

EARTH OBSERVATION SYMPOSIUM (B1)  
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TOWARDS AN EARLY WARNING SERVICE FOR FAST-DEVELOPING EVENTS BASED ON A  
SAR-ENABLED MICROSATELLITE CONSTELLATION

**Abstract**

Access to Space-enabled observation systems is getting increasingly faster, intuitive, and automated. Several players are offering 24/7 imagery from first class satellites and their high resolution optical and radar sensors. Others are vying for large constellations to provide full Earth coverage based on optical sensor suites. However, current near real-time commercial services usually have latencies of about 7 hours between the captured event and the moment a user can access the data; and insufficient revisit frequencies of all-weather (SAR) enabled satellites do not allow for setting up early warning systems for fast developing events related with security, extreme weather, sudden harmful blooms (such as HABs) posing risks to human health and economic activities. This shortcoming is particularly relevant in maritime areas, where there are few or none in situ sensors.

Together with IPMA, the Portuguese institution tasked with coordinating research on the sea and atmosphere, TEKEVER is assessing a new microsatellite constellation equipped with distributed optical and radar sensors to allow hourly revisits, integrated with in situ and airborne sensors, and ecosystem and environmental models to provide cost-effective early warning systems targeting extreme events. This service would be focused on reducing the gap between satellite data collection and processing, and its availability to end users, making it suitable for fast developing events.

The assessment will focus on real-time monitoring of Portuguese waters based on satellite and model data, representing a supplemental cost-effective solution that will increase the chances of predicting ex-

ceptional events before they reach the coast, reducing risks and economic losses, revealing intra- and inter-annual variations, as well as expressing trends that might reflect changes in the climate system. It will impact regulators, monitoring bodies, industry and coastal zone managers.

This paper starts by presenting an assessment of existing and potential user needs for monitoring fast developing events that shape risks related with security, safety, public health, environmental sustainability and economic activities. It will map existing data providers, system models, and process simulations to validate both technical and market gaps and identify critical issues for further developing and integrating these models. Service architecture will follow allowing for different application scenarios for a set of services to assess their effectiveness and efficiency against existing solutions in developing forecasts and adopting innovative strategies to prevent harmful events, mitigate their impacts or estimate interactive effects. The paper will conclude with insights on the technical and economic feasibility of such a service.