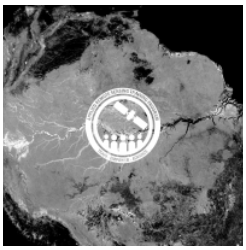
Introductory

2026

Disasters

Synthetic Aperture Radar (SAR)

An Introduction to Synthetic Aperture Radar (SAR) and Its Applications



This online webinar provides an introduction to SAR, including interferometric SAR (InSAR), as well as a review of the characteristics of historical, current, and upcoming openly-available SAR satellite data. It also explores the type of applications that each sensor can best address. Additionally, this webinar discusses online sources of openly available SAR data, along with tools, software, and other resources to understand, explore, and facilitate the analysis of SAR data.

Introductory

Bilingual (Spanish)

2024

Identifying Disaster Extent and Risk Using NISAR Surface Displacement

This intermediate, two-part training will focus on the use of InSAR data from NISAR and surface displacement products from OPERA to monitor ground movements and assess areas at risk of landslides, earthquakes, and other natural hazards. The training will also include demonstrations on how to use these data products to evaluate regions that may have been damaged by seismic events.

Intermediate

2026

Monitoring Surface Water with SAR for Water Resource Management

This intermediate-level training introduces participants to complementary approaches for monitoring surface water using NISAR and OPERA. Participants learn how to use NISAR SAR amplitude data to generate their own flood maps by identifying open water and inundated vegetation, as well as how to use the analysis-ready OPERA Surface Water Extent product for monitoring surface water and to support water management activities. The training highlights the strengths, limitations, and appropriate applications of each approach.

Intermediate

Bilingual (Spanish)

2026

Disaster Assessment using Synthetic Aperture Radar

This training includes theoretical portions for each disaster as related to the SAR signal interaction with surface conditions and demonstrations using Google Earth Engine, Jupyter Notebooks, and the SNAP Toolbox, all freely and openly available tools.

Intermediate

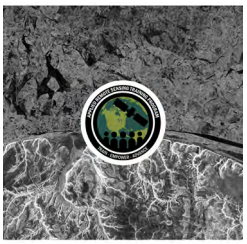
Bilingual (Spanish)

2022

Disasters

Synthetic Aperture Radar (SAR)

SAR for Detecting and Monitoring Floods, Sea Ice, and Subsidence from Groundwater Extraction



This training is a follow-on to the SAR training held in October 2022, which covered detection and monitoring of oil spills, landslides, and floods. This training addresses these applications through the use of open-source tools and SAR data to inform on disaster awareness and response and how to best allocate resources to mitigate their impacts.

Advanced
Bilingual (Spanish)
2023

SAR for Landcover Applications

This webinar series builds on the knowledge and skills previously developed in ARSET SAR trainings. Presentations and demonstrations focus on agriculture and flood applications. Participants learn to characterize floods with Google Earth Engine and learn to analyze synthetic aperture radar (SAR) for agricultural applications, including retrieving soil moisture and identifying crop types.

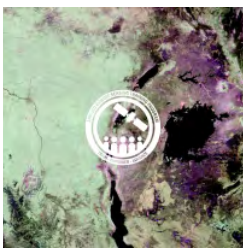
Advanced
Bilingual (Spanish)
2019

SAR for Disasters and Hydrological Applications

This training builds on the skills taught in previous ARSET SAR trainings in terms of the use of Google Earth Engine for flood mapping with radar data. This training presents two new topics; the use of InSAR for characterizing landslides and the generation of a digital elevation model (DEM).

Advanced
Bilingual (Spanish)
2019

Radar Remote Sensing for Land, Water, and Disaster Applications



This webinar series builds on ARSET's previous webinar, Introduction to Synthetic Aperture Radar. The training focuses on different techniques such as time-series', polarimetry, and interferometry for mapping and monitoring disasters, water, and land cover applications such as deforestation, crops, flooding, and earthquakes.

Advanced
Bilingual (Spanish)
2018

Disasters

Urban Heat Islands (UHI)

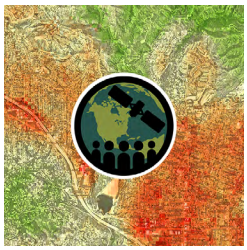
Satellite Remote Sensing for Urban Heat Islands

This training addresses the use of remote sensing in determining where "hot spots" of land surface temperature are located in urban areas, why these areas are experiencing increased temperature, which populations are most vulnerable, and ways to mitigate the effects through adaptive land use planning.

Introductory

2020

Introduction to Thermal Remote Sensing and Applications in Urban Heat Island Mapping



This training begins by establishing the physical principles of TIR, including emissivity and blackbody radiation. While these fundamentals are broadly applicable to numerous applications, this training specifically focuses on using data from NASA's Ecosystem Spaceborne Thermal Radiometer Experiment on Space Station (ECOSTRESS) to identify heat-vulnerable communities and quantify urban heat island (UHI) effects.

Intermediate

2026

Satellite Remote Sensing for Measuring Urban Heat Islands and Constructing Heat Vulnerability Indices

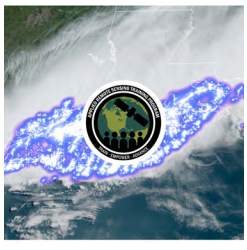
Once urban heat islands (UHIs) have been mapped, incorporating socioeconomic data pertaining to population, demographics, and health information into heat vulnerability indices (HVIs) can help guide interventions to manage heat related risks to public health. This four-part, advanced webinar builds on ARSET's urban heat island training held in November 2020 with hands-on exercises for participants to measure UHIs and construct HVIs for their areas of interest.

Advanced

2022

Other

Introduction to Lightning Observations and Applications



As the intensity and frequency of extreme weather events are likely to increase due to climate change impacts, lightning activity will likely increase as well, causing more power outages, increased risks of wildfire ignition, and increased numbers of injuries and fatalities. Therefore, information about lightning activity is critical for better preparedness against these disasters. This three-part, introductory training focuses on global and regional lightning data products that can be applied to disaster risk preparedness.

Introductory

2024

Disasters

Other

Introduction to NASA's "Black Marble" Night Lights Data

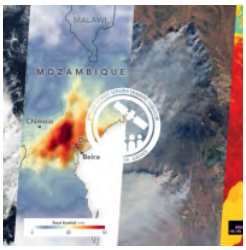
This webinar focuses on building the skills needed to choose the appropriate night lights product, acquire and understand Black Marble data, and how to use the data in analyses for tracking urbanization, electrification, and disaster monitoring.

Introductory

Bilingual (Spanish)

2020

Earth Observations for Disaster Risk Assessment and Resilience

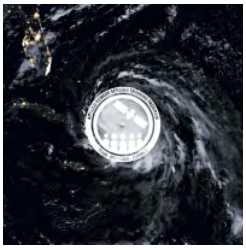


This webinar series focuses on Earth observation (EO) data useful for disaster risk assessment. The series covers disasters including tropical cyclones, flooding, wildfires, and heat stress. The training also covers access of socioeconomic and disaster damage data. Sessions 3 and 4 cover case studies and operational applications of EO for disaster risk assessment.

Introductory

2019

Monitoring Tropical Storms for Emergency Preparedness



Tropical storms have major impacts, including loss of life and destruction of property. In 2017 alone, the United States experienced three tropical storms with more than $1 billion in losses. Open source satellite data can be used before, during, and after a storm for monitoring and response. A storm's intensity, path, wind, precipitation, storm surge, and flooding can be derived from historical and near real-time satellite observations. In this introductory training, participants learn about the NASA data and tools they can use to monitor tropical storms.

Introductory

2018

Overview of the Global Disasters Alert and Coordination System (GDACS)

The Global Disaster Alert and Coordination System (GDACS) provides near real-time data, alerts, and impact assessments that can be accessed online. In this two-hour webinar, participants learn how to use GDACS to monitor real-time disasters, assess the impacts of an event, and develop response strategies for both national and international events.

Introductory

2017

Disasters

Other

Satellite Observations for Analyzing Natural Hazards on Small Island Nations

This three-part training series focuses on small island nations while introducing the data, methods, and tools useful for monitoring natural hazards. Case studies are used to demonstrate methodologies applying satellite and model data and open access tools to analyze storm impacts, sea level rise, and landslides on small island nations.

Intermediate

Bilingual (Spanish)

2021

Remote Sensing for Disasters Scenarios

According to the WHO, every year disasters "kill around 90,000 people and affect close to 160 million people worldwide." This training shows participants how NASA remote sensing data can be used to characterize and monitor disaster-related events and support relief efforts. Each session covers a different disaster and its supporting data. Disaster scenarios include tropical storms, flooding, earthquakes, and landslides.

Intermediate

Bilingual (Spanish)

2019