

# Crop monitoring during COVID-19 with ESA RACE Dashboard and EO Browser

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# Summary

## 1. Introduction

1. Intro to ESA RACE Dashboard
2. Intro to EO Browser

## 2. Case Study

1. RACE Dashboard: Context
2. EO Browser:
  - Data Search
  - Data comparison
  - Time series extraction (pixel and polygon)

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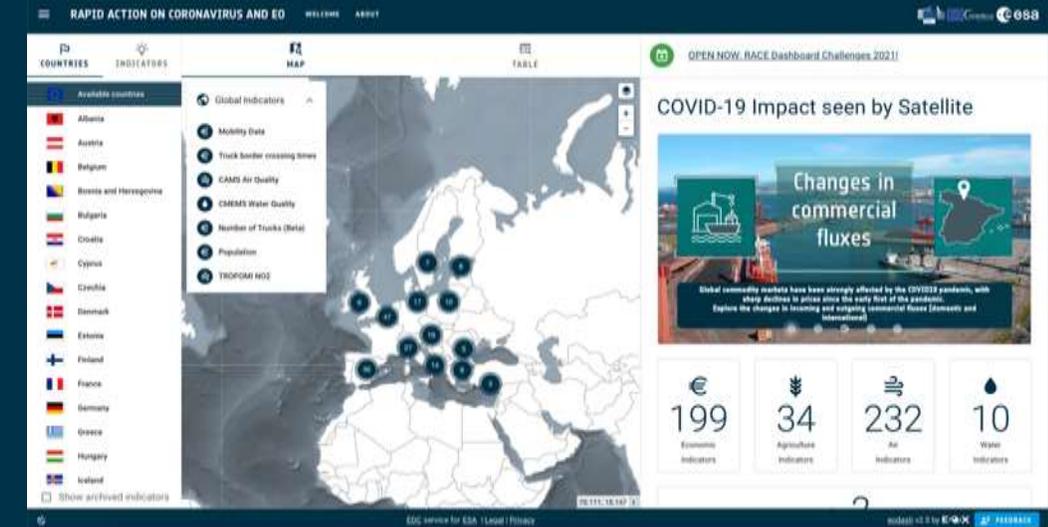
## Objectives:

- Publish Earth Observation information on the state of the European economy and society.
- Use European Earth Observation:
  - Copernicus Sentinels and Third Party Missions
  - Leverage the capabilities of European companies and use the latest AI-powered platform technology

## Topics of interest:

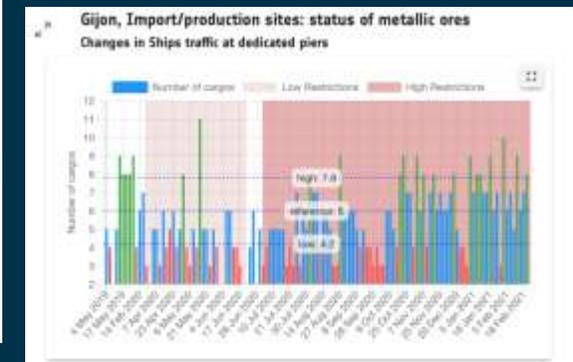
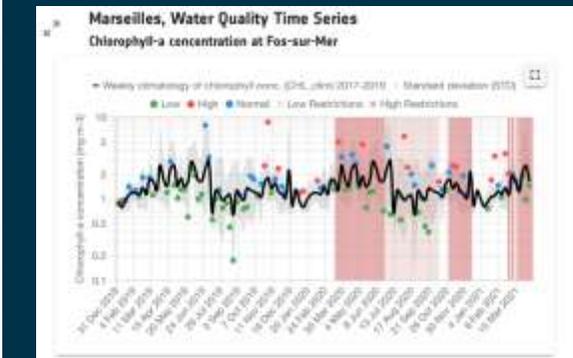
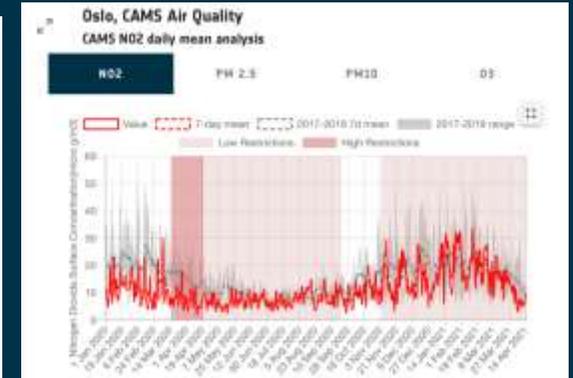
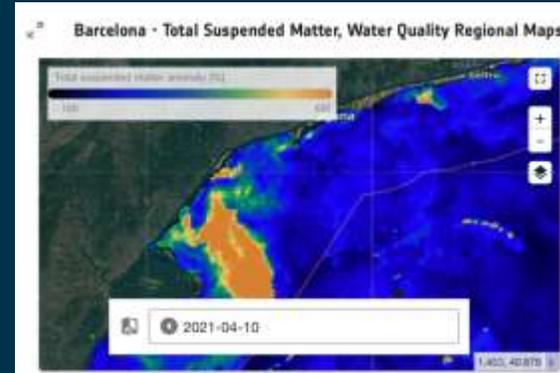
- **Climate:** concentration of greenhouse gases
- **Environment:** air and water quality trends
- **Economic Indicators:** industry, maritime transport, construction, trade, traffic
- **Agriculture:** asparagus, berries, etc.

## Joint initiative from ESA and EU



# Multiple Data Sources (Open)

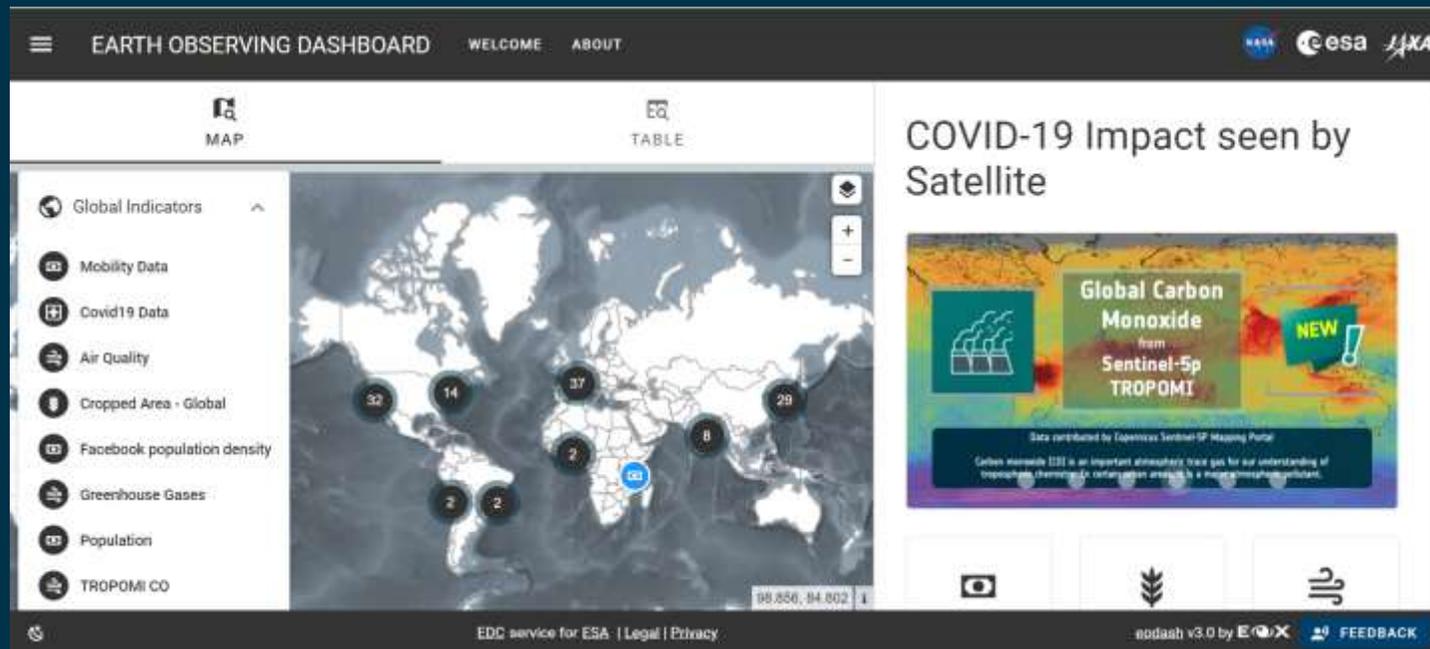
- Copernicus Sentinels (S-1, S-2, S-3, S-5p)
- Third Party Missions (Pleiades, Deimos, Iceye)
- Copernicus Services (CMEMS, CAMS)
- Copernicus Climate Data Store (Temperature, Relative Humidity, Wind)
- AIS
- Statistical data
- OpenStreetMap
- Mobility (Google, GSA)
- Anonymised mobile data
- Health (Our World in Data, Oxford)
- Population (CIESIN)



# Intro to “Rapid Action on Covid-19 and EO”: <https://race.esa.int/>

A more detailed presentation (30min) of the ESA RACE Dashboard can be found at <https://eo4society.esa.int/resources/2021-tat-8/> (PDF and recorded session, in English)

As part of ESA's wider collaboration with JAXA and NASA, there is also the EO Dashboard, with data from other regions of the world: <https://eodashboard.org>



# Summary

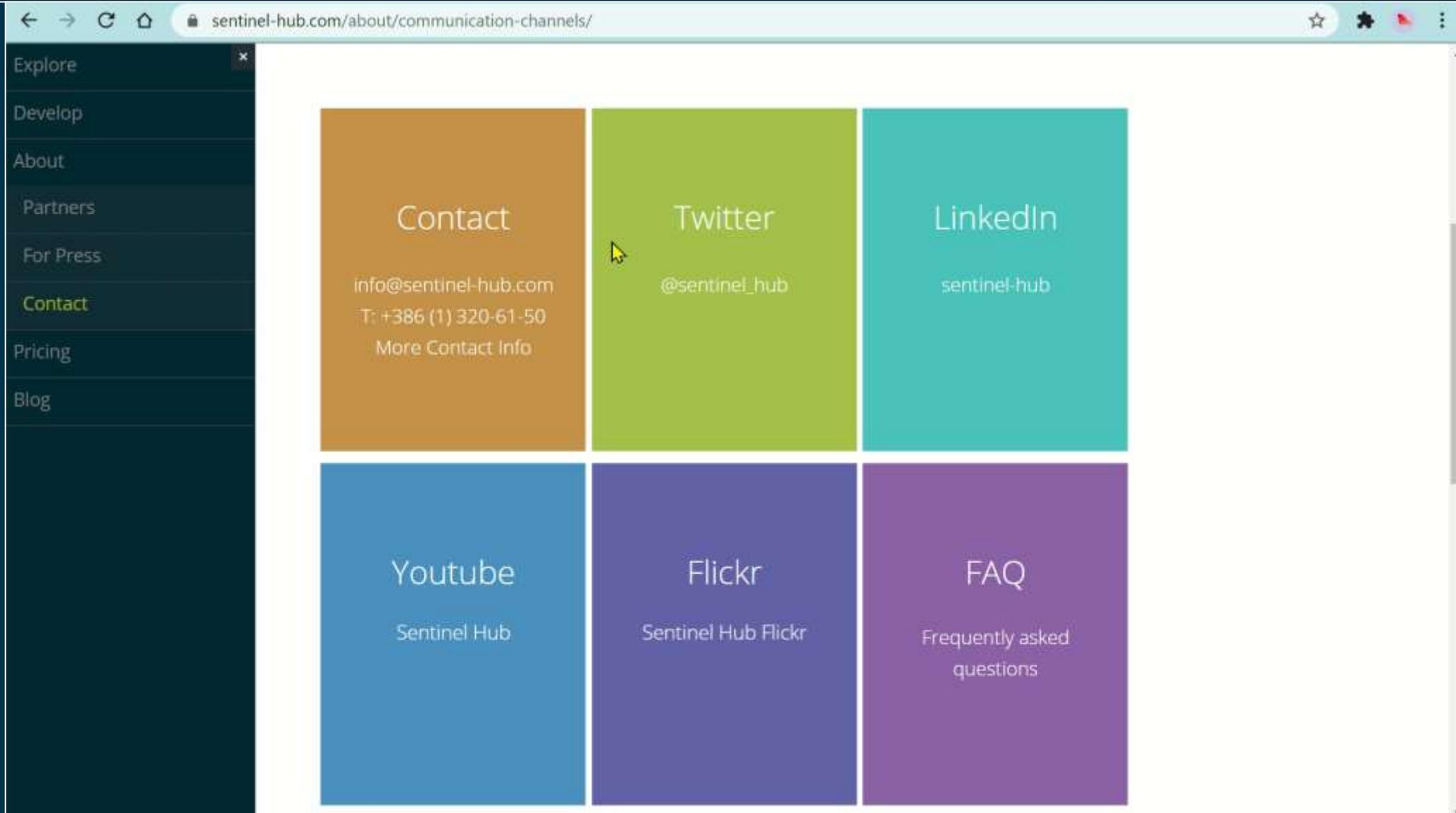
## 1. Introduction

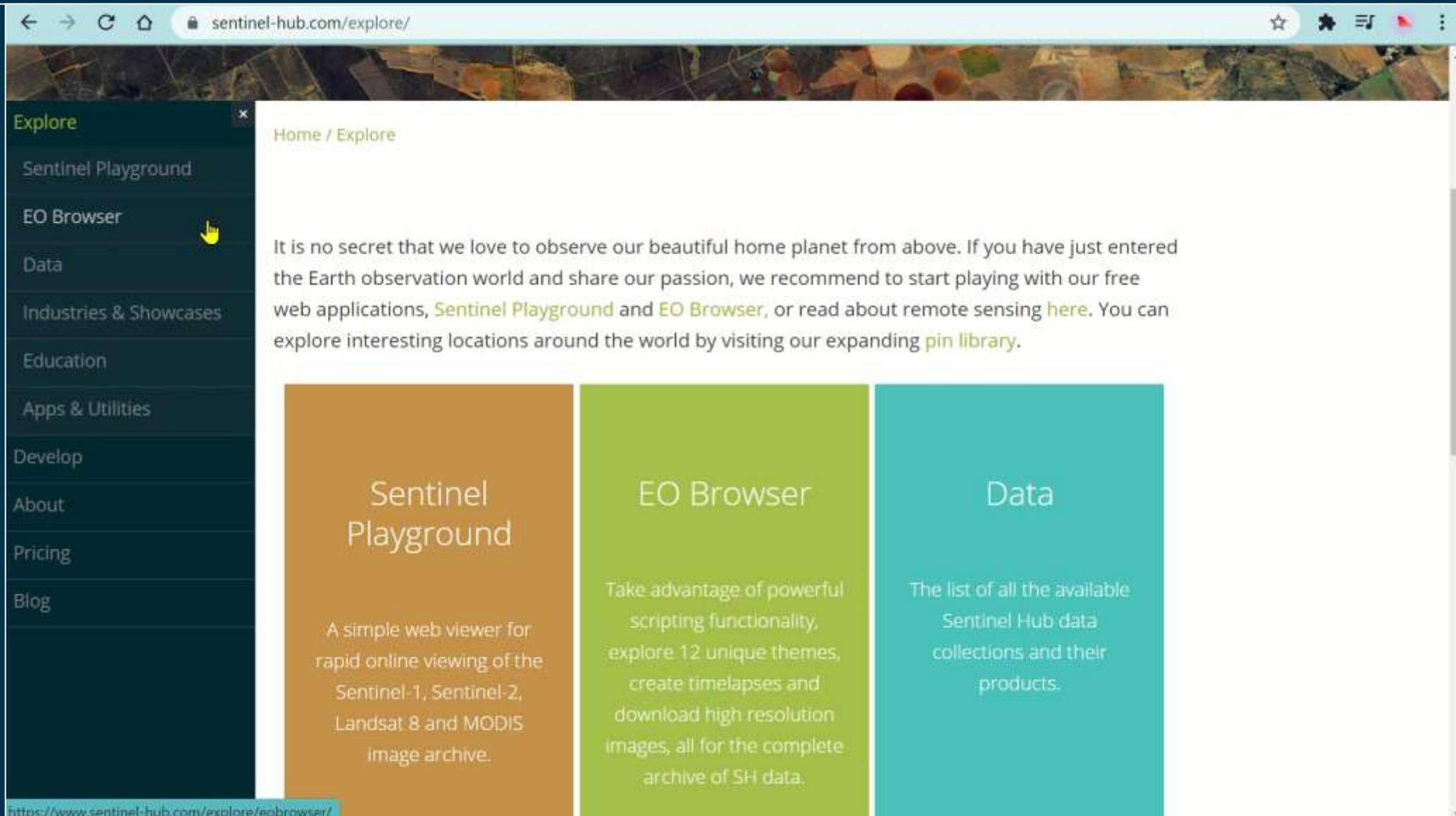
1. Intro to ESA RACE Dashboard
2. **Intro to EO Browser**

## 2. Case Study

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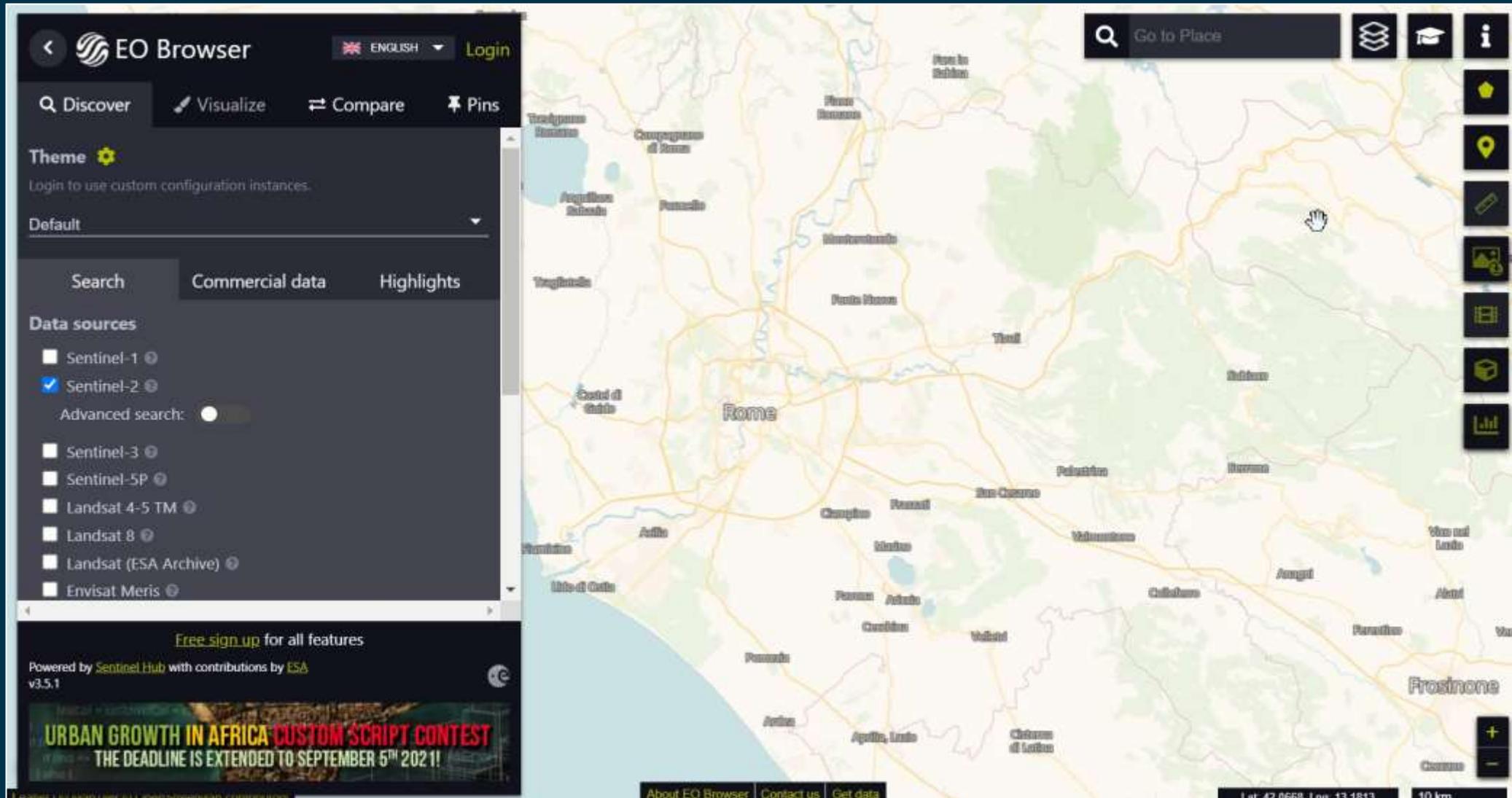


The screenshot shows a web browser window with the URL <https://www.sentinel-hub.com/explore/>. The page features a dark sidebar on the left with navigation links: Explore, Sentinel Playground, EO Browser (highlighted with a mouse cursor), Data, Industries & Showcases, Education, Apps & Utilities, Develop, About, Pricing, and Blog. The main content area has a header "Home / Explore" and a paragraph of introductory text. Below the text are three colored boxes: a brown box for "Sentinel Playground" (describing a web viewer for Sentinel-1, Sentinel-2, Landsat 8, and MODIS), a green box for "EO Browser" (describing scripting functionality and high-resolution image download), and a teal box for "Data" (describing the list of available data collections and products).

Home / Explore

It is no secret that we love to observe our beautiful home planet from above. If you have just entered the Earth observation world and share our passion, we recommend to start playing with our free web applications, [Sentinel Playground](#) and [EO Browser](#), or read about remote sensing [here](#). You can explore interesting locations around the world by visiting our expanding [pin library](#).

Sentinel Playground	EO Browser	Data
A simple web viewer for rapid online viewing of the Sentinel-1, Sentinel-2, Landsat 8 and MODIS image archive.	Take advantage of powerful scripting functionality, explore 12 unique themes, create timelapses and download high resolution images, all for the complete archive of SH data.	The list of all the available Sentinel Hub data collections and their products.



The screenshot displays the EO Browser interface. On the left, a sidebar contains navigation and configuration options: a back arrow, the EO Browser logo, a language dropdown set to 'ENGLISH', and a 'Login' button. Below these are tabs for 'Discover', 'Visualize', 'Compare', and 'Pins'. A 'Theme' section is followed by a 'Data sources' list with checkboxes for Sentinel-1, Sentinel-2 (checked), Sentinel-3, Sentinel-5P, Landsat 4-5 TM, Landsat 8, Landsat (ESA Archive), and Envisat Meris. A 'Free sign up for all features' banner is at the bottom of the sidebar. The main area is a map of Rome, Italy, with a search bar at the top right. A vertical toolbar on the right side of the map includes icons for home, location, layers, and other map controls. At the bottom of the map, there are links for 'About EO Browser', 'Contact us', and 'Get data', along with coordinates (Lat: 42.0668, Lon: 13.1813) and a 10 km scale bar.

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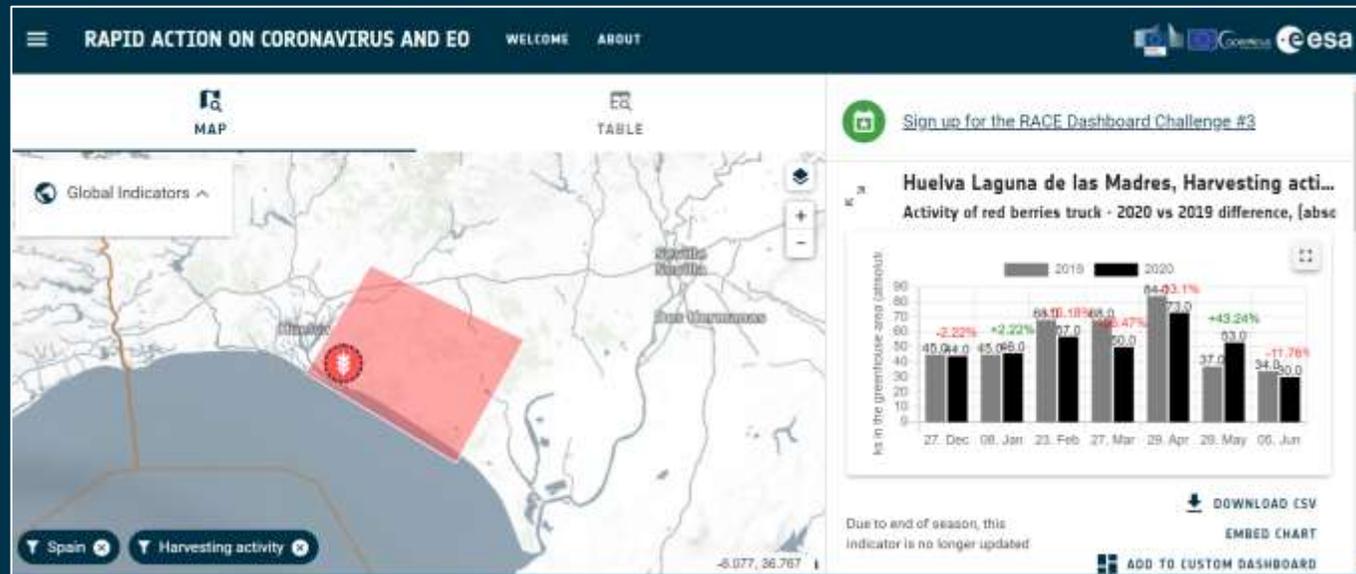
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# Case Study

Crop harvesting in Huelva during the pandemic,  
with RACE Dashboard and EO Browser

Huelva (Spain) is an agricultural area of greenhouses, where fruit and vegetables are exported all over Europe. Workers often come temporarily from Morocco, and the harvest is stored in trucks for transport.

During 2020, the lack of workers and the drop in demand caused a delay in the harvest and a drop in the amount harvested.



The screenshot displays the RACE Dashboard interface. At the top, there are navigation links for 'CORONAVIRUS AND EO', 'WELCOME', and 'ABOUT'. The left sidebar features a 'COUNTRIES' section with a list of available countries, each accompanied by its flag. The main content area is divided into two columns. The left column shows a map of Europe with circular data points overlaid on various countries, each containing a numerical value. The right column features a featured article titled 'COVID-19 Impact seen by Satellite' with a sub-heading 'Changes in commercial fluxes'. Below the article, there are three icons representing different data categories: a wheat stalk, a water drop, and a mountain range. The bottom of the dashboard includes a footer with 'EDC service for ESA | Legal | Privacy', 'eodash v3.0 by EOX', and a 'FEEDBACK' button.

**Available countries:**

- Albania
- Austria
- Belgium
- Bosnia and Herzegovi...
- Bulgaria
- Croatia
- Cyprus
- Czechia
- Denmark
- Estonia
- Finland
- France

**Map Data Points (Approximate):**

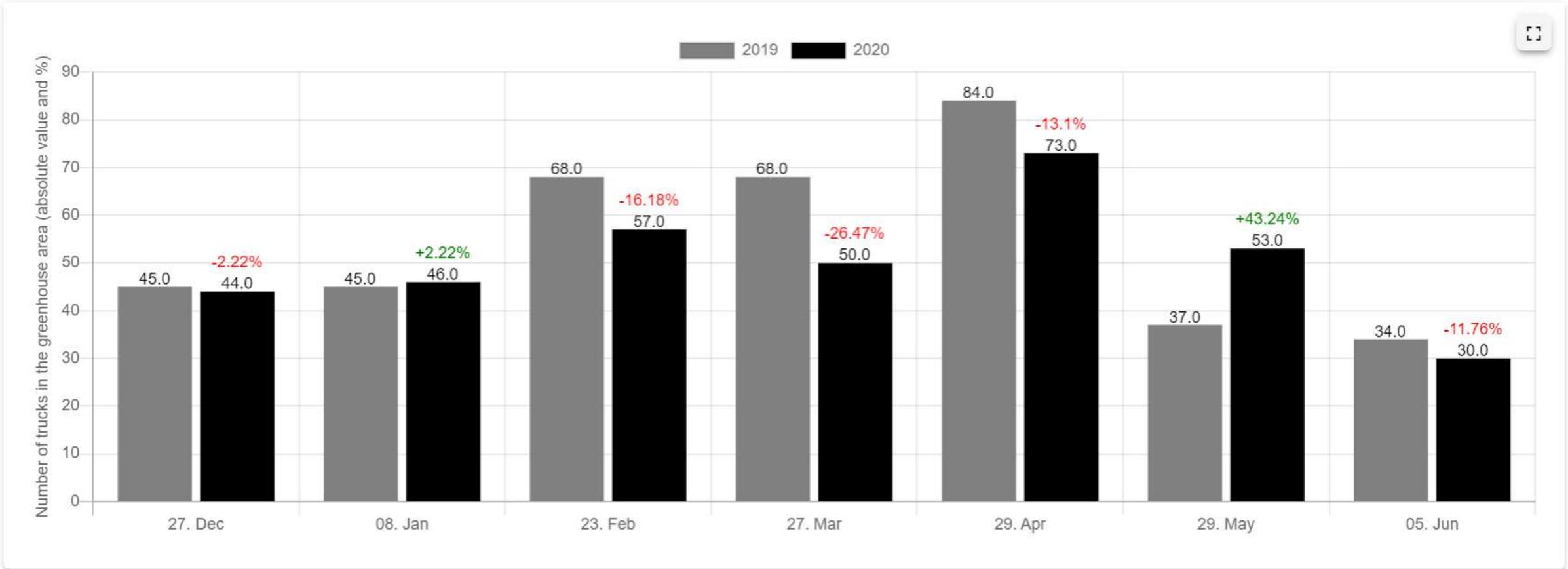
Country	Value
Albania	3
Austria	5
Belgium	9
Bosnia and Herzegovi...	19
Bulgaria	31
Croatia	17
Cyprus	10
Czechia	43
Denmark	5
Estonia	36
Finland	16
France	20
Germany	3

**Featured Article:** COVID-19 Impact seen by Satellite  
Changes in commercial fluxes  
Global commodity markets have been strongly affected by the COVID19 pandemic, with sharp declines in prices since the early first of the pandemic. Explore the changes in incoming and outgoing commercial fluxes (domestic and international).



## Huelva Laguna de las Madres, Harvesting activity

Activity of red berries truck - 2020 vs 2019 difference, (absolute value and %)



In February, March, April and June 2020 there were fewer trucks than in 2019, i.e. less harvested. In May 2020, on the other hand, there were more trucks than in 2019.

The harvest in 2020 was smaller, started later and had a peak of activity in May.

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# Search and visualisation of S2 data in EO Browser

The screenshot displays the EO Browser interface. On the left, a sidebar contains navigation and search options. At the top, there is a search bar with the text "Laguna de las Madres". Below it, a "Discover" tab is active, showing a "Default" dropdown menu. The "Search" tab is selected, displaying a "Data sources" list with checkboxes for Sentinel-1, Sentinel-2 (checked), Sentinel-3, Sentinel-5P, Landsat 4-5 TM, Landsat 8, Landsat (ESA Archive), and Envisat Meris. Under "Advanced search", there is a toggle for "Advanced search" (checked), checkboxes for "L1C" and "L2A (atmospherically corrected)" (checked), and a "Max. cloud coverage" slider set to 40%. A banner at the bottom of the sidebar promotes a "CUSTOM SCRIPT CONTEST" with a deadline of September 5th, 2021. The main map area shows a satellite view of a coastal region with labels for "Huerva", "Petalas de la Frontera", and "Minguez". A search bar at the top right contains "Laguna de las Madres". The bottom right corner shows coordinates "Lat: 37.2730, Lon: -6.9419" and a scale of "3 km".

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# Comparison of images in EO Browser + use of Pin

The screenshot displays the EO Browser interface. The top navigation bar includes a back arrow, the 'EO Browser' logo, a language dropdown set to 'ENGLISH', and a power icon. Below this, the user's name 'Hello, Amalia Castro' is visible. The main navigation menu contains 'Discover', 'Visualize', 'Compare', and 'Pins'. The 'Visualize' tab is active, showing a list of visualization options for the 'Dataset: Sentinel-2 L2A'. The date is set to '2020-06-05'. The visualization options include: 'True color' (Based on bands 4,3,2), 'False color' (Based on bands 8,4,3), 'NDVI' (Based on combination of bands (B8 - B4)/(B8 + B4)), 'False color (urban)' (Based on bands 12,11,4), 'Moisture index' (Based on combination of bands (B8A - B11)/(B8A + B11)), and 'SWIR' (Based on bands 12,8A,4). The 'True color' option is selected. The main view shows a satellite image of a rural area with a grid of fields. A search bar at the top right contains the text 'Laguna de las Madres'. A vertical toolbar on the right side contains various icons for map interaction. At the bottom, there is a banner for 'URBAN GROWTH IN AFRICA CUSTOM SCRIPT CONTEST' and a footer with 'Powered by Sentinel Hub with contributions by ESA v3.5.1' and 'About EO Browser | Contact us | Get data'.

# Comparison of images in EO Browser + use of Pin

EO Browser

ENGLISH

Hello, Amalia Castro

Discover Visualize Compare Pins

Remove all Add all pins Split

Sentinel-2 L2A: 1\_TRUE\_COLOR  
Date: 2019-06-06  
Lat/Lon: 37.19, -6.89 | Zoom: 14

Split position: [slider]

Sentinel-2 L2A: 1\_TRUE\_COLOR  
Date: 2020-06-05  
Lat/Lon: 37.19, -6.89 | Zoom: 14

Split position: [slider]

Powered by Sentinel Hub with contributions by ESA v3.5.1

URBAN GROWTH IN AFRICA CUSTOM SCRIPT CONTEST  
THE DEADLINE IS EXTENDED TO SEPTEMBER 5<sup>TH</sup> 2021!

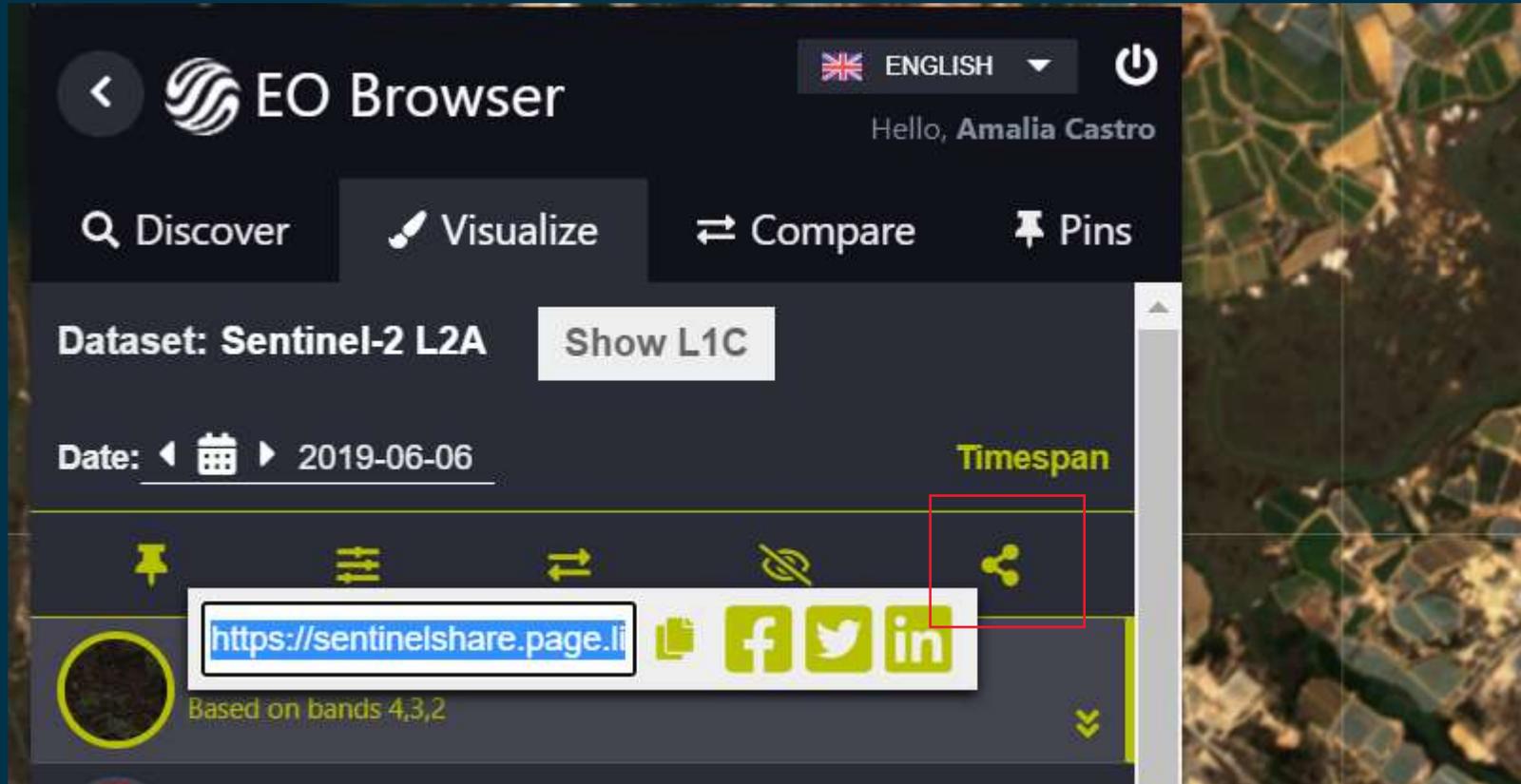
Laguna de las Madres

maptiler

About EO Browser Contact us Get data

Lat: 37.18713 Lon: -6.90352 500m

Pins can be shared via links or on social media:



2019: <https://sentinelshare.page.link/EgY9>

2020: <https://sentinelshare.page.link/ijKe>

# Creation of a timelapse (June - July for 2019 and 2020)

EO Browser

ENGLISH

Hello, Amalia Castro

Discover Visualize Compare Pins

Remove all Add all pins Split

Sentinel-2 L2A: 1\_TRUE\_COLOR  
Date: 2019-06-06  
Lat/Lon: 37.19, -6.89 | Zoom: 14

Split position: [slider]

Sentinel-2 L2A: 1\_TRUE\_COLOR  
Date: 2020-06-05  
Lat/Lon: 37.19, -6.89 | Zoom: 14

Split position: [slider]

Powered by Sentinel Hub with contributions by ESA v3.5.1

**URBAN GROWTH IN AFRICA** CUSTOM SCRIPT CONTEST  
THE DEADLINE IS EXTENDED TO SEPTEMBER 5<sup>TH</sup> 2021!

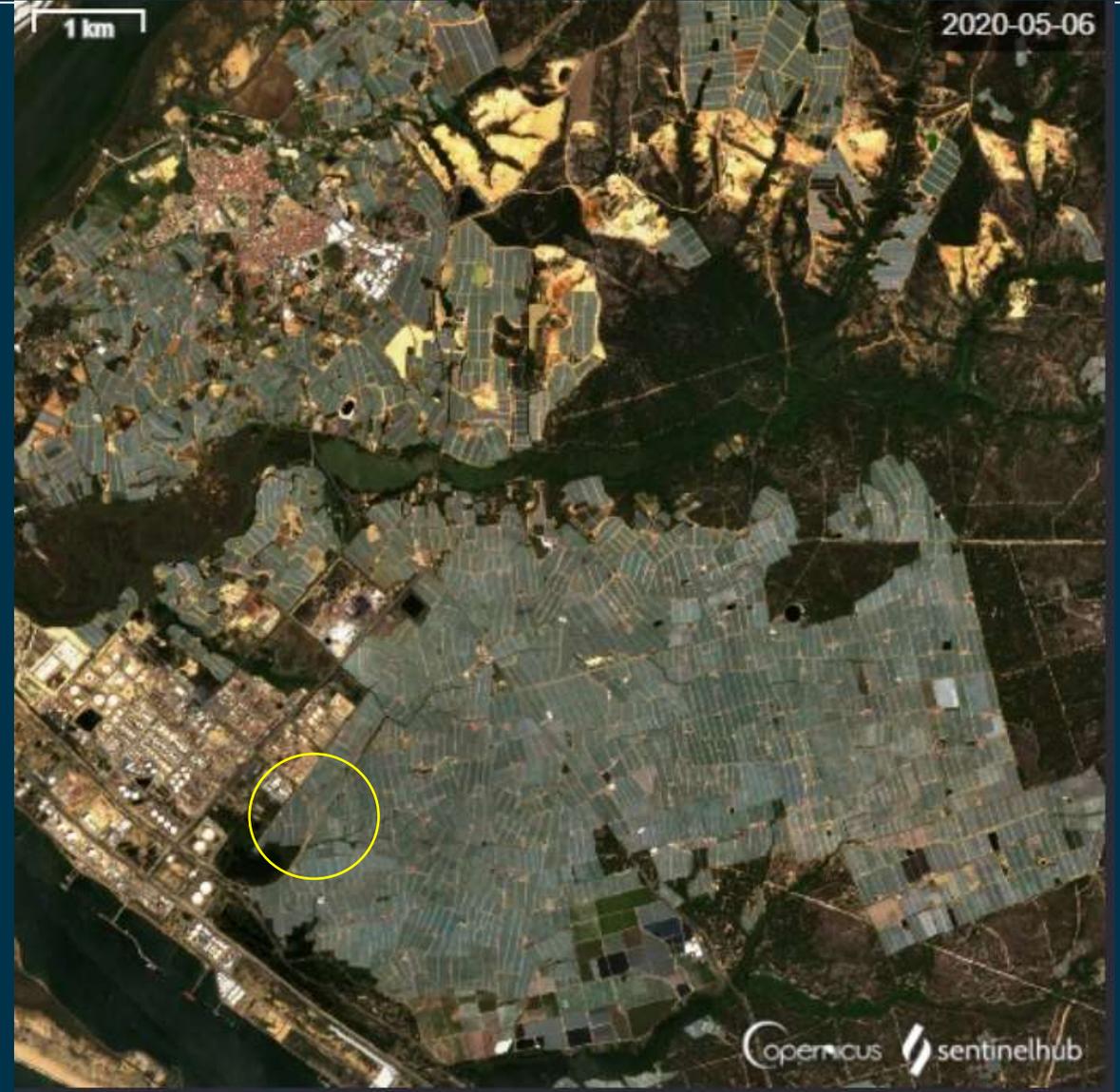
maptiler

About EO Browser Contact us Get data

Laguna de las Madres

Lat: 37.19806 Lon: -6.87164 500 m

# Comparison of the two timelapses (2019 and 2020)



# Comparison of the two timelapses (2019 and 2020)



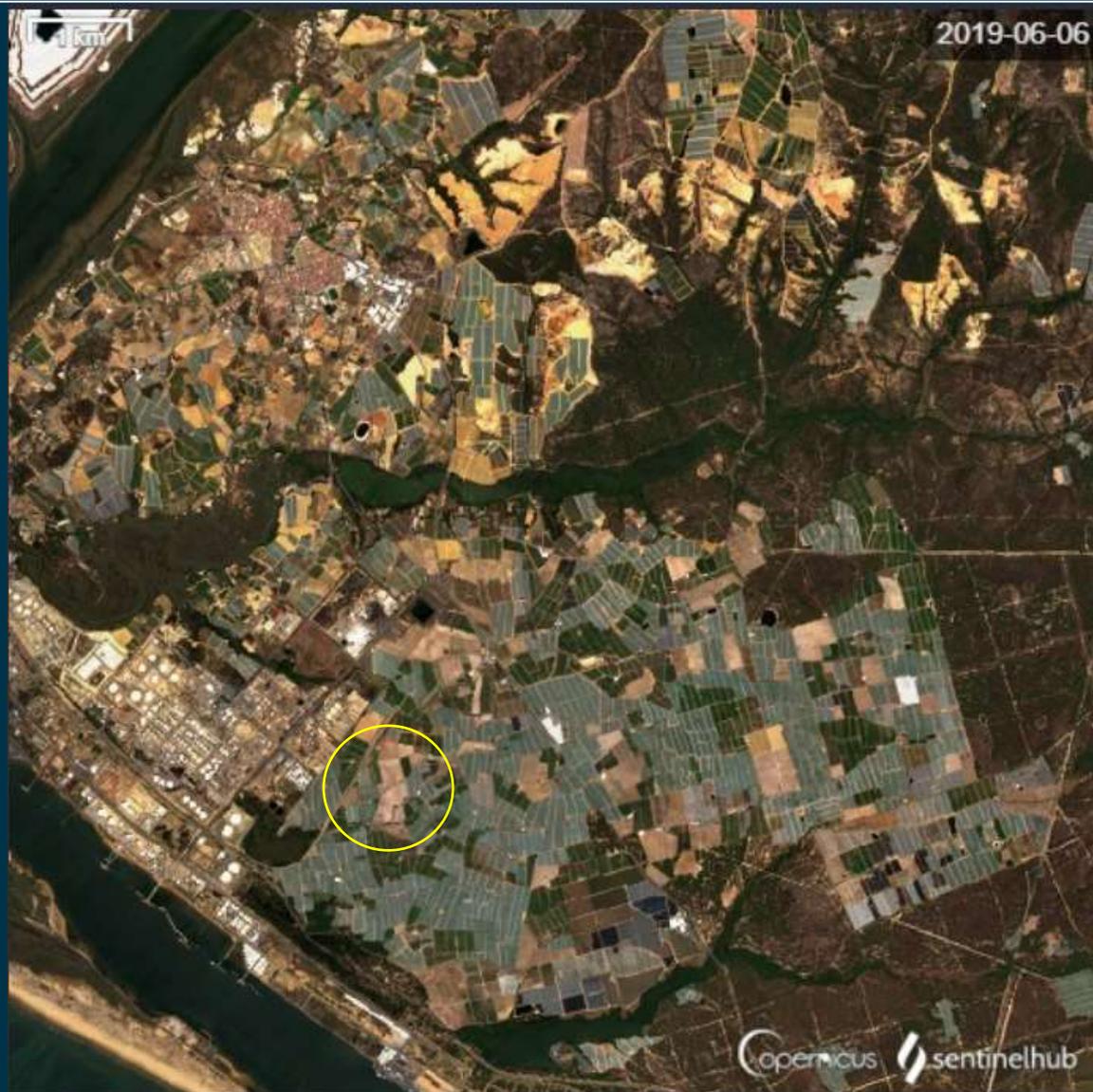
# Comparison of the two timelapses (2019 and 2020)



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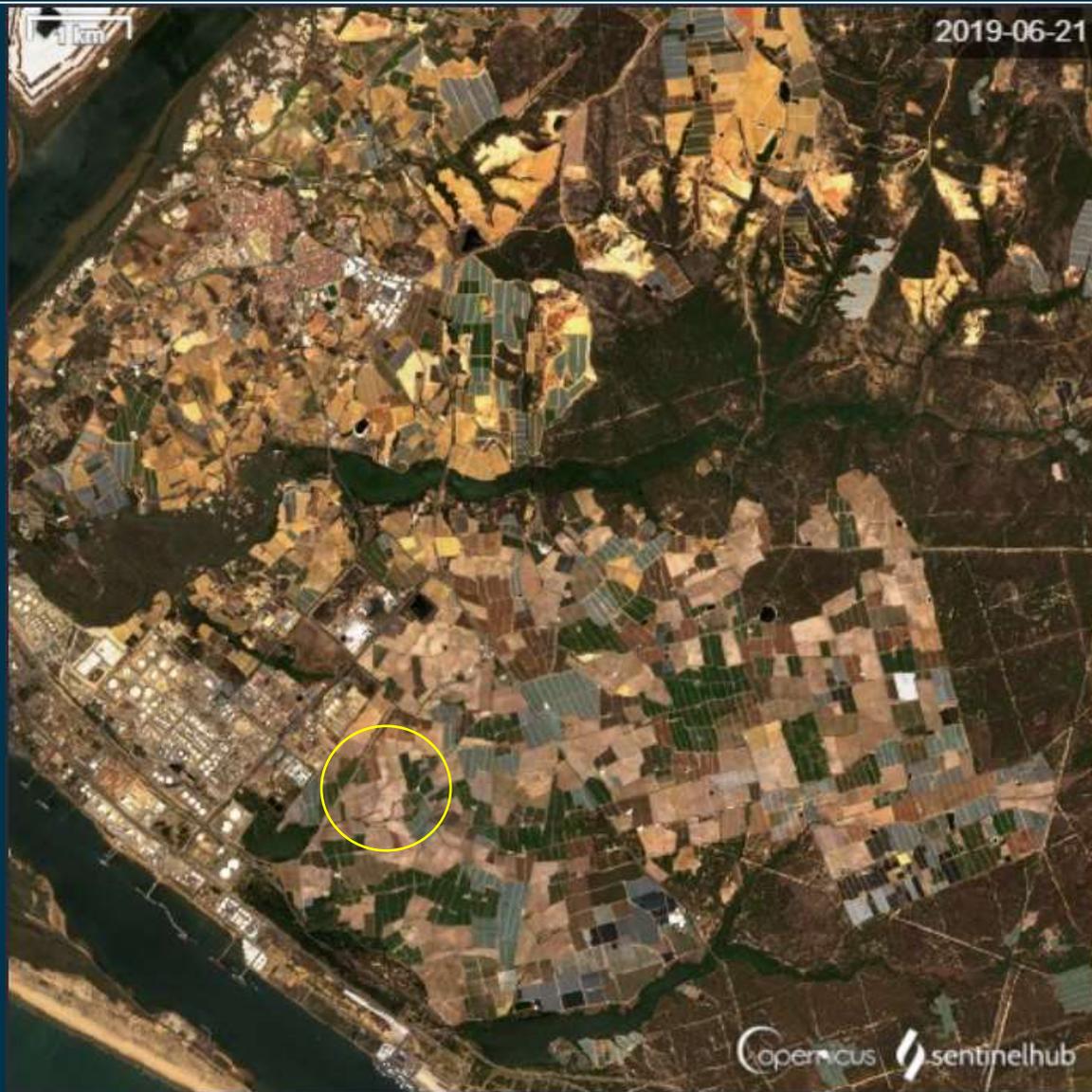
# Comparison of the two timelapses (2019 and 2020)



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# Extract time series from an area or pixel

The screenshot displays the EO Browser interface. The top left shows the 'EO Browser' logo, a language dropdown set to 'ENGLISH', and a user greeting 'Hello, Amalia Castro'. Below this are navigation tabs for 'Discover', 'Visualize', 'Compare', and 'Pins'. The main content area shows a satellite image of 'Laguna de las Madres' with a search bar at the top right. A left sidebar contains a 'Dataset: Sentinel-2 L2A' section with a 'Show L1C' button. Below this is a 'Date' selector set to '2019-07-11' and a 'Timespan' section with various icons. A list of processing options is visible, including 'True color' (Based on bands 4,3,2), 'False color' (Based on bands 8,4,3), 'NDVI' (Based on combination of bands (B8 - B4)/(B8 + B4)), 'False color (urban)' (Based on bands 12,11,4), 'Moisture index' (Based on combination of bands (B8A - B11)/(B8A + B11)), and 'SWIR' (Based on bands 12,8A,4). At the bottom of the sidebar, it says 'Powered by Sentinel Hub with contributions by ESA v3.5.1'. A banner at the bottom of the sidebar reads 'URBAN GROWTH IN AFRICA CUSTOM SCRIPT CONTEST THE DEADLINE IS EXTENDED TO SEPTEMBER 5TH 2021!'. The main image area shows a satellite view of a rural landscape with a hand cursor over a specific area. The bottom right corner of the image area shows coordinates 'Lat: 37.17865, Lon: -6.87540' and a scale of '100 m'. At the bottom of the interface, there are links for 'About EO Browser', 'Contact us', and 'Get data'.

# Extract one pixel time series (2019 and 2020)

The screenshot displays the EO Browser interface. On the left, a sidebar contains the following elements:

- EO Browser logo and language selector (ENGLISH).
- Navigation buttons: Discover, Visualize, Compare, Pins.
- Dataset: Sentinel-2 L2A, with a Show L1C button.
- Date: 2019-07-11, with a Timespan selector.
- Color selection tools: True color (Based on bands 4,3,2), False color (Based on bands 8,4,3), NDVI (Based on combination of bands (B8 - B4)/(B8 + B4)), False color (urban) (Based on bands 12,11,4), Moisture index (Based on combination of bands (B8A - B11)/(B8A + B11)), and SWIR (Based on bands 12,8A,4).
- Footer: Powered by Sentinel Hub with contributions by ESA v3.5.1.

The main area shows a satellite image of Laguna de las Madres. A yellow location pin is placed on a specific pixel. The right sidebar contains map navigation tools (pan, zoom, home, layers, info, etc.). At the bottom, there are links for About EO Browser, Contact us, and Get data, along with coordinates (Lat: 37.18189, Lon: -6.82952) and a 100m scale bar.

# Extract one pixel time series (2019 and 2020)

2019: Harvest between 12-27 May

2020: Harvest between 5-10 June



# Extract one pixel time series (2019 and 2020)

To improve the visualisation of the time series, the data can be downloaded as CSV.

The pixel coordinates are Lat: 37.180266, Long: -6.876791



# Extract one pixel time series (2019 and 2020)



0.01 km<sup>2</sup>

```
{"type": "Polygon", "coordinates": [[[-6.878081, 37.180786], [-6.876708, 37.180752], [-6.876579, 37.180154], [-6.877888, 37.179915], [-6.878081, 37.180786]]]}
```

2019: Harvest between  
12 April - 2 May

2020: Harvest between 5-10 June



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Thank you for your attention!

