CEOS
Committee on Earth Observation Satellites

NASA-ESA-JAXA Dashboard

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- **COVID-19 pandemic has caused various changes in socio-economic activities and some of the activities link with environmental changes.**

- **In April, JAXA, NASA and ESA launched a collaboration to analyze the changes in the global environment and socio-economic activities before and after the global pandemic using Earth observation satellite data from the three agencies.**

- **The collaboration has been supported by dedicated working groups: Air quality and Climate WG, Dashboard WG, Economic activity WG, Water quality and WG Agriculture WG.**

- **As a result of the collaboration, the three space agencies have created the Earth Observing Dashboard and released it on 25 June.**
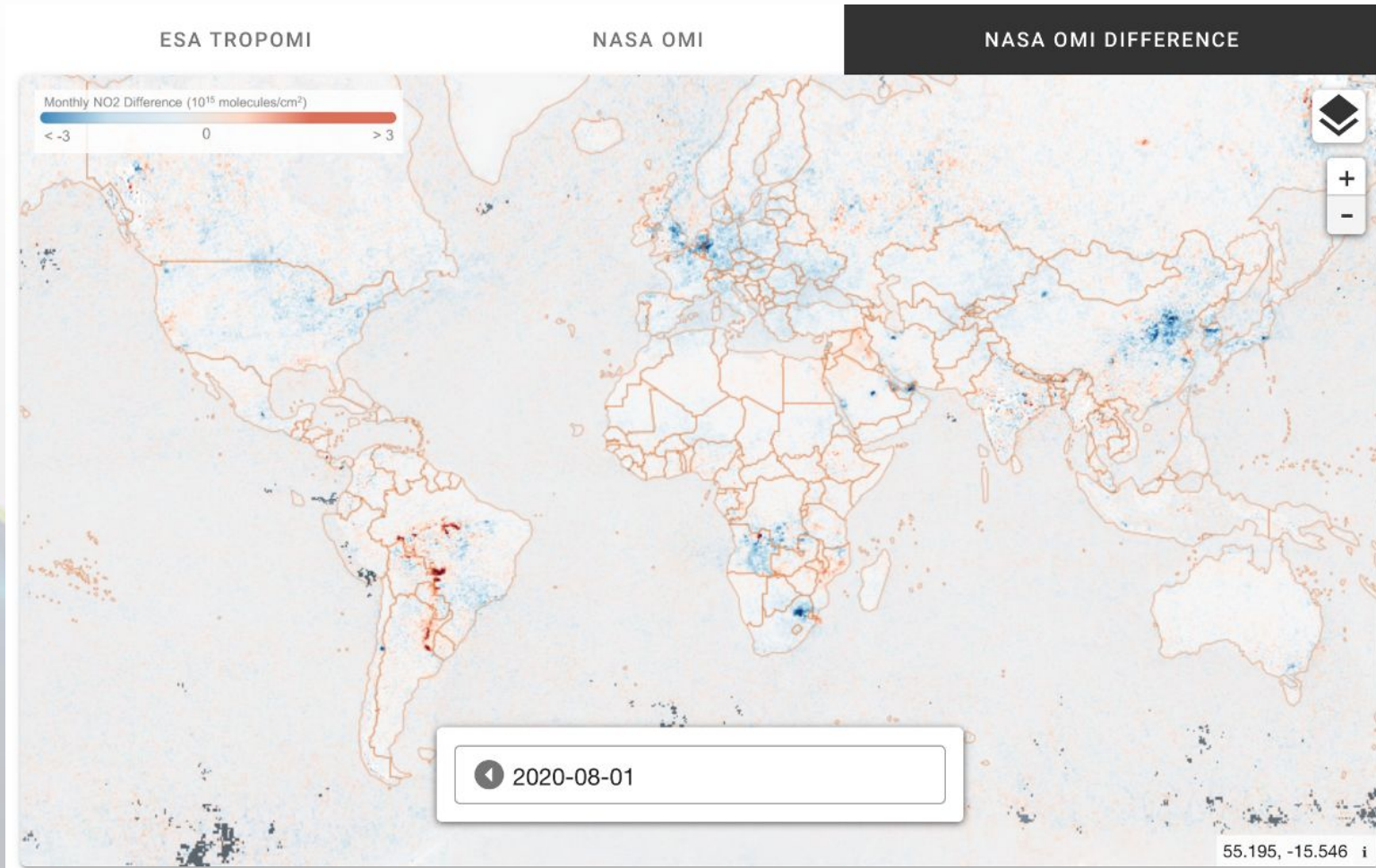
Earth Observing Dashboard

- **Earth Observing Dashboard integrates multiple satellite data records with analytical tools to allow user-friendly tracking of changes in air and water quality, climate change, economic activity, and agriculture.**

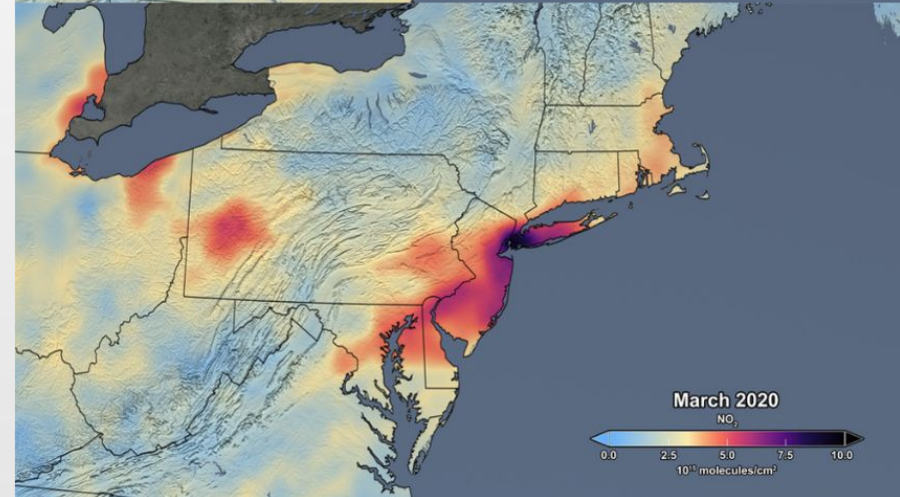- **Earth Observing Dashboard was developed by utilizing APIs and Datacube technologies.**
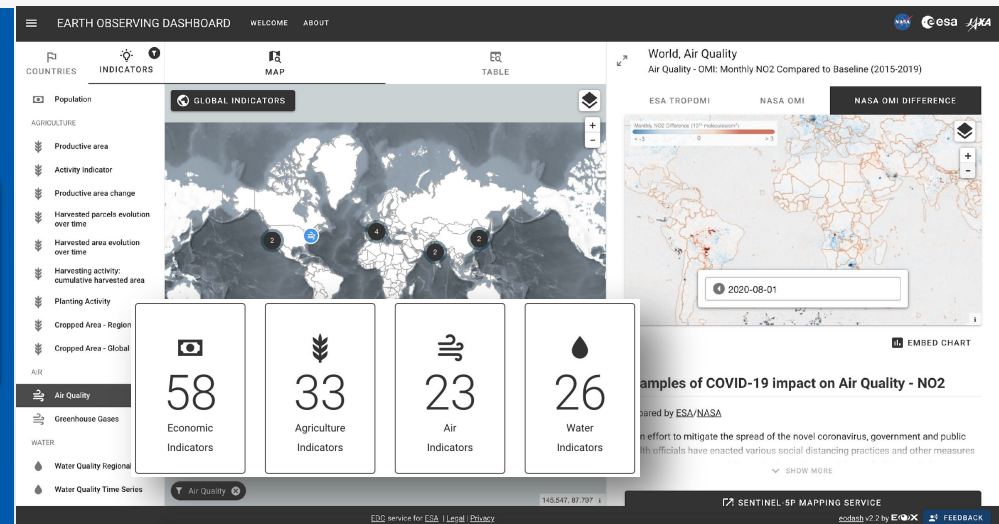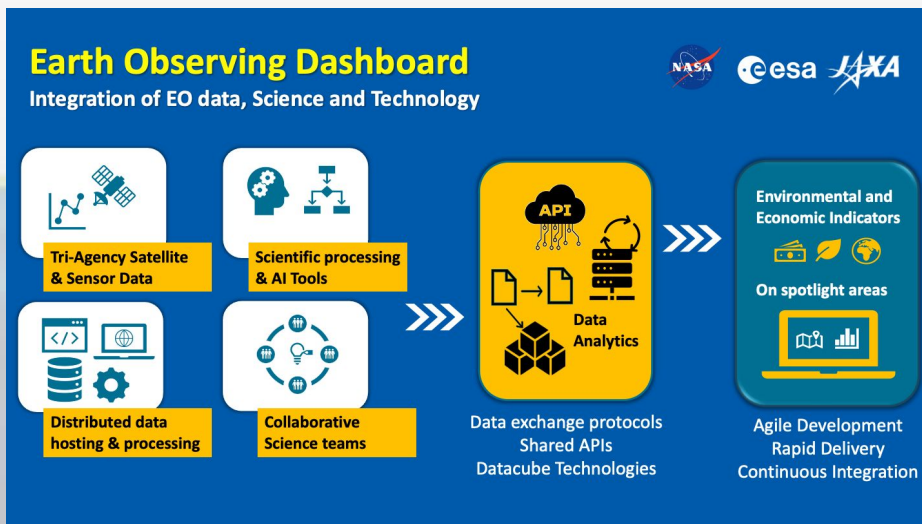
eodashboard.org

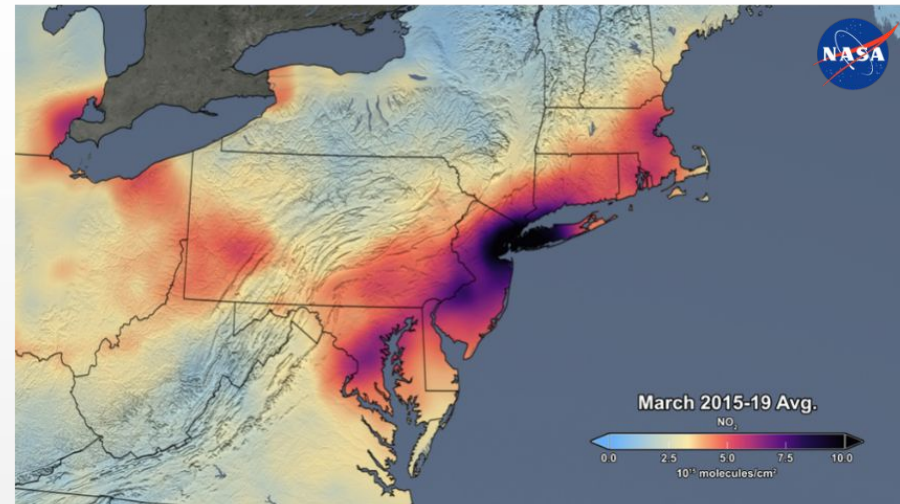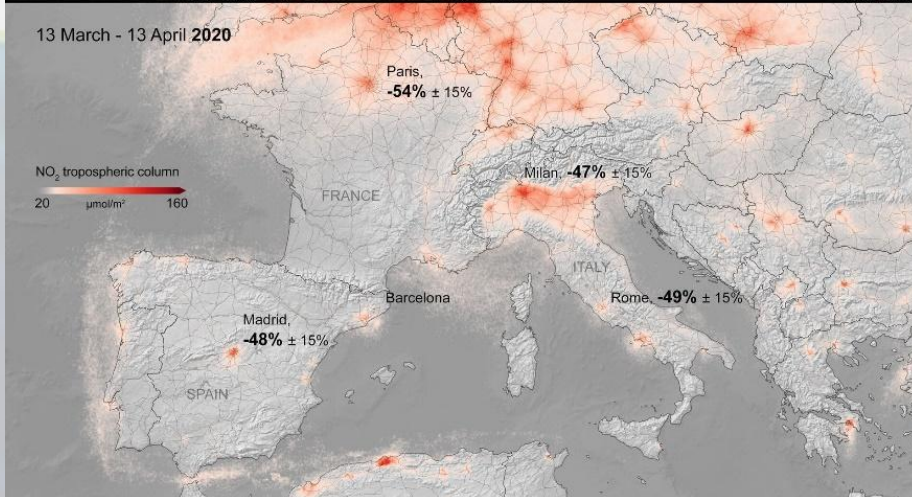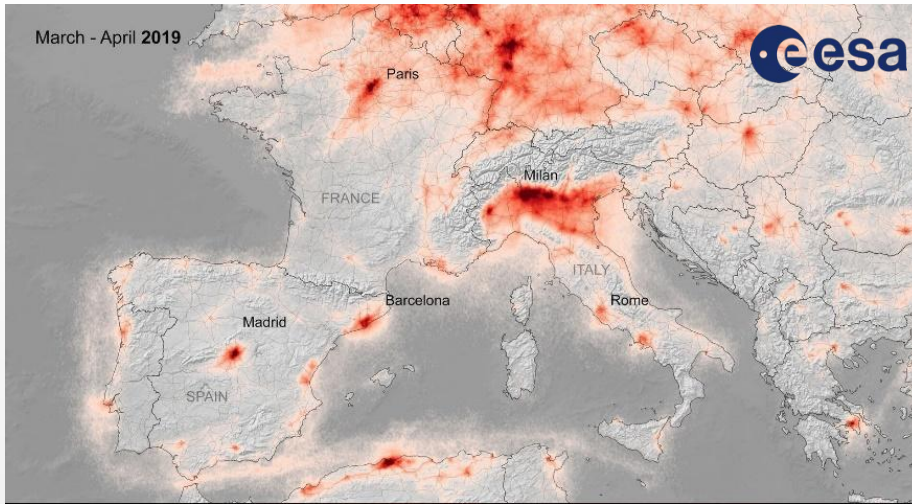- **NO2 by Aura OMI: Monthly NO2 Compared to Baseline (2015-2019)**

- **NO2 global map by Sentinel-5P and Aura**

March – April **2019**

Paris

Milan

FRANCE

Barcelona

Madrid

Rome

ITALY

SPAIN

13 March – 13 April **2020**

Paris, **-54%** ± 15%

Milan, **-47%** ± 15%

FRANCE

NO₂ tropospheric column
20   µmol/m²   160

Madrid, **-48%** ± 15%

Barcelona

Rome, **-49%** ± 15%

ITALY

SPAIN

March 2015-19 Avg.
NO₂
0.0   2.5   5.0   7.5   10.0
10¹ molecules/cm²

March 2020
NO₂
0.0   2.5   5.0   7.5   10.0
10¹ molecules/cm²

Indicator example: Climate

- **CO2 global map by OCO-2**

- **CO2 city scale map by GOSAT**
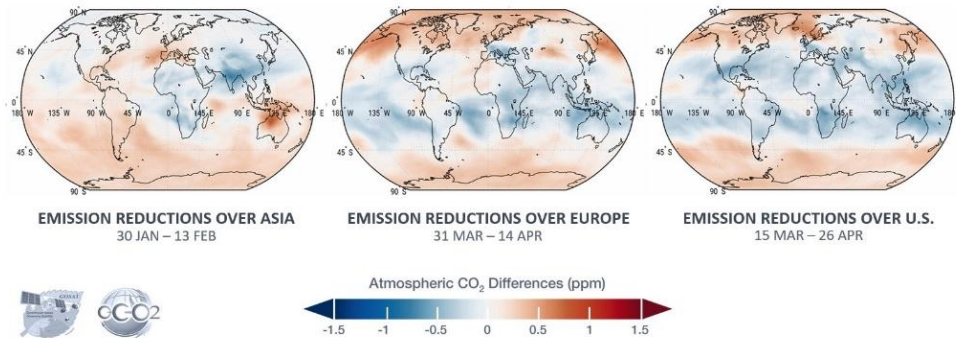
Example of localized CO_2 from GOSAT over Tokyo
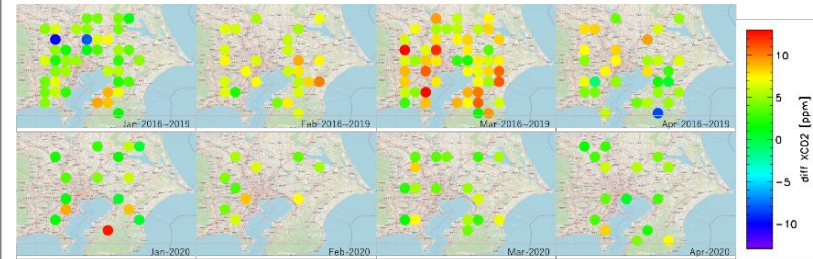
(top) Map of average 2016-2019 CO2 over Tokyo for different months
(bottom) Map of average 2020 CO2 over Tokyo for same months

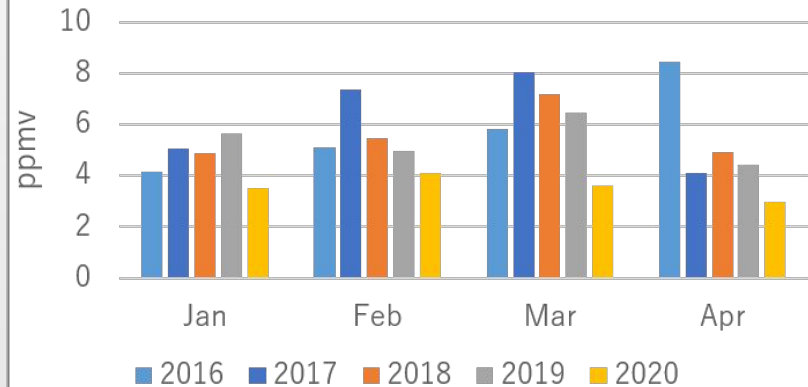### Comparisons of Observed CO_2 and Emission Changes

Assimilated OCO-2 difference in CO_2 concentrations in 2020 minus prior years average

EMISSION REDUCTIONS OVER ASIA
30 JAN – 13 FEB

EMISSION REDUCTIONS OVER EUROPE
31 MAR – 14 APR

EMISSION REDUCTIONS OVER U.S.
15 MAR – 26 APR

Atmospheric CO_2 Differences (ppm)
-1.5 -1 -0.5 0 0.5 1 1.5

Tokyo

2016 2017 2018 2019 2020
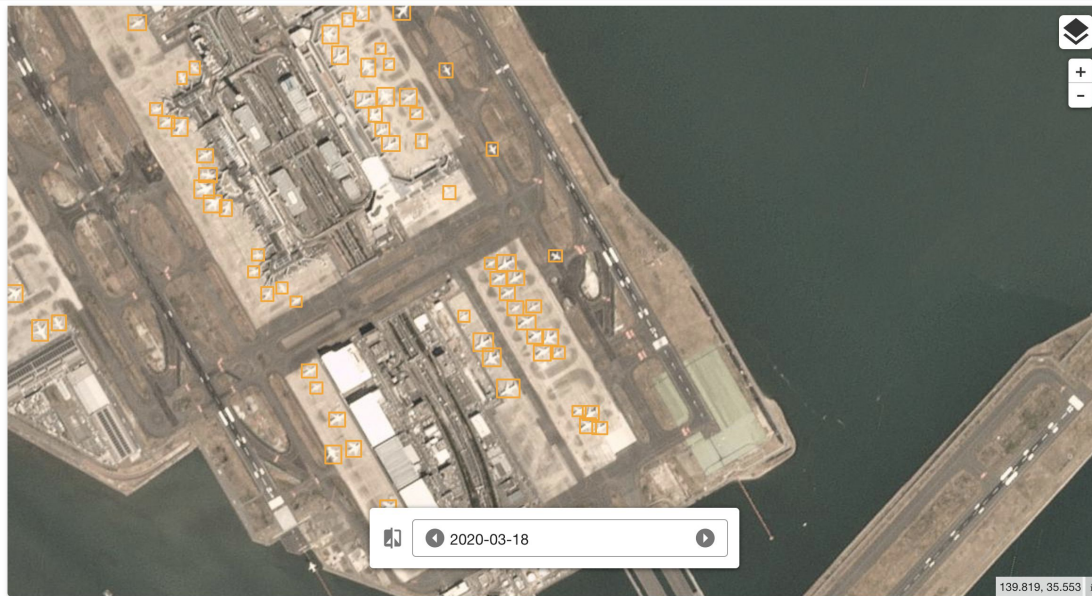
Average monthly abundances of CO2 (relative scale) in the lower troposphere over Tokyo for past 4+ years from GOSAT

- **Number of airplanes at parking areas in Tokyo International Airport based on ALOS-2 PALSAR-2, Sentinel-1 and Planet (with automatic plane detection in HR imagery)**

- **North Adriatic: effect of the lockdown and the subsequent recovery on inland and coastal waters by monitoring the deviation from a weekly climatological mean of Total Suspended Matters (TSM) as measured from optical sensors: Sentinel-3, GCOM-C and Aqua.**
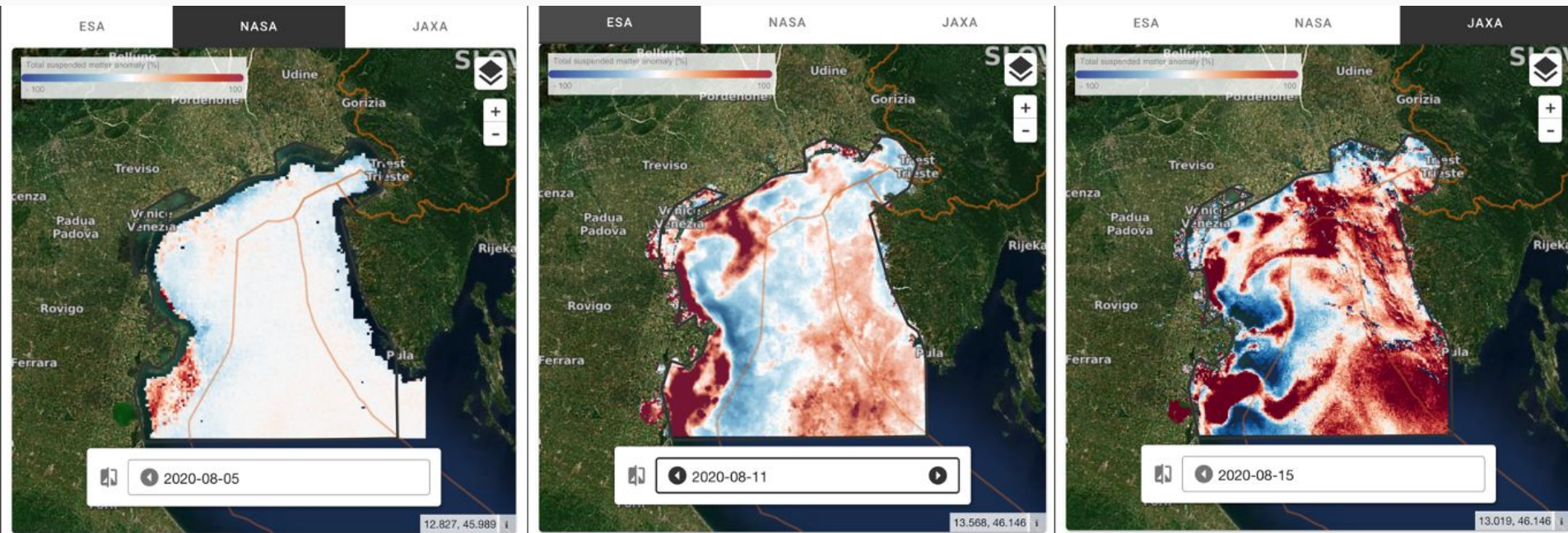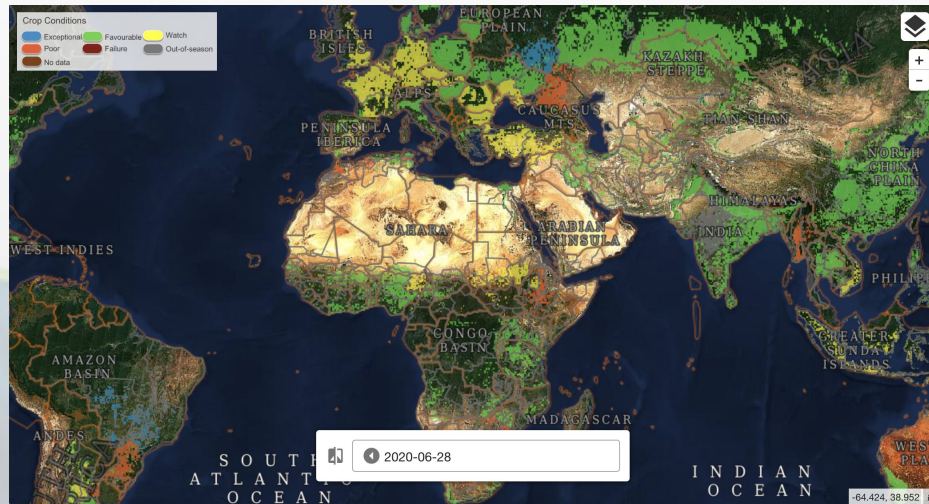

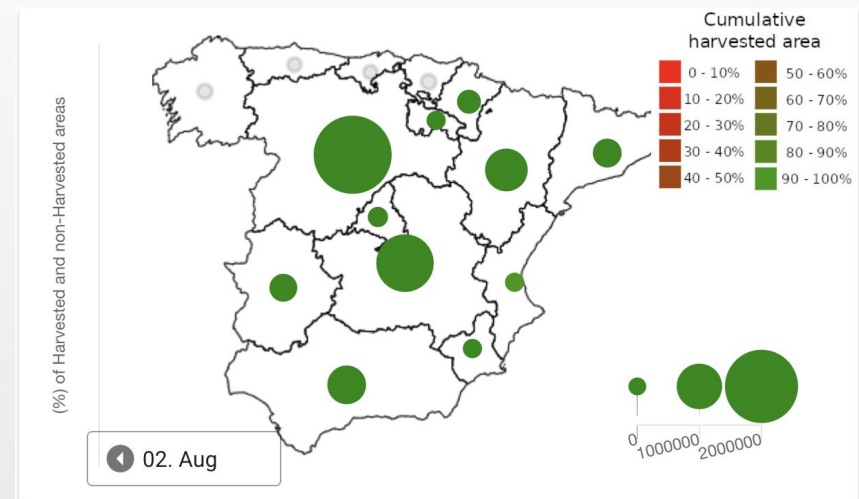Denser time series enabled by combining observations from three agencies

- **GEOGLAM Crop Monitor data integrated, informing on global food supply**

- **Parcel based monitoring of winter cereals in Spain, based on Sentinel-2 time series processed on Sen4CAP**

Global crop conditions as of June 28, 2020. Blue and green colours indicate exceptional and favourable crop conditions, while red and burgundy indicate poor crop conditions and crop failure. Yellow areas are currently under watch for potential negative impacts on crops.
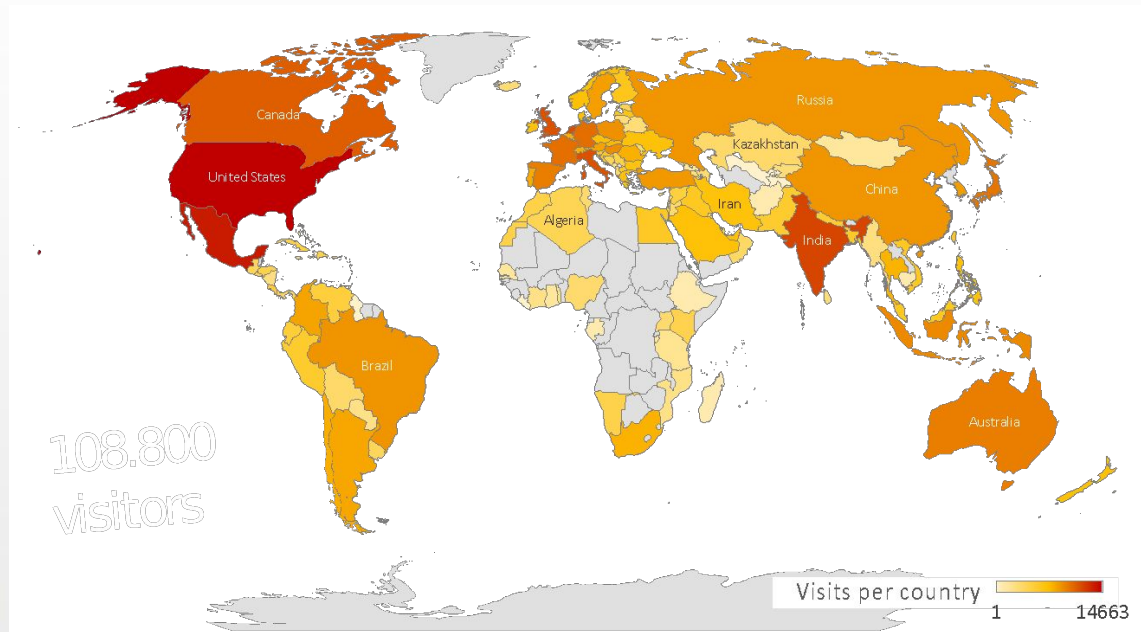
Dashboard visits: metrics

- **Most visited indicators from last update:**
  - Greenhouse Gases,
  - SAR Slowdown Proxy Maps,
  - Nightlights,
  - Finished goods production: output inventory level,
  - Air Quality Time Series,
  - Water Quality Maps – Total suspended Matter

- **Visitors from 145 Countries**

108.800 visitors

Visits per country
1   14663

- **Number of visits**: 108.800 estimated total, 37.017 with accepted cookies
- **Average visit duration**: 03 min 8 sec
- **Top visiting countries:** United States, India, Netherlands, Italy, United Kingdom, Canada, Germany, France, Japan, Australia

Earth Observing Dashboard status

- **Continuous update after the first release on 25 June**
  - o 3 August:
    - ▪ Agriculture -California rice crop monitoring
    - ▪ Economy –Port information (FR and JP)
  - o 30 September:
    - ▪ Airports: throughput (on 16 AOIs in USA, JP and CN)
    - ▪ Air Quality -OMI: Monthly NO2 Compared to Baseline (2015-2019)
    - ▪ Economy-SAR Recovery Proxy Maps (on 11 AOIs in USA, TZ, TG, JP, FR, CN, BE)
    - ▪ Agriculture –GEOGLAM global map and Togo
    - ▪ Unified display of tri-agency maps over common AOIs for Air Quality Maps and Water Quality Maps

- **JAXA, NASA and ESA have defined the procedure for adding new Area of Interest (AOI) of the existing indicators based on the requests from partner agencies who contribute to develop and verify the contents of the indicators.**

OUTLOOK

- **NASA-ESA-JAXA confirmed interest to continue the Trilateral EO Dashboard cooperation activity and expand it to new areas and new indicators**

- During the recent CEOS SIT Technical Workshop, some **CEOS Agencies expressed interest in participating in the joint NASA, ESA, and JAXA COVID-19 Dashboard Initiative**. CEOS Agencies were invited to offer feedback on their desired level of participation (e-mail ceos-sec 24/09/2020 11:41)
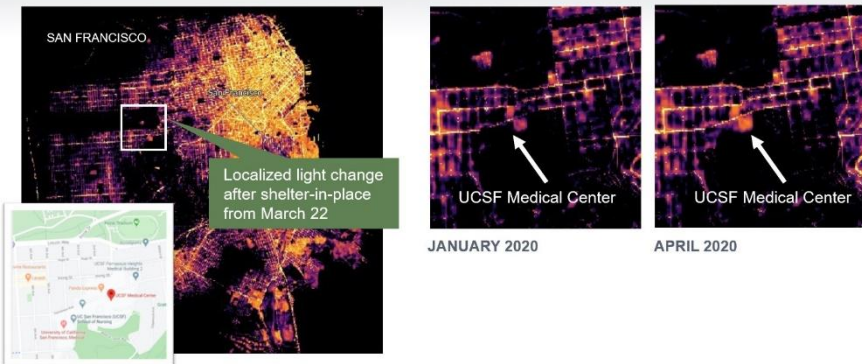
Near Term (< 3 months)
Existing indicators on new AOIs

Long Term (>3 months)
Space agencies commitment (e.g. funding , manpower, data provision) , New indicators development
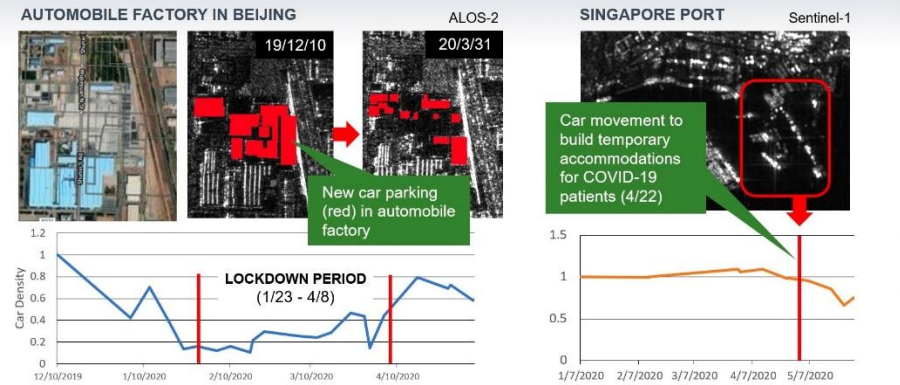
Continued Science and Public Outreach

Indicator example: Economic activity

- **NASA night light data**

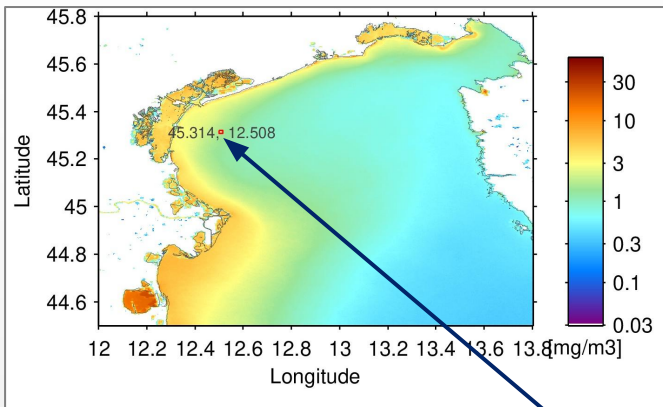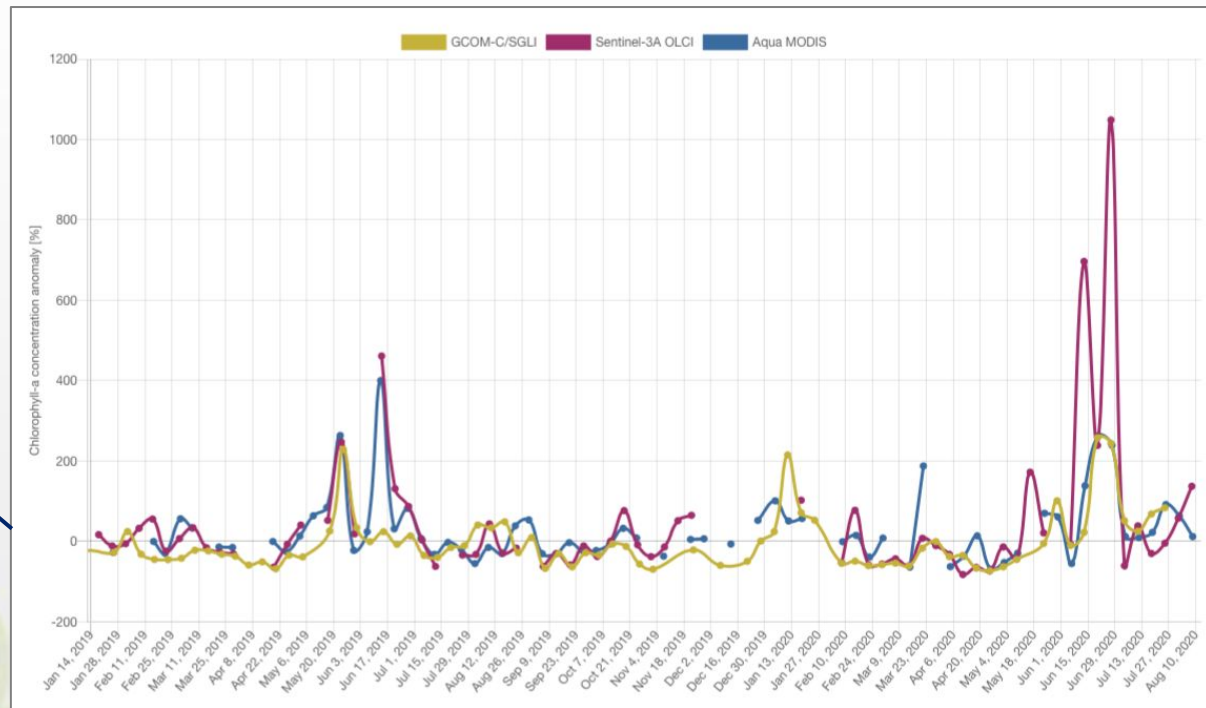- **Car density time series change by ALOS-2 and Sentinel-1**

- **Chlorophyll-a (Chl) concentration by GCOM-C, Sentinel-3 and Aqua**

North Adriatic sea

Time series graph of Chl concentration from GCOM-C, Sentinel-3 and MODIS in North Adriatic sea

- **Planting activity monitoring by NDVI from GCOM-C, Sentinel-2 and Landast-8**