

URSA

Windows tutorial



HUD - Cities Lab

Urban Growth Simulator

Open-source tool for simulating and comparing scenarios

Cities supported by the tool were selected based on data from the [Global Human Settlement Layer \(GHSL\)](#), generated by the European Commission

The screenshot shows the homepage of the GHSL website. At the top left is the European Commission logo. The main title is "GHSL - Global Human Settlement Layer". Below it is a subtitle: "Open and free data and tools for assessing the human presence on the planet". A navigation bar includes links for Home, Copernicus, Data and tools, Visual analytics, Degree of urbanisation, Knowledge and training, and News. The main visual is a world map showing human settlement density, with a prominent "2000" label. On the left, there's a sidebar for "Copernicus Europe's eyes on Earth" with links for Exposure Mapping, Population, and Built-up areas. At the bottom, a link reads "Click here to find out about the technology behind this image".

What these cities have in common:

Located in **Latin America and the Caribbean**

Categorized as **Functional Urban Areas - FUA***

Population **above
100.000 inhabitants**

* According to the OECD, the FUA (Functional Urban Area) includes different cities along with their commuting zones. Therefore, they are densely populated cities alongside less densely populated commuting zones whose labor market is highly integrated with the city.

Urban Growth Simulator

Open-source tool for simulating and comparing scenarios

REQUIREMENTS

Skills

- Basic command-line interface (CLI) knowledge.
- Basic knowledge of Python and Docker instances.

Software - freely available

- Python
- Docker
- URSA



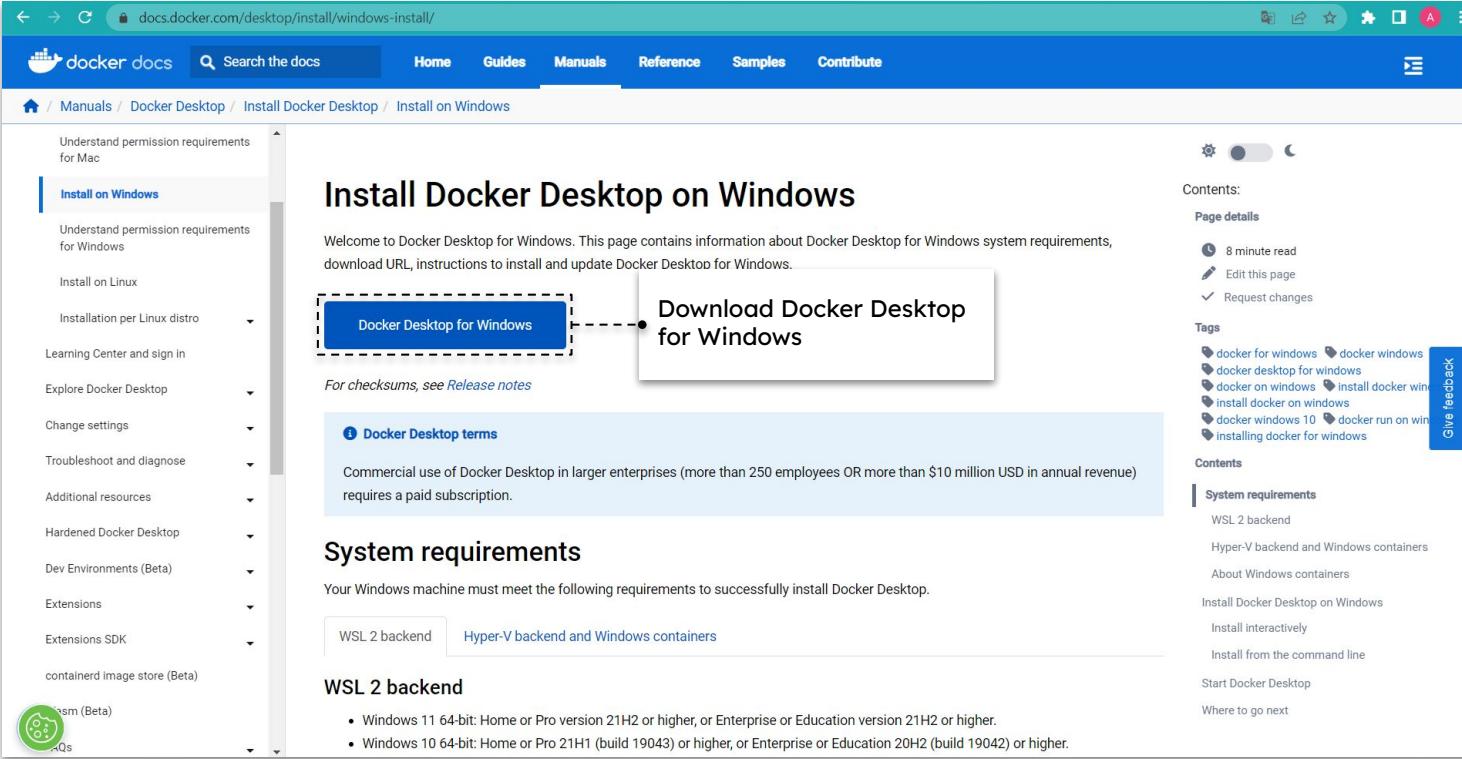
NOTE: the app can be deployed on a server and made accessible without any user requirements.

Step 1: Installing Docker

*The following instructions are required **only once** per computer.*

Installing Docker

1. The first step is to download 'Docker Desktop for Windows' from its [website](#).



The screenshot shows a web browser displaying the Docker documentation page for installing Docker Desktop on Windows. The URL in the address bar is docs.docker.com/desktop/install/windows-install/. The page title is "Install Docker Desktop on Windows". A prominent blue button labeled "Download Docker Desktop for Windows" is highlighted with a dashed box and a callout bubble. To the right of the main content area, there is a sidebar with "Contents" sections for "Page details" (8 minute read, Edit this page, Request changes), "Tags" (docker for windows, docker desktop for windows, docker on windows, install docker windows, install docker on windows, docker windows 10, docker run on windows, installing docker for windows), and "System requirements" (WSL 2 backend, Hyper-V backend and Windows containers). The main content area also includes sections for "System requirements" (listing WSL 2 backend and Hyper-V backend) and "WSL 2 backend" (listing system requirements for Windows 11 and Windows 10).

Understand permission requirements for Mac

Install on Windows

Understand permission requirements for Windows

Install on Linux

Installation per Linux distro

Learning Center and sign in

Explore Docker Desktop

Change settings

Troubleshoot and diagnose

Additional resources

Hardened Docker Desktop

Dev Environments (Beta)

Extensions

Extensions SDK

containerd image store (Beta)

asm (Beta)

AQs

Install Docker Desktop on Windows

Welcome to Docker Desktop for Windows. This page contains information about Docker Desktop for Windows system requirements, download URL, instructions to install and update Docker Desktop for Windows.

Docker Desktop for Windows

For checksums, see [Release notes](#)

Download Docker Desktop for Windows

Docker Desktop terms

Commercial use of Docker Desktop in larger enterprises (more than 250 employees OR more than \$10 million USD in annual revenue) requires a paid subscription.

System requirements

Your Windows machine must meet the following requirements to successfully install Docker Desktop.

WSL 2 backend Hyper-V backend and Windows containers

WSL 2 backend

- Windows 11 64-bit: Home or Pro version 21H2 or higher, or Enterprise or Education version 21H2 or higher.
- Windows 10 64-bit: Home or Pro 21H1 (build 19043) or higher, or Enterprise or Education 20H2 (build 19042) or higher.

Installing Docker

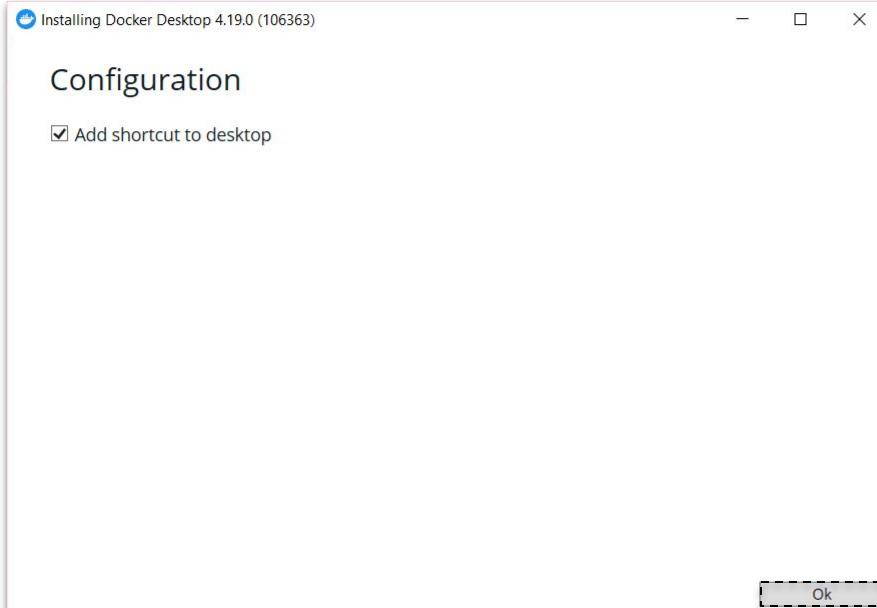
2. Next, you should run the 'Docker Desktop Installer.exe' file to initiate the installation..

The screenshot shows a web browser displaying the Docker documentation at docs.docker.com/desktop/install/windows-install/. The main content is titled "Install Docker Desktop on Windows". It includes sections for "Docker Desktop for Windows", "Docker Desktop terms", and "System requirements". A callout box highlights the "Docker Desktop for Windows" button. At the bottom left, there is a link to "Docker Desktop Installer.exe". The right side of the page features a sidebar with "Contents", "Page details" (including a 8 minute read time), "Tags" (such as docker for windows, docker desktop for windows, docker on windows, etc.), and "System requirements". A "Give feedback" button is also visible.

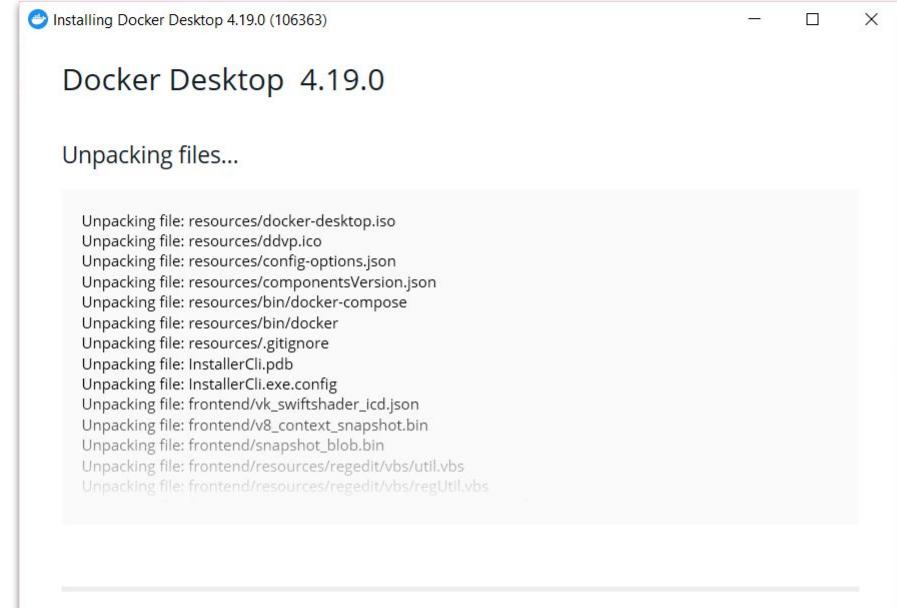
Ejecutar el instalador de Docker para Windows

Installing Docker

3. The installation window will open. Select 'Ok'.

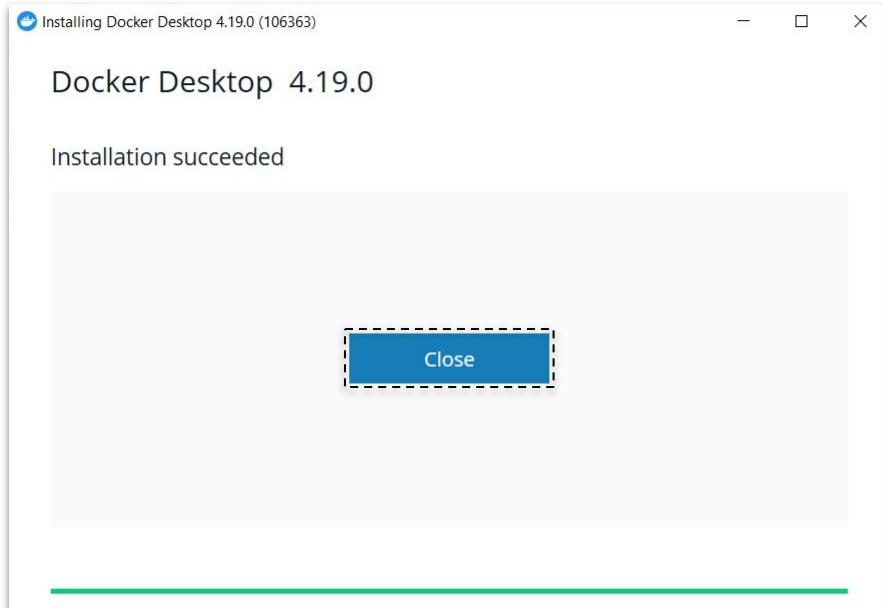


4. It will be necessary to wait for all the files to be decompressed.

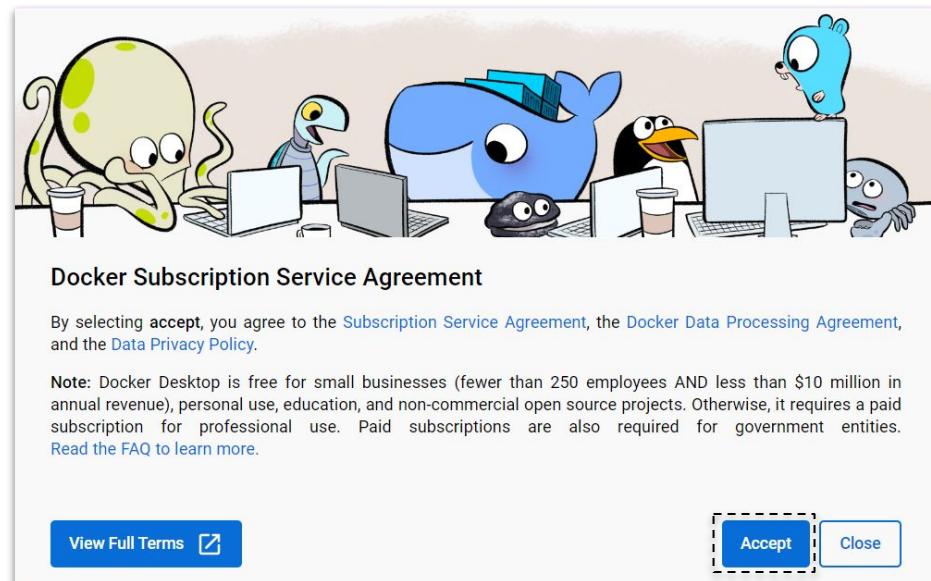


Installing Docker

5. After completing the installation, a window will open indicating that it was successful. Select '**Close**'.

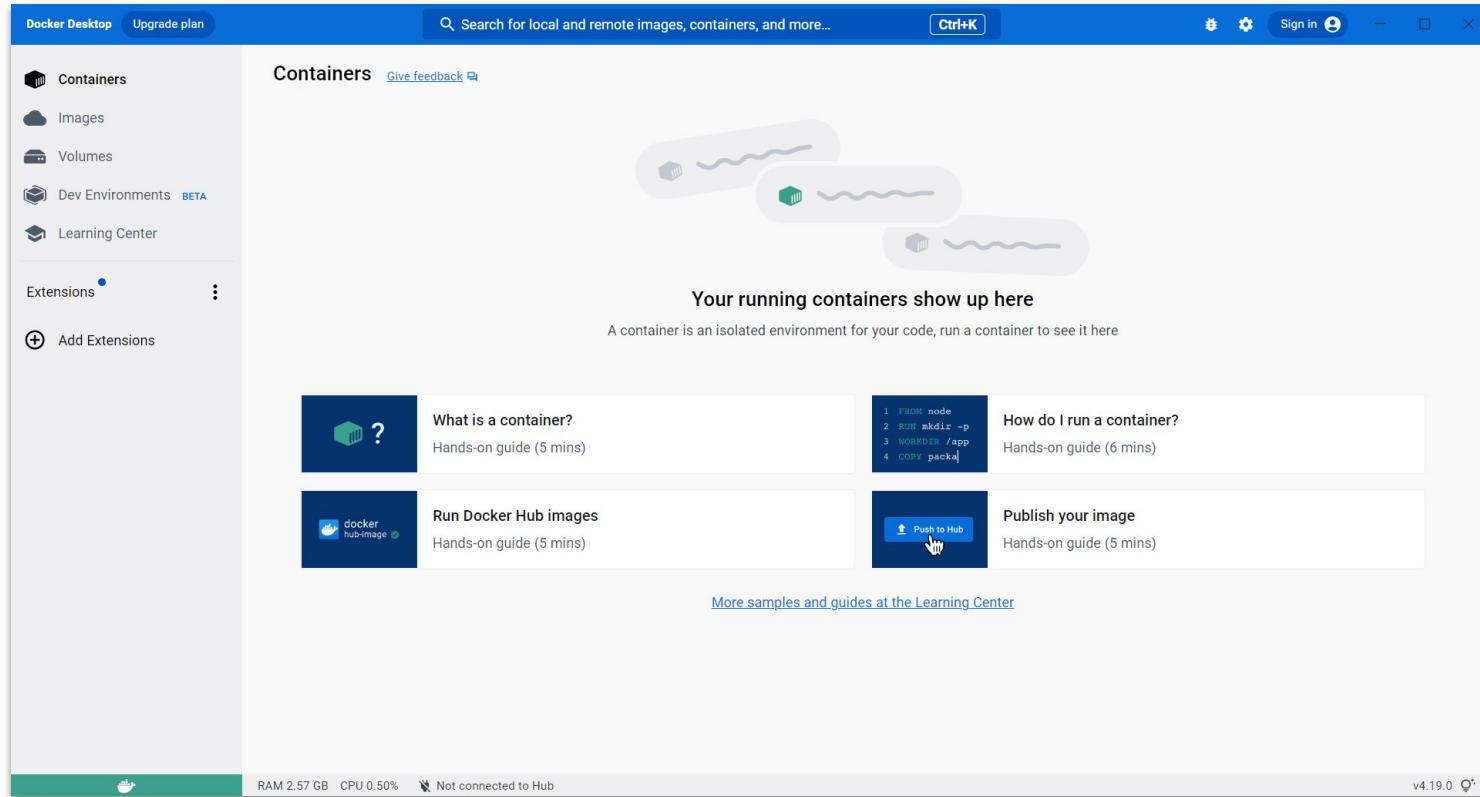


6. Finally, it will be necessary to accept the terms and conditions.



Installing Docker

7. At the end of the installation, Docker Desktop will open automatically.



Installing URSA

*The following instructions are required **only once** per computer.*

Installing URSA

1. Para instalar la aplicación, lo primero que se debe hacer es ingresar al [repositorio](#) y descargarlo (o clonarlo en el caso de tener experiencia en GitHub).

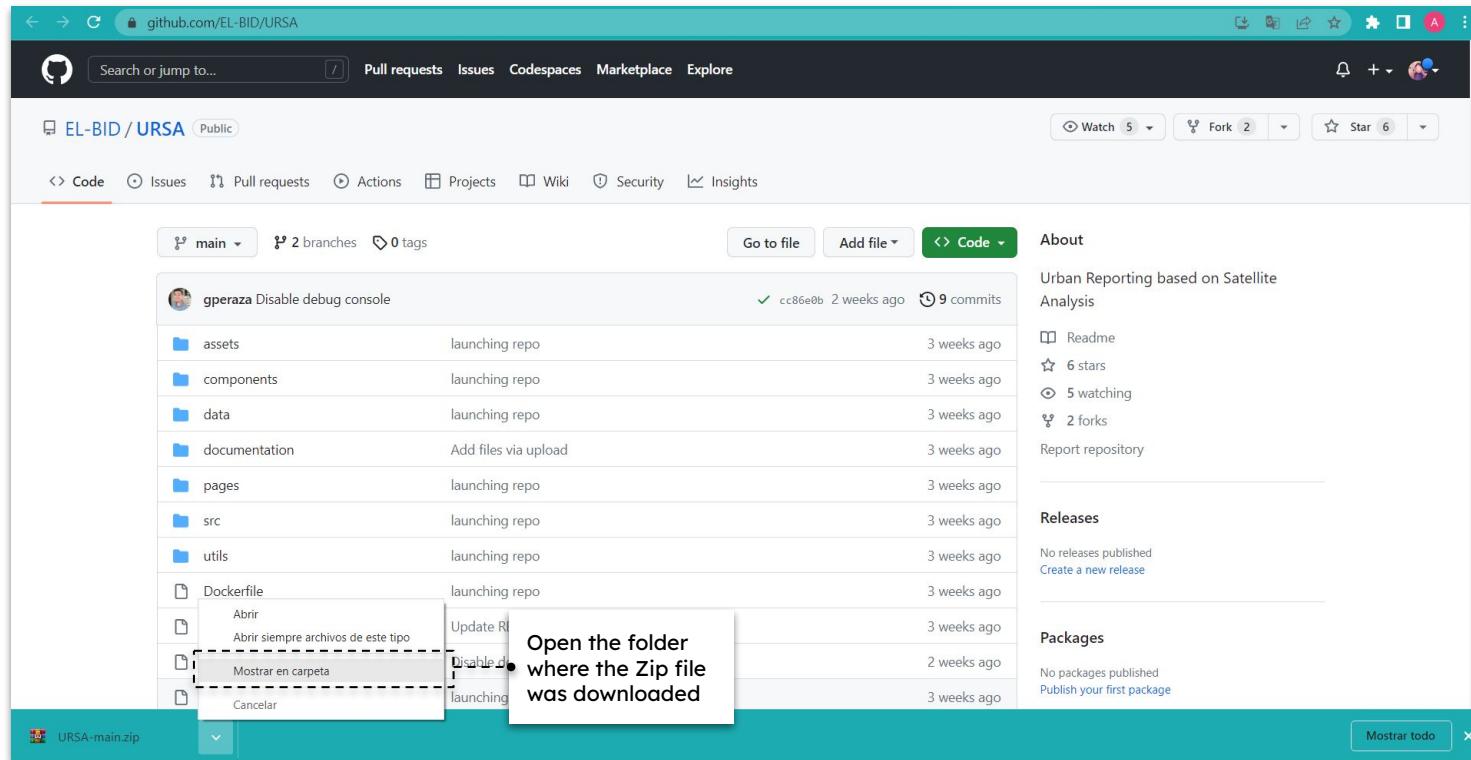
The screenshot shows the GitHub repository page for 'EL-BID / URSA'. The repository has 5 watches, 2 forks, and 6 stars. The 'Code' dropdown menu is open, showing options for 'Local' and 'Codespaces', and a 'Clone' section with 'HTTPS', 'SSH', and 'GitHub CLI' links. A 'Download ZIP' button is highlighted with a dashed box. Two callout boxes provide instructions: 'STEP 1 Access the app code' points to the 'Code' dropdown, and 'STEP 2 Download zipped files' points to the 'Download ZIP' button.

STEP 1
Access the app code

STEP 2
Download zipped files

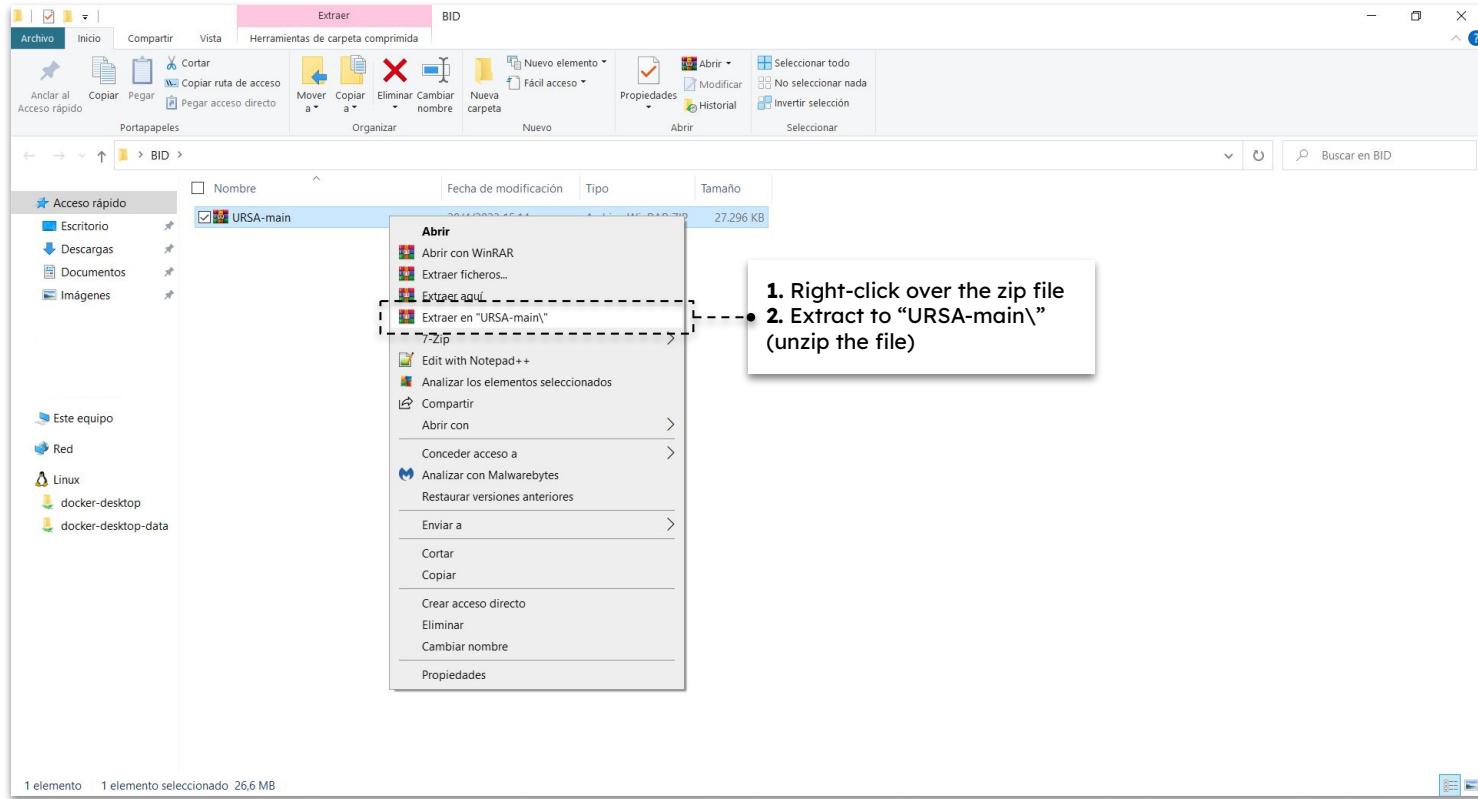
Installing URSA

2. Once downloaded, we need to go to the folder where it was downloaded and unzip the ZIP file.



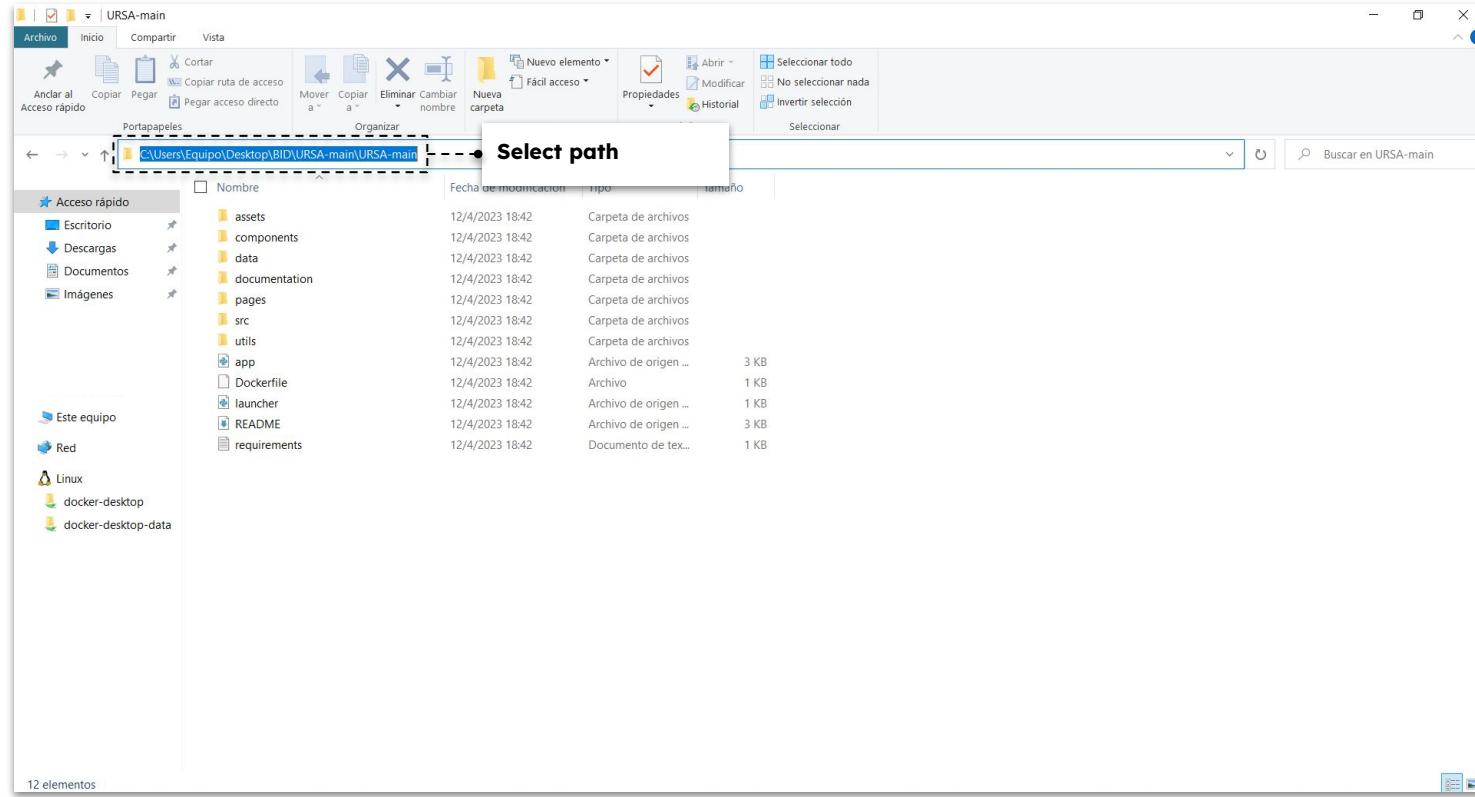
Installing URSA

2. Once downloaded, we need to go to the folder where it was downloaded and unzip the ZIP file.



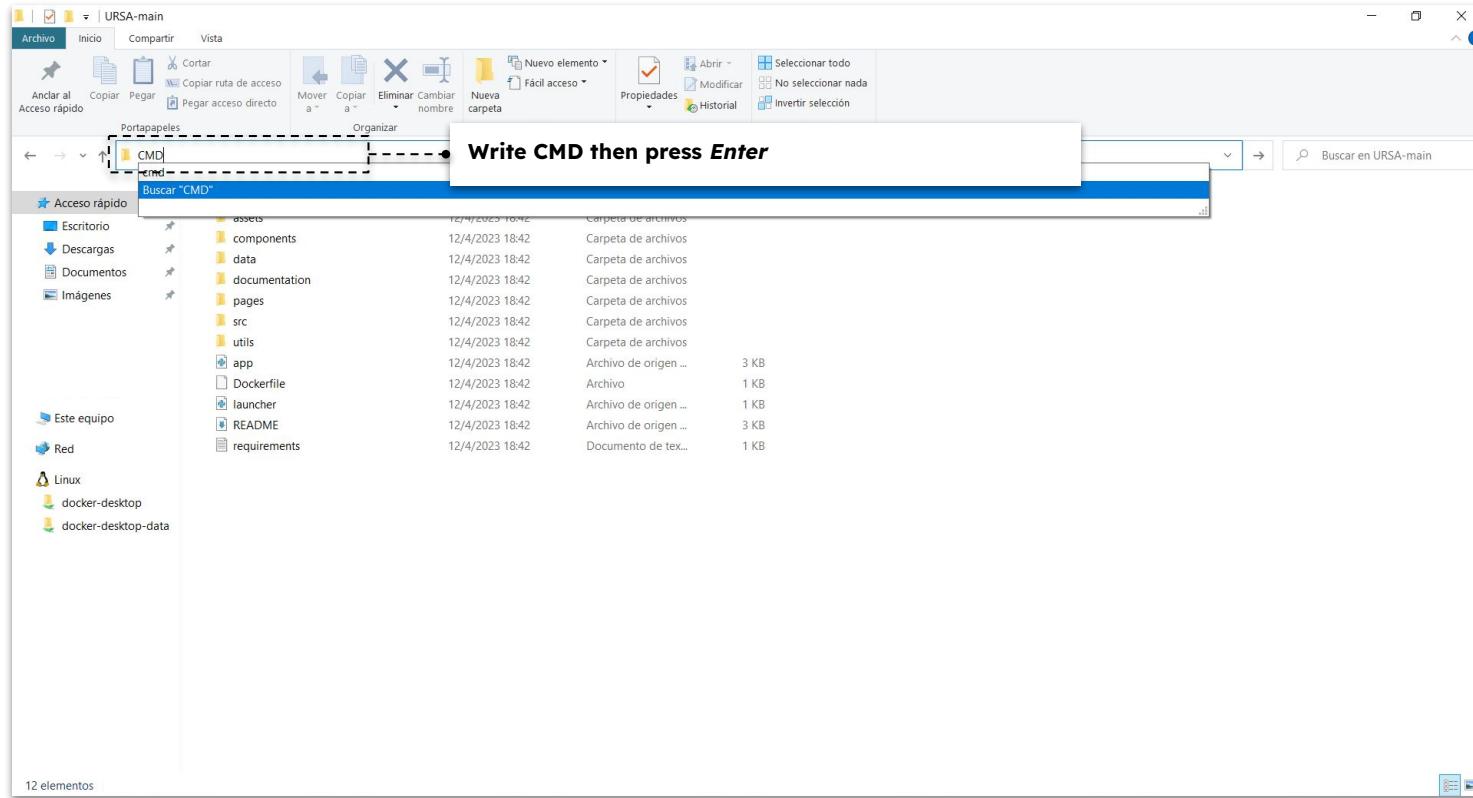
Installing URSA

3. Then, access the console (CMD). To do this, first, enter the decompressed folder (named "URSA-main") and click on the path/directory.



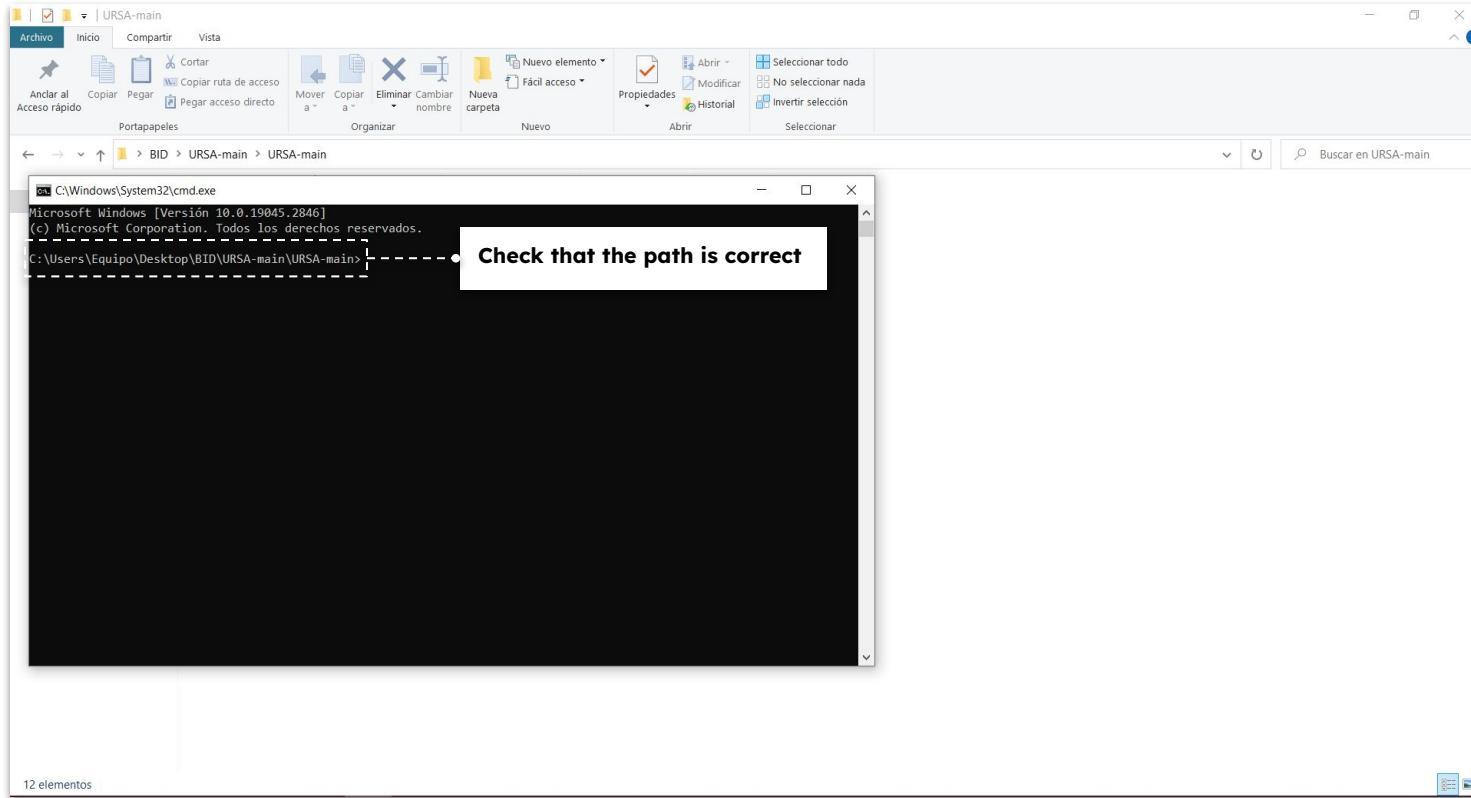
Installing URSA

4. And secondly, type **CMD** and press *Enter* on the keyboard.



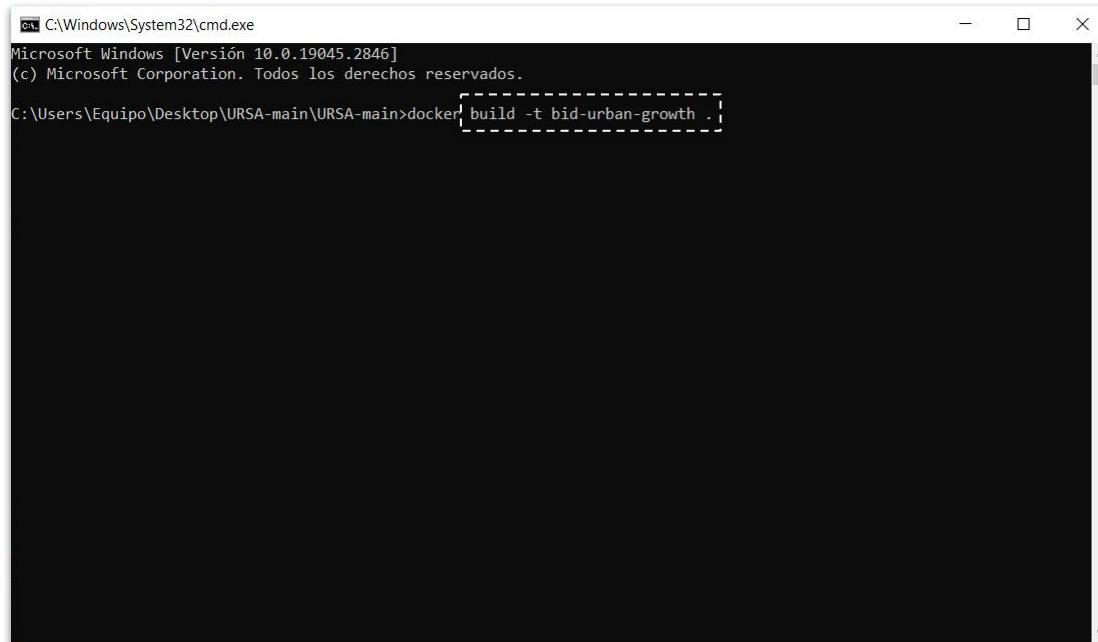
Installing URSA

5. The console (command line) will open in the directory with our files



Installing URSA

- From the console (command line), start the Docker image by executing the following line: **docker build -t bid-urban-growth**



A screenshot of a Windows Command Prompt window titled "C:\Windows\System32\cmd.exe". The window shows the following text:
Microsoft Windows [Versión 10.0.19045.2846]
(c) Microsoft Corporation. Todos los derechos reservados.
C:\Users\Equipo\Desktop\URSA-main\URSA-main>docker build -t bid-urban-growth .|

Installing URSA

7. Then, wait for all the lines of code to finish executing in the console. The process will take a while the first time as it needs to download and configure various software components. Once the initial setup is complete, subsequent launches will be almost instantaneous.

```
[+] Building 24.6s (4/11)
=> [1/7] FROM docker.io/jupyter/scipy-notebook@sha256:dc04d8fad24cd4ac555db0c6d3652ecd7b6255798a8328ffe62848ecd 21.2s
=> sha256:6ef5c1eada530a77798af78e081328cf4be0c1d7d348f682b73f494940402b26 13.02MB / 13.02MB 2.3s
=> sha256:81207f6bd5291a52651a96cee4a5243e2aa04352db86dcac68aeaf53b9d853d84 17.52kB / 17.52kB 0.0s
=> sha256:b780cc522ffbd853d1ac2ab9c90083569a008d76bc05a5b28ba1c9c80fffb5ab 681B / 681B 0.7s
=> sha256:2ab09b027e7f3a0c2e8bb1944ac46de38cebab7145f0bd6effebfe5492c818b6 29.53MB / 29.53MB 4.5s
=> sha256:4f4fb700ef54461cfa02571ae0db9a0dc1e0cdb5577484a6d75e68dc38eacc1 32B / 32B 1.2s
=> sha256:b984aa876370cf6e66756c2814a8f76015fbc1daed0d34b401556a5df0fda814f 1.92kB / 1.92kB 1.9s
=> sha256:807cf7d9f64290d2e130bed91da3dfa9a0552c81b384892966554ad2206e78e9 4.92kB / 4.92kB 2.5s
=> sha256:d8dbbf80d1f1d3644325af7c925f94c37101f17830a444bdb46b00b7a9863ca 151B / 151B 2.8s
=> sha256:2761e2005ffd9f07543b3366b9c9d3f2e2d70baef966439f3fcebf702ccb681 278B / 278B 3.1s
=> sha256:694a0803cd5c3aa9ae1bb79e51b84ff9afe2f4e65842bde5400ec88bf73fa4 92.68MB / 92.68MB 11.6s
=> sha256:1a7e0fe0aabef68ff05acc6ff3dcbb030b0b12f388e31c5bb1952c4dbfffd3853f 4.20kB / 4.20kB 3.5s
=> sha256:c3b25fb9c4c813f161bbec11d0306e0545a2509264a24f84b87c3a872f3fd1b 30.50MB / 30.50MB 8.2s
=> sha256:c9b96d5c3c5289ef79ad0796c8d10a424b2953e600273aed96bf7471a5e0330 119.21MB / 119.21MB 14.9s
=> extracting sha256:2ab09b027e7f3a0c2e8bb1944ac46de38cebab7145f0bd6effebfe5492c818b6 9.3s
=> sha256:5b74db4936ae2ec4ffea190e8927beaba836469461ce3b5079d6239b9f591f 683B / 683B 8.9s
=> sha256:44655641b144b32109f42b167edbcb73b3e48a90e620a9b850aea821e7b31dce0 1.41kB / 1.41kB 9.3s
=> sha256:b96108ec43efc90712a1bf474b94e79ac0bafff623f95979d43e08d2729725d72 1.48kB / 1.48kB 9.7s
=> sha256:32f1b067711befdeecbf3687b2acf91f1c5b016ff8303cd2cd7365e186edf5e 119.54MB / 177.85MB 21.0s
=> sha256:2d7d1a89897726c723c350b869ab8115a66abd96f2205df8a643ad046ec079d3 1.46kB / 1.46kB 12.0s
=> sha256:d8ee39f3f1ce8b565b4e2b58bbae8c6d364f0eff9ea4e3e1572c091e74ff7f95 436B / 436B 12.4s
=> sha256:4369ac14db9383d0ae43d9d2a46464c83817525f776d6ec7573e40892a9c8b67 77.04MB / 278.29MB 21.0s
=> sha256:2038e44c3464be6b740741363cce61be9f9ea528ac5e87c0064269d435ad6570 55.57MB / 486.25MB 21.0s
=> extracting sha256:6ef5c1eada530a77798af78e081328cf4be0c1d7d348f682b73f494940402b26 4.5s
=> extracting sha256:b780cc522ffbd853d1ac2ab9c90083569a008d76bc05a5b28ba1c9c80fffb5ab 0.0s
=> extracting sha256:4f4fb700ef54461cfa02571ae0db9a0dc1e0cdb5577484a6d75e68dc38eacc1 0.0s
=> [internal] load build context 6.4s
=> transferring context: 53.18MB 6.0s
```

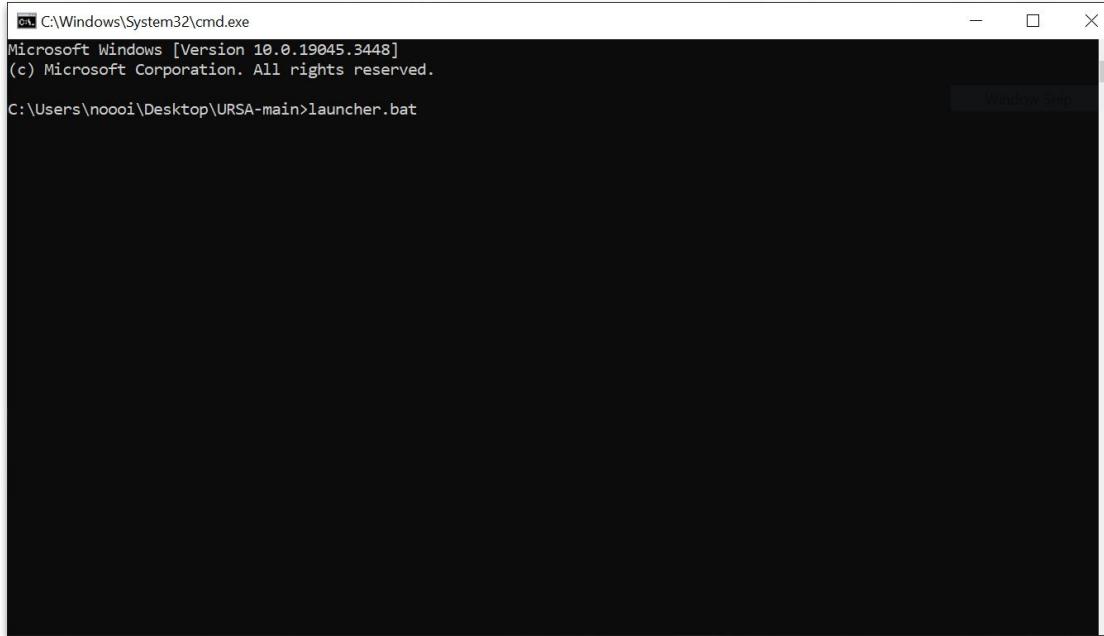
This is how the console looks while the code is running.

Running URSA

The following instructions are required each time the application is run

Running URSA

1. To load and run a Docker container that will start the app, open the console (command line) again in the directory where the repository is located and execute the following command: launcher.bat



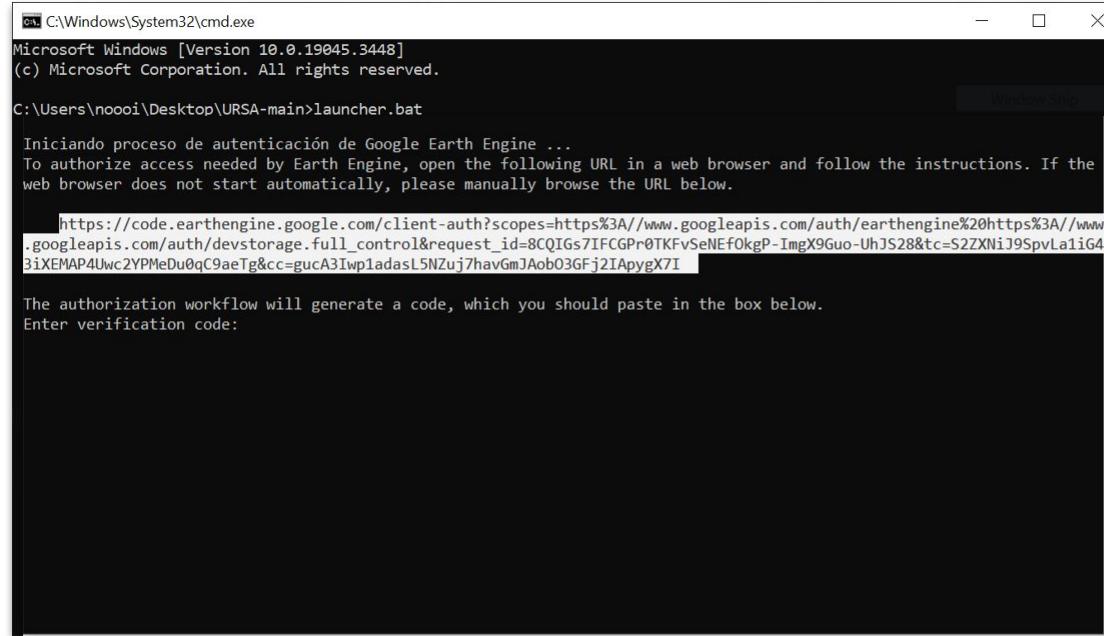
```
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.19045.3448]
(c) Microsoft Corporation. All rights reserved.

C:\Users\nooooi\Desktop\URSA-main>launcher.bat
```

(if you are using Mac or Linux, instead run “**bash launcher.sh**”)

Running URSA

2. The application will request a code from Google Earth Engine. To obtain it, simply copy the link that appears in the console and paste it into the preferred web browser.



```
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.19045.3448]
(c) Microsoft Corporation. All rights reserved.

C:\Users\nooooi\Desktop\URSA-main>launcher.bat

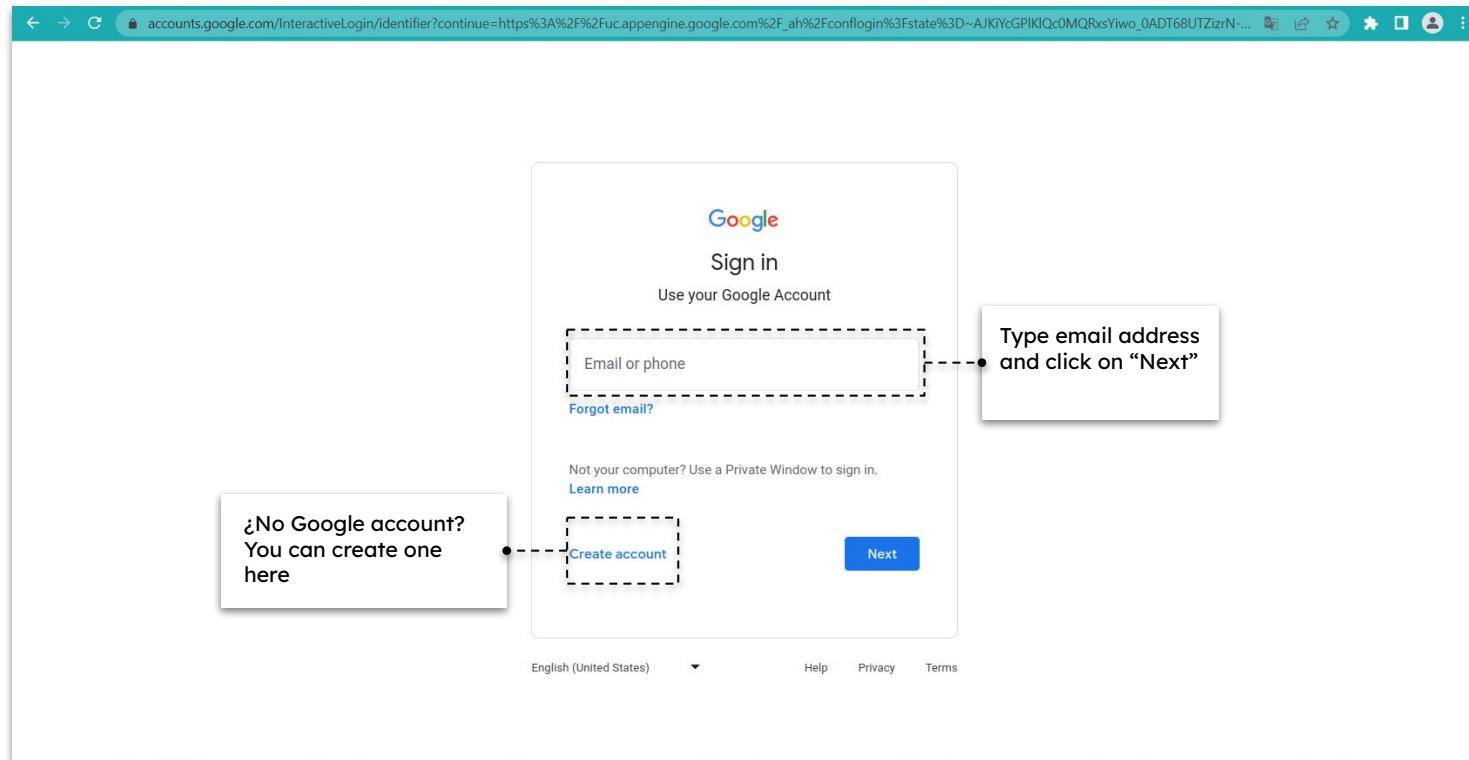
Iniciando proceso de autenticación de Google Earth Engine ...
To authorize access needed by Earth Engine, open the following URL in a web browser and follow the instructions. If the
web browser does not start automatically, please manually browse the URL below.

https://code.earthengine.google.com/client-auth?scopes=https%3A//www.googleapis.com/auth/earthengine%20https%3A//www.googleapis.com/auth/devstorage.full\_control&request\_id=8CQIGs7IFCGPr0TKFvSeNEfOkgP-ImgX9Guo-UhJS28&tc=S2ZXNiJ9SpvLa1iG43iXEMAP4Uwc2YPMeDu0qC9aeTg&cc=gucA3Iwp1adasL5NZuj7havGmJAob03GFj2IApygX7I

The authorization workflow will generate a code, which you should paste in the box below.
Enter verification code:
```

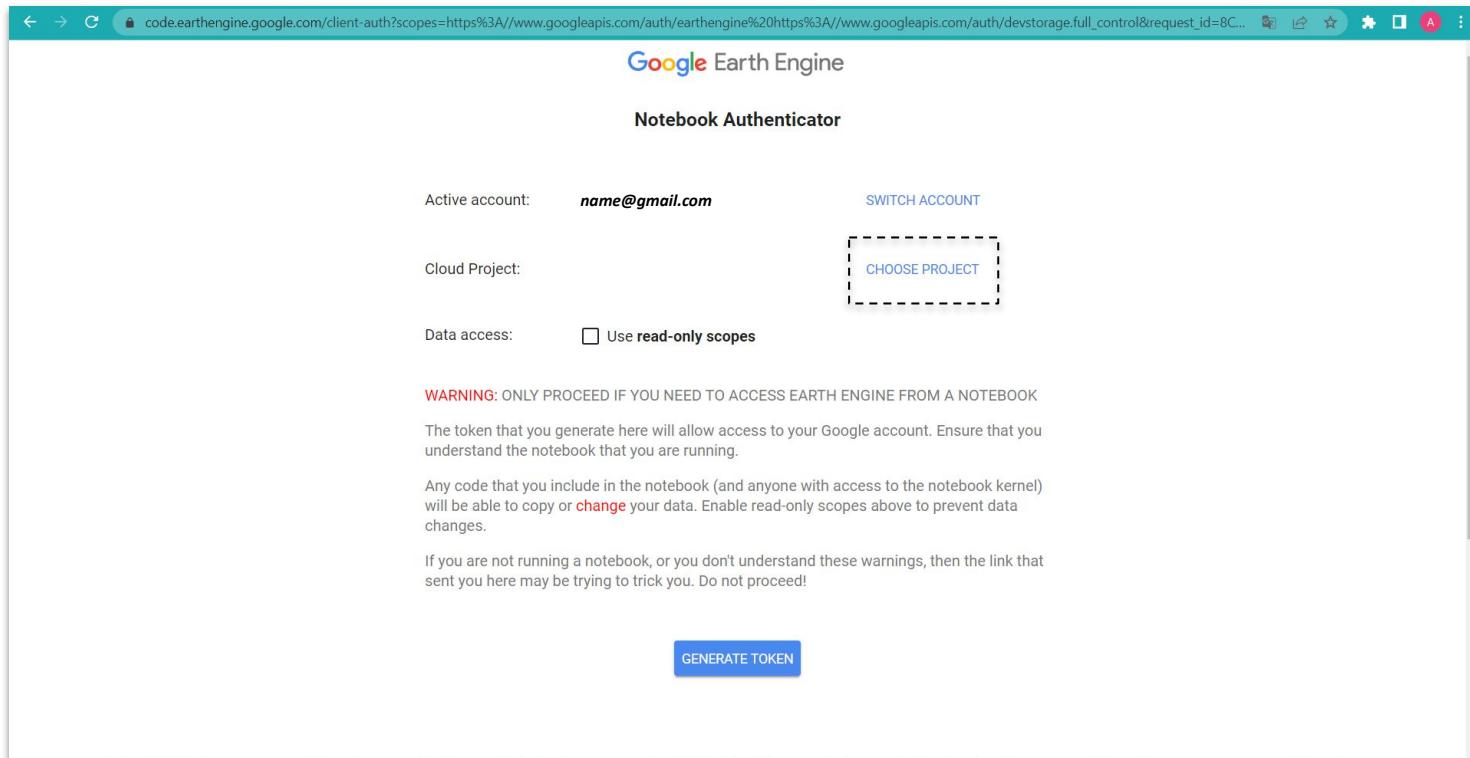
Running URSA

3. The link will take us to Gmail and prompt us to log in with our email and password. If you don't have an account, you can create one by selecting 'Create account'.



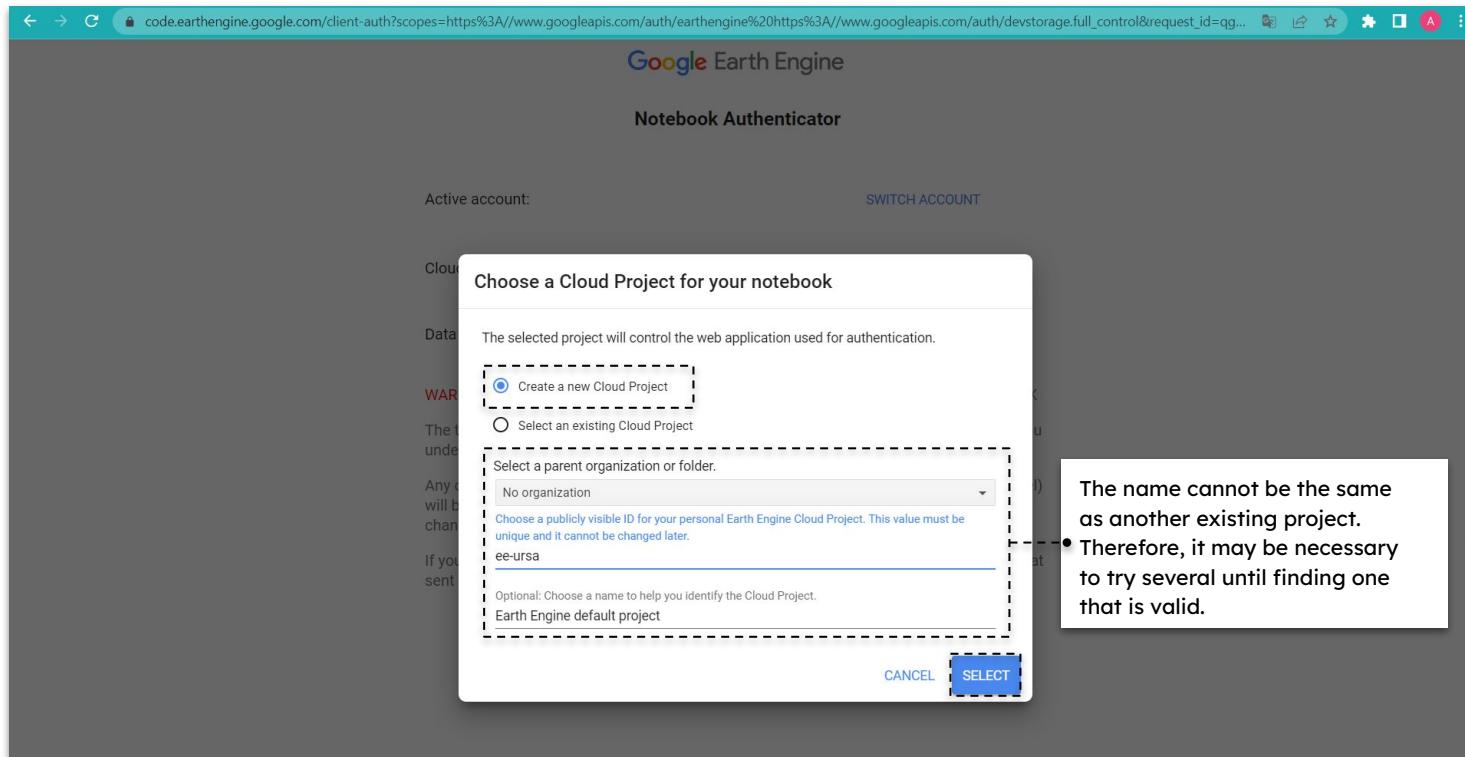
Running URSA

4. We will have to choose the 'Cloud Project' from 'Choose Project'.



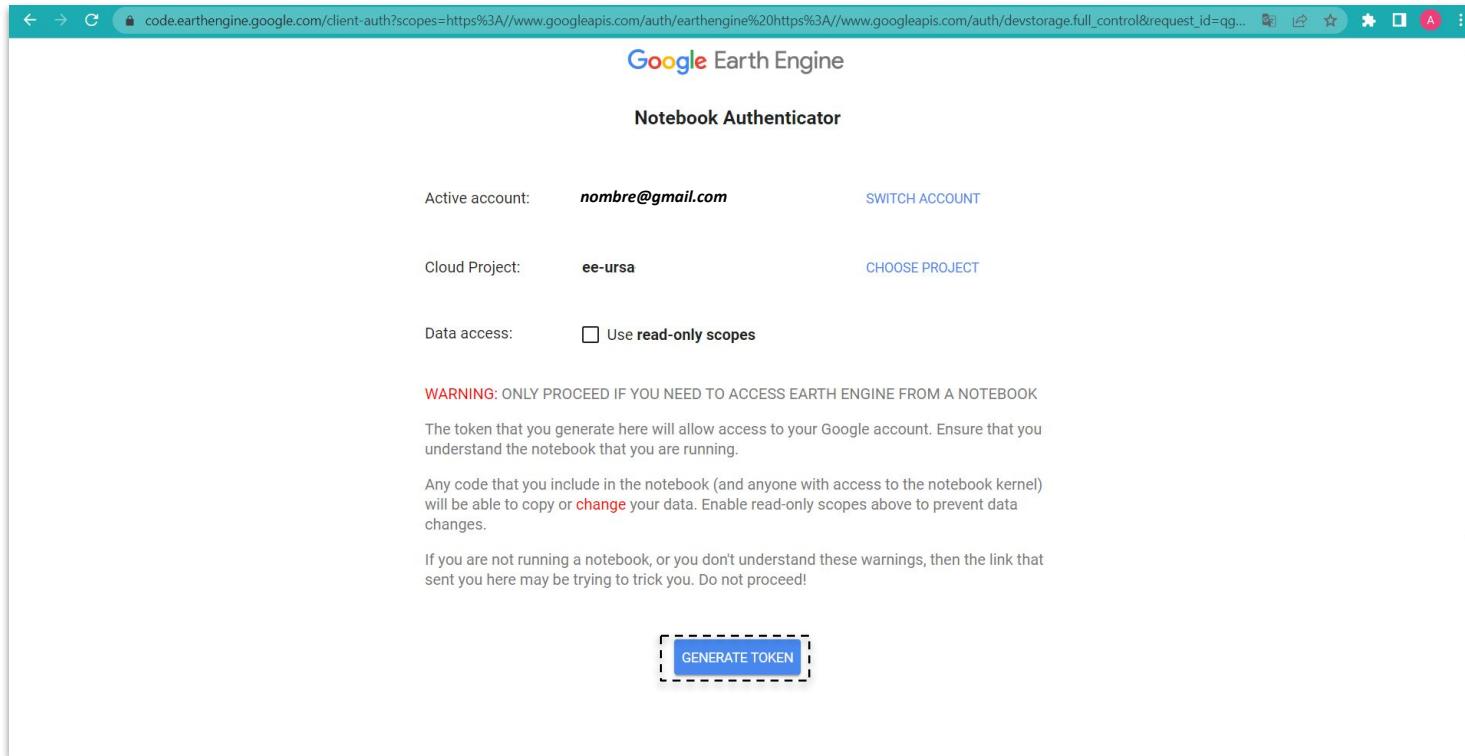
Running URSA

5. A window will open where you'll need to create a new project.



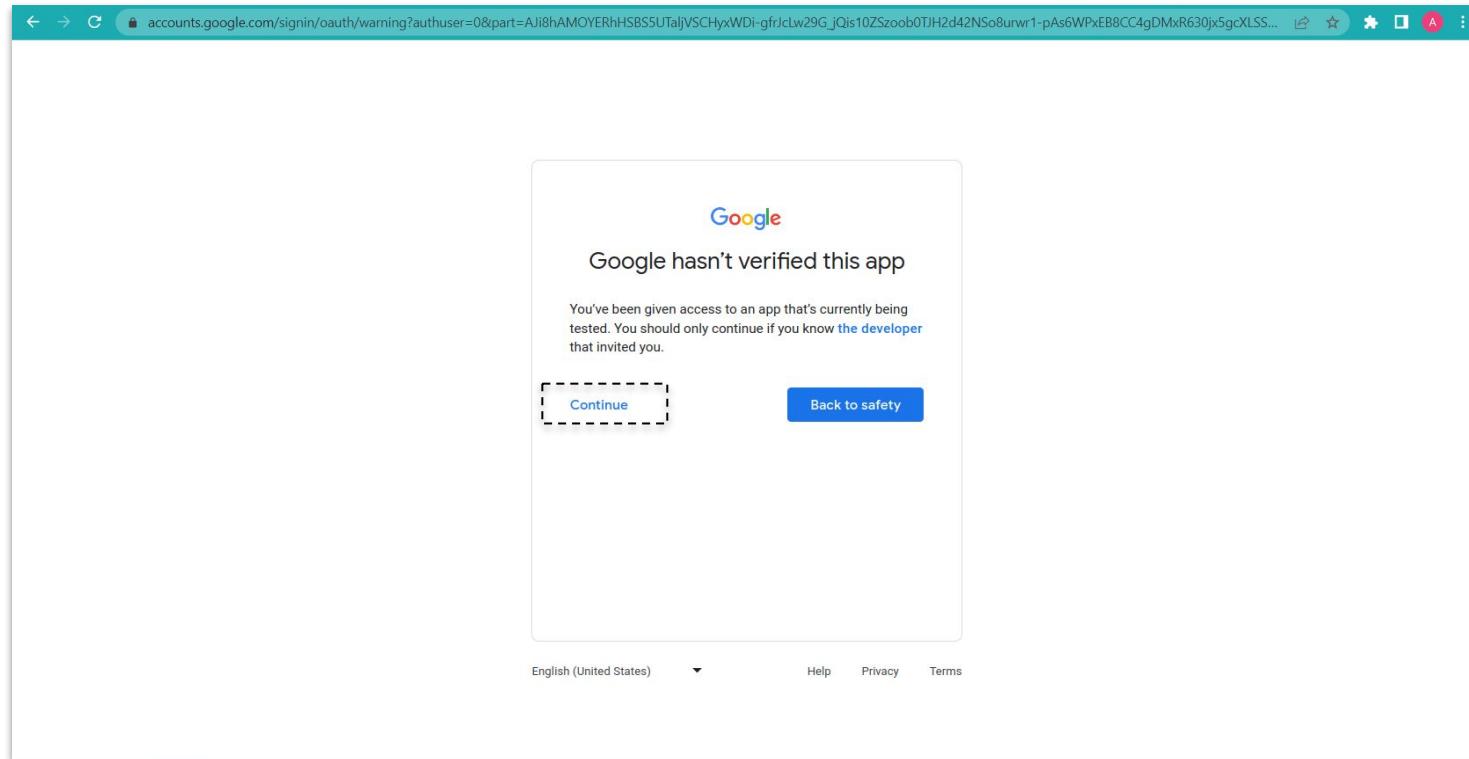
Running URSA

6. Once the name is selected, complete the previous window and click on "**GENERATE TOKEN**" to proceed.



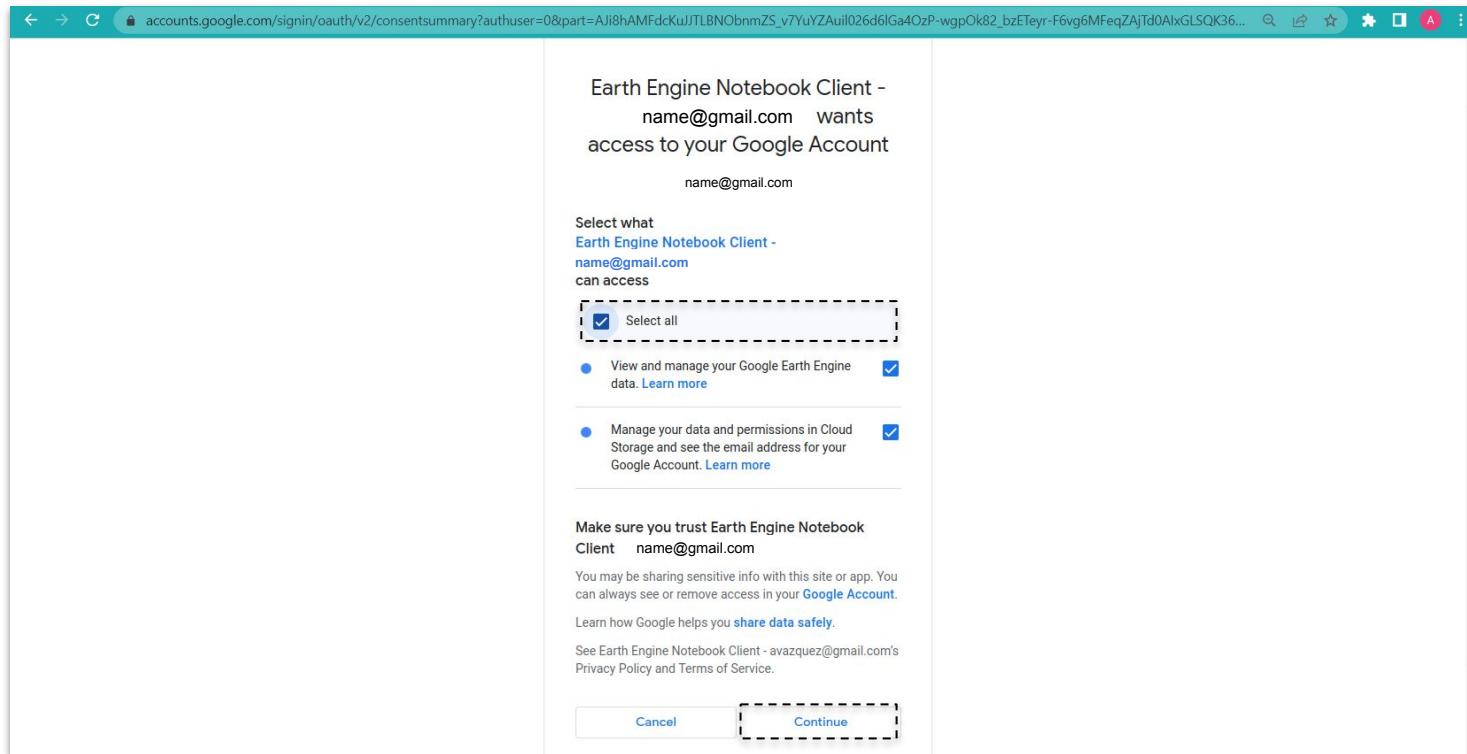
Running URSA

7. A warning page will appear indicating that Google has not created the application. Click "Continue" to proceed with the authentication process.



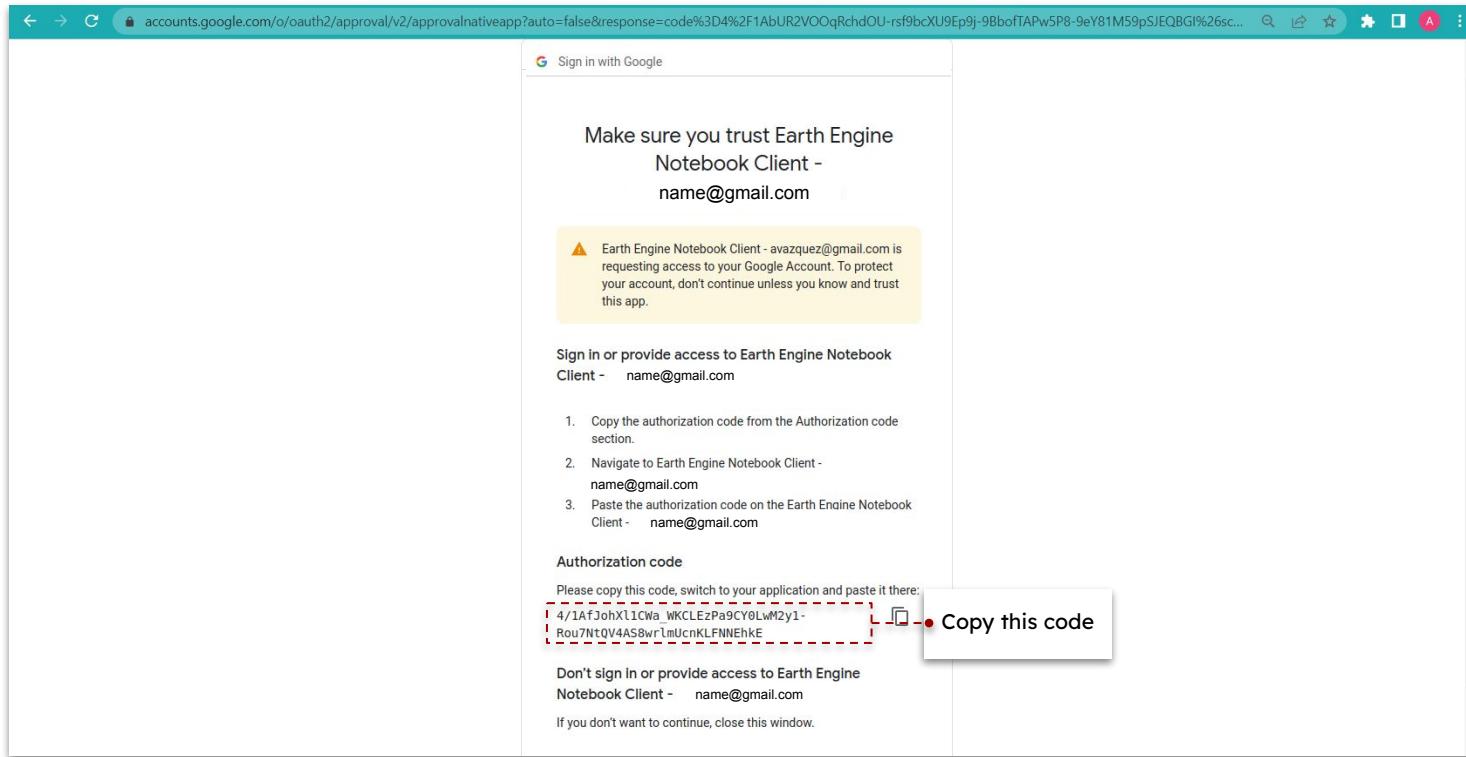
Running URSA

8. The consent screen will appear where it is necessary to give consent to the requested fields and click "Continue."



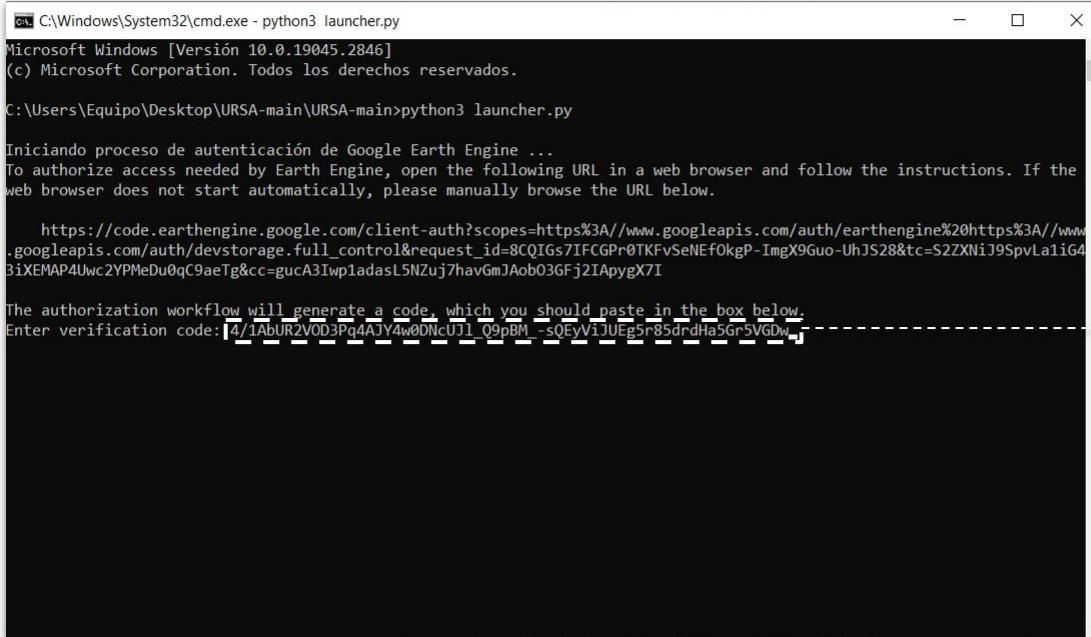
Running URSA

9. Finally, the authorization code will appear. It is necessary to copy the verification code/token from the authorization



Running URSA

10. Paste the code in the command line console:



```
C:\Windows\System32\cmd.exe - python3 launcher.py
Microsoft Windows [Versión 10.0.19045.2846]
(c) Microsoft Corporation. Todos los derechos reservados.

C:\Users\Equipo\Desktop\URSA-main\URSA-main>python3 launcher.py

Iniciando proceso de autenticación de Google Earth Engine ...
To authorize access needed by Earth Engine, open the following URL in a web browser and follow the instructions. If the
web browser does not start automatically, please manually browse the URL below.

https://code.earthengine.google.com/client-auth?scopes=https%3A//www.googleapis.com/auth/earthengine%20https%3A//www
.googleapis.com/auth/devstorage.full_control&request_id=8QIGs7IFCGPr0TKFvSeNEf0kgP-ImgX9Guo-UhJS28&tc=S2ZXNiJ9SpvLa1iG4
BiXEMAP4Uwc2YPMcDu0qC9aeTg&cc=gucaA3Iwp1adasL5NZuj7havGmJAob03GFj2IApygX7I

The authorization workflow will generate a code, which you should paste in the box below.
Enter verification code: 4/1AbUR2VOD3Pq4AJY4w0DNcUJ1_09pBM_-s0EyViJUEg5r85drdHa5Gr5VGdw
```

Paste the code
and press *Enter*

Running URSA

11. A message will appear indicating that the authentication was successful.

```
C:\Windows\System32\cmd.exe - python3 launcher.py
Microsoft Windows [Versión 10.0.19045.2846]
(c) Microsoft Corporation. Todos los derechos reservados.

C:\Users\Equipo\Desktop\URSA-main\URSA-main>python3 launcher.py

Iniciando proceso de autenticación de Google Earth Engine ...
To authorize access needed by Earth Engine, open the following URL in a web browser and follow the instructions. If the
web browser does not start automatically, please manually browse the URL below.

    https://code.earthengine.google.com/client-auth?scopes=https%3A//www.googleapis.com/auth/earthengine%20https%3A//www
    .googleapis.com/auth/devstorage.full_control&request_id=8CQIGsTIFCGPr0TFvSeNEf0kgP-ImgX9Guo-UhJS28&tc=S2ZXNiJ9SpvLa1iG4
    BiXEMAP4Uwc2YPMeDu0qC9aeTg&cc=gucA3Iwp1adasL5NZuj7havGmJAob03GFj2IApyg7I

The authorization workflow will generate a code, which you should paste in the box below.
Enter verification code: 4/1AbUR2VOD3Pq4AJY4w0DNcUJl_09pBM_-sQEyViJUEg5r85drdHa5Gr5VGdW

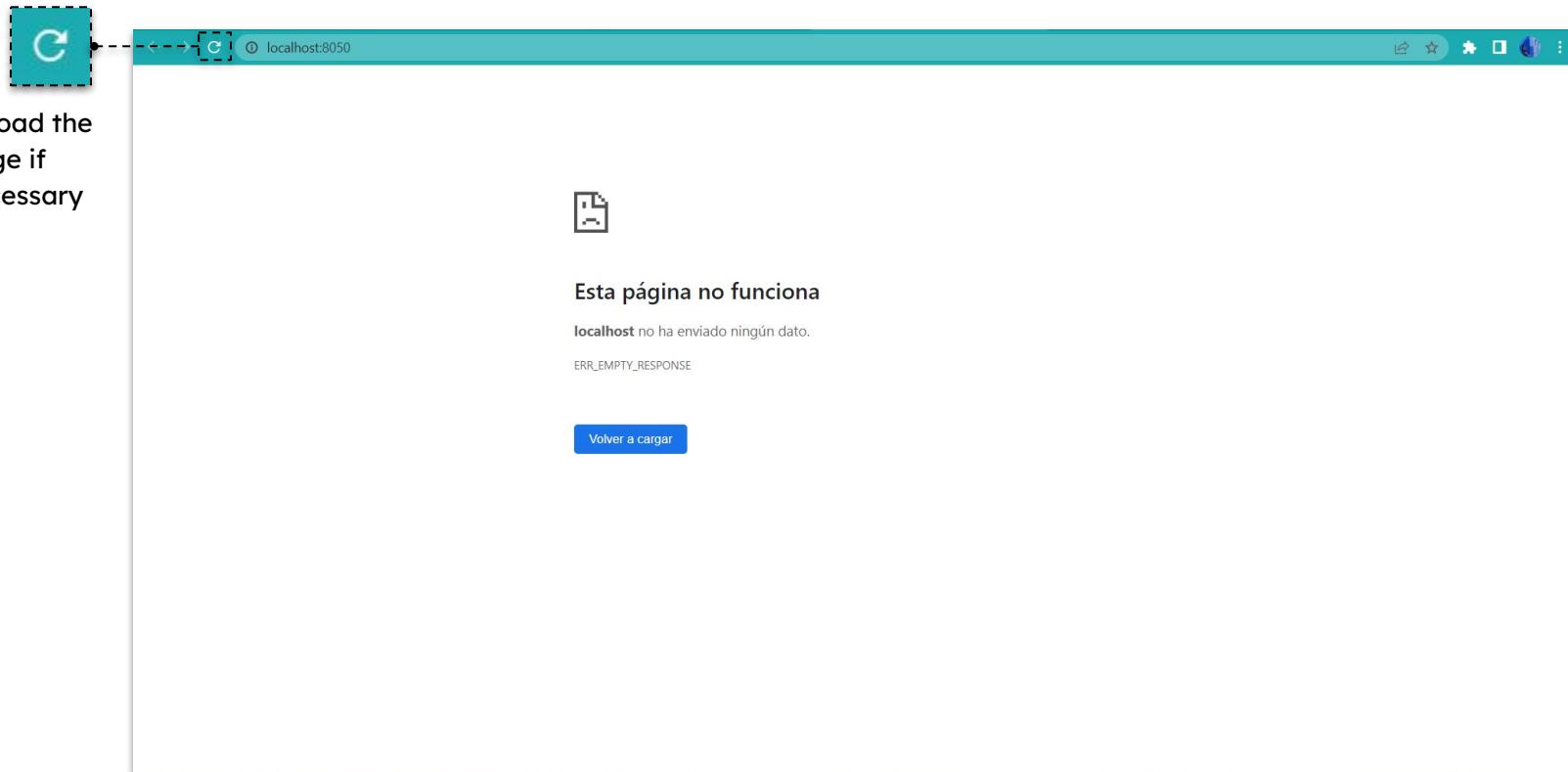
Successfully saved authorization token.
¡La autenticación de Google Earth Engine ha sido exitosa! -----
Dash is running on http://0.0.0.0:8050/
-----
```

Authentication completed!

```
* Serving Flask app 'app'
* Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on all addresses (0.0.0.0)
* Running on http://127.0.0.1:8050
* Running on http://172.17.0.2:8050
Press CTRL+C to quit
```

Running URSA

12. To view the application, open a window with the address <http://localhost:8050/>



Running URSA

13. To start using the application, choose the country and city of interest.

This screenshot shows the 'Welcome' page of the URSA web application. At the top, there are navigation links for Home, 127.0.0.1:8050, and three language options: Español, English, and Portuguese. On the left, there is a vertical navigation bar with icons for Home, Cities, Buildings, Population, and Temperature. The main content area features a map of South America and Central America. Two dropdown menus are overlaid on the map: one for 'Select country' containing 'Argentina' and another for 'Select city of interest' containing 'Bahía Blanca'. A 'Select' button is located between the two dropdowns. A callout box points to the 'Select' button with the text 'Click on Select to choose a city'. To the right of the map, there is a text box explaining the default bounding box and how to modify it using zoom controls (+/-) and selection tools (checkbox, selection box, etc.). The text also instructs users to press the 'Apply' button after selecting their area of interest.

Home 127.0.0.1:8050

Español English Portuguese

Welcome

This web application will allow you to explore the historical and future sprawl of your city.

Please select a country and city from the menus below.

Once you have chosen the city, you can explore the visualizations on the left navigation bar.

Select country

Select city of interest

Argentina

Bahía Blanca

Select

Click on Select to choose a city

The default bounding box uses the limits of metropolitan areas identified by the Global Human Settlement Layer (GHS). We recommend using these. If you want to modify the analysis area to expand or reduce it, use the buttons on the right. When you have finished selecting your area of interest, press the Apply button.

If you want to use the

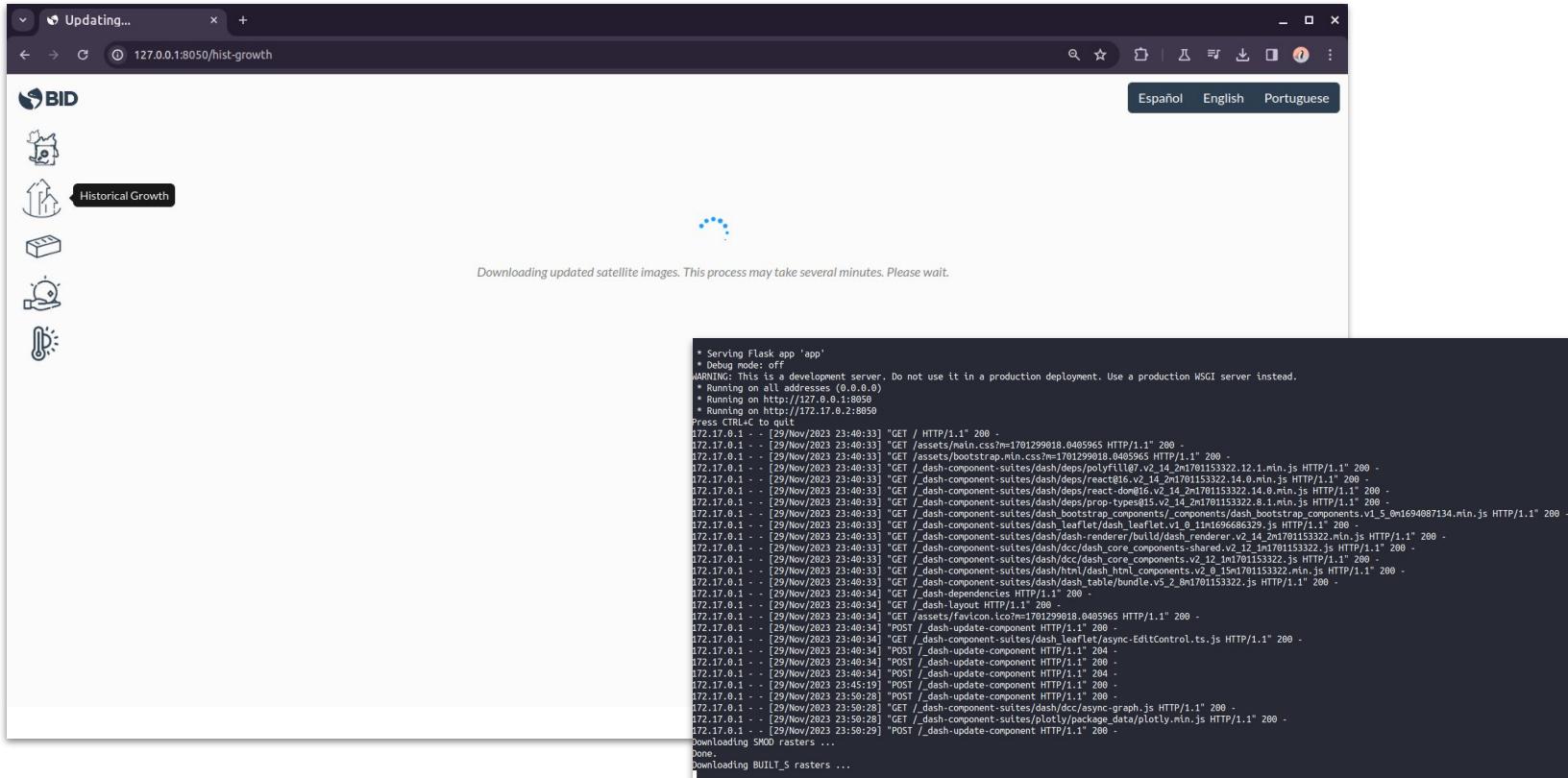
Running URSA

14. Next, choose from one of the 4 categories for which you want to view information: "Historical Growth," "Land Use," "Future Scenarios," "Heat Islands."

The screenshot shows the URSA application running in a browser window. The top navigation bar includes a logo for BID, language options (Español, English, Portuguese), and a search bar. On the left, a sidebar menu lists five categories: Home, Historical Growth, Land Use, Future Scenarios, and Heat Islands. The 'Home' option is currently selected. Below the menu, there are two dropdown menus: 'Argentina' and 'Bahía Blanca', both set to 'Select'. The main area features a map of the Bahía Blanca region in Argentina. A blue bounding box highlights a specific area around the city center. To the right of the map, a tooltip provides instructions for modifying the analysis area: "The default bounding box uses the limits of metropolitan areas identified by the Global Human Settlement Layer (GHSL). We recommend using these. If you want to modify the analysis area to expand or reduce it, use the buttons on the right. When you have finished selecting your area of interest, press the Apply button." At the bottom right of the map area, there is a note: "If you want to use the".

Running URSA

15. The query may take several minutes depending on the size and volume of information for the selected city. You can see all the code being executed to generate results from the console.



Updating... 127.0.0.1:8050/hist-growth

BID

Español English Portuguese

Historical Growth

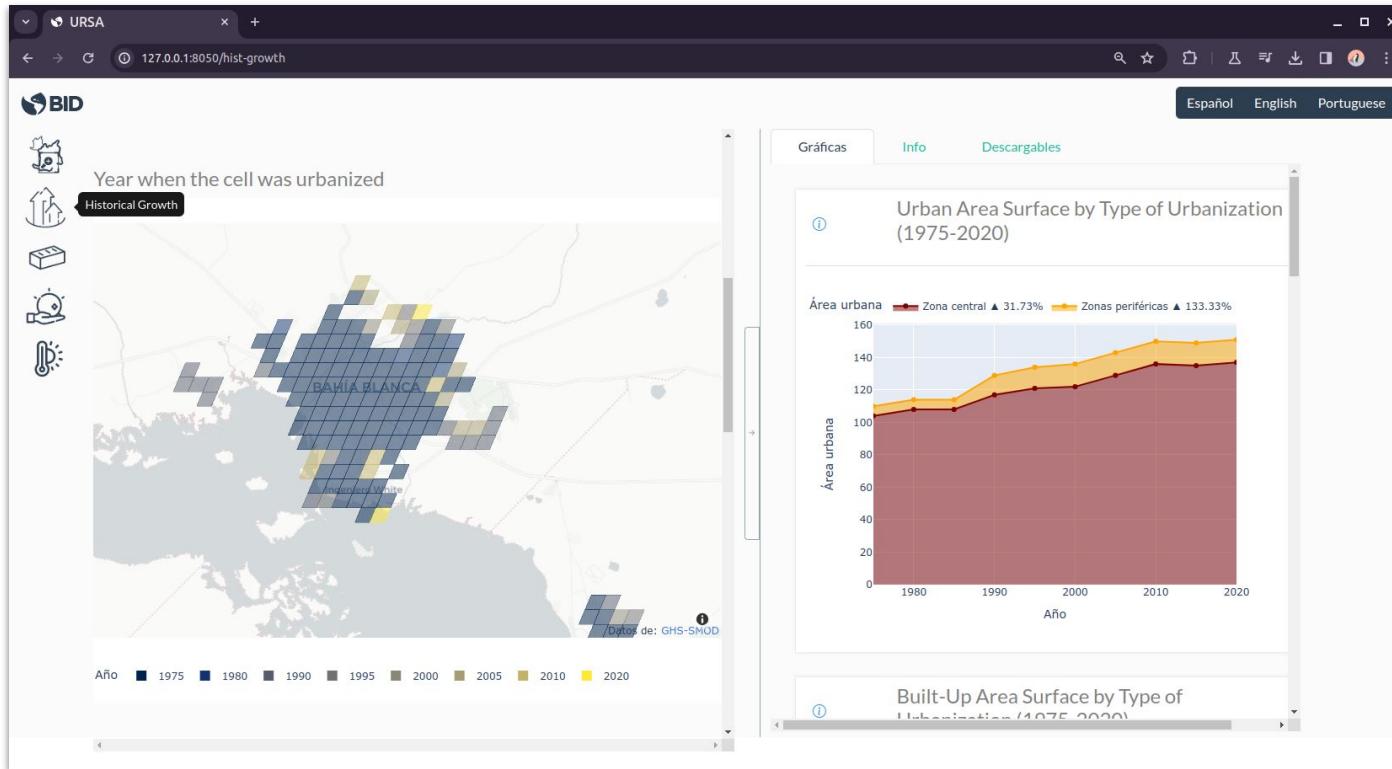
Downloading updated satellite images. This process may take several minutes. Please wait.

```
* Serving Flask app 'app'
* Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on all addresses (0.0.0.0)
  Run on https://127.0.0.1:8050
* Running on http://172.17.0.2:8050
Press CTRL+C to quit
[29/Nov/2023 23:40:33] "GET / HTTP/1.1" 200 -
[29/Nov/2023 23:40:33] "GET /assets/main.css?m=1701299018.0405965 HTTP/1.1" 200 -
[29/Nov/2023 23:40:33] "GET /assets/bootstrap.min.css?m=1701299018.0405965 HTTP/1.1" 200 -
[29/Nov/2023 23:40:33] "GET /dash-component-suites/dash/deps/react-dom@16.v2_14.2n1701153322.12.1.min.js HTTP/1.1" 200 -
[29/Nov/2023 23:40:33] "GET /dash-component-suites/dash/deps/react-dom@16.v2_14.2n1701153322.14.0.min.js HTTP/1.1" 200 -
[29/Nov/2023 23:40:33] "GET /dash-component-suites/dash/deps/react-dom@16.v2_14.2n1701153322.14.0.min.js HTTP/1.1" 200 -
[29/Nov/2023 23:40:33] "GET /dash-component-suites/dash/deps/react-dom@15.v2_14.2n1701153322.8.1.min.js HTTP/1.1" 200 -
[29/Nov/2023 23:40:33] "GET /dash-component-suites/dash_bootstrap_components@v1.5.0_m1694087134.min.js HTTP/1.1" 200 -
[29/Nov/2023 23:40:33] "GET /dash-component-suites/dash_bootstrap_components@v1.5.0_m1694087134.components/dash_bootstrap_components.v1.5.0_m1694087134.min.js HTTP/1.1" 200 -
[29/Nov/2023 23:40:33] "GET /dash-component-suites/dash_leaflet@v1.0_1m1n696686329.js HTTP/1.1" 200 -
[29/Nov/2023 23:40:33] "GET /dash-component-suites/dash_renderer/build/dash_renderer.v2_14.2n1701153322.mln.js HTTP/1.1" 200 -
[29/Nov/2023 23:40:33] "GET /dash-component-suites/dash_renderer/build/dash_renderer.v2_14.2n1701153322.mln.js HTTP/1.1" 200 -
[29/Nov/2023 23:40:33] "GET /dash-component-suites/dash_reactcore@v2.0_15n1701153322.js HTTP/1.1" 200 -
[29/Nov/2023 23:40:33] "GET /dash-component-suites/dash_reactcore@v2.0_15n1701153322.mln.js HTTP/1.1" 200 -
[29/Nov/2023 23:40:33] "GET /dash-component-suites/dash_table@bundle.v2_8n1701153322.js HTTP/1.1" 200 -
[29/Nov/2023 23:40:34] "GET /dash-dependencies HTTP/1.1" 200 -
[29/Nov/2023 23:40:34] "GET /dash-layout HTTP/1.1" 200 -
[29/Nov/2023 23:40:34] "GET /assets/favicon.ico?m=1701299018.0405965 HTTP/1.1" 200 -
[29/Nov/2023 23:40:34] "POST /dash-update-component -"
[29/Nov/2023 23:40:34] "GET /dash-component-suites/dash_leaflet@v1.0_m1n696686329.js HTTP/1.1" 200 -
[29/Nov/2023 23:40:34] "POST /dash-update-component HTTP/1.1" 204 -
[29/Nov/2023 23:40:34] "POST /dash-update-component HTTP/1.1" 200 -
[29/Nov/2023 23:40:34] "POST /dash-update-component HTTP/1.1" 204 -
[29/Nov/2023 23:45:19] "POST /dash-update-component HTTP/1.1" 200 -
[29/Nov/2023 23:45:19] "POST /dash-update-component HTTP/1.1" 200 -
[29/Nov/2023 23:50:28] "POST /dash-update-component HTTP/1.1" 200 -
[29/Nov/2023 23:50:28] "GET /dash-component-suites/dcc/async-graph.js HTTP/1.1" 200 -
[29/Nov/2023 23:50:28] "GET /dash-component-suites/plotly/package_data/plotly.min.js HTTP/1.1" 200 -
[29/Nov/2023 23:50:29] "POST /dash-update-component HTTP/1.1" 200 -
Done, Downloading BUILT_S rasters ...

```

Running URSA

16. When the information finishes loading, you can navigate all the data related to the selected category. To view other categories, you will need to select them and wait for the information to load.



¡Thank you!



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