

A world map with a color overlay representing CO2 emissions. The colors range from dark blue (low emissions) to dark red (high emissions). High emission areas are visible in North America, Europe, and East Asia. The map is used as a background for the title and introductory text.

Observation d'émissions de CO₂ par satellite

Ministère de la transition écologique et solidaire


IGN : Institut national de l'information géographique et forestière

LSCE : Laboratoire des sciences du climat et de l'environnement

Contexte

Aujourd'hui, les émissions de CO₂ sont suivies via des données d'activité (“inventaires”)

- Auto-déclaration de chaque État
- Qualité hétérogène
- Peu d'informations à fine échelle (ex: ville, saison)
- Issues de modélisations des processus émetteurs

A satellite with solar panels is shown in space, orbiting the Earth. The Earth's surface is visible below, showing blue oceans and green landmasses. The background is the dark void of space with some stars.

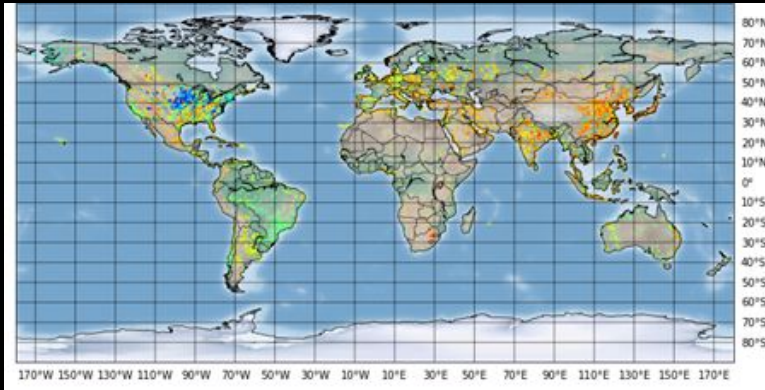
Comment améliorer la qualité, l'objectivité et la résolution des données d'émission de CO₂?

Notre idée : combiner données d'inventaires et satellite

Inventaires

- Villes, centrales (charbon/gaz/fioul), usines...

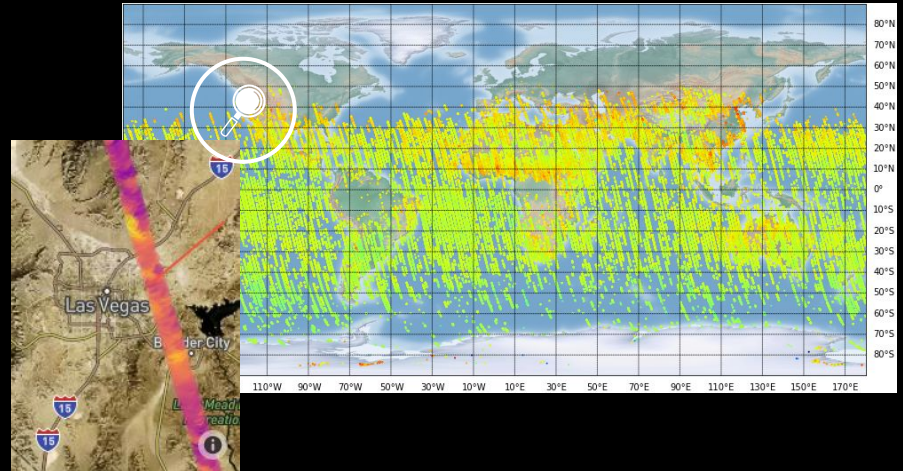
> 5 sources de données, 17500 points / an



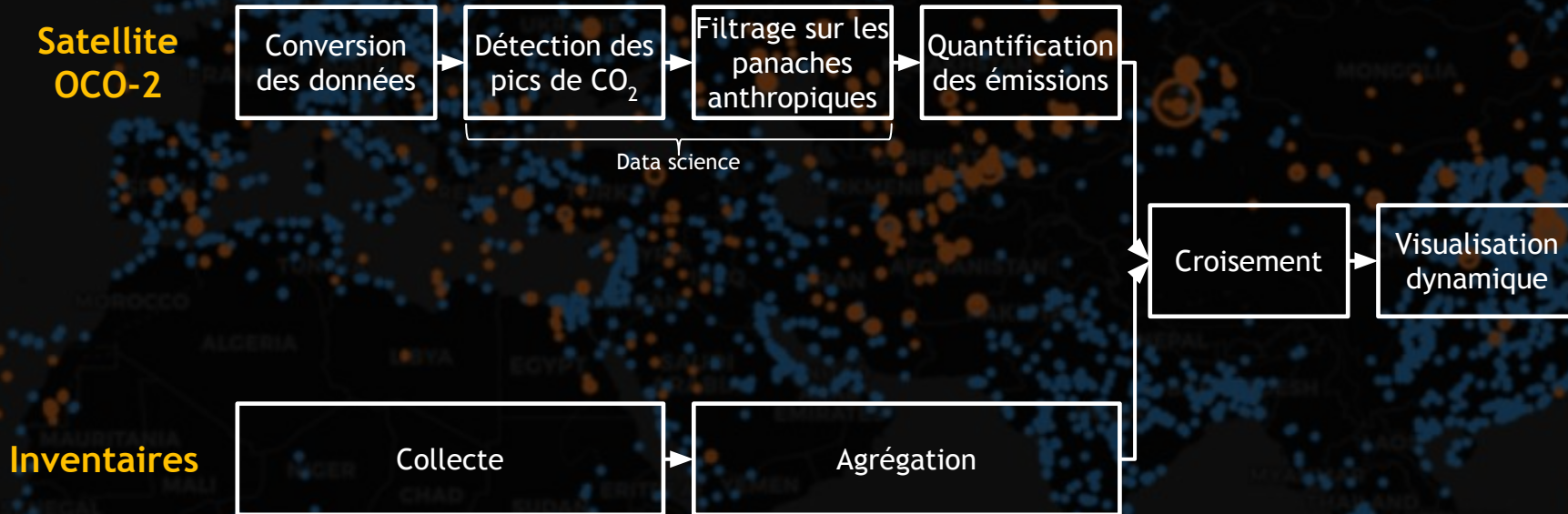
Satellite OCO-2 (NASA)

- Observations des concentrations de CO₂ à proximité de la trace du satellite de jour et en ciel clair

> 2 millions de points / mois



Notre approche



Allons voir le résultat tout de suite : **DÉMO !**



Valeur de la démarche

1^{er} projet aussi poussé

- de croisement des données d'inventaire et satellite à l'échelle mondiale
- offrant aussi une visualisation dynamique & facile d'utilisation

Intérêts déjà exprimés :

- Recherche : Frédéric Chevallier (Laboratoire des Sciences du Climat et de l'Environnement) pour préparer les futurs satellites de surveillance du CO₂ : MicroCarb, CO2M...
- Sandbag : Think tank européen
- Le ministère de la transition écologique (?) : pour aller plus loin dans le suivi des émissions de CO₂ afin de le fonder sur l'observation directe et spatialisée des gaz

A world map with a grid overlay, showing CO2 data. The map is color-coded with green and yellow, indicating different levels of CO2 concentration. The word "MERCI" is written in large white letters across the center of the map. The map includes latitude and longitude markings on the right and bottom edges.

MERCI

Mentors : Frédéric, Marie, Matthieu

Contributeurs : Amélie, Benoît, Charlotte, Christian, Eliott, Martin, Quentin, Raphaelae...



A tester sur <http://oco2.courty.fr>

Annexes

Sources d'émission de CO₂

1/ Estimation of anthropogenic emissions of greenhouse gases
Source: Emissions Database for Global Atmospheric Research (EDGAR)
Link: https://edgar.jrc.ec.europa.eu/overview.php?v=50_GHG

2/ Power plants burning fossil fuels (gas, oil and coal)
Source: World Resource Institute
Link: <http://datasets.wri.org/dataset/globalpowerplantdatabase>

3/ Coal power plants
Source: Global Energy Monitor (GEM)
Link: https://www.gem.wiki/Main_Page

4/ Major cities
Source: Open Data Soft
Link: <https://public.opendatasoft.com/explore/dataset/co2-emissions-cities>

5/ ETS infrastructures
Source: Sandbag
Link: <https://sandbag.be/>



WORLD
RESOURCES
INSTITUTE



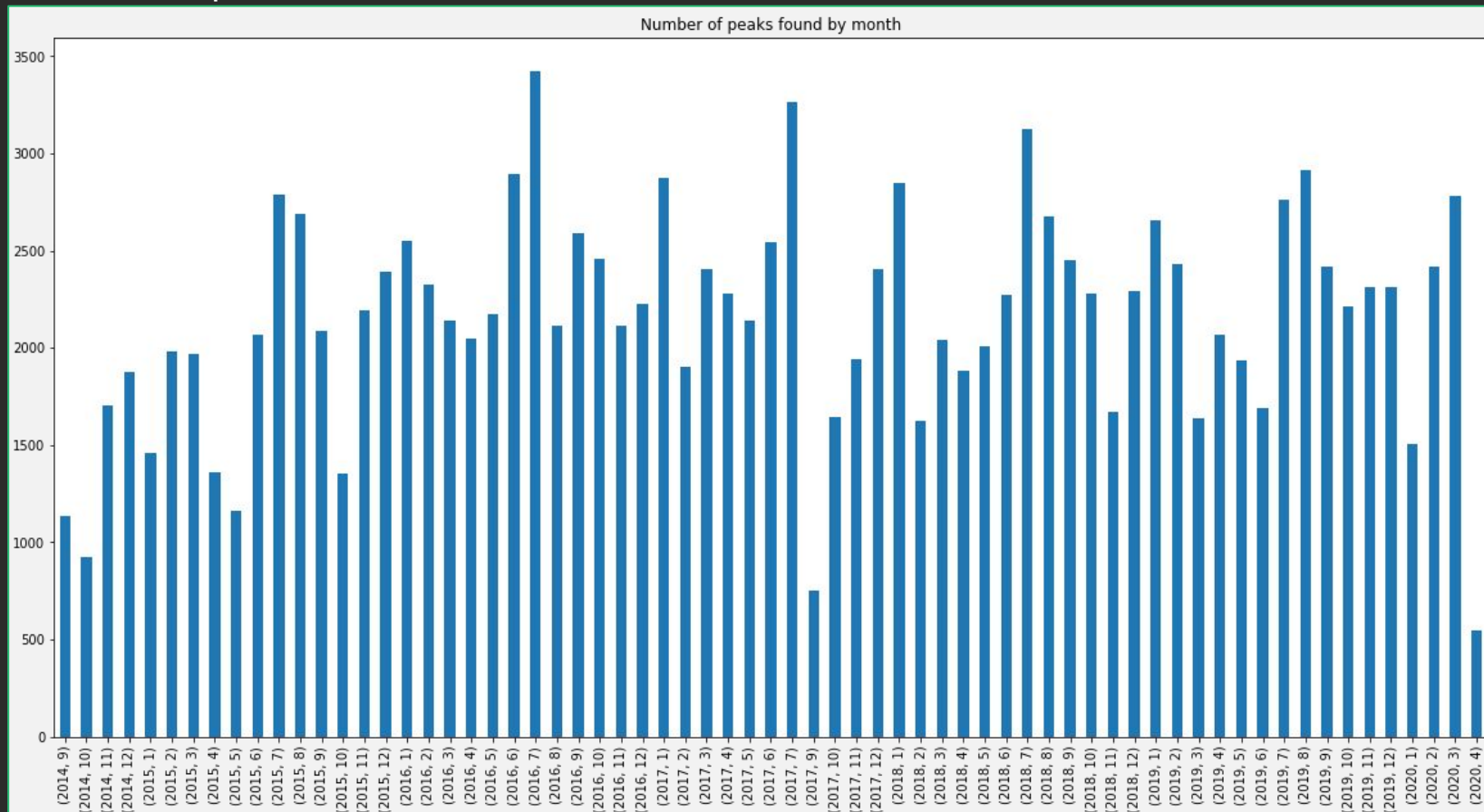
Global
Energy
Monitor



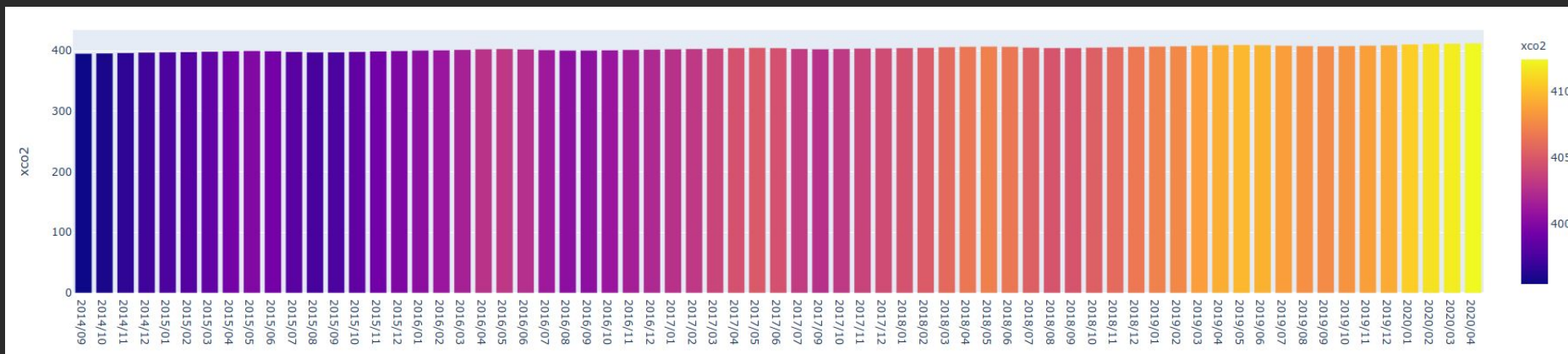
sandbag
smarter climate policy

Nombre de pics détectés par mois

Total : 140 000 pics



Moyennes mensuelles des observations depuis 2014

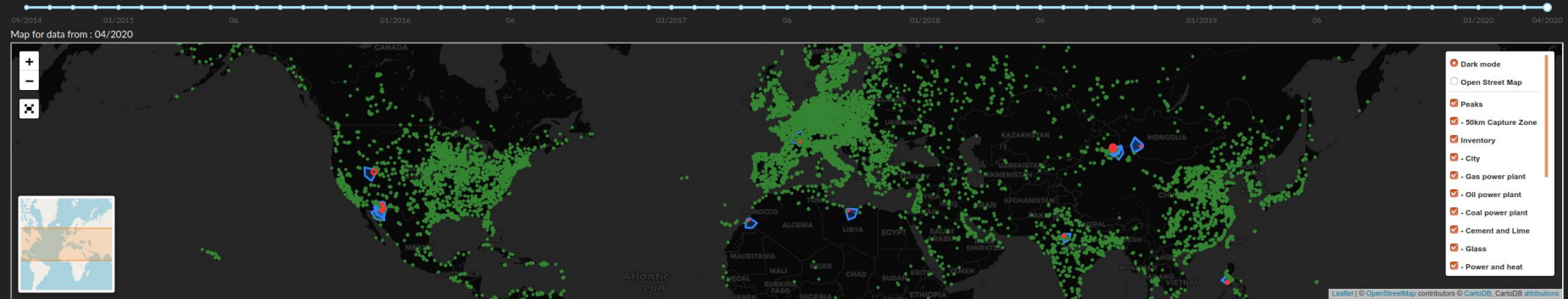


OCO-2 satellite data analysis

The goal of our project is to localize CO₂ emissions on Earth based on the carbon concentration data measured by the OCO-2 Satellite from the NASA.

- The map shows in red the places where we detect a peak in CO₂ emission based on OCO-2 satellite data.
- We also plot the potential CO₂ source from declarative content (EDGAR, IEA, FAO...), in green.
- You can select a month of observations with the slider below.
- You can click on a peak to view a detailed graph of what the satellite really saw and how we find a peak in this data.

For more info, see [our website](#).



Please select a point

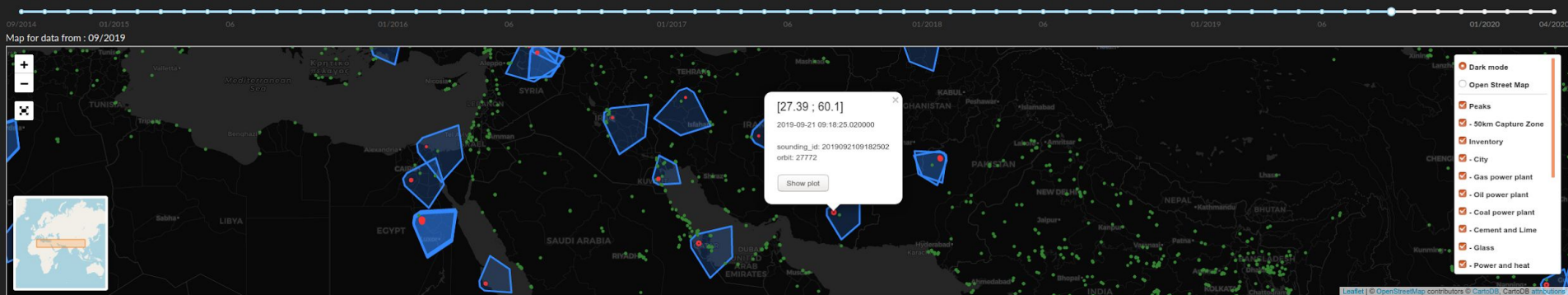


OCO-2 satellite data analysis

The goal of our project is to localize CO₂ emissions on Earth based on the carbon concentration data measured by the OCO-2 Satellite from the NASA.

- The map shows in red the places where we detect a peak in CO₂ emission based on OCO-2 satellite data.
- We also plot the potential CO₂ source from declarative content (EDGAR, IEA, FAO...), in green.
- You can select a month of observations with the slider below.
- You can click on a peak to view a detailed graph of what the satellite really saw and how we find a peak in this data.

For more info, see [our website](#).

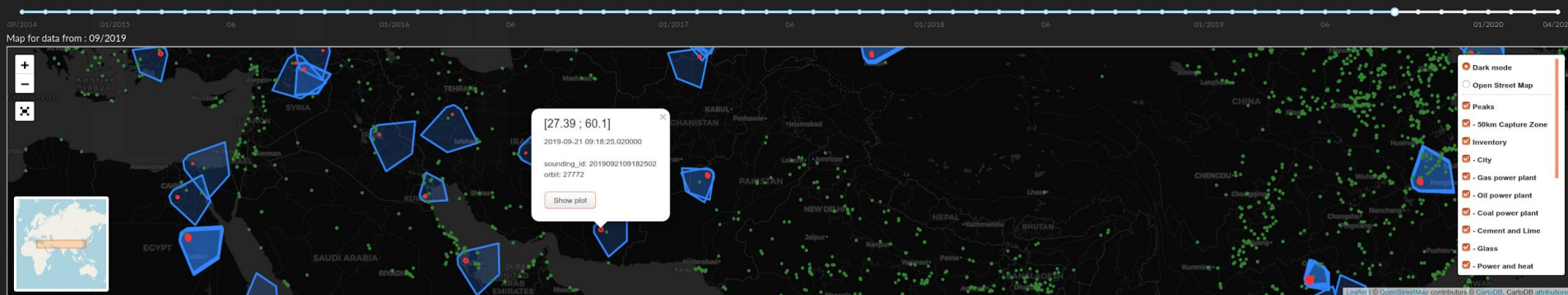


OCO-2 satellite data analysis

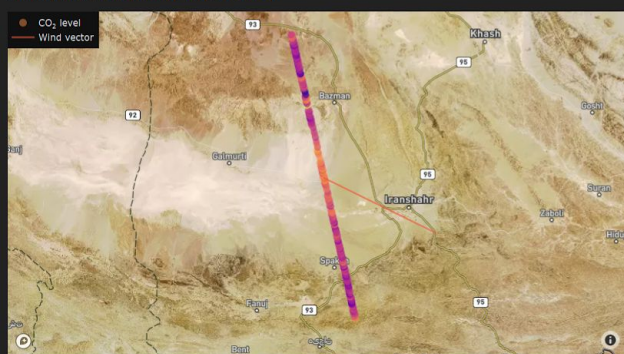
The goal of our project is to localize CO₂ emissions on Earth based on the carbon concentration data measured by the OCO-2 Satellite from the NASA.

- The map shows in red the places where we detect a peak in CO₂ emission based on OCO-2 satellite data.
- We also plot the potential CO₂ source from declarative content (EDGAR, IEA, FAO...), in green.
- You can select a month of observations with the slider below.
- You can click on a peak to view a detailed graph of what the satellite really saw and how we find a peak in this data.

For more info, see [our website](#).



Satellite view of the data



Satellite data for 100km around the peak



The estimated mass of the peak is 1,273.72 ton of CO₂ per hour

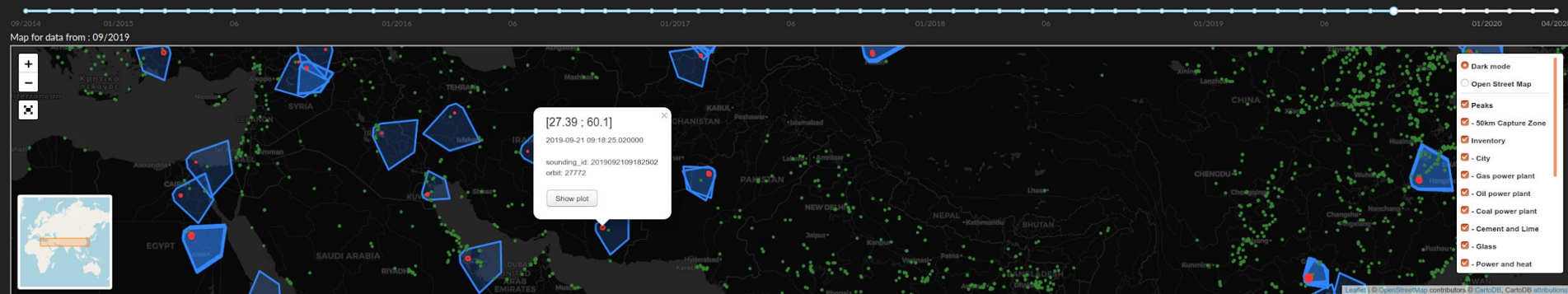


OCO-2 satellite data analysis

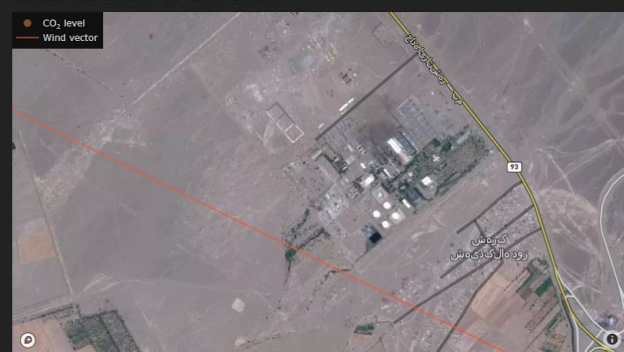
The goal of our project is to localize CO₂ emissions on Earth based on the carbon concentration data measured by the OCO-2 Satellite from the NASA.

- The map shows in red the places where we detect a peak in CO₂ emission based on OCO-2 satellite data.
- We also plot the potential CO₂ source from declarative content (EDGAR, IEA, FAO...), in green.
- You can select a month of observations with the slider below.
- You can click on a peak to view a detailed graph of what the satellite really saw and how we find a peak in this data.

For more info, see [our website](#).



Satellite view of the data



Satellite data for 100km around the peak

