

# What is ClimateSERV?

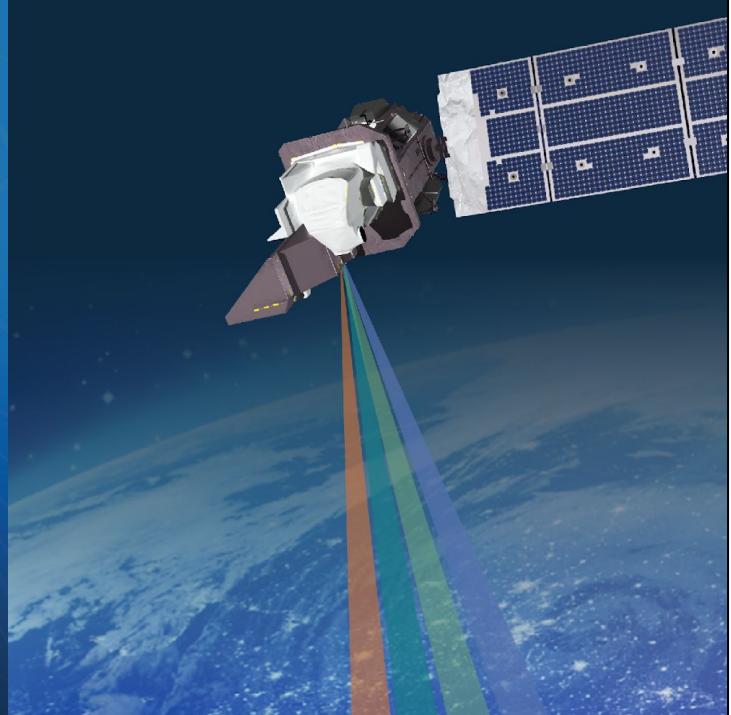
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Introduction → CS → what CS does → what they will use CS for  
Hello everyone ,

My name is Micky Maganini, and I work for SERVIR, a U.S. Government organization and partner of ITC. Today I am going to introduce you to a web-based tool called ClimateSERV that was developed by SERVIR. ClimateSERV allows users to visualize and analyze geospatial datasets. You will be using ClimateSERV to estimate the relative soil moisture in your region of interest. Then, you will use that estimate as an input to your radiative transfer models in your final project.

# What is SERVIR?



## Context

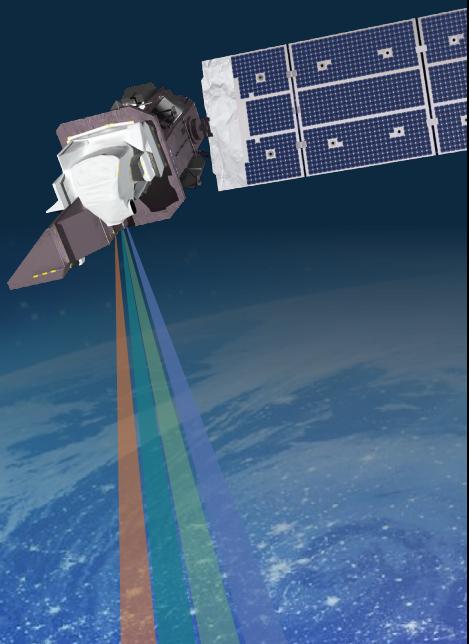
Before we learn more about ClimateSERV, I want to provide some context about What SERVIR is.

# CONNECTING SPACE TO VILLAGE



**SERVIR** is a joint initiative of NASA, USAID, and leading geospatial organizations in Asia, Africa, and Latin America that partners with countries and organizations to address challenges in climate change, food security, water and related disasters, land use, and air quality.

Using satellite data and geospatial technology, SERVIR co-develops innovative solutions through a network of regional hubs to improve resilience and sustainable resource management at local, national and regional scales.



**USAID**  
FROM THE AMERICAN PEOPLE



**SERVIR**



joint program → hubs

SERVIR is a joint program between NASA and the US Agency for International Development. We develop solutions to address environmental challenges using earth observation data. We work with organizations around the world in five regional hubs to create these solutions.

# Who Is SERVIR?



- Poverty reduction & resilience
- Data-dependent issues in data-scarce places
- International field presence
- 30+ Earth observing satellite missions, free & open data
- Major research portfolio
- Societal benefit from space



## Regional Hub Host Institutions:



## Hub Consortium Members:



## Private sector collaborators:



## USG collaborators:



## Intergovernmental, NGO collaborators:



## Research collaborators:

20+ US universities & research centers through the SERVIR Applied Sciences Team; ITC, in-region university networks



## SERVIR network → ITC & SERVIR

Beyond these regional hub institutions, we partner with organizations in the private sector, Intergovernmental organizations, NGOs, and research institutions like ITC. ITC and SERVIR have partnered with each other since 2018 as both institutions apply earth observations to sustainable development on a global scale.

## ClimateSERV



### Transition to ClimateSERV

Now that you have some context on who we are at SERVIR and why we are partnered with ITC, let's learn about ClimateSERV, a tool developed by SERVIR.

# ClimateSERV Increases Global Access to Critical Agricultural, Drought Information



**ClimateSERV** provides actionable climate information for regional and local decision makers:

- Enables easy access to **180-day rainfall and temperature forecasts**, along with historic rainfall and vegetation conditions
- Includes **key datasets and visualizations** from CHIRPS, NMME, and MODIS without the need for extensive local monitoring
- Currently in use by Kenya Meteorological Service field offices to develop in-season **crop selection guidance** and suggested planting times



web-based tool → regions where we work → satellite data → Now

ClimateSERV is a free web-based tool that allows users to download, analyze, and interpret historical and forecasted geospatial data. ClimateSERV was developed because practitioners and government decision makers in the regions SERVIR works need a way to accurately assess how severe a drought will be and its potential effect on crop yields. But in these regions, long-term ground observations of rainfall and soil moisture are sparse. Thus there is a critical need for satellite and model-derived rainfall data.

# ClimateSERV GUI



ClimateSERV HOME MAP ABOUT HELP CENTER

Statistical Query

Set Area of Interest

About AOI options ▾

Draw Upload Select

Show Current AOI ▾

Select Data

Type of Request

Time-series Analysis

Dataset Type

Observation

Data Source

SERVIR GLOBAL

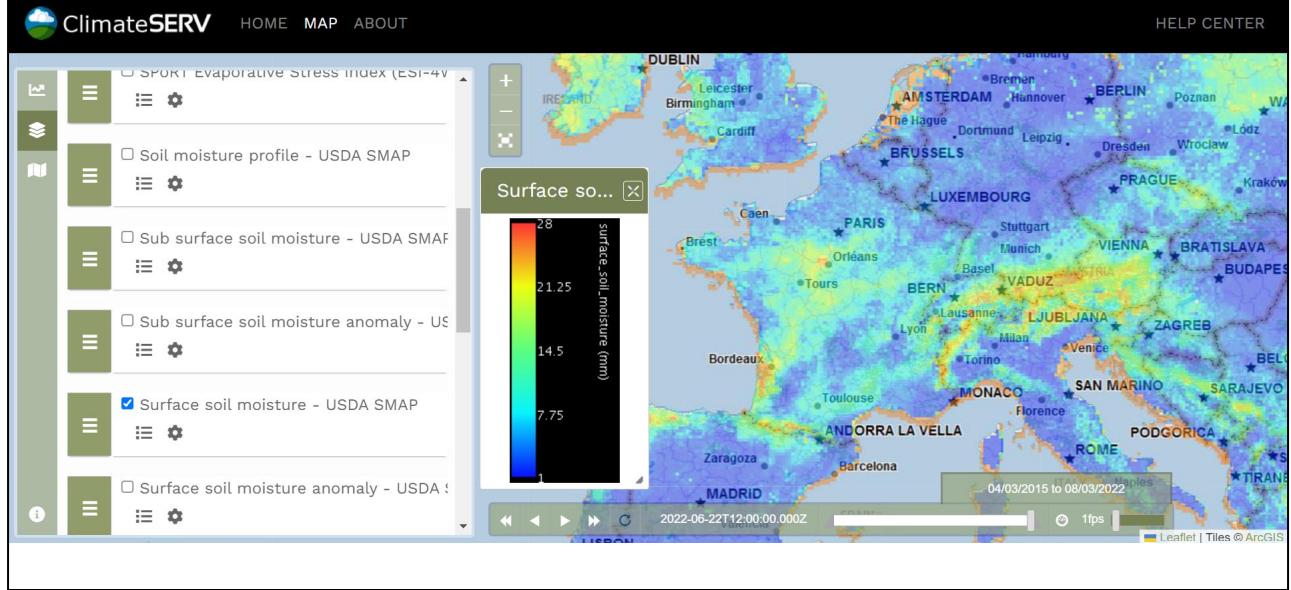
ClimateSERV

The screenshot shows the ClimateSERV Graphical User Interface. On the left, there is a sidebar titled 'Statistical Query' with sections for 'Set Area of Interest' and 'Select Data'. Under 'Select Data', there are dropdown menus for 'Type of Request' (set to 'Time-series Analysis'), 'Dataset Type' (set to 'Observation'), and 'Data Source'. On the right, there is a map of Europe and Africa. A search bar is located at the top center of the map area. The map includes labels for various countries and regions. At the bottom of the map, there is a toolbar with icons for zooming, panning, and other map controls.

## GUI → Different Panels

This is what the ClimateSERV Graphical User Interface (or GUI) looks like when you first enter ClimateSERV. There are two main panels we can use within climateSERV, the Statistical Query mode and the Layers mode. The statistical query panel is useful for analyzing how data varies over a period of time, and the layers panel is useful for viewing how data varies in space, or viewing how it varies over both space and time simultaneously.

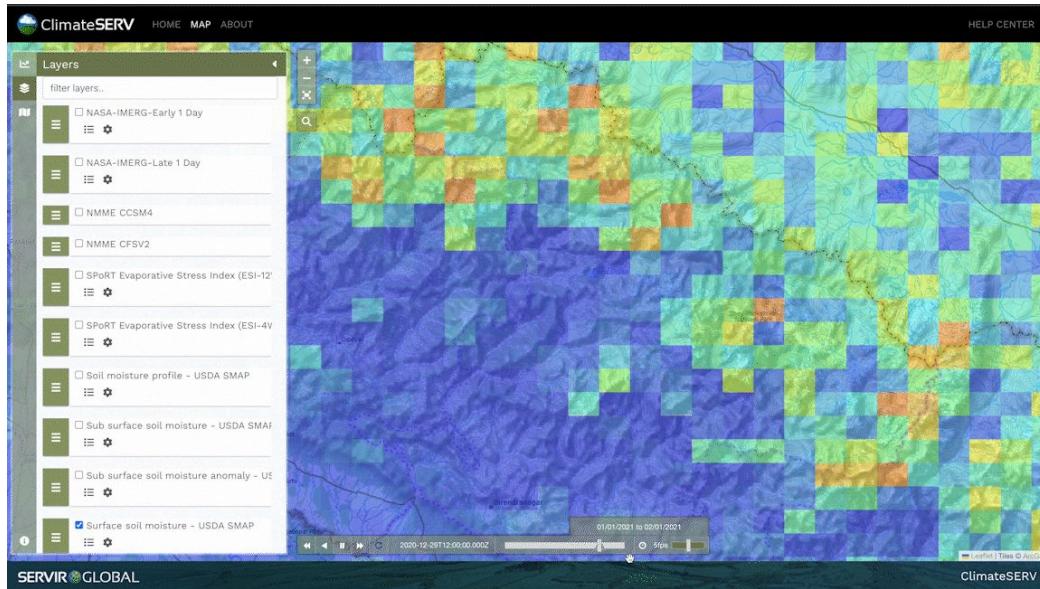
# ClimateSERV GUI: Layers Panel



Layers Panel → Displaying Datasets → Legend → single point in time

Here you see how data will appear when using the Layers Panel. As you can see on the left hand side, I have toggled the box next to "Surface Soil Moisture – USDA SMAP", so that dataset is displaying on our map. As we can see from the legend, warmer colors like red and yellow indicate wetter soil conditions, whereas cooler colors like blue and green indicate drier soil conditions. This represents the data obtained from a single point in time. But what if we want to view how data varies across both space and time?

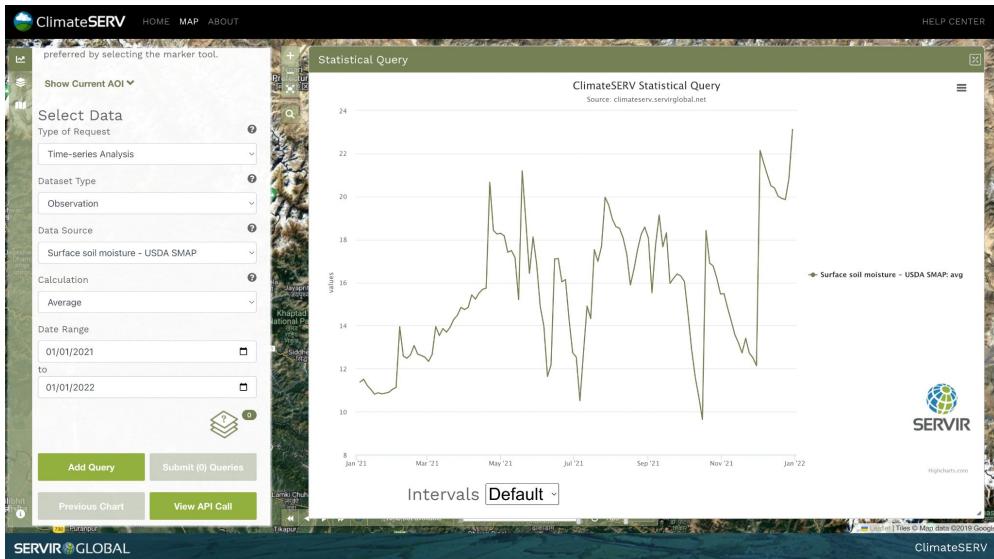
# ClimateSERV GUI: Layers Panel



## Animation

In that case, we can use the animation feature in ClimateSERV to animate the data over a period of time.

# ClimateSERV GUI: Statistical Query Panel



## Statistical Query panel → graph

To perform a more in-depth analysis of how your data varies over time for your period of interest, you can use the Statistical Query tab. Here you can see the graph that ClimateSERV displays for a soil moisture dataset over the course of a year.

# Soil Moisture Datasets Available in ClimateSERV



## 1. NSIDC SMAP

- a. Historical Data
- b. Characteristics
  - i. Spatial Range: Near-Global (everywhere excluding poles)
  - ii. Spatial Resolution: 1 km
  - iii. Temporal Range: 1 April 2015 - 29 September 2022
  - iv. Temporal Resolution: Daily
  - v. Top 5 cm of soil column
- c. Subsets
  - i. Raw data (daily)
  - ii. 15-day mosaic

## 2. USDA SMAP

- a. Historical Data
- b. Characteristics
  - i. Historical Data
  - ii. Spatial Range – Global
  - iii. Spatial Resolution – 10 km/ 0.1°
  - iv. Temporal Range – March 31, 2015 - August 03, 2022
  - v. Temporal Resolution: Every 3 days
  - vi. Top 2.5 cm of soil column
- c. Subsets
  - i. Soil Moisture Profile
  - ii. Subsurface Soil Moisture
  - iii. Subsurface Soil Moisture Anomaly
  - iv. Surface Soil Moisture
  - v. Surface Soil Moisture Anomaly

## 3. LIS Soil Moisture

- a. Model
- b. Characteristics
  - i. Spatial Range – Most of Africa, some of Middle East
  - ii. Temporal Range – June 1, 2000 - Present
  - iii. Spatial Resolution: 3 kilometers
  - iv. Temporal Resolution: Daily
- c. Subsets
  - i. Modeled Soil Moisture 0 - 10 cm
  - ii. Modeled Soil Moisture 10 - 40 cm
  - iii. Modeled Soil Moisture 40 - 100 cm
  - iv. Modeled Soil Moisture 100 - 200 cm

NSIDC SMAP → What is SMAP → Downscaled → USDA SMAP → Downscaled → LIS product

But what you'll be using climateSERV for is to determine the relative soil moisture in your region of interest in order to determine a reasonable soil moisture input for your radiative transfer model. So there are actually three different soil moisture datasets for you to choose from. The first is the NSIDC SMAP dataset, where NSIDC stands for the National Snow and Ice Data Center and SMAP stands for Soil Moisture Active Passive mission. The Soil Moisture Active Passive Mission is an orbiting observatory that measures the amount of water in the surface soil everywhere on Earth. NSIDC takes the raw SMAP data, which has a spatial resolution of more than 10km, and downscale it to a spatial resolution of 1 km using a downscaling algorithm. This data represents approximately the top 5 cm of the soil column.

The USDA SMAP dataset, which stands for the United States Department of Agriculture, uses the same SMAP dataset, integrated into a soil moisture model that uses in situ soil moisture measurements, but keeps it at the native resolution of 1 degree, or about 10 kilometers. the surface soil moisture product represents the top 2.5 cm of the soil column.

Finally, ClimateSERV offers the Land Information System, or LIS product, which was created by NASA's Short-term Prediction and Transition Center. So this dataset is a model, so it doesn't use the SMAP data, but rather is a run of a land surface model whose inputs are forced by meteorological, precipitation, and vegetation information

that come from other models as well as satellite observations, providing the soil moisture at various depths which you can see on the right. As you can see, these datasets have differing temporal ranges and resolutions, as well as differing spatial ranges and resolutions.

# ClimateSERV Materials



## Module 1: Getting Started in ClimateSERV

SERVIR Science Coordination Office  
Curriculum Development Team  
Contact: [mm005@gsu.edu](mailto:mm005@gsu.edu)



## Module 2: Exploring Soil Moisture Data in ClimateSERV

SERVIR Science Coordination Office  
Curriculum Development Team  
Contact: [mm005@gsu.edu](mailto:mm005@gsu.edu)



## ClimateSERV Dataset Encyclopedia

SERVIR Science Coordination Office  
Curriculum Development Team  
Contact: [mm005@gsu.edu](mailto:mm005@gsu.edu)



materials → Module 1 → Module 2 → CSDE → Asynchronous Design

To help you learn how to use ClimateSERV, we at SERVIR have created some materials to help. These documents include Module 1, which will show you how to navigate the different panels in ClimateSERV Graphical User Interface (or GUI), Module 2 which will show you how to explore soil moisture in climateserv, and the ClimateSERV Dataset Encyclopedia, which provides information about the datasets on ClimateSERV, which we will use in both Modules 1 and 2. These Materials are designed so you can work with ClimateSERV completely asynchronously.

# Acknowledgements

Collect Earth Online has received financial support from NASA, The U.S. Agency for International Development (USAID), SERVIR, the Food and Agriculture Organization (FAO), the U.S. Forest Service, SilvaCarbon, Google, and Spatial Informatics Group. It was co-developed as an online tool housed within the OpenForis Initiative of FAO.

Collect Earth Online was initially developed by SERVIR, and is now supported by a broad base of partners. CEO was inspired by Collect Earth, a desktop software developed by FAO. The development team includes Arthur Luz, Jordan Combs, Matt Spencer, Richard Shepherd, Oliver Baldwin Edwards, Sif Biri, Roberto Fontanarosa, Francisco Delgado, Githika Tondapu, Billy Ashmall, Nishanta Khanal, John Dilger, Karen Deyson, Karis Tenneson, Kel Markert, Africa Flores, Emil Cherrington, and Eric Anderson.

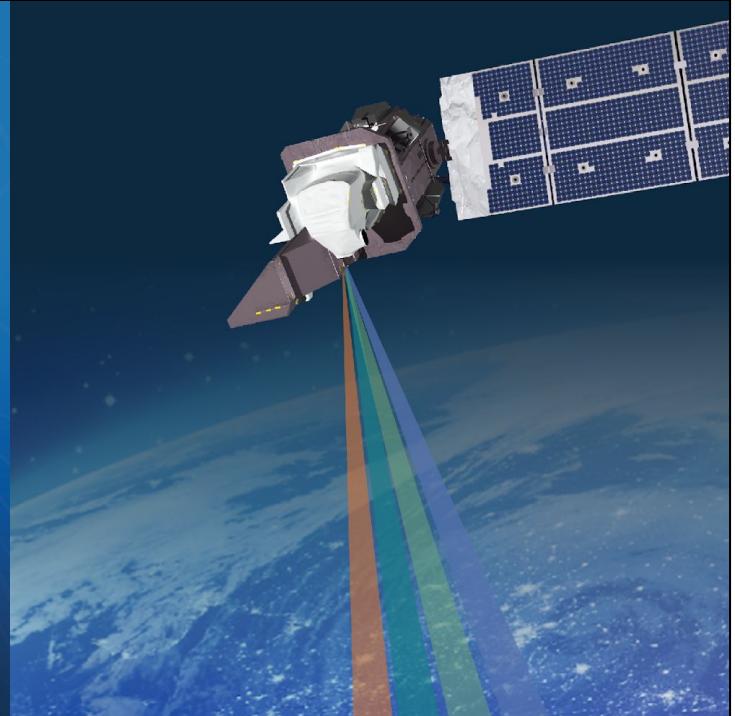
The Collect Earth Online curriculum was organized by SERVIR's Science Coordination Office with individual modules created by NASA's Earth Observatory, the Spatial Informatics Group, and SERVIR SCO. Individual modules were developed by Crystal Wespestad (Spatial Informatics Group), Holli Riebeek (NASA Earth Observatory), Robert Simmon (NASA Earth Observatory), Billy Ashmall (SERVIR Science Coordination Office) Micky Maganini (SERVIR Science Coordination Office), NASA Earth Observatory, NASA, and the US Agency for International Development. Review of the material was conducted by SERVIR's Science Coordination Office, specifically Kelsey Herndon, Emil Cherrington, Billy Ashmall, Diana West, Katie Walker, Lauren Carey, Jacob Abramowitz, Jake Ramthun, Natalia Bermudez, Stefanie Mehlich, Emily Adams, Stephanie Jimenez, Vanesa Martin, Alex Goberna, Francisco Delgado, Biplov Bhandari, and Amanda Markert. Crucial insight regarding the development of the curriculum materials was provided by Claudia Paris and Andrea Puzzi Nicolau.

Review of the material was also conducted by Bart Krol and Laura Cray of ITC (The Faculty of Geo-information Science and Earth Observation at the University of Twente). The course and unit banner images were created by Gianluca Ambrosi of ITC.

## Sources

- Development Team: <https://sams.servirglobal.net/detail/7>
- All other info: <https://www.collect.earth/about/>

## Live Demonstration



So let's go to ClimateSERV and see how these different panels and modes work in action, and see the differences between these soil moisture datasets.

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So with that I'd like to end here and take any questions. We at SERVIR are happy to help with any questions you may have when working with ClimateSERV, so don't hesitate to reach out if you have any questions or face any issues when working with ClimateSERV.



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