

► Project *brief*

Thünen Institute of Rural Studies

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timeStamp – more efficiency in large scale monitoring of measures

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- **Comprehensive information on land use and measures can be obtained using freely available Sentinel satellite data.**
- **Due to a lack of suitable applications, agricultural and nature conservation authorities have hardly tapped the potential of this data for large scale monitoring.**
- **With timeStamp we developed an user-friendly web application for the automated processing of satellite data, which can be supplemented with more modules in the future.**

Background and purpose

The Agricultural Policy (CAP) and nature conservation is currently carried out frequently in time-consuming and cost-intensive physical on-site inspections. By using Sentinel satellite data, authorities of the agricultural and nature conservation agencies shall in the future be able to reduce on-site inspections. The implementation of satellite data into the operational processes of federal agencies has been delayed recently by the lack of suitable infrastructure and processing capacities for the retrieval, analysis and evaluation of remote-sensing data.

The timeStamp project aims to develop a cloud-based web application for satellite data analysis and output of evaluation results. An application is available on auf CODE-DE ([CODE DE – About CODE-DE](#)), the German Cloud for utilisation of remote sensing data by public institutions, as a Service ([timeStamp \(code-de.org\)](#)).

The first use case is a module designed to control catch crops declared by farmers as Ecological Focus Area (EFA) of the CAP Greening. In addition, the multifunctional basic function provides standard time-series graphs, test parameters, and change indicators usable for various areas of application related to land use change and management.

Approach/method

In workshops with cooperating federal agencies, we assessed the specific technical requirements and user requirements to identify the necessary functions and tools of the web application. We established suitable indicators and algorithms to control the EFA catch crops based on pre-

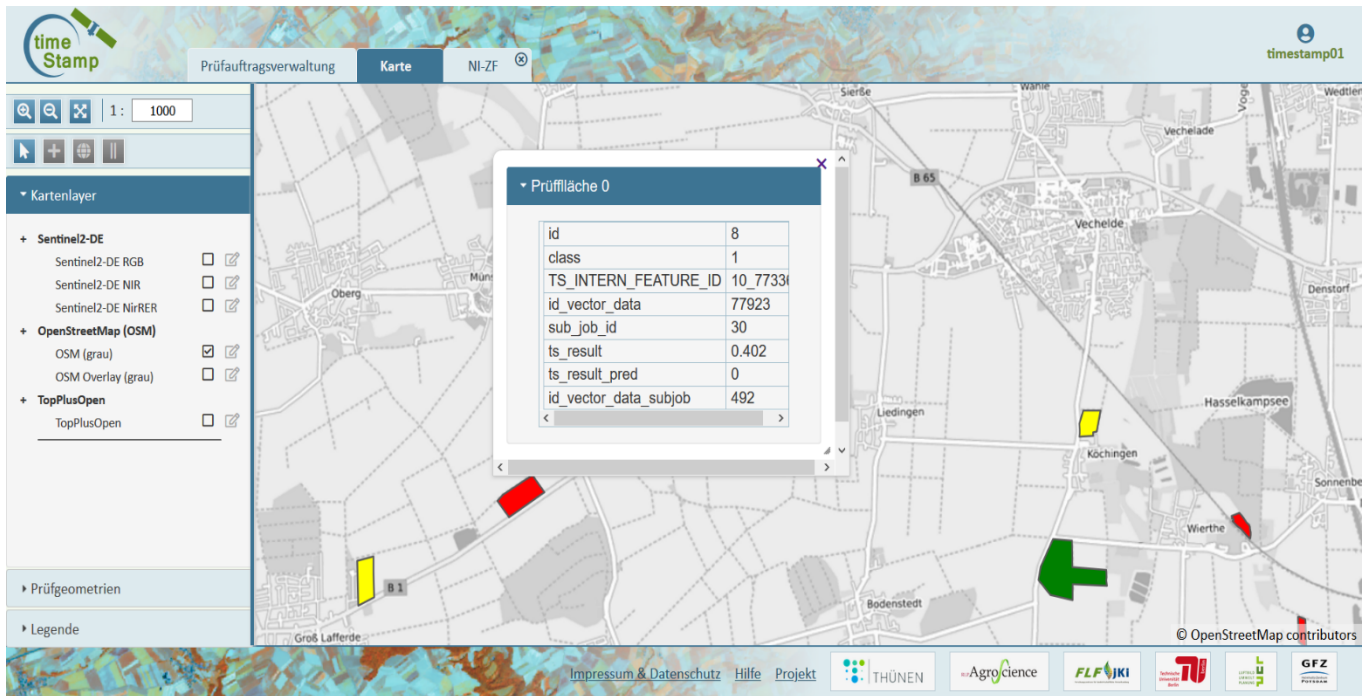
processed timeseries data of Sentinel-1 and Sentinel-2 satellites. EFA catch crops mapped in the field, as well as on-site control data of the Integrated Accounting and Control System, were used as training- and validation data sets for the algorithms developed.

Also, the algorithms for the parameters of the multifunctional basis function were coded. All algorithms were implemented into the cloud-based processing environment/platform (backend), in which the analysis of the satellite image timeseries takes place. Finally, the user interface was added. This interface enables the users to upload and manage their data, start, view and download cues for the planning of on-site inspections.



Results

The timeStamp web application provides a platform for automated analysis of satellite image time-series data starting with data from 2016. The web-application enables the user to up- and download data (including the geometries of the surfaces to be checked), submit testing conditions and testing period and finally to view and download evaluation results. The latter are displayed in site-specific time-series graphics, and in spatial context by a web-GIS. Control cues are provided with a traffic light colour coding, this was recently implemented for the use case of EFA catch crops. Thereby, the application can support authorities in the inspection of area-related measures and enable them to



Spatial visualization of the results for the examination of catch crop areas with WebGIS using a traffic light colour coding (Source: Thünen Institute)

plan on-site inspections more efficiently and focus on areas with ambiguous examination results.

The multifunctional basic function provides standard time-series and test parameters for the monitoring of vegetation and soil moisture amongst other things for areas and test periods. Thus, the multifunctional basic function offers evaluation options for issues relating to areal monitoring in the field of environment and nature conservation.

Conclusion and perspectives

The timeStamp web application is designed for easy implementation of remote sensing analysis. It is now available as Service on CODE-DE for registered users. There is no need for installations and no local computing capacities. The user interface enables users to incorporate satellite data into their workflows without a need for in-depth expertise in remote sensing. Also, the applications' modular structure allows functions to be extended, and thus adapted to specific authority issues and integrated into the authority body's internal infrastructure.

Possible application options of the basic function are the examination of compensation measures and the detection of grassland utilisation schemes and intensities by identifying mowing events.

Future development potential is in the field of agricultural funding. According to EU-guidelines, satellite data shall be used in the future inspect site-specific measures for evidence of agricultural activity.

The basic concept of timestamp is a platform with modular functionalities based on use cases which can be enhanced and easily enables integration into the infrastructure of governmental agencies.

The spin off projects „Copernicus lights green“ and „SENSchiene“ are recently developing new use cases, thereby extending the functionalities available on the timeStamp platform in the future.

Weitere Informationen

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Project website

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Partners

- ¹ Thünen Institute
- ² TU Berlin
- ³ Luftbild, Umwelt, Planung GmbH
- ⁴ Julius Kühn-Institut
- ⁵ RLP AgroScience

Publications

<https://www.sciencedirect.com/science/article/abs/pii/S0168169921001903>
<https://doi.org/10.1016/j.compag.2021.106173>

CODE-DE portfolio and access link

<https://code-de.org/de/portfolio/?infrastructure=&id=88>
[timeStamp \(code-de.org\)](https://code-de.org/timeStamp)

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