



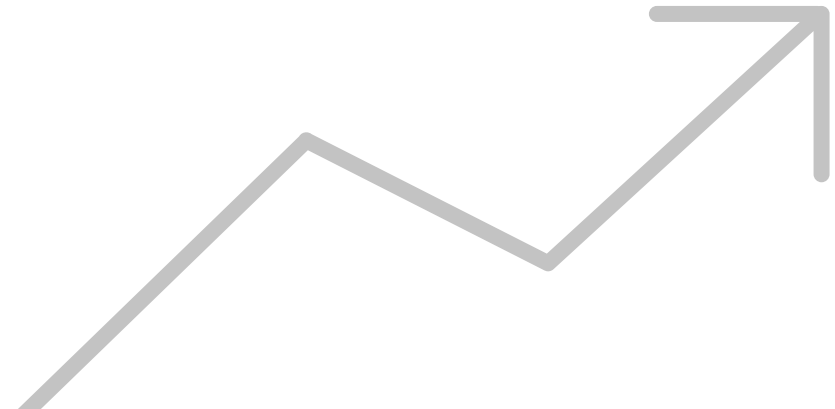
Funded by
the European Union

Project supported by ESA Network of Resources Initiative

DISTATIS
Statistisches Bundesamt

Satellite data for Economics – Sat4EC

Project achievements



Background and Motivation



Aim: Economic flash estimation

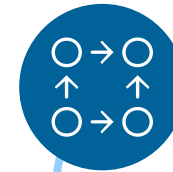
Increasing demand for urgent fact based economic data



Data and status quo

Traditional data not available. Estimates profit from additional data sources.

Use of established satellite-based indicators from external resources



Process

Independent data production

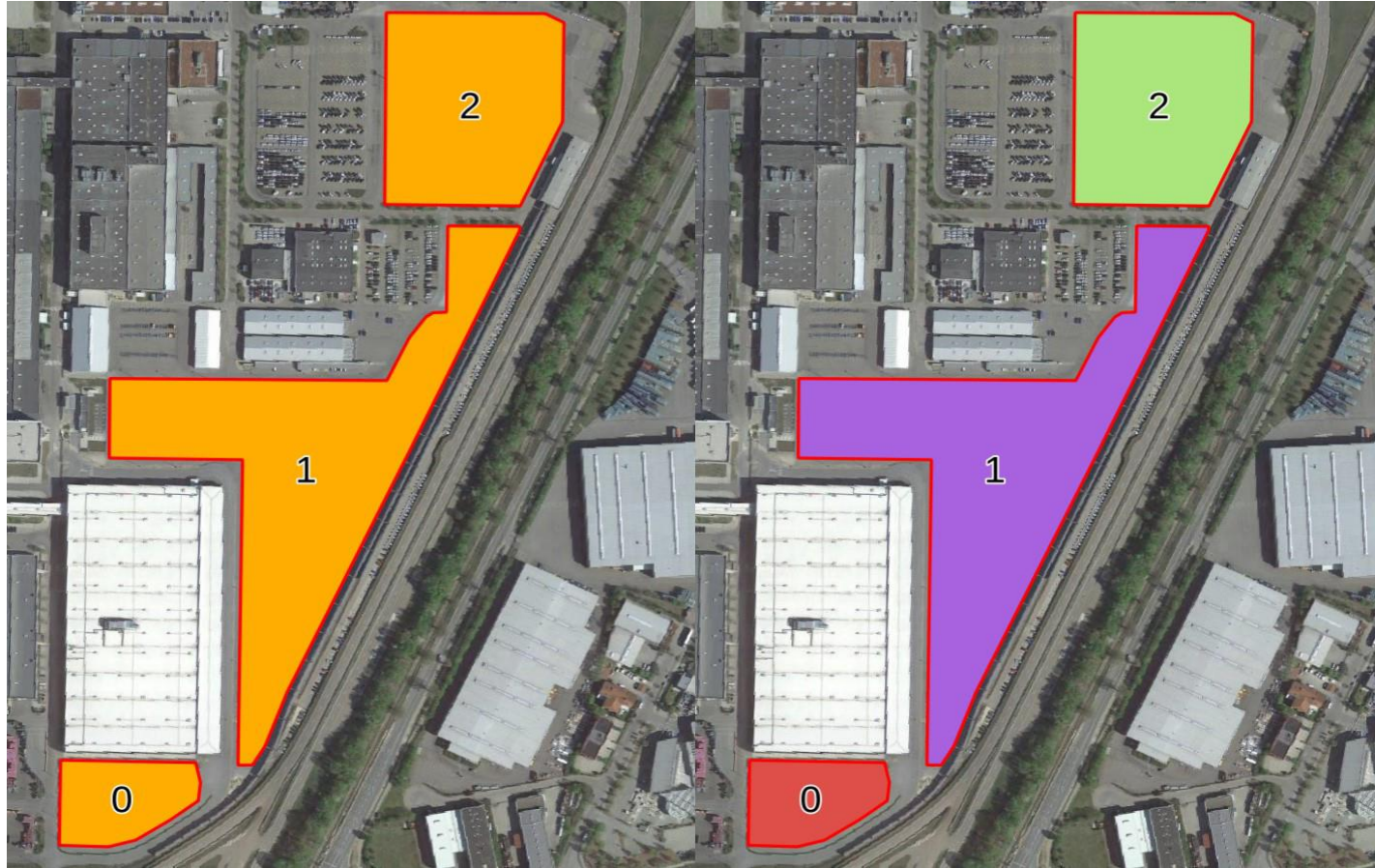
Improve data workflow and cooperation

Capacity building

Performed Work

Areas of Interest (AOIs)

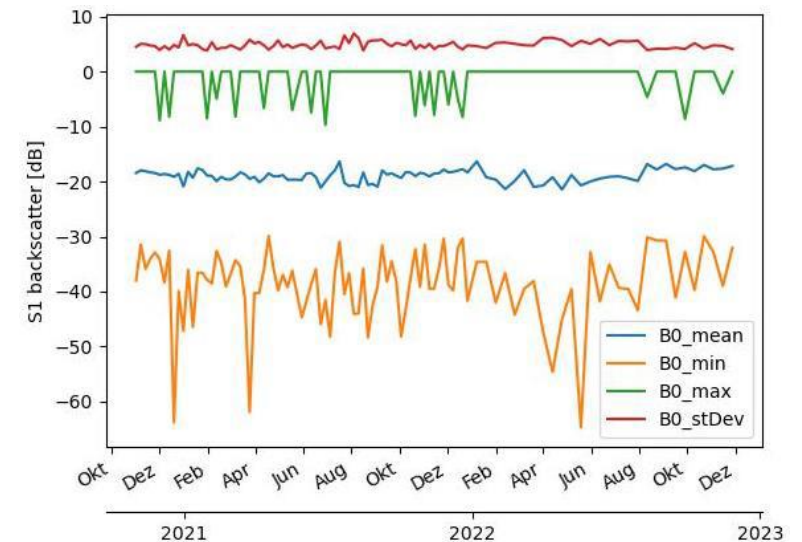
- » Code allows reading AOI files and other standards in different formats that are automatically detected and do not require user interaction (Geopackage, Geojson, Shape files, WKT coordinate representation, Polygon geometry object)
- » User can declare if the computation should be run on the AOI as a whole or if available sub AOIs should be identified
- » Rules defined for identifying relevant AOIs
- » 14 automobile production facilities have been identified as valuable AOIs, 10 automobile production facilities were identified as unsuitable for observation



Left: Sub AOIs being aggregated into a single multipolygon.
Right: Sub AOIs being treated as individual polygons.

Data request

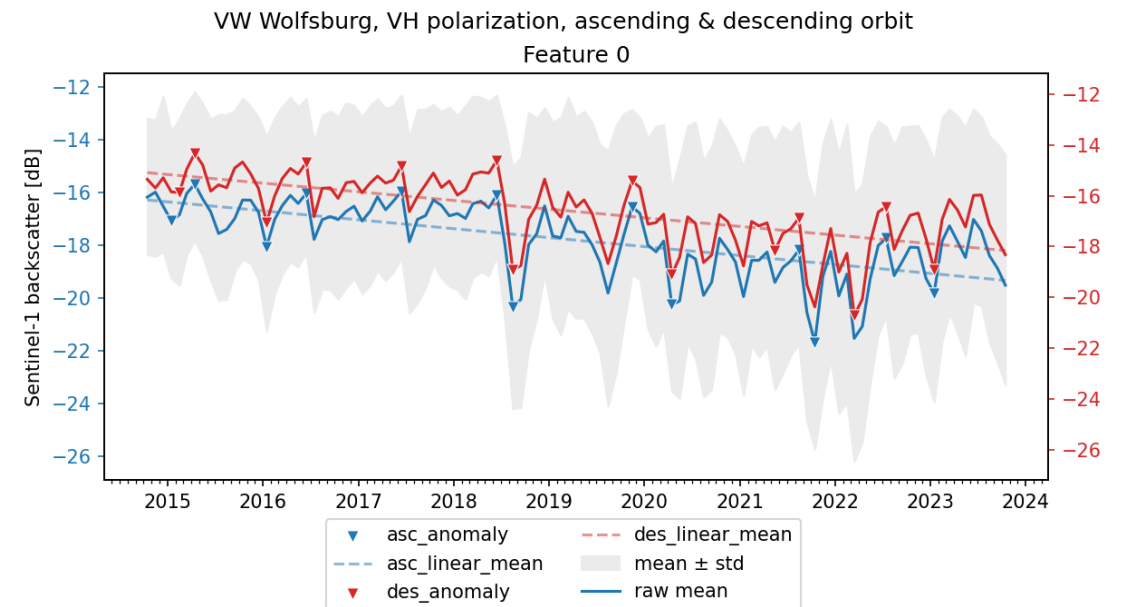
- » Data is requested through Sentinel Hub and the provided Statistical API by submitting a Sentinel Request
- » Automatic check if data has already been downloaded for the requested AOI. If data is present, the algorithm checks if the requested dates exceed the present data into the past or into the future and downloads and adds new data if necessary.
 - » Number of requests to Sentinel Hub can be reduced substantially.
 - » If necessary, old results can be overwritten, for instance if the underlying Sentinel-1 processing would change legacy data and a re-download is necessary.



Data analysis

- » Several execution parameters can be set
 - » Compute on orbits, set start & end date, semi-daily or monthly data (custom monthly aggregation as Sentinel Hub only accepts days)
 - » Set regression function, compute aggregated or split AOI
 - » Use already existing data, connect to Sentinel Hub

- » Regression
 - » Interpolate raw mean data, eliminate peaks likely being noise
 - » Support various interpolation methods (Spline, Rolling mean, Polynomial)
 - » Provide linear mean for visuals



Data analysis

- » Anomaly detection
 - » Anomalies define stable peaks
 - » Detected on interpolated raw or uninterpolated monthly data
 - » Drop anomalies within insensitive data range
 - Linear mean
 - +/- (0.2 * linear standard deviation), factor was derived empirically
 - » Drop anomalies in close timely proximity
- » Test if there is a difference in the results between ascending and descending orbit
 - » Effect indeterminable
- » Effects of cars parked in various orientations
 - » Effect possible, but unclear how to measure with Sentinel-1 data alone

Data analysis

- » Test if there is a difference in the results between ascending and descending orbit
 - » Effect indeterminable
- » Orientation of cars
 - » Effects of cars parked in various orientations
 - » Effect possible, but unclear how to measure with Sentinel-1 data alone

Achievements

- » Timelines actualisation
- » Automatic check if data has already been downloaded for the requested AOI
- » New AOIs and possibility of sub AOIs -> difference in results
- » Multiple tests of effects of factors like orbit, orientation of parked cars, terrain -> No measurable effect or negligible
- » Effect of different anomaly detection, interpolation and regression methods

Potential

Internal

- » Capacity building ensures continuity
- » Developed process and methods as workflow adaptable for future satellite-based indicators
- » Successful validation with statistical data

External

- » Exemplary case for countries not as deep in EO data
- » Cooperation with the national space agency (DLR) and ESA as an exemplary use case
- » Early information about important economic sector

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