



Remote Sensing Basics

Fundamentals of Remote Sensing



Participants will become familiar with satellite orbits, types, resolutions, sensors, and processing levels. In addition to a conceptual understanding of remote sensing, attendees will also be able to articulate its advantages and disadvantages. Participants will also have a basic understanding of NASA satellites, sensors, data, tools, portals, and applications to environmental monitoring and management.



NASA'S Earth Observing Fleet

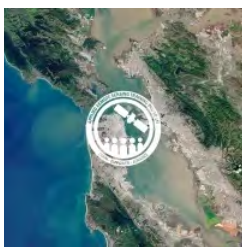


Get familiar with Earth observing satellites in NASA's fleet, sensors that collect data you can use in ARSET trainings, and their potential applications.



Ecological Conservation - 2023 Trainings

Connecting Citizen Science with Remote Sensing

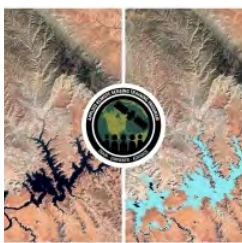


Citizen science projects provide the opportunity for community member volunteers to monitor the Earth. These projects have dramatically increased in the last decade and can provide great benefits to projects that combine Earth Observations with ground-based information in the fields of climate change, sustainable development, ecosystem monitoring and characterization, drought, and land cover or land-use change.

Introductory - 2023



Fundamentals of Machine Learning for Earth Science



Artificial intelligence and machine learning have grown in popularity in recent decades as a result of advances in high-performance computing and open-source software. At the core, machine learning provides a statistical inference based on the inputs provided by the user, in which algorithms learn relationships between input data and output results. The complexity of these algorithms allows for the discovery of patterns and trends invisible to the human analyst.

Introductory - 2023



Ecological Conservation - 2023 Trainings



Spectral Indices for Land and Aquatic Applications

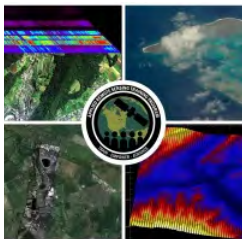


This training begins with the Normalized Difference Vegetation Index (NDVI), along with its calculation, uses, and prominence in Earth science. Then it expands to indices used in aquatic ecosystems, such as the Normalized Difference Chlorophyll Index (NDCI), Normalized Difference Aquatic Vegetation Index (NDAVI), Floating Algal Index (FAI), and Normalized Difference Turbidity Index (NDTI) for aquatic applications. In the final session we review the Enhanced Vegetation Index (EVI), Soil-Adjusted Vegetation Index (SAVI), and Normalized Burn Ratio (NBR).

Introductory - 2023



Biodiversity Applications for Airborne Imaging Systems



Effective monitoring and management of critically important and biodiverse ecosystems requires a comprehensive suite of data and analysis tools. The use of NASA Earth Observations (EO), in particular the combination of multispectral and hyperspectral optical imagery, thermal infrared data, and laser altimeter (LiDAR) data, can provide an increased understanding of ecosystem function.

Intermediate - 2023



Ecological Conservation - 2022 Trainings

Monitoring Aquatic Vegetation with Remote Sensing

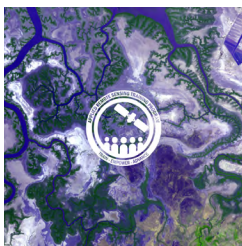


This training will combine basic information on the remote sensing of AVs, spectrometry of aquatic/coastal vegetation, and a demonstration of the NASA-funded Floating Forests citizen science tool.

Introductory - 2022



Evaluating Ecosystem Services with Remote Sensing



This training outlines the basics of ecosystem services and natural capital accounting. It also provides an overview of how Earth Observations (EO) can be used to support global frameworks and initiatives such as standards set by the United Nation's System of Environmental Economic Accounting (UN-SEEA). Case-study examples are provided to highlight locally specific efforts such as valuation of native pollinators, urban ecosystem accounts, valuation of coastal resilience and coral reef habitats, and forest conservation and carbon sequestration.

Introductory - 2022



Using the UN Biodiversity Lab to Monitor the Pulse of the Planet



This training will focus on using remote sensing and geospatial data within the NASA-supported UN Biodiversity Lab (UNBL) to take action on national conservation and sustainable development priorities. With over 400 of the world's best global data layers on biodiversity, ecosystem services, and sustainable development, UNBL enables decision-makers and policymakers to access essential global data, upload national datasets, and calculate dynamic indicators for any area of interest - all without any background in remote sensing and GIS.

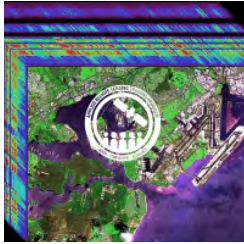
Intermediate - 2022



Ecological Conservation - 2021 Trainings



Hyperspectral Data for Land and Coastal Systems



The ability of hyperspectral data to characterize chemical, physiological, and morphological traits allows decision-makers to better understand critical components of ecosystem dynamics such as invasive species encroachment, forest decline and pest infestation, and ocean dynamics. This training is also an opportunity to build capacity in a large user community prior to the launch of the highly anticipated global hyperspectral SBG mission.

Introductory - 2021



Using Google Earth Engine for Land Monitoring Applications



This training will cover the GEE Code Editor, hands-on exercises on change detection, time series analysis, land cover classification, and accuracy assessment of optical imagery. These processes are an integral part of optical imagery analysis for many applications, including monitoring forest disturbance, wildfire mapping, identifying land cover degradation, mapping ecosystem connectivity, and identification of land surface changes due to urban growth.

Intermediate - 2021



Species Distribution Modeling with Remote Sensing



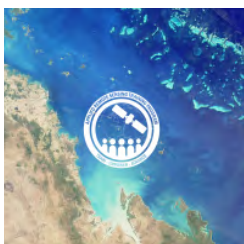
SDMs contextualize future scenarios based on known or projected ecological parameters and are the cornerstone for adaptive management planning around short- and long-term changes to complex landscapes. This training will provide an overview of SDMs, show how to use remote sensing data for landscape characterization, and highlight multiple Applied Sciences projects that have developed tools for conducting SDM for a variety of ecosystems.

Intermediate - 2021



Ecological Conservation - 2020 Trainings

Remote Sensing of Coastal Ecosystems



Coastal and marine ecosystems serve key roles for carbon storage, nutrients and materials cycling, as well as reservoirs of biodiversity. They also provide ecosystem services such as sustenance for millions of people, coastal protection against wave action, and recreational activities. Users, particularly those with little remote sensing experience, stand to benefit from this training covering some of the difficulties associated with remote sensing of coastal ecosystems, particularly beaches and benthic communities such as coral reefs and seagrass.

Introductory - 2020



Remote Sensing for Mangroves in Support of the UN Sustainable Development Goals



This training focuses on mapping and monitoring mangroves and how it relates to UN sustainable development indicator 6.6.1: Change in the extent of water-related ecosystems over time. Indicator 6.6.1 is used in determining progress toward meeting Sustainable Development Goal 6, which is to "Ensure availability and sustainable management of water and sanitation for all."

Introductory - 2020



Ecological Conservation - 2020 Trainings



Using the UN Biodiversity Lab to Support National Conservation and SDGs



There is a global demand for more NASA ARSET trainings focused on biodiversity, conservation, the UN Sustainable Development Goals (SDGs), and how to link NASA satellite data to ecological and human-influenced systems. This training aims to fill that gap by extending the influence of this NASA-supported tool and increasing its dissemination, use, and overall success. UN Biodiversity Lab makes global datasets on biodiversity and sustainable development easily accessible, supporting our broad audience.

Introductory - 2020



Understanding Phenology with Remote Sensing

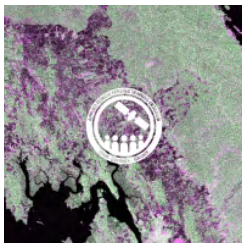


This training will focus on the use of remote sensing to understand phenology: the study of life-cycle events. Phenological patterns and processes can vary greatly across a range of spatial and temporal scales, and can provide insights about ecological processes like invasive species encroachment, drought, wildlife habitat, and wildfire potential.

Introductory - 2020



Forest Mapping and Monitoring with SAR Data



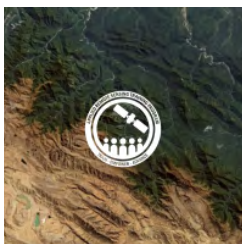
This advanced webinar series will introduce participants to 1.) SAR time series analysis of forest change using Google Earth Engine (GEE), 2.) land cover classification with radar and optical data with GEE, 3.) mapping mangroves with SAR, and 4.) forest stand height estimation with SAR.

Advanced - 2020



Ecological Conservation - 2019 Trainings

Earth Observations for Indigenous-Led Land Management



This introductory webinar series will share lectures, case studies, and demonstrations with representatives of indigenous peoples' organizations and will focus on how Earth observations (EO) data and tools can provide spatial information for forest monitoring, mapping, and responding to ecosystem threats. This series will help attendees strengthen their technical capacities to use EO data and tools to enhance their sustainable land management practices.

Introductory - 2019



Remote Sensing for Conservation and Biodiversity



Conservation and biodiversity management play important roles in maintaining healthy ecosystems. Earth observations can help with these efforts. This online webinar series introduces participants to the use of satellite data for conservation and biodiversity applications. The series will highlight specific projects that have successfully used satellite data.

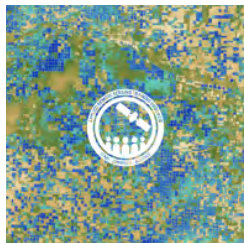
Introductory - 2019



Ecological Conservation - 2019 Trainings



New Sensor Highlight: ECOSTRESS



This webinar will focus on a NASA instrument that was launched and installed on the International Space Station in Summer 2018. Designed to study terrestrial ecosystems and plant water stress from the ISS, ECOSTRESS can also be used to better understand crop health, volcanoes, urban heat, wildland fires, coastal systems, and much more.

Introductory - 2019



A Q&A Session on Radar Remote Sensing



Previous ARSET online webinar series' focused on building the skills needed to acquire and understand SAR data, including polarimetric and interferometric SAR (PolSAR and InSAR), as well as their potential applications. The demand for guidance using SAR is extensive. The goal of this live, two-hour question and answer session was to provide participants with the opportunity to ask questions to a panel of experts.

Introductory - 2019



Remote Sensing for Freshwater Habitats



This webinar series will guide participants through using NASA Earth observations for habitat monitoring, specifically for freshwater fish and other species. This training will also provide a conceptual overview, as well as the tools and techniques for applying landscape environmental variables to genetic and habitat diversity in species.

Intermediate - 2019



Investigating Time Series of Satellite Imagery

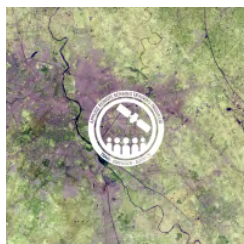


This training will focus on two tools, AppEEARS from the LPDAAC, and LandTrendr via Google Earth Engine (GEE). AppEEARS enables users to integrate point or polygon ground-based data with satellite imagery. The GEE implementation of LandTrendr enables users to analyze land cover dynamics, including short-term disturbances and long-term trends.

Advanced - 2019



Remote Sensing for Monitoring Land Degradation and Sustainable Cities SDGs



In this training, attendees will learn to use a freely-available QGIS plugin, Trends.Earth, created by Conservation International (CI), and includes special guest speakers from the United Nations Convention to Combat Desertification (UNCCD) and UN Habitat. Trends.Earth allows users to plot time series of key land change indicators. Attendees will learn to produce maps and figures to support monitoring and reporting on land degradation, improvement, and urbanization for SDG indicators 15.3.1 and 11.3.1.

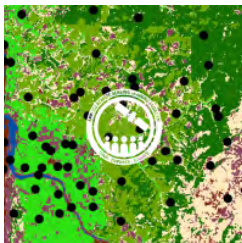
Advanced - 2019



Ecological Conservation - 2018 Trainings

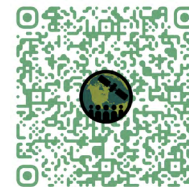


Accuracy Assessment of a Land Cover Classification

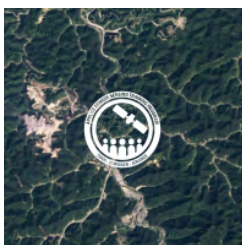


The next step to using land cover classifications is being able to evaluate the performance of a land cover map using accuracy assessments. This training will equip attendees with the skills necessary to conduct an accuracy assessment on a land cover map and identify which classes might be misrepresented.

Advanced - 2018



Change Detection for Land Cover Mapping



This advanced series focuses on using satellite imagery to map changes in land cover. Attendees will learn change detection methods, including image subtraction and classification. They will also conduct their own change detection analysis. This training will use QGIS, the R statistical program, and the Random Forest algorithm.

Advanced - 2018



Ecological Conservation - 2017 Trainings

Introduction to Remote Sensing for Scenario-Based Ecoforecasting

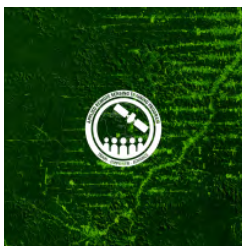


Assessing the ecological impacts of a changing climate is crucial for natural resource management decision-making. NASA Earth observations can be used to help make these decisions. This four-week webinar series, in collaboration with the USGS North Central Climate Center, will include an overview of the satellites, sensors, and tools relevant to ecological forecasting; available climate products and data for ecological modeling; scenario planning; and the application of modeling for species distribution and state-and-transition simulations.

Introductory - 2017



Remote Sensing of Land Indicators for Sustainable Development Goal 15

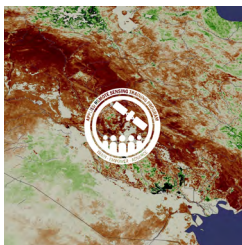


In this webinar, participants learn how to access and apply satellite data relevant to land indicators, such as estimating total forest area and forest change. The webinar includes an overview of the SDGs, as well as an introduction to image classification and change detection.

Intermediate - 2017



Remote Sensing of Drought



Prolonged drought can result in economic, environmental, and health-related impacts. In this webinar, participants learn how to monitor drought conditions and assess impacts on the ecosystem using precipitation, soil moisture, and vegetation data. The training provides an overview of drought classification, as well as an introduction to web-based tools for drought monitoring and visualization.

Advanced - 2017



Ecological Conservation - 2017 Trainings



Land Cover Classification with Satellite Imagery



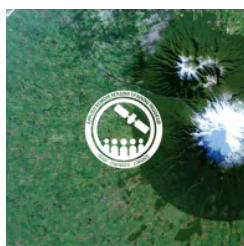
Land cover classification is an important first step to assessing land cover and land use. This advanced webinar provides lectures and hands-on activities focused on using satellite imagery for land cover classification. In two four-hour sessions, attendees will learn how to acquire Landsat imagery, display it in an open-source Geographic Information System (GIS), analyze spectral signatures of land cover types, and conduct a supervised land cover classification.

Advanced - 2017



Ecological Conservation - 2016 Trainings

Remote Sensing of Forest Cover and Change Assessment for Carbon Monitoring



In this intermediate course participants are provided with an overview of carbon monitoring for terrestrial ecosystems. This includes background information about the Intergovernmental Panel on Climate Change (IPCC), Greenhouse Gas (GHG) inventories, the United Nations Framework Convention on Climate Change (UNFCCC), and development of the Reducing Emissions from Deforestation and Degradation (REDD+) program. This course covers products from Landsat, MODIS, Sentinel, and other sensors commonly used for land management applications.

Intermediate - 2016



Introduction to Remote Sensing for Coastal and Ocean Applications



In this intermediate course participants will be provided with an overview of remote sensing for coastal and ocean applications. This includes a background in aquatic remote sensing, data access and tools for processing and analyzing imagery, and examples and live demonstrations of tools that have been developed for NASA and partner organizations. This course will cover data products from MODIS, VIIRS, HICO, and other sensors commonly used for ocean applications.

Intermediate - 2016



Creating and Using Normalized Difference Vegetation Index (NDVI) from Satellite Imagery



In this advanced webinar participants will learn how to acquire, use, and derive NDVI imagery from Landsat and MODIS. Weekly webinars include lectures, hands-on demonstrations of exercises, and written instructions on how to conduct the exercises. The exercises use QGIS, a cross-platform open source GIS application.

Advanced - 2016

