Instantaneous Infrastructure Monitoring by Earth Observation

Started in December 2022

Welcome message

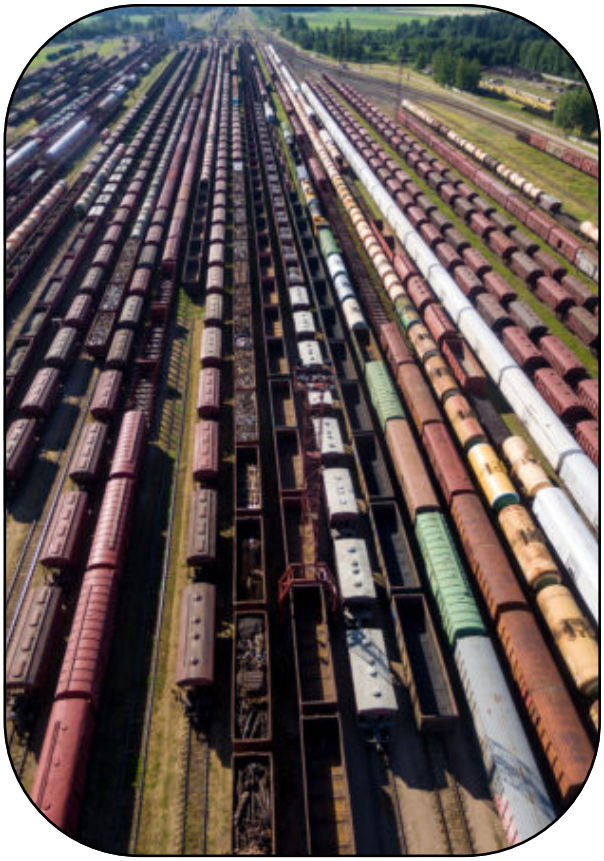
Hello.

Concept

The project Instantaneous Infrastructure Monitoring by Earth Observation (IIMEO) contributes to an end-to-end solution for the operational real-time, high-resolution monitoring of critical infrastructure by means of an innovative observation payload for a future Low Earth Orbit (LEO) constellation. IIMEO focuses on developments for an innovative on-board processing unit and novel sensor configuration. The goal of this project is to design, implement and demonstrate key technological factors of a future satellite-based EO system capable of providing functions necessary for instantaneous monitoring of infrastructures in near real time.

The project's primary objectives

- ***Constellation concept*** providing real-time, on-board processing of products with very high spatial resolution
- Provide ***a technological solution to monitor European infrastructure*** with a focus on protection of infrastructure and the opportunity of immediate reactions in the case of disasters
- Demonstrate the capability for ***end-to-end solutions for services provided by future satellite constellations*** – including hardware, software processing, real-time on board processing and connection to the end-user platforms in the context of an airborne flight campaign
- Demonstrate the use of the developed technology for the ***monitoring of railways*** in cooperation with stakeholders
- Provide ***on-board processing hard and software on TRL 6*** suitable for a European demonstrator mission in 2026/2027
- Provide a ***cost-efficient concept for infrastructure monitoring*** using future satellite constellations, which can form a business case for European industry.



Pilot user

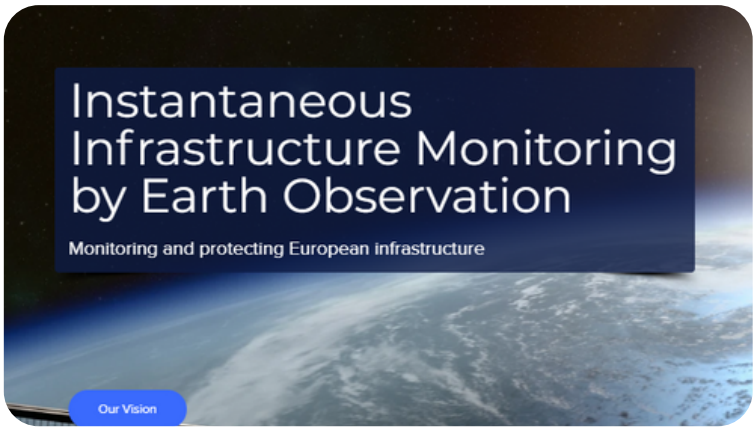
This project focuses on demonstrating the key technological building blocks for one critical application as a pilot project: the protection of railroads to secure a continuous service with only very short interruptions in the case of disasters. For testing purposes, elaboration will be carried out in close cooperation with a railway company as a pilot user to define use cases for commercial applications based on the requirements of industry and public services. The end-to-end prototype service including on-board processing will be demonstrated within a final flight campaign.

Ongoing process

End-user requirements and use cases analysis.

IIMEO research concept, addressing the key challenges of satellite-based EO system capable of providing functions necessary for instantaneous monitoring of infrastructures in near real time (currently, we are searching for use-cases), will be defined based on the requirements from the use case partners.

We are also working on setting up and adjusting our website in order to deliver all the information in one place for better convenience.



Further actions

Based on the defined concept, we will further determine and implement all required elements of the IIMEO solutions. Besides specifying and facing with concerns, for the first 6 months we have set tasks that are required to be completed:

- Technical Constraints of SmallSat Constellation in Low-Earth-Orbit
- Sensor Data Processing *on the satellite*

One of the main perspectives are:

- provisioning of reference data sets for use throughout the project, as well as the advanced prototyping of data processing algorithms & EO sensor system
- focus on the selection and integration of all required hardware components providing computational capabilities for real time data processing for on-board operation, with respect to future application of SmallSat LEO constellations
- adaptation and integration of algorithms for the on-board processing unit
- implementation of IIMEO Platform prototype, the off-board algorithm adaptation and integration and the implementation of use case specific infrastructure services.

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