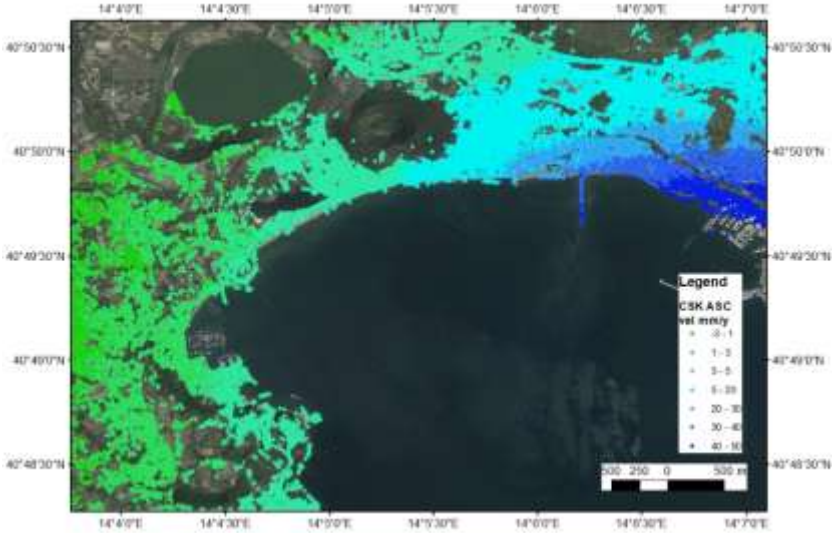
Integrated application of Remote sensing and Cultural heritage : the EO4GEO project scenarios



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EO4GEO Project

"Towards an innovative strategy for skills development and capacity building in the space geo-information sector supporting Copernicus User Uptake "

EO4GEO is an Erasmus+ Sector Skills Alliance gathering 26 partners from 12 countries from academia, private and public sector active in the education/training and space/geospatial sectors.

Duration: 4 years from January the 1st, 2018
Budget: 3,85 M€

Partnership: (from 16 EU Countries),
26 organisations + 22 (initially) Associated Partners
from Academia, Companies and networks, many of them Members of the Copernicus Academy Network

Addressed Copernicus Areas:
Integrated Applications, Smart Cities, Climate Change

The space/geospatial sector is of strategic importance since it already provides support to many worldwide, European, national and sub-national policy domains. However, **data and services are still used in a sub-optimal way.**

Data and services related to the space/geospatial sector **are still used in a sub-optimal way**

Bridge the skills gap between supply and demand of education and training in the **space/geospatial sector**

A lack of specialized technical and scientific skills impedes the uptake by private companies and other actors

Working in an multi- and interdisciplinary way and applying innovative solutions for its education and training actions including **case based and collaborative learning scenarios**

ISPRA contribute to the EO4GEO project

Integrated applications of satellite monitoring: 4 application domains			
Ground motion	**Geohazard zoning**	**Land Change Detection**	**Agro Monitoring System**
Landslide affecting Cultural Heritage sites - Baia Archaeological Park (Naples) (ISPRA)	Landslides documentation supported with an EO-based service (PLUS)	Geospatial data and technologies applications for monitoring land use change (ROSA)	EO-based agro monitoring system to support regional decision-making (UJI)
Tutorials of integrated applications and training modules			

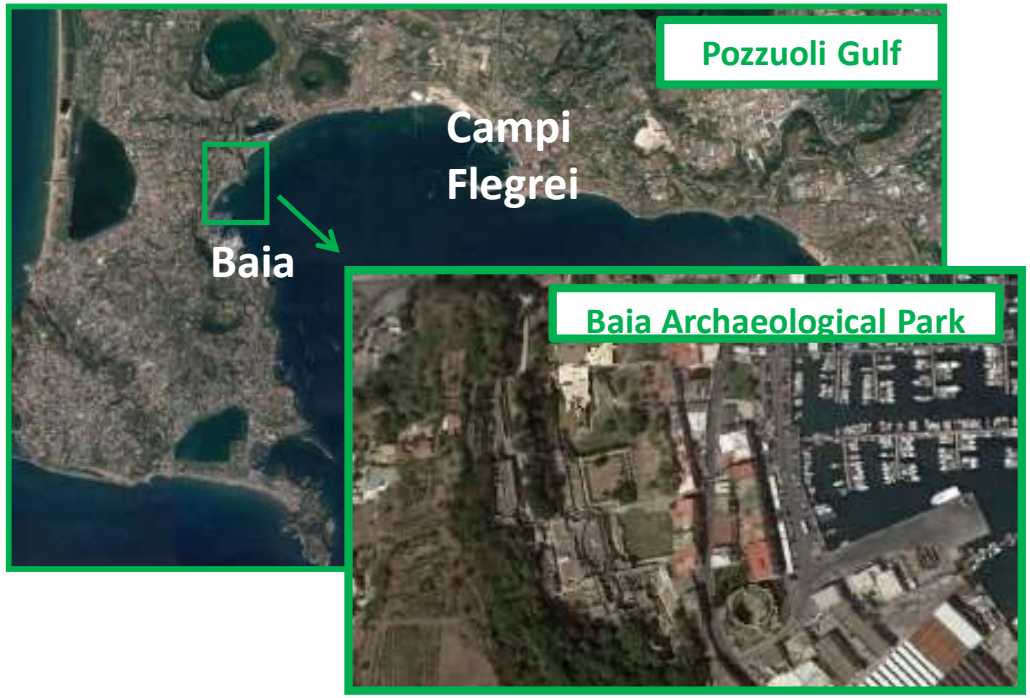
Author comment

Objective:Prepare and circulate among partners a list of potential integrated applications of satellite monitoring using open platforms (e.g. Copernicus) in the field of geo-hazard monitoring.

- The sub-sector Integrated Applications deals with multi-faceted, usually multi-sector and often on cross-border challenges to connect domain of geo-hazard monitoring and assessment with the ones of sustainable development of anthropogenic settlement. Main expected results will be to define standard methodologies in order to implement risk scenarios on selected exposed elements using open and free EO data.
- ISPRA in the framework of its task will develop and coordinate different scenarios fostering the uptake of EO data, services and standardized methodologies of analysis. Available EO data provided from different satellite missions, both European and international (e.g. Sentinel from Copernicus program, COSMO-Sky-Med from ASI), will be tested to evaluate their effectiveness and efficiency in the field of geo-hazard monitoring and risk assessment.
- To achieve these targets some proposed case study were clustered in 4 Application Domains. Then, for each Application Domain, the most representative scenario was selected basing on the different stakeholders involved, EO data, monitoring and analysis activities carried out.
- For all scenarios learning objectives spans from the knowledge of different EO and geospatial data and their relative sources and availabilities, to the understanding of specific analysis techniques for each kind of data (radar, optical, DEM, field survey),and to the integration of all interdisciplinary data for the problem-solving of environmental threats

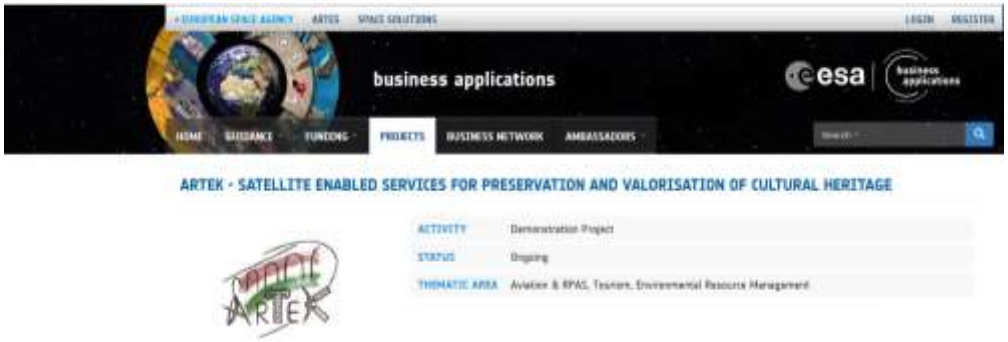
Landslide affecting cultural Heritage Sites

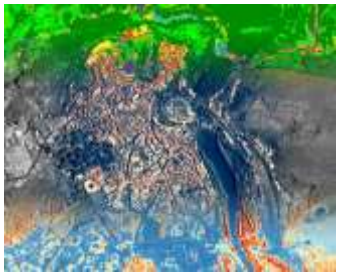
Case study: Baia Archaeological Park



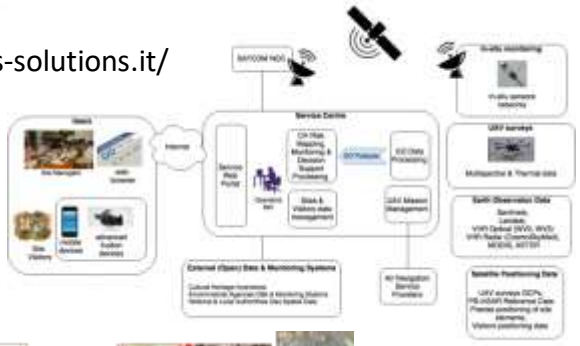
- Located close by the Phlegrean Fields caldera, unique example of volcanic-related subsidence with unrest cycles;
- It extends exactly along the inner side of the western sector of the volcanic building of Baia.
- The area experiences intense ground uplift and down lift;
- site location, along the steep internal slopes of the volcano, required a strong control over the area development with massive terracing works.

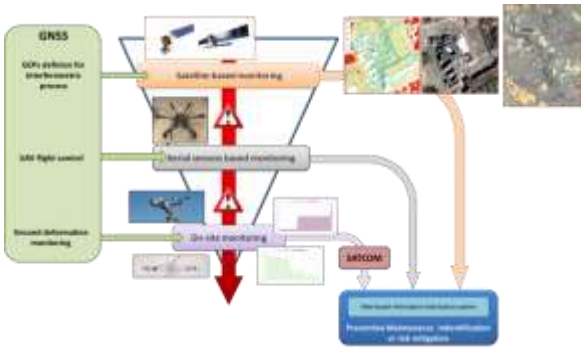
Landslide affecting cultural Heritage Sites





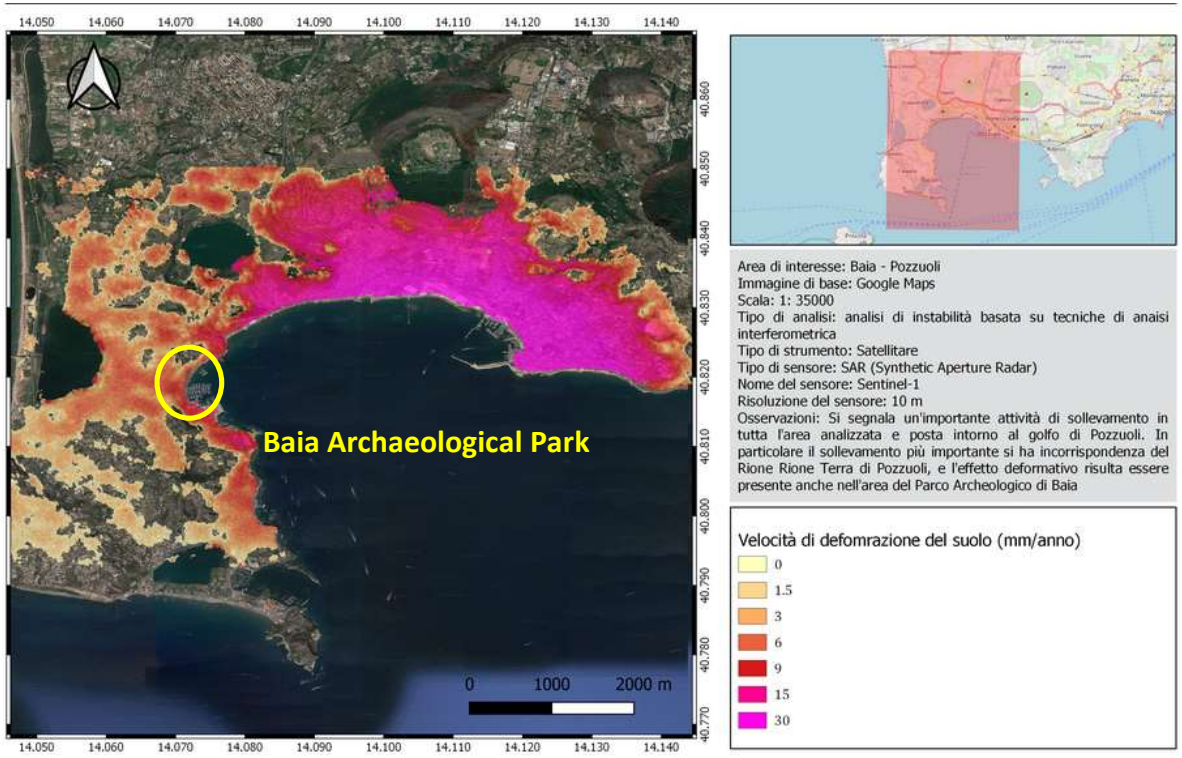
Source:http://artek.apps.nais-solutions.it/





https://business.esa.int/projects/artek

Landslide affecting cultural Heritage Sites
Case study: Baia Archaeological Park



Ground Displacement Map SAR images acquired with SENTINEL 1

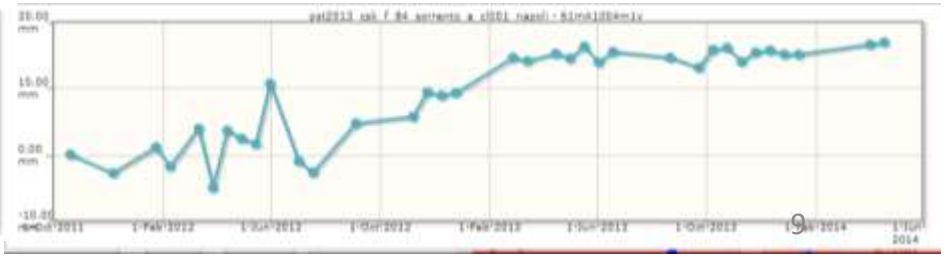
➢**Significant uplift rate (up to 30 mm/yr) involving the neighbored "Terra di Pozzuoli " and the Baia Archaeological Park**

Source: http://artek.apps.nais-solutions.it/

Landslide affecting cultural heritage sites
Case study: Baia Archaeological Park

PST – ERS ASC data
time-interval 1993 - 2001

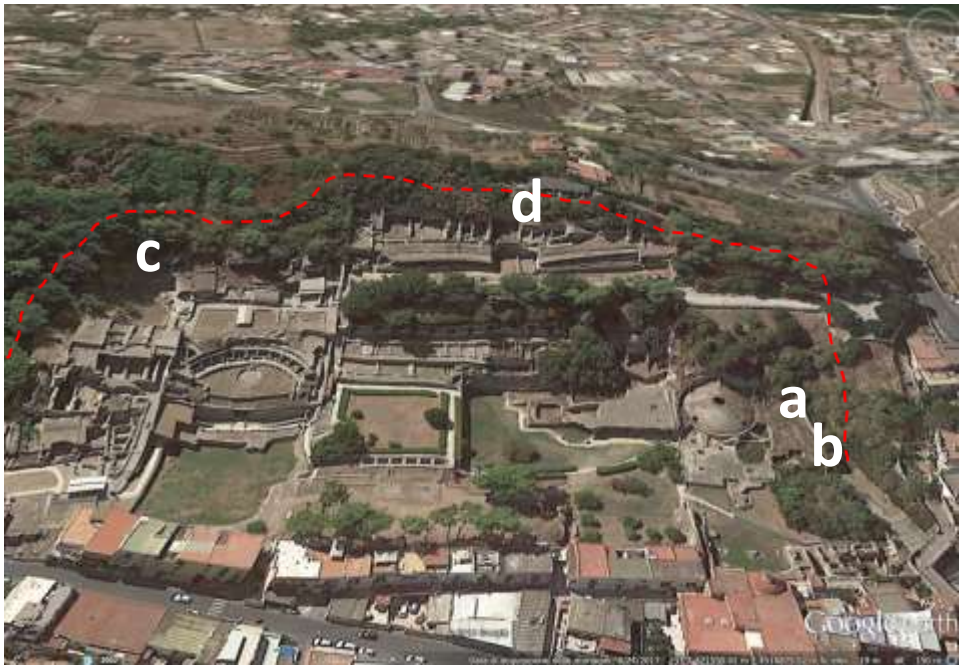
PST – CSK ASC data
time-interval 2011 - 2014

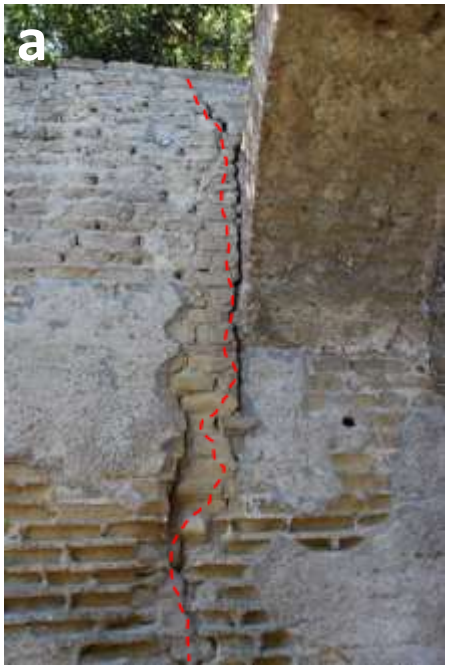


Author comment

- Preliminary InSAR analysis were performed exploiting ERS and COSMO Sky-Med datasets; the fist dataset show ground lowering henomena, highlighting that subsidence affected areas close Phlegrean Fields during that period (1993 – 2003). The deformation rates (5-10 mm/yr) recorded in the investigated time interval are consistent with the general down lift cycle, while time series show some small uplift events.

Field Survey





Author comment

- The instability phenomena seem to be related to the very high acclivity values of top sector of the slope favoring the activation of modest collapse phenomena as well as by ordinary management and maintenance of the area (e.g. invasive vegetation, absence of drainage systems).

CONCLUSIONS

- Forthcoming InSAR data **processing** will take into consideration the most recent **SENTINEL-1** data, allowing us to assess the instability phenomena evolution of the area in a recent time interval.

- Conduct a series of **training actions** for the selected scenarios in different categories of exposed elements (e.g. linear infrastructure and transportation network, cultural heritage and urban areas);

- define a standard methodology to use EO data and services favouring as much as possible open, accessible and free data, to carry out geo-hazard risk assessment, monitoring and mitigation

- Dissemination and promotion EO4GEO project activities (e.g. International summer school, Copernicus academy, FPA)

- **Partnership Agreement** among ISPRA and Campi Flegrei Archaeological Park for the research activities development.