Data and Science for Decision Making in Transboundary Waters in Latin American and the Caribbean (LAC)

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About

This repository contains the agenda, installation instructions, and training materials for the Interagency Water Working Group (ISAT) workshop, *Building Capacity on Scientifically Robust Tools and Methodologies for IWRM in La Plata Basin: Data Access*. This worksop was conducted in Buenos Aires in November, 2022, and was organized in partnership with the Organization of American States (OAS) and the Comité Intergubernamental Coordinador de los Países de la Cuenca del Plata (CIC).

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1. Training Agenda

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Day 1: Monday, November 14

Introductions		
Time	**Title and Topics**	**Type**
09:00-10:30	Opening Session	Discussion
10:30-11:30	Break	
11:00-12:00	Introduction to the ISAT Partnership	Discussion
12:00-1:00	Lunch	

Session 1: Introduction to Hydrological Remote Sensing

Time	Title and Topics	Type
1:00-2:00	Fundamentals of Remote Sensing	Presentation
2:00-3:00	Overview of Land Cover Remote Sensing	Presentation
3:00-3:30	Break	
3:30-4:30	Accessing and Examining Land Cover	Exercise
4:30-5:00	End-of-day Discussion	Discussion
5:30-6:15	Opening Day Welcome Reception	Event

Day 2: Tuesday, November 15

Session 2A: Precipitation

Time	Title and Topics	Type
09:00-09:15	Welcome/Agenda	Discussion
09:15-10:00	GPM Mission Overview	Presentation
10:00-11:00	Precipitation Analysis and Discussion	Excercise
11:00-11:30	Break	
11:30-12:00	Introduction to MODIS	Presentation
12:00-1:00	Access & Analysis of MODIS NDVI	Excercise
1:00-2:00	Lunch	

Session 2B: Soil Moisture & Evapotranspiration

Time	Title and Topics	Type
2:00-2:30	Introduction to SMAP	Presentation
2:30-3:30	SMAP Data Access & Analysis	Exercise
3:30-4:00	Break	

4:00-4:30	Introduction to Evapotranspiration Access	Presentation
4:30-5:00	Access Landsat-Based ET	Exercise
5:00-5:30	Questions/End-of-day Discussion	Discussion

Day 3: Wednesday, November 16

Session 3A: Water Height / Aerial Extent

Time	Title and Topics	Type
09:00-09:15	Welcome/Agenda	Discussion
09:15-10:00	Introduction to MOGWAI	Presentation
10:00-11:00	MOGWAI Example	Exercise
11:00-11:30	Break	
11:30-12:00	Introduction to AWS	Presentation
12:00-12:30	Q&A	Discussion
12:30-1:30	Lunch	

Session 3B: Water Quality

Time	Title and Topics	Type
1:30-2:00	Freshwater Health Index (FHI)	Presentation
2:00-2:30	Introduction to Water Quality Remote Sensing	Presentation
2:30-3:00	Break	
3:00-4:00	Water Quality Rmote Sensing Applications	Exercise
4:00-4:30	Q&A	Discussion
4:30-5:00	Questions/End-of-day Discussion	Discussion

Day 4: Thursday, November 17

Field Visit

Time	Title and Topics	Type
08:00-12:00	INA's Laboratory and Field Visit	Field Visit
1:00-2:00	Lunch	

Session 4: Introduction to Land Surface Modeling

Time	Title and Topics	Type
2:00-2:45	Overview of Global Land Data Assimilation (GLDAS)	Presentation
2:45-3:30	Summary of Surface Water Budget Components	Presentation
3:30-4:00	Break	
4:00-5:00	Access & Analysis of GLDAS Runoff	Exercise
5:00-5:30	Questions/End-of-day Discussion	Discussion

Day 5: Friday, November 18

Session 5A: Introduction to Modeling Frameworks

Time	Title and Topics	Type
09:00-10:30	La Plata Decision Support System (SSTD)	Discussion
10:30-11:00	Break	
11:00-12:00	Introduction to SWAT-Online & NASAaccess	Presentation
12:00-1:00	Intro to Hydrologic Modeling System (HEC-HMS) & Land Information System (LIS)	Presentation
1:00-2:00	Lunch	

Session 5B: Training Debrief & Future Directions

Time	Title and Topics	Type
2:00-3:00	DSS Case Study: Lima, Peru	Presentation

3:00-4:00	Training Debrief (Reflections on the week, Directions for future trainings)	Discussion
4:00	Close Out	Discussion

2. Installation Instructions

2.1. Requirements

Operating system:

- Windows 8 or newer, 64-bit
- macOS 10.13+
  - If you are unsure which chip you have (Intel vs. M1), check here.
- Minimum 5 GB disk space to download and install

2.2. Install Miniconda

Anaconda is an open-source package and environment management system that runs on Windows, macOS, and Linux. Conda quickly installs, runs, and updates packages and their dependencies. It also easily creates, saves, loads, and switches between environments on your local computer. It was created for Python programs, but it can package and distribute software for any language. This training will use a simplified installation called *Miniconda*.

1. Navigate to the installation page and download the installer for your operating system.

Windows Installers

Windows

Python version	Name	Size	SHA256 hash
Python 3.9	Miniconda3 Windows 64-bit	71.2 MiB	1acbc2e8277ddd54a5f724896c7edee112d068529588d94470296 6c867e7e9cc
Python 3.8	Miniconda3 Windows 64-bit	70.6 MiB	94f24e52e316fa935ccf94b0c504ceca8e6abc6190c68378e18550c95bb7cee1
Python 3.7	Miniconda3 Windows 64-bit	69.0 MiB	b221ccdb2bbc5a8209a292f858ae05fd87f882f79be75b37d26faa881523c057
Python 3.9	Miniconda3 Windows 32-bit	67.8 MiB	4fb64e6c9c28b88beab16994bfba4829110ea3145baa60bda5344174ab65d462
Python 3.8	Miniconda3 Windows 32-bit	66.8 MiB	60cc5874b3cce9d80a38fb2b28df96d880e8e95d1b5848b15c20f1181e2807db
Python 3.7	Miniconda3 Windows 32-bit	65.5 MiB	a6af674b984a333b53aaf99043f6af4f50b0bb2ab78e0b732aa60c47bbfb0704

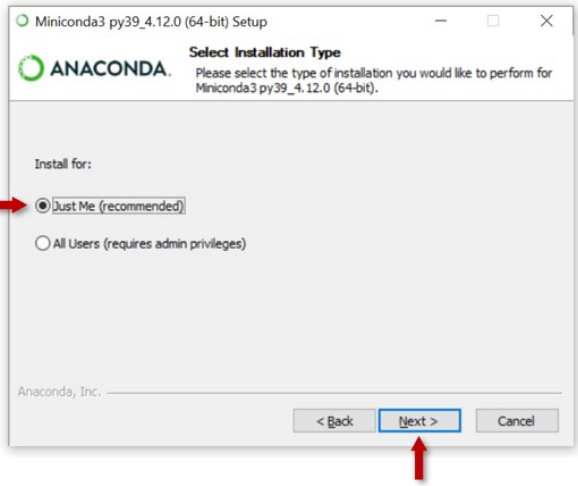
Mac OS Installers. For Mac OS users, choose the **pkg** installer option.

macOS

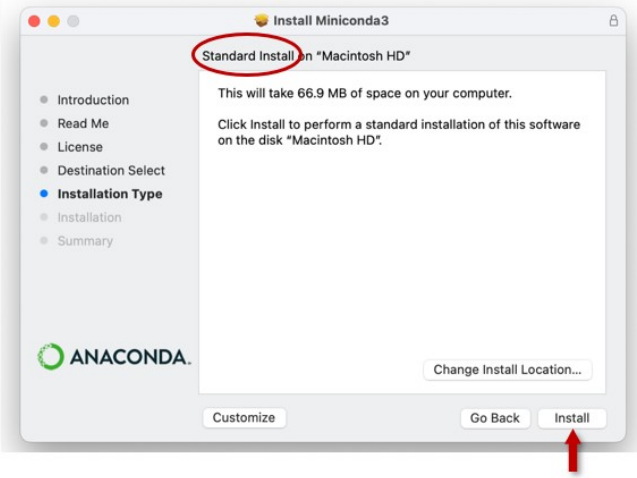
Python version	Name	Size	SHA256 hash
Python 3.9	Miniconda3 macOS Intel x86 64-bit bash	56.0 MiB	007bae6f18dc7b6f2ca6209b5a0c9bd2f283154152f82becf787aac709a51633
Intel	Miniconda3 macOS Intel x86 64-bit pkg	62.7 MiB	cb5618463771168 5b08f6eba9532cef6985ed7007b38e789613d5dd3f94ccc6b
	Miniconda3 macOS Apple M1 ARM 64-bit bash	52.2 MiB	4bd112168cc33f8a4a60d3ef7e72b52a85972d588cd065be803eb21d73b625ef
M1	Miniconda3 macOS Apple M1 ARM 64-bit pkg	63.5 MiB	0cb5165ca751e827d91a4ae6823bfda24d22c398a0b3b01213e57377a2c54226
Python 3.8	Miniconda3 macOS Intel x86 64-bit bash	56.4 MiB	f930f5b1c85e509ebbf9f28e13c697a082581f21472dc5360c41905d10802c7b
	Miniconda3 macOS Intel x86 64-bit pkg	63.1 MiB	62eda1322b971d43409e5dde8dc0fd7bfe799d18a49fb2d8d6ad1f6833448f5c
	Miniconda3 macOS Apple M1 ARM 64-bit bash	52.5 MiB	13b992328ef088a49a685ae84461f132f8719bf0cabc43792fc9009b0421f611
	Miniconda3 macOS Apple M1 ARM 64-bit pkg	63.8 MiB	e92fd40710f7123d9e1b2d44f71e7b2101e3397049b87807ccf612c964beef35
Python 3.7	Miniconda3 macOS Intel x86 64-bit bash	66.0 MiB	323179e4873e291f07db041f3d968da2ffc102dcf709915b48a253914d981868
	Miniconda3 macOS Intel x86 64-bit pkg	72.7 MiB	9278875a235ef625d581c63b46129b27373c3cf5516d36250a1a3640978280cd

2. Go to your *Downloads* folder and double-click the installer to launch.
3. Read the licensing terms and click **I Agree**.
4. Select Installation Type. On Windows, it is recommended that you install for **Just Me** as this does not require administrator rights. For Mac OS users, choose the "Standard Install" option:

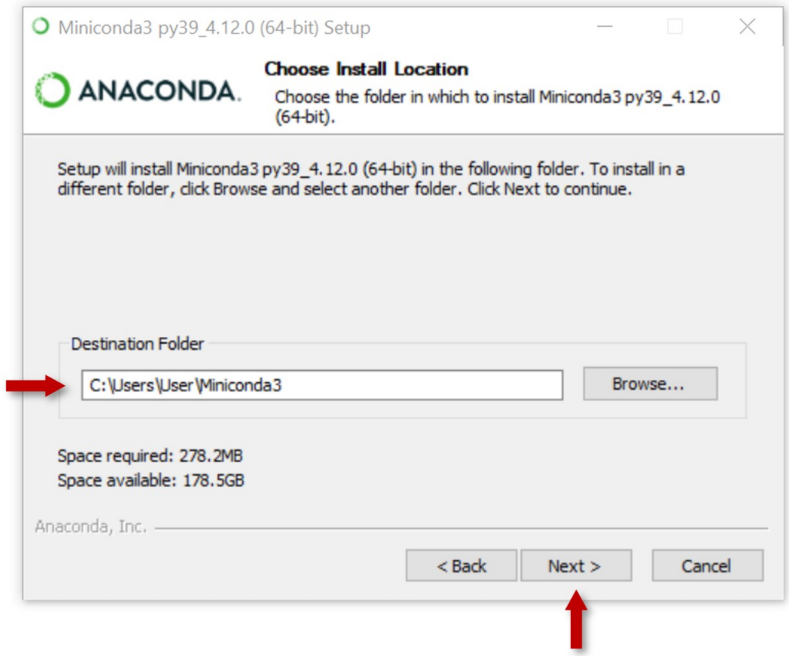
Windows



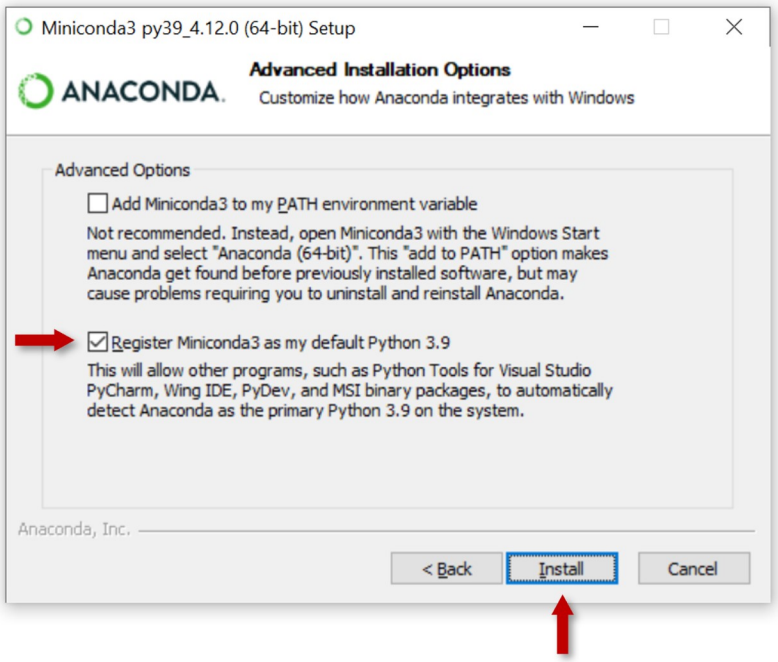
Mac OS



5. For Windows installations, select a destination folder to install Miniconda and click *Next*.



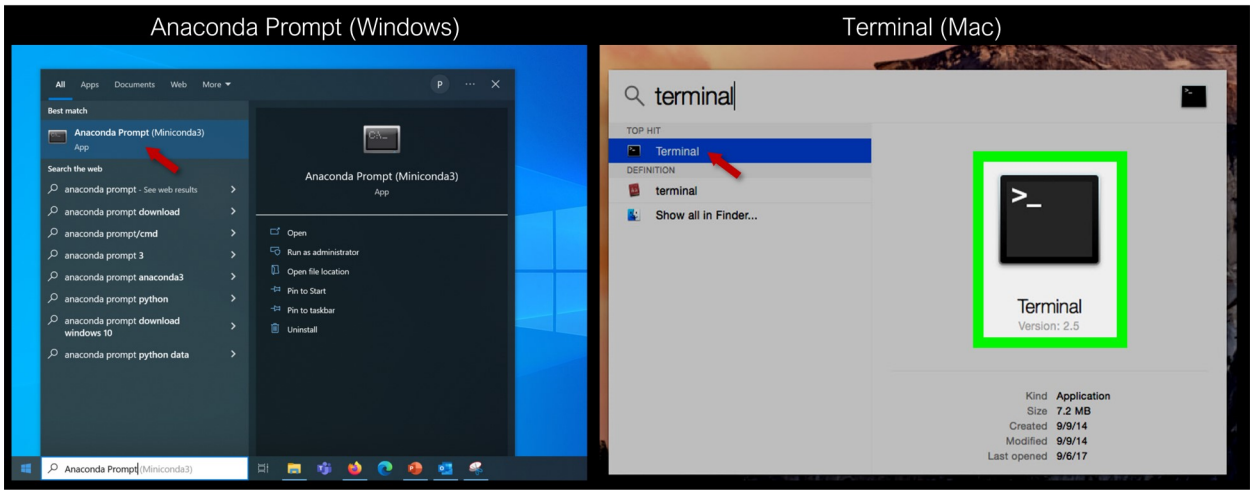
6. Choose whether to add Miniconda to your PATH environment variable or register Miniconda as your default Python. We **don't recommend** adding Miniconda to your PATH environment variable, since this can interfere with other software.



7. Click **Install**. If you want to watch the packages Miniconda is installing, click Show Details.

2.3. Download training materials

1. Open terminal window ("Anaconda Prompt" on Windows, "Terminal" on Mac)



2. Install *git* through terminal. This allows your computer to download the training materials hosted on Github:

```
conda config --add channels conda-forge
conda install -c conda-forge git
```

When asked to Proceed, type "**y**"

3. Navigate to desired working directory (e.g. "C:\Users\Name\Documents"):

```
cd Documents
```

4. Clone repository to working directory:

```
git clone https://github.com/pcoddo/ISAT-Training-LaPlata.git
```

2.4. Create Conda environment

Create conda environment using provided `environment.yml` file:

```
conda env create -f environment.yml
```

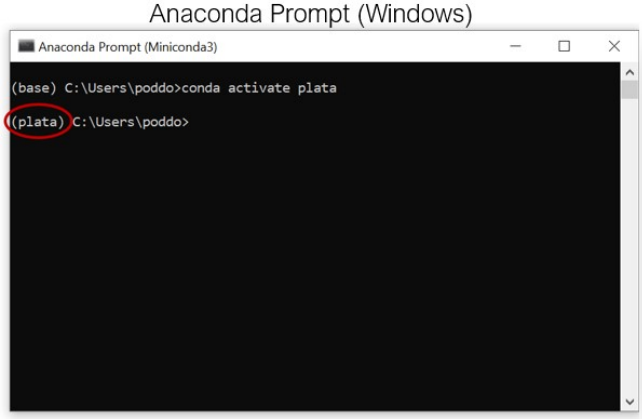
This environment should install all necessary software and packages for the training. Depending on internet and processor speeds, **this may take several minutes.**

Activate new environment:

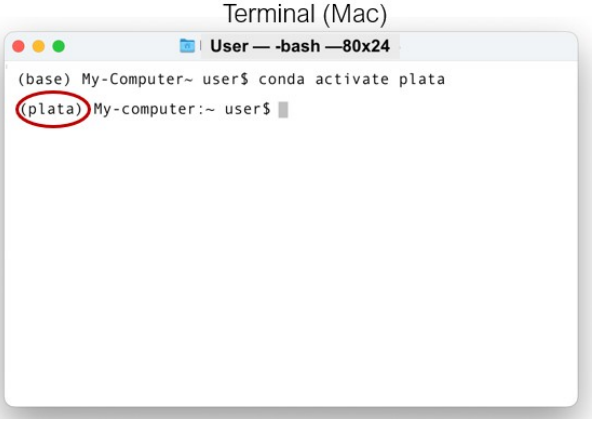
```
conda activate plata
```

The terminal should now display the activated environment:

Anaconda Prompt (Windows)



Terminal (Mac)



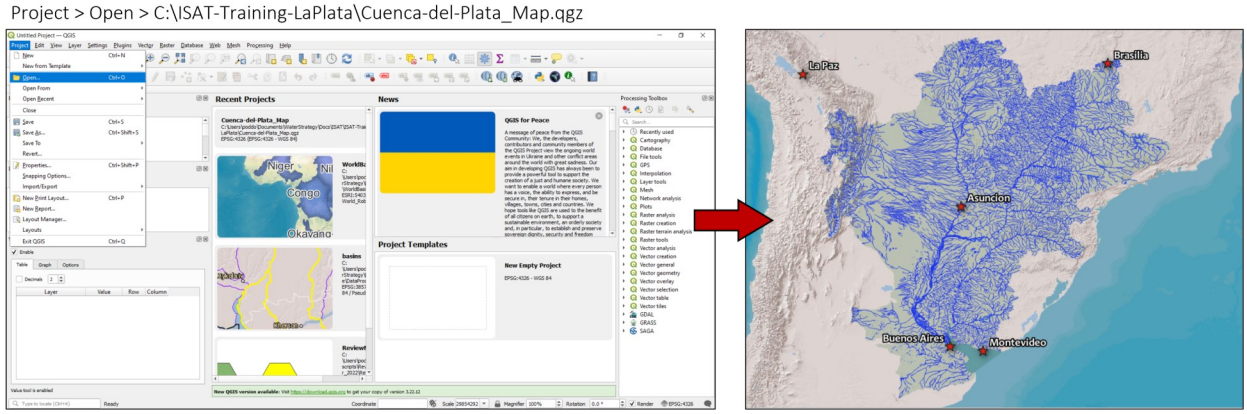
2.5. Test installation

Check to see if QGIS installed successfully:

```
qgis
```

The application should open in a new window. Once it does, try opening the `Cuenca-del-Plata_Map.qgz` map file:

Project > Open > C:\ISAT-Training-LaPlata\Cuenca-del-Plata_Map.qgz



2.6. Updating Conda environment

The presenters may make updates to this repository as the workshop progresses. To ensure you have the latest version of the materials, you may need to update your local files with any recent changes.

1. First, ensure "plata" environment is activated:

```
conda activate plata
```

2. Next, navigate to the training folder (e.g. "C:\Users\Name\Documents\ISAT-Training-LaPlata") and download latest files:

```
cd Documents
cd ISAT-Training-LaPlata
```

3. Finally, download latest files:

```
git pull
```

3. Useful Links

Direct Data Sources

- **USGS Earth Explorer**
  - Landsat
  - Sentinel-2
  - SRTM
- **Copernicus Open Access Hub**
  - Sentinel-1 - Synthetic Aperture Radar (SAR)
  - Sentinel-2
  - Sentinel-3
  - Sentinel-5P
- **NASA EARTHDATA**
  - Alaska Satellite Facility, a source for current and historic RADAR data
- **GEO on AWS**

Data and Imagery Viewers

- **NASA Worldview**
  - Satellite data
- **NOAA View**
  - Ocean, land and atmospheric data

- Resource Watch
  - Hundreds of data sets on the state of the planet's resources and citizens
- Global Forest Watch
  - Data, technology and tools tobetter protect forests

Commercial Imagery Sources

- Google Earth Engine
  - Cloud-based implementation with dozens of available datasets
- Planet
  - High temporal resolution
  - Relatively high spatial resolution
  - Relatively low spectral resolution
- Maxar
  - High resolution RGB and synthetic-aperture radar data.
- Iceye
  - High spatial and temporal resolution synthetic-aperture radar data
- Airbus
  - High resolution RGB and synthetic-aperture radar imagery.
- Blacksky
  - Plan for high temporal resolution
  - Relatively high spatial resolution
  - Relatively low spectral resolution

Some of the above sources were drawn from the nicar20-imagery-sources repository by Tim Wallace

4. Acknowledgements

These materials draw on previous trainings developed by the NASA Advanced Remote Sensing Training (ARSET) Program. Special thanks to Dr. Amita Mehta, Dr. Erika Podest, Dr. Ana Prados and the rest of the ARSET team for providing those materials! Thanks also to Aarti Arora for helping to design the meeting agenda.

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