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MEASURES OF SURFACE MOVEMENTS IN CATALONIA USING SENTINEL-1 DATA

>>> A few years later

In the last few years, the automation of Sentinel-1 image processing for continuous monitoring of the territory has been improved. A monthly update of the surface motion map is currently being provided for all of Catalonia. Such product provides a large amount of data studied using Artificial Intelligence (AI) techniques to detect movements of extensive areas of territory.

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BENEFICIARIES	Cartographic and Geological Institute of Catalonia (ICGC)	Cartographic and Geological Institute of Catalonia (ICGC); PA departments for control of the territory	Experts in geology, terrain analysis, control of aquifers	Citizens and society
SERVICES	TIER 1: SERVICE PROVIDER Sentinel-1	TIER 2 PRIMARY USER A complete map of measures of land movement for the entire territory of Catalonia	TIER 3 SECONDARY USER A tool to evaluate the causes and to apply solutions, for better management and monitoring of the territory (in combination with geological studies and in situ measurements)	TIER 4 END USER BENEFICIARIES Improvement of civil security and sense of safety

Value chain definition following SeBS Methodology - <https://earsc.org/sebs>

The space-based solution

This Copernicus-based solution was developed by the PA for other users such as companies, professionals, agencies, associations, single citizens. In the past few years, there were significant automation improvements.

The Usage Maturity Level

UML of the solution has transitioned to a higher level. The main reason that helped this transition is an increased recognition about the effectiveness of the solution at decision-making level based on the achieved results and return-of-experience.

Thematic Area



TERRITORIAL MANAGEMENT AND URBAN PLANNING

Region of Application



CATALONIA

Sentinel mission used



S1

Copernicus Service used



-

Usage Maturity Level



5

Overall benefits

ECONOMIC



- Increased revenues have been registered.
- Reduction of risk has been registered

ENVIRONMENTAL



- Reduced depletion of natural resources

REGULATORY



- The solution has helped to inform the design/review of policy parameters
- The solution has improved the PA's capabilities to detect and assess non-compliances

INNOVATION



No noticeable additional modification/impact on the functioning of the public administration nor on the lives of the citizens since 2018.

SCIENCE



- The solution has enabled some technological advancement (e.g. positive technological externalities)
- There was an increase in technical/scientific expertise related to Copernicus/EO within the PA
- There was an increase in technical/scientific expertise related to Copernicus/EO at the service provider

SOCIETAL



Civil security has improved (e.g. reinforcement of the sense of safety and protection for society)

Benefits classification following SeBS Methodology - <https://earsc.org/sebs>

Interesting facts...

The products are being used by different departments of the Public Administration for the control of the territory, including experts in geology, terrain analysis, control of aquifers among others. The quality and usefulness of the results is making more and more departments interested in their exploitation. From technical perspective, the processing of Sentinel-1 images has been automated, providing monthly updates of the surface motion map for all of Catalonia. Additionally, various processing stages have been improved and AI techniques were applied for the automatic detection of subsidence phenomena.

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Outlook to the future

A more in depth work on Artificial Intelligence (AI) techniques is planned for the future. The purpose of these techniques would be an automatic classification of various surface motion patterns (seasonal, subsidence, uplift, other) and the creation of an alarm system capable of detecting precursors of dangerous movements.

This methodology aims to facilitate the study and automatic analysis of large territories.

Contacts

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