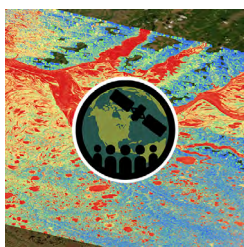


Water Resources

Hydrology

Monitoring Global Terrestrial Surface Water Height using Remote Sensing



The latest NASA mission, Surface Water and Ocean Topography (SWOT), which was launched on December 16, 2022, allows the first ever mapping of global surface freshwater components, including rivers, lakes, and wetlands, with high-resolution measurements (~200 m). This training focuses on introducing SWOT freshwater data products and their applications for water resources and disaster management.

Introductory
Bilingual (Spanish)
2025

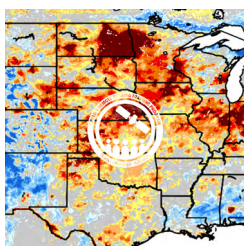
Introduction to Snow and Ice Data Products and Applications for Water Resources Management



Approximately 75% of the Earth's total freshwater is stored in glaciers, ice sheets, and permafrost (USGS). In many regions, snowmelt also serves as a major source of freshwater. NASA Earth system models can diagnose snowfall during winter and estimate snow water equivalent—a key parameter for assessing freshwater resources. This training introduces NASA's snow and ice data products and snow water equivalence data to participants, with a particular focus on snow data application to monitoring and forecasting snow-fed river flow and water availability.

Introductory
2025

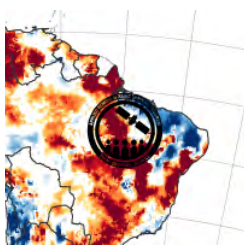
Application of NASA SPoRT-Land Information System (SPoRT-LIS) Soil Moisture Data for Drought



Conducted by experts in LIS and operational drought monitoring, this training enables users to interpret SPoRT-LIS soil moisture percentile products for drought applications. Examples from operational applications as well as practice exercises (for using LIS data for drought monitoring) are included in this training.

Introductory
2023

Groundwater Monitoring using Observations from NASA'S GRACE Missions



GRACE observations have been used for detecting groundwater depletion and for drought and flood predictions. This lightning-style training is designed to answer the demand and interest from the applications community in technologies that can be used to support water resources management. The training provides an overview of the GRACE missions, groundwater data availability, and their applications in the monitoring and management of water resources.

Introductory
Bilingual (Spanish)
2020



Water Resources

Hydrology

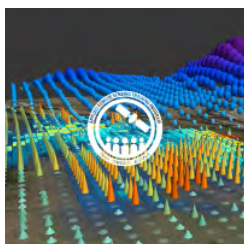
Using Earth Observations to Monitor Water Budgets for River Basin Management



Rivers are a major source of freshwater. They support aquatic and terrestrial ecosystems, provide transportation, and generate hydropower. Managing river basin watersheds is critical for developing policies for sustainable water allocation and development. Over the course of four sessions, this introductory training series addresses the use of satellite data and Earth system modeling data sources to estimate surface water budgets.

**Introductory
2019**

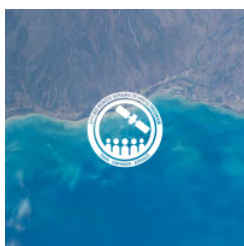
Introduction to Using the VIC Hydrologic Model with NASA Earth Observations



The Variable Infiltration Capacity (VIC) Model uses inputs to better understand hydrological processes in near real-time. Many of the inputs are available from NASA remote sensing and Earth system models, allowing the model to provide soil moisture, evapotranspiration, and runoff as outputs. Together with precipitation data, these outputs provide quantitative assessment of a regional water budget. This introductory training includes an overview of the model, sources of satellite-derived input data, and implementation of the model.

**Introductory
2018**

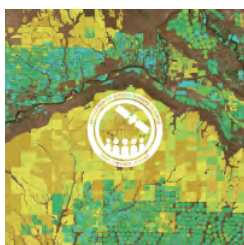
Water Resource Management using NASA Earth Science Data



This five week training covers precipitation (rainfall and snow fraction), soil moisture, evapotranspiration, runoff and streamflow, groundwater, and lake level heights. Attendees are introduced to a number of NASA data products.

**Introductory
2015**

Applications of Remote Sensing-Based Evapotranspiration Data Products



This three-part training series focuses on introducing newly available ET products derived from remote sensing observations. It specifically covers a web portal called OpenET (<https://openetdata.org/>), which includes ET products estimated by using six models as well as Landsat satellite observations. These ET products cover the Western United States. In addition, information about global ET products derived from ECOSystem Spaceborne Thermal Radiometer Experiment on the Space Station (ECOSTRESS) is also given.

**Intermediate
2022**



Water Resources

Hydrology

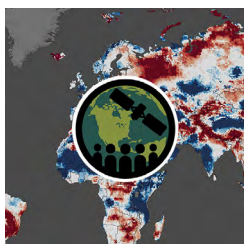
Applications of Remote Sensing to Soil Moisture and Evapotranspiration



This training series is intended to help attendees learn about NASA soil moisture and evapotranspiration products and learn how to access and apply them for water resource management. Throughout the five sessions, participants learn how to monitor and manage water resources with techniques learned during the training.

Intermediate
2016

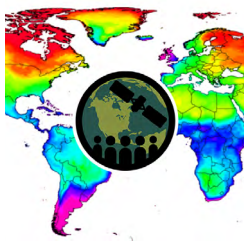
Monitoring Groundwater Changes for Water Resources Management



This three-part training focuses on an overview of GRACE/GRACE-FO data, OPERA-DISP data, and GLDAS groundwater data for assessing seasonal to interannual groundwater changes at various spatial scales. The training provides hands-on experience in accessing and analyzing these products for applications.

Advanced
2026

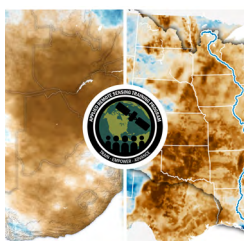
Assessing Extreme Weather Statistics using NASA Earth eXchange Global Daily Downscaled Projections (NEX-GDDP-CMIP6)



NASA Earth eXchange Global Daily Downscaled Projections (NEX-GDDP-CMIP6) provide global, high resolution, bias-corrected projections of daily minimum and maximum temperatures, precipitation, humidity, windspeed, and surface radiation from the Coupled Model Intercomparison Project Phase 6 (CMIP6) GCMs at 0.25x0.25-degree resolution. This training focuses on evaluating projected statistics of extreme heat and cold wave events, and extreme precipitation excess and deficit events, from NEX-GDDP-CMIP6 at the regional scale.

Advanced
2025

Drought Monitoring, Prediction, and Projection using NASA Earth System Data



This four-part, advanced training builds upon previous ARSET trainings and provides hands-on data analysis exercises for monitoring different types of drought (meteorological, hydrological, and agricultural). Moreover, the training includes drought prediction analysis on sub-seasonal to seasonal (S2S) time scales and climate change projection analysis of drought conditions.

Advanced
2024



Water Resources

Hydrology

Applications of GPM IMERG Reanalysis for Assessing Extreme Dry and Wet Periods



Past ARSET trainings on water resources and flood management covered TMPA and IMERG data and their applications in detail. This advanced training focuses on analysis and interpretation of the new long-term IMERG data, focused on extreme wet and dry period monitoring and management. The training includes lectures and hands-on exercises demonstrating how to derive regional precipitation statistics.

**Advanced
2020**

Using Earth Observations to Monitor Water Budgets for River Basin Management II



Past ARSET trainings on monitoring water budgets for river basins focused on data sources relevant for river basin monitoring and management, and provided case studies for estimating the water budget of a watershed using remote sensing products. This advanced training includes lectures and hands-on exercises for participants to estimate water budgets for a given river basin.

**Advanced
2020**

Hydrography

Mapping and Monitoring Lakes and Reservoirs with Satellite Observations



This training focuses on introducing remote sensing observations for monitoring the water level of lakes; a critical surface water component affecting the residential, economical, and recreational sectors in the area. Recent observations of lake bathymetry based on remote sensing observations are also presented.

**Introductory
2021**

River Basin Delineation Based On NASA Digital Elevation Data



This lightning-style training focuses on describing NASA digital elevation data and its applications in deriving river basin information by using Hydrological data and maps based on SHuttle Elevation Derivatives at multiple Scales (HydroSHEDS) database. Exercises are provided for river basin delineation using HydroSHEDS.

**Introductory
2019**



Water Resources

Hydrography

NASA Satellite Laser Altimetry for Coastal and Near-Shore Bathymetry



The Advanced Topographic Laser Altimeter System (ATLAS) instrument's green wavelength, photon-counting lidar signal can reach depths of up to 40 meters in regions with adequate water clarity to provide shallow, near-shore bathymetric data for a range of applications. The ATL24 product provides near global along-track coastal and nearshore satellite-derived bathymetry. This training improves users' knowledge of ICESat-2, the ATL24 product, and how to access, plot, and analyze ICESat-2 bathymetry data.

Intermediate
2025

Water Quality

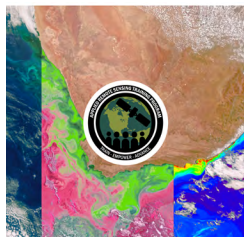
The Application of Earth Observations for Assessing Waterborne Disease Risk



This two-part training focuses on describing and accessing remote sensing observations useful as water quality indicators of waterborne diseases. It also presents case studies where remote sensing data are used to assess the likelihood of cholera outbreaks.

Introductory
2025

Introduction to Plankton, Aerosol, Cloud, Ocean Ecosystem (PACE) Hyperspectral Observations for Water Quality Monitoring



This three-part, introductory training provides an overview of past and current hyperspectral sensors. Specifically, the training provides information on NASA's PACE mission, its sensors and data products, webtools for accessing data, and software for processing hyperspectral data and water quality parameters derived from PACE/OCI. The training also highlights some advantages and limitations of PACE data. This is the first ARSET training focusing on the use of hyperspectral data for water quality applications.

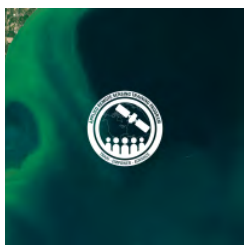
Introductory
Bilingual (Spanish)
2024



Water Resources

Water Quality

Introduction to Remote Sensing of Harmful Algal Blooms



Harmful algal blooms (HABs) can have a negative impact on the ecosystem and human health. Satellite remote sensing is able to collect data frequently and over a large area to identify impaired water quality from HABs. This data can help decision-makers decide where to take water samples, determine what toxins are in the water, decide whether they need to change or move drinking water intakes, and decide whether a fishery needs to be closed.

Introductory
2017

Monitoring Water Quality in Lakes and Coastal Regions Using STREAM



This two-part training introduces the STREAM web tool to visualize maps of water quality parameters over lakes and coastal areas and how to use STREAM application programming interface (API) to discover and download satellite images and water quality data for a selected water body. The training demonstrates how to assess changes in water quality in a given lake using QGIS. The training also demonstrates the application of a MDN model to estimate water quality parameters from satellite images.

Intermediate
2026

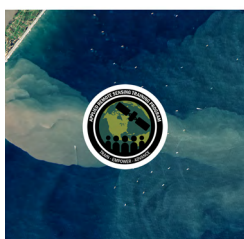
Monitoring Coastal and Estuarine Water Quality: Transitioning from MODIS to VIIRS



This intermediate training provides an overview of recent satellites and sensors used for extending the MODIS long-term water quality time series, specifically focusing on VIIRS image processing using the NASA Ocean Color software, SeaDAS. This training points out similarities and differences between MODIS and VIIRS and demonstrate water quality monitoring procedures using these sensors in selected coastal and estuarine regions.

Intermediate
Bilingual (Spanish)
2021

Overview of SeaDAS 8.4.1 for the Processing, Analysis, and Visualization of Optical Remote Sensing Data for Water Quality Monitoring



This two-hour training provides an overview and demonstration of the latest version of SeaDAS 8.4.1, which is useful for remote sensing of water quality monitoring. This training also serves as a prerequisite for future ARSET training on remote sensing of water quality.

Advanced
2024

Water Resources

Water Quality

Monitoring Water Quality of Inland Lakes using Remote Sensing



This advanced-level training focuses on using remote sensing observations from Landsat 8 and 9, Sentinel-2, and Sentinel-3 for assessing water quality parameters, including chlorophyll-a concentration, turbidity, and Total Suspended Solids (TSS) in inland lakes.

**Advanced
2023**

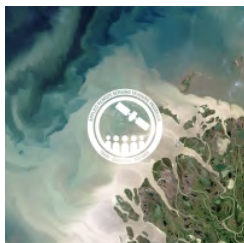
Monitoring Coastal and Estuarine Water Quality using Remote Sensing and In Situ Data



This two-part, advanced training series is a follow-on to the training on coastal and estuarine water quality held in September 2021. It is a hands-on training with demos provided by instructors, followed by an hour of lab time for participants to use Level-1 MODIS and VIIRS data provided by the Ocean Biology DAAC (OB.DAAC) and SeaDAS and OCSSW software for deriving water quality parameters.

**Advanced
2021**

Integrating Remote Sensing into a Water Quality Monitoring Program



This training series helps attendees perform advanced image processing of satellite data and learn about using satellites to track indicators of harmful algal blooms. This includes monitoring water temperature and chlorophyll-a concentrations. Attendees can also use this information for reporting around UN SDG 6.

**Advanced
2019**

Processing Satellite Imagery for Monitoring Water Quality



This training series helps attendees perform advanced image processing of satellite data and learn about using satellites to track indicators of harmful algal blooms. This includes monitoring water temperature and chlorophyll-a concentrations. Attendees can also use this information for reporting around UN SDG 6.

**Advanced
Bilingual (Spanish)
2018**

