SESA | Support to EU External and Security Actions

Protecting cultural heritage through satellite imagery

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Copernicus Europe's eyes on Earth

implemented by SATCEN EUROPEAN UNION SATELLITE CENTRE

Copernicus is the European Union's Earth observation programme.

The Copernicus Security Service is one part of the Copernicus Programme. It aims to support related European Union policies by providing information in response to the security challenges Europe is facing, namely improving crisis prevention, preparedness and response capacities in the following key areas:

- **Support to EU External and Security Actions** (implemented by the *European Union Satellite Centre, SatCen*);
- **Maritime surveillance** (implemented by the European Maritime Safety Agency, EMSA);
- **Border surveillance** (implemented by FRONTEX. The *European Union Satellite Centre, SatCen,* provides support via a SLA).

European Commission
SATCEN
EUROPEAN UNION SATELLITE CENTRE
EC – SatCen Cooperation:
A Legacy of more than 20 Years Empowering EU Strategic Autonomy

Scope of SESA

SESA is designed to support the European Union and its Member States by enhancing situational awareness needed by institutional stakeholders working in security-related domains.

The service delivers custom-designed geospatial products based on the analysis of satellite imagery and the information provided contributes to enhancing European capacities in crisis prevention, preparedness and response.

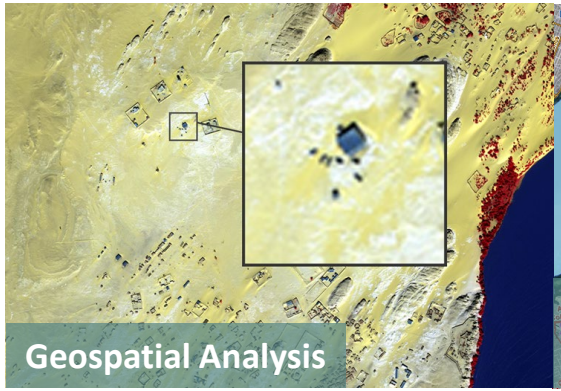
It also aims to assist in situations of crisis or emerging crisis and supports them in order to prevent global and trans-regional threats having a destabilising effect.

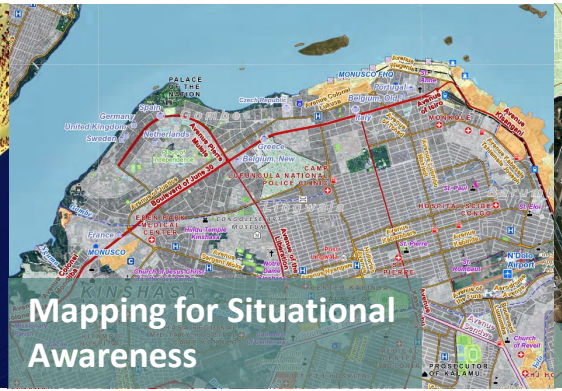
SESA Policy Groups

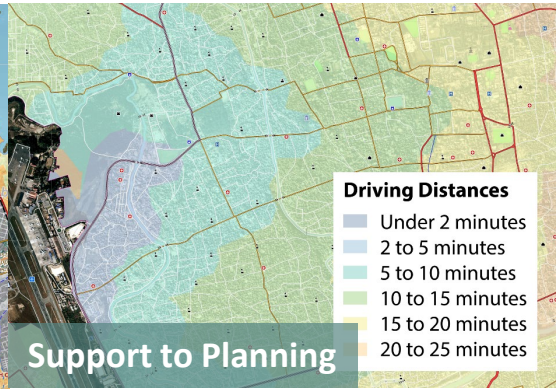
The **Copernicus Security Service Component on Support to EU External and Security Actions (SESA)** is a European geospatial information service that assists the EU and its Member States in the framework of applicable Union policies and legislation along the following main policy groups, associated to key responsibilities across EU Institutions and Member States:

SESA Service Types

Copernicus SESA is divided into **three on-demand service types**. Each of them represents a different level of analysis in response to specific needs and phases of the decision-making process, i.e. planning, situational awareness.







The Geospatial Analysis service is used to confirm any information requested by the user.

The service provides up-to-date cartographic and thematic information.

The Support to Planning service is conceived to be used in the preparatory phase of a mission or event.

SESA application areas

Environmental Compliance

Cultural Heritage

Humanitarian Aid

International Trade and Economic Diplomacy

Stability and Resilience for Development

Rule of Law

Security of EU Citizens

Transport Safety and Security

Climate Security

Crisis and Conflict

Health Security

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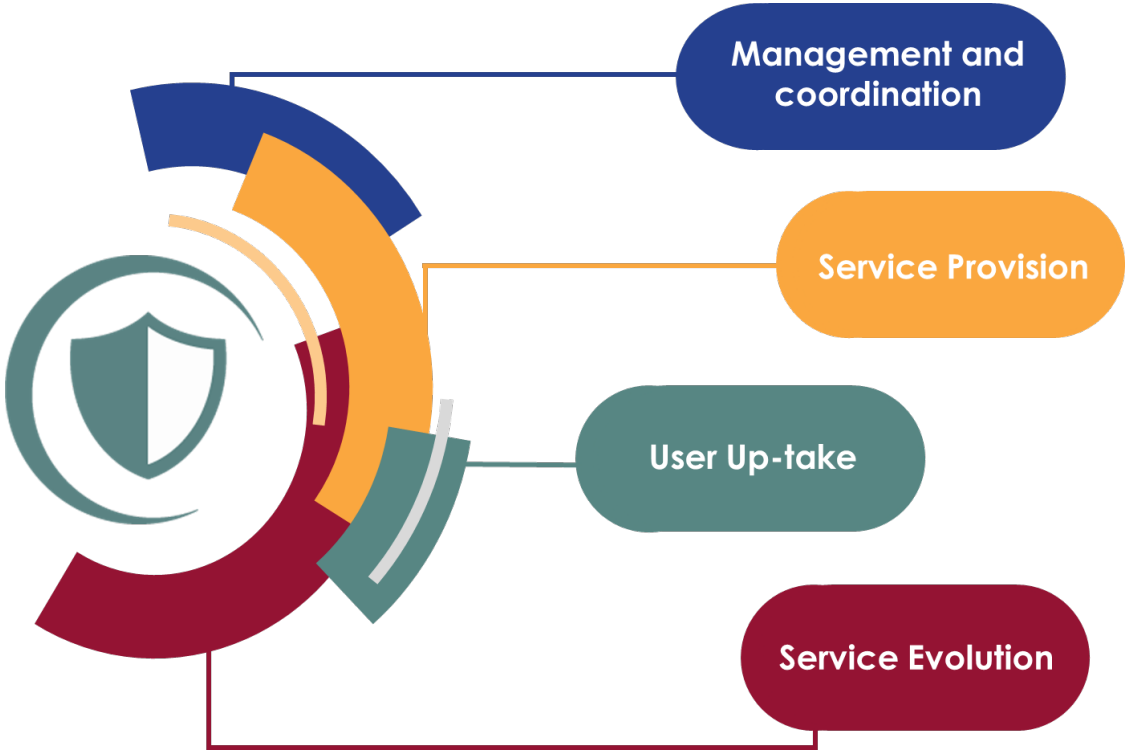
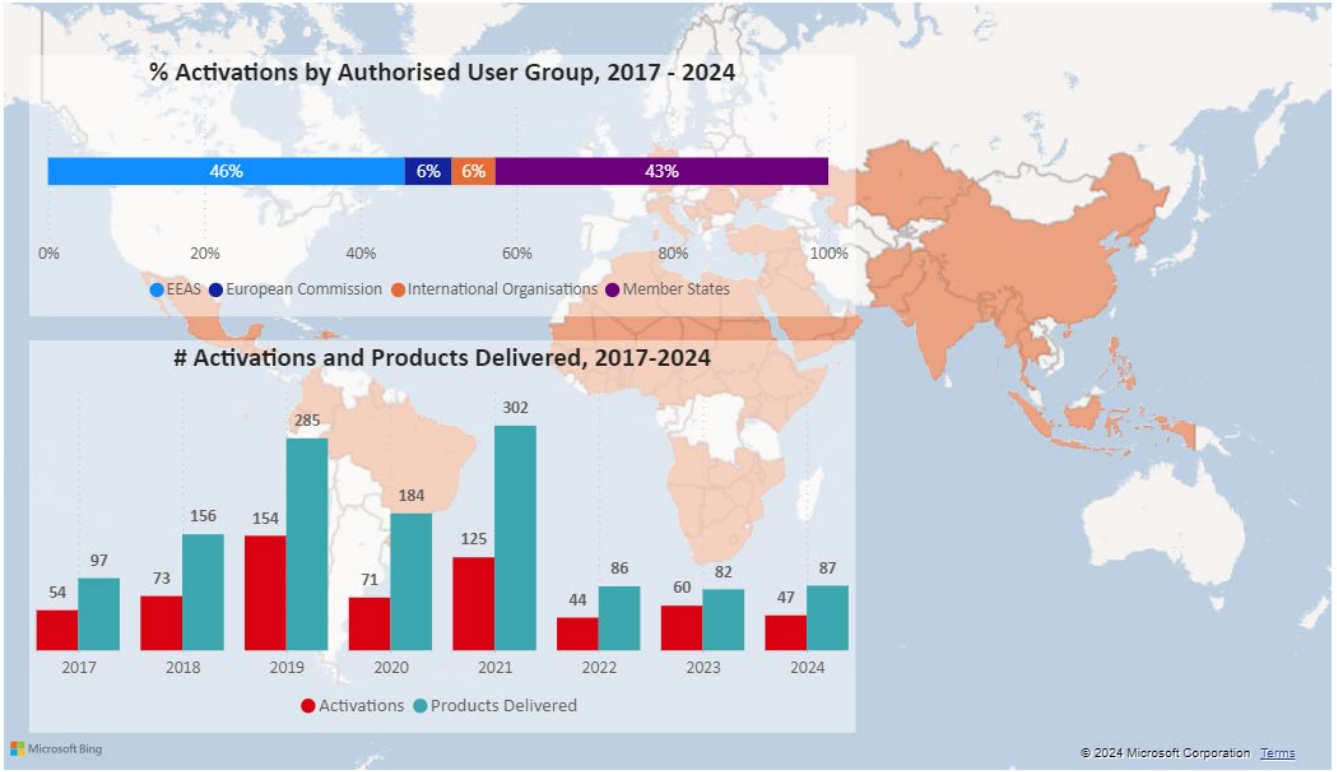
Copernicus SESA – Components



Copernicus SESA operations 2017 - 2024



2024

 # Users
41

 # Activations
628

 # Products
1,279

 # Countries
91

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Cultural Heritage – Actionable insights from Geo data

Archaeological Crime from satellite

Indicators of Archaeological Crime

- Illegal excavation and plundering of an archaeological site for gaining profit (selling)

Looting

- Destruction of a feature (vandalism, explosion, etc.)

Destruction

- Construction related activity, directly affecting the archaeological site

Construction

- Earth works directly affecting the site

Earth Movement

- Detection of possible archaeological site covered

Buried Heritage

- Defense position, suspicious vehicles, etc.

Other Activity

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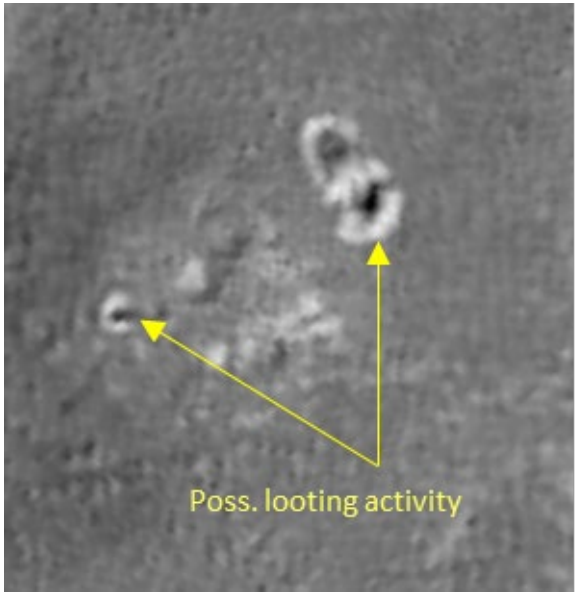
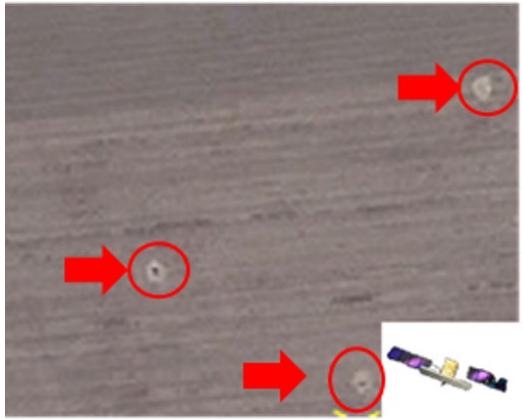
Looting

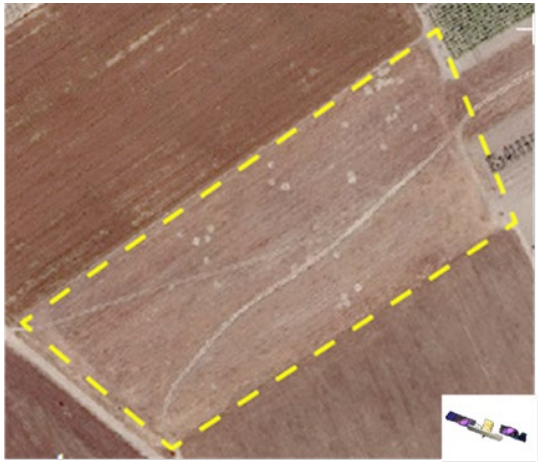
In archaeology and the cultural heritage sector, the term ‘looting’ refers to illegal excavations carried out by digging holes on a site of archaeological or historic significance in search of objects and antiquities to be sold in the black market.

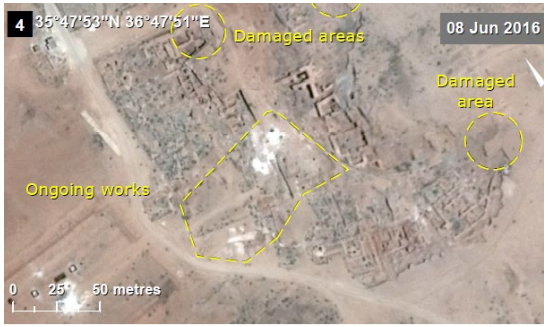


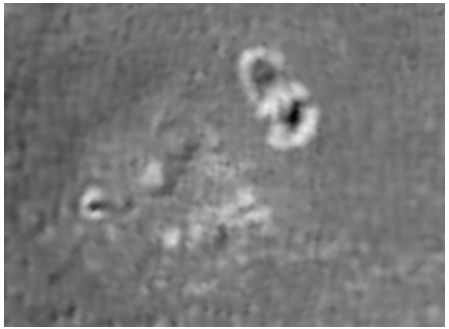


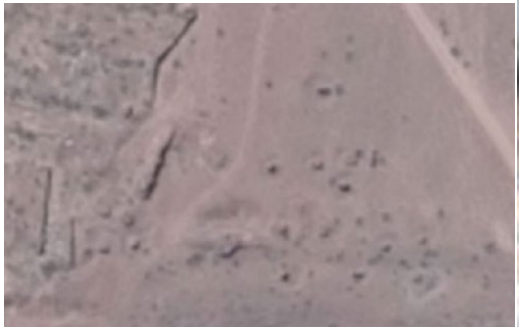
A typical sign of looting on satellite imagery is the presence of numerous, amorphous, dark holes in the ground (usually with a diameter of 1-3 m), caused by manual digging.

Looting

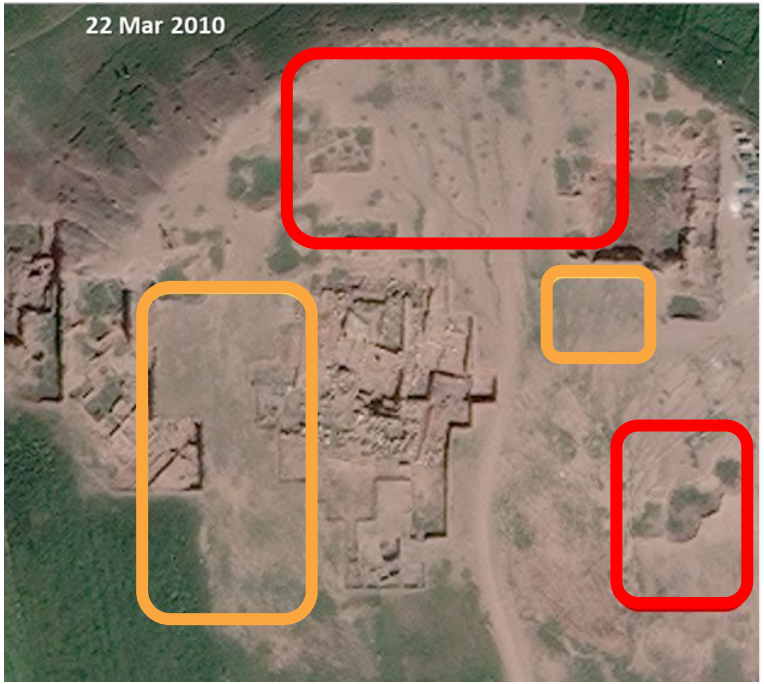


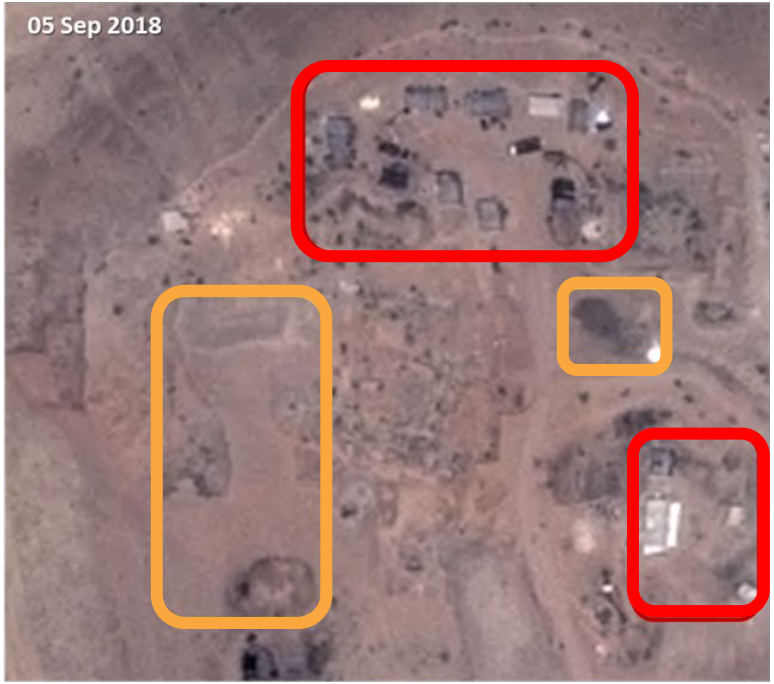

4
35°47'53"N 36°47'51"E
Damaged areas
08 Jun 2016
Damaged area
Ongoing works
0 25 50 metres





Earth Works



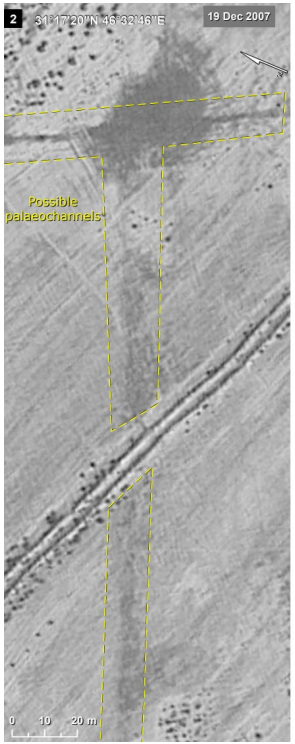


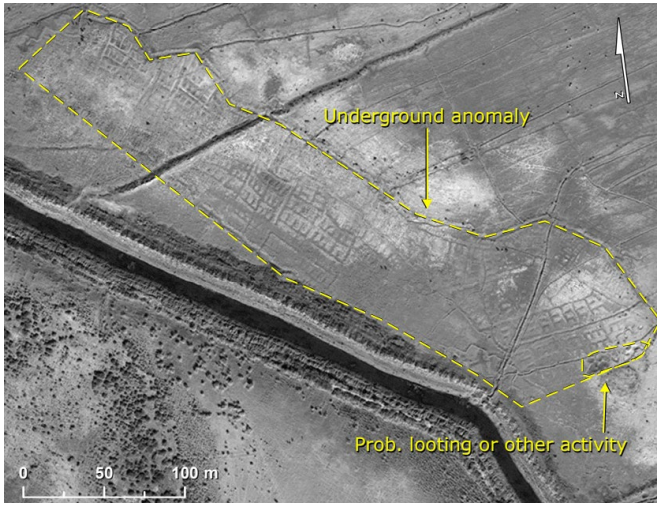
Earth Movement

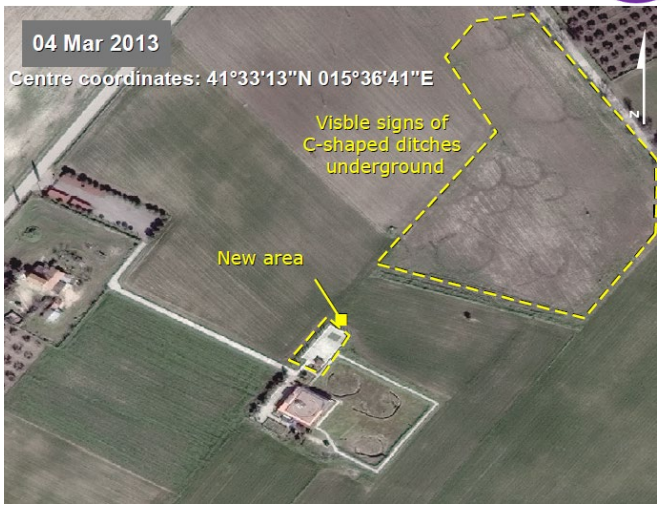
Construction

Destruction

Buried Heritage







Poss. palaeochannels

Areas detected with spectral and morphologic differences i.e. height, tone, texture, pattern, shape, shadow, size

Underground Anomalies

Underground shapes (parallel streets and domestic architecture) poss. remnants of an ancient city

Erosion/ Salinity

Areas characterised by a large quantity of salts and soil degradation

Other Activity

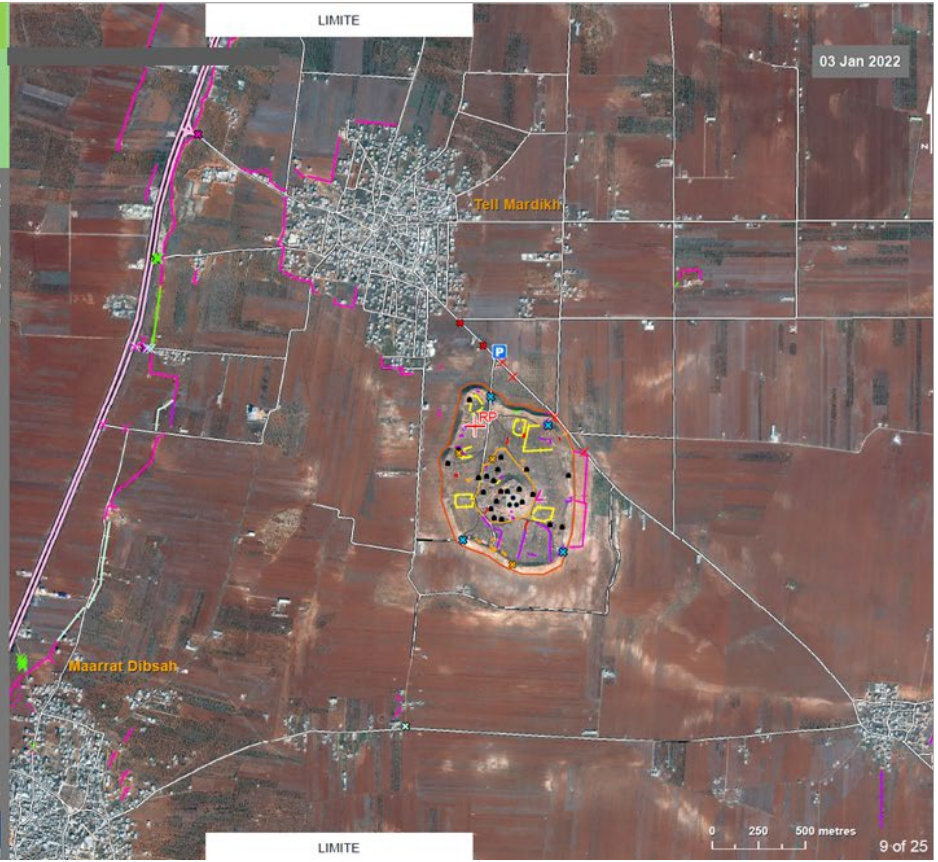
Ebla

Syrian Arab Republic

Defence Walls Overview

This page shows an overview of the area where defence walls were built over the 2011-2022 period.

While the highest level of activity and the largest amount of damage to the archaeological site took place in the 2011-2020 period, most of the walls in the surrounding area were built from 2020 onwards.



Legend

- Reference point
- Archaeological element
- New entrance
- Checkpoint
- Main entrance
- Checkpoint, 2020
- Checkpoint, 2021
- Checkpoint, 2022
- Roadblock, 2014-2017
- Roadblock, 2020
- Roadblock, 2021
- Roadblock, 2022
- Defence, 2014
- Defence, 2015
- Defence, 2016
- Defence, 2017
- Defence, 2018
- Defence, 2020
- Defence, 2021
- Defence, 2022
- Highway
- Local road, paved
- Local road, unpaved
- Acropolis
- Tell Mardikh

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Additional contribution and reporting

- Evaluation of damage evolution over a specific monitoring period (days, months, years)

Multitemporal anlaysis

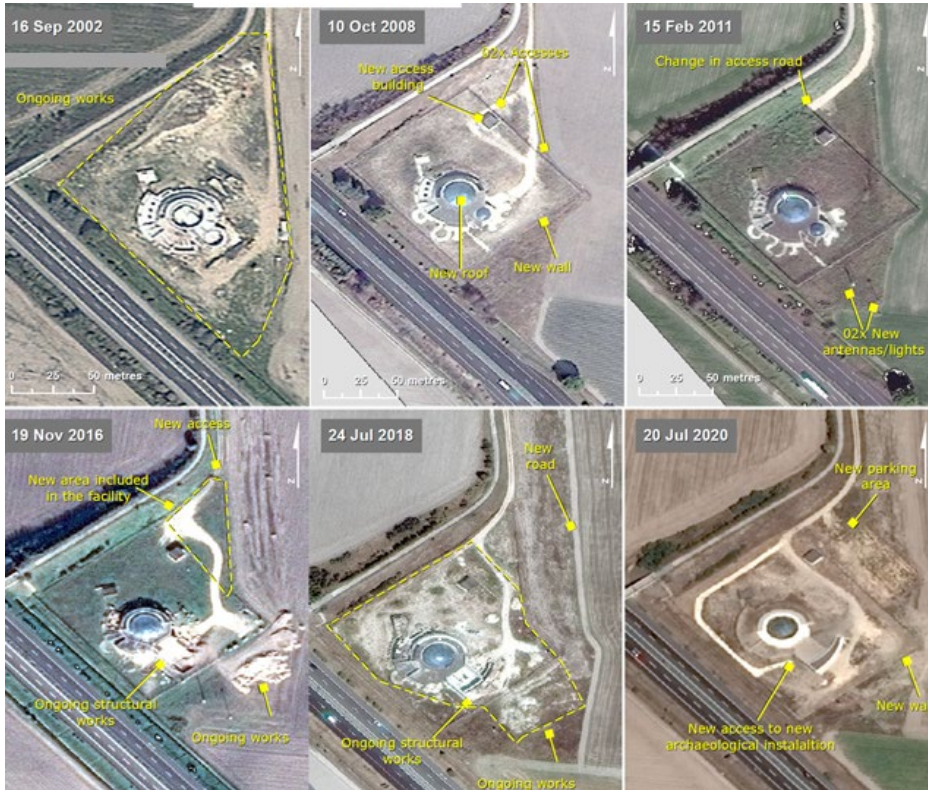
- Analysis of the structural changes in the area, security analysis and planning of possib

Site Analysis

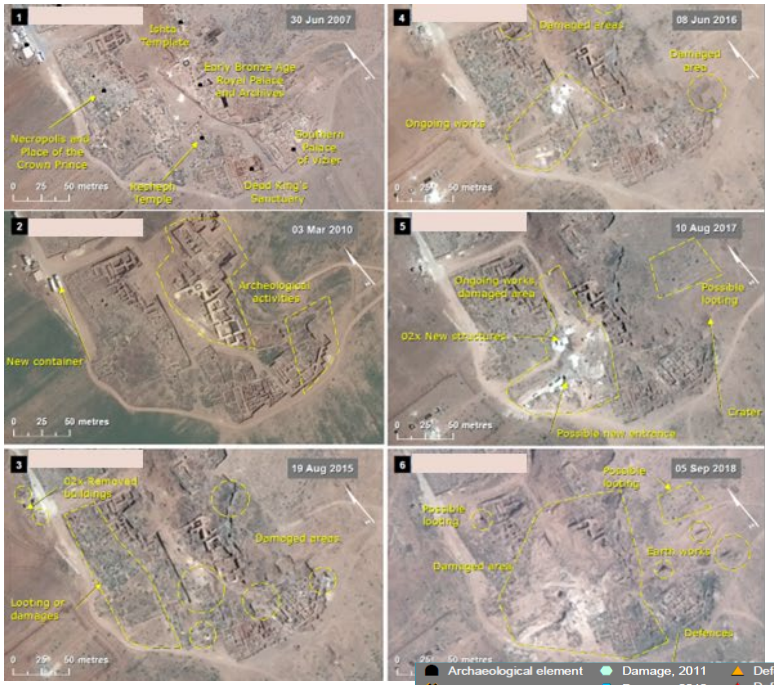
- Analysis of the results, identification of trend, most affected area

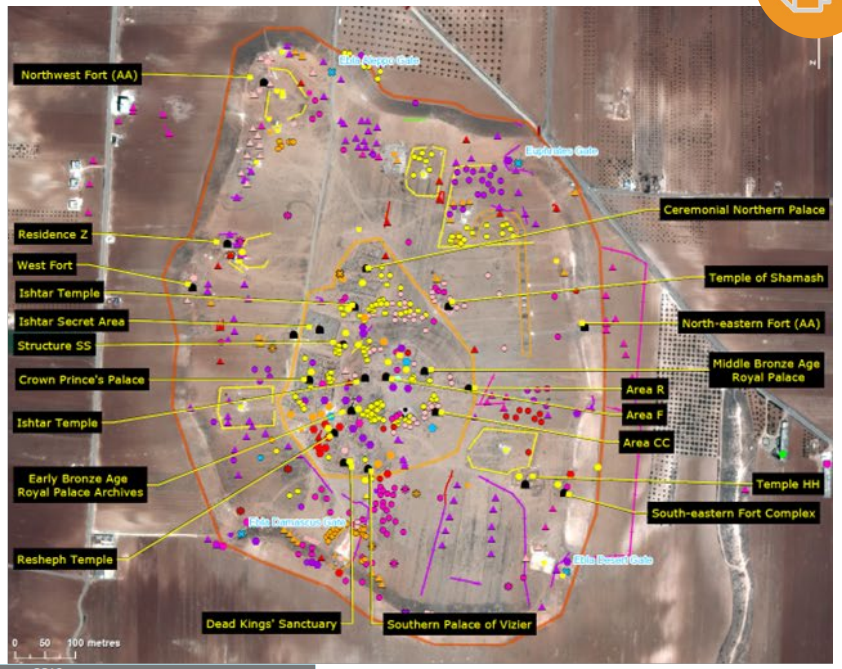
Analysis and statistics

Site analysis



Multitemporal analysis





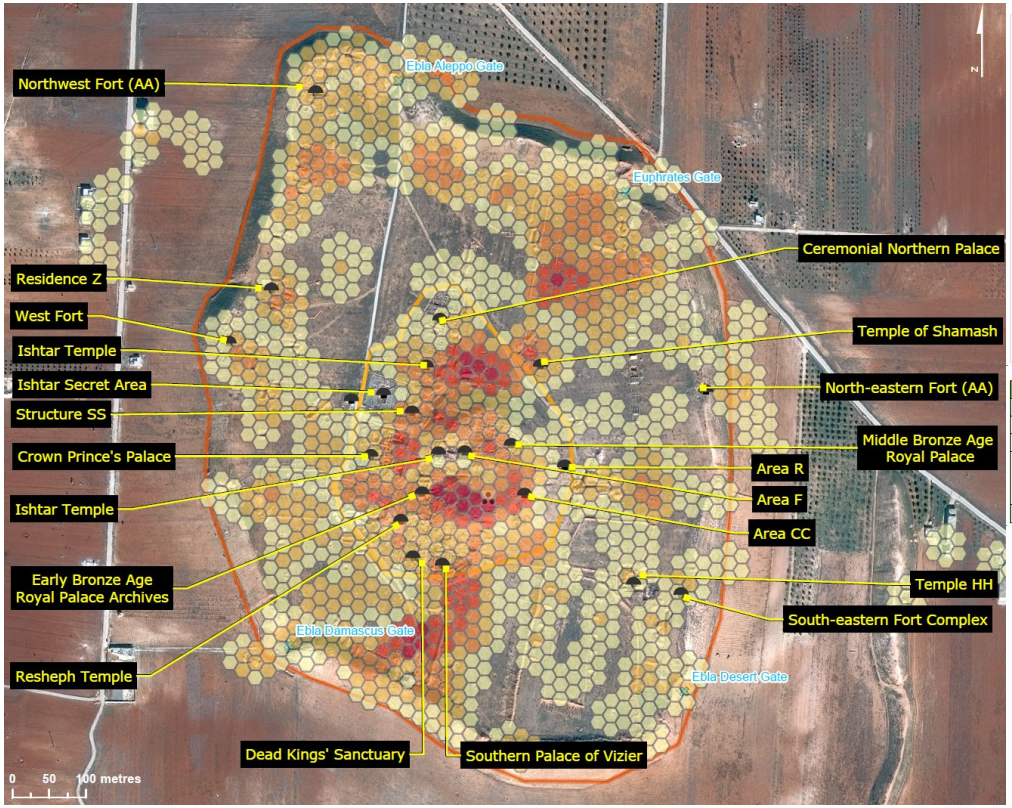
Archaeological element
Entrance, 2016
Entrance, 2018
Ongoing works, 2014
Ongoing works, 2015
Ongoing works, 2016
Ongoing works, 2018
Ongoing works, 2020
Crater, 2016
Crater, 2017
Crater, 2020

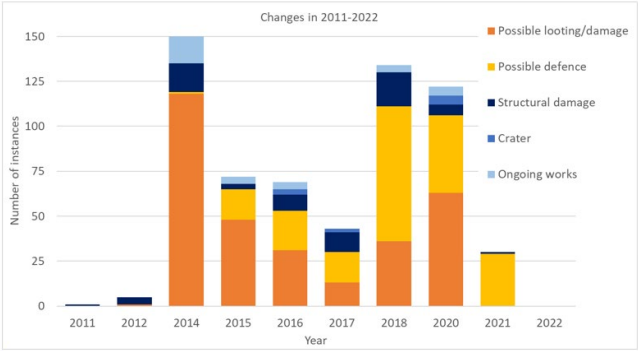
Damage, 2011
Damage, 2012
Damage, 2014
Damage, 2015
Damage, 2016
Damage, 2017
Damage, 2018
Damage, 2020
Damage, 2021
Defence, 2014
Defence, 2015

Defence, 2016
Defence, 2017
Defence, 2018
Defence, 2020
Possible looting, 2012
Possible looting, 2014
Possible looting, 2015
Possible looting, 2016
Possible looting, 2017
Possible looting, 2018
Possible looting, 2020
Defence, 2014

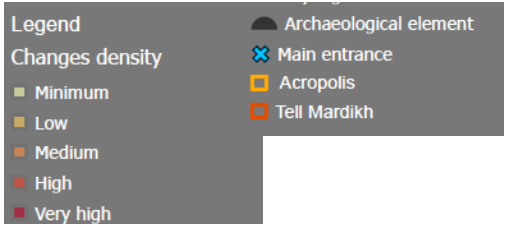
Defence, 2015
Defence, 2016
Defence, 2017
Defence, 2018
Defence, 2020
Defence, 2021
Roadblocks 2014-2017
Defence, 2016
Acropolis
Tell Mardikh

Analysis and statistics

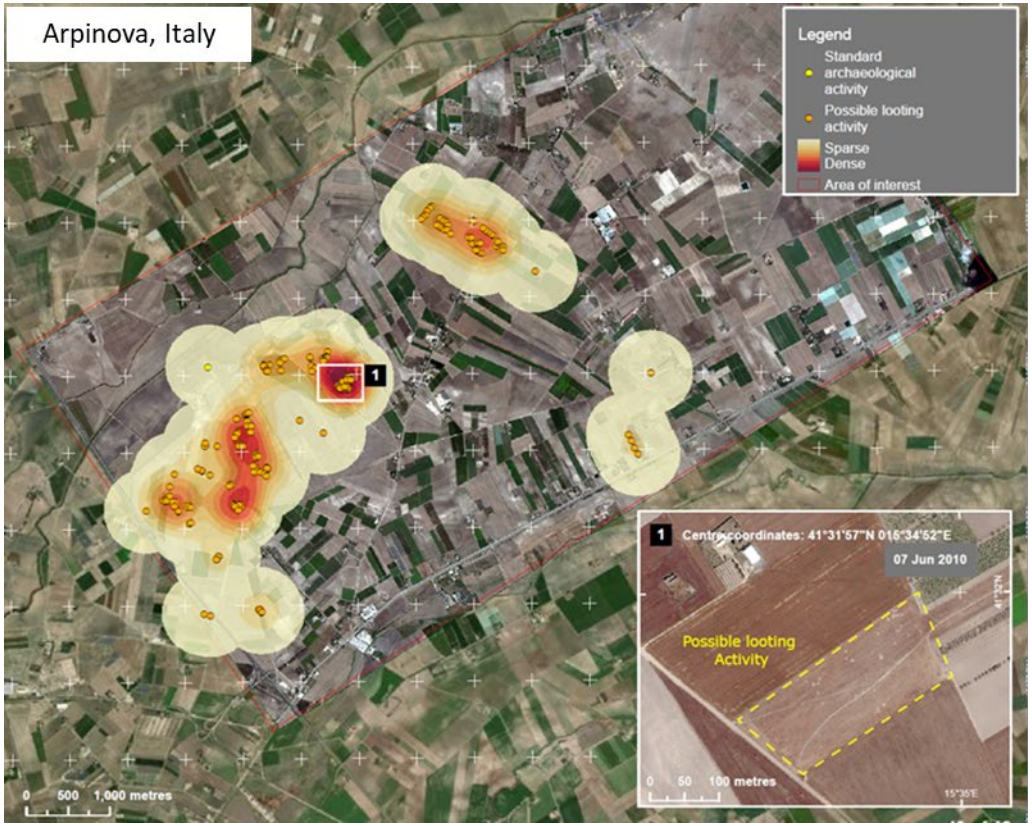




Conflict Period		2011	2012	2014	2015	2016	2017	2018	2020	2021	2022	Total	Total
Possible looting/damage		0	1	118	48	31	13	36	63	0	0	310	**310**
Possible defence		0	0	1	17	22	17	75	43	29	0	204	**204**
Possible damage	Structural	1	4	16	3	9	11	19	6	1	0	70	**112**
	Crater	0	0	0	0	3	2	0	5	0	0	10	
	Ongoing works	0	0	15	4	4	0	4	5	0	0	32	
Total Changes		1	5	150	72	69	43	134	122	30	0	**626**	



Analysis and Statistics



		Assessment		
Suspicious Activity (No.)	Total	Highly Likely	Likely	Plausible
Looting or agricultural/grazing activity	134	76	45	13
Looting or archaeological activity	69	63	4	2
Not related to looting activity	47	1	12	34
Standard archaeological activity	1	1	0	0
Total	**251**	**141**	**61**	**49**

Table 1: Suspicious activity detected in the analysed area.

		Assessment		
	Total	Highly Likely	Likely	Plausible
Looting or agricultural/grazing activity	134	76	45	13
Looting or archaeological activity	69	63	4	2
Possible looting activity (No.)	**203**	**139**	**49**	**15**

Table 2: Possible looting activity detected in the analysed area.

	Assessment of Looting Activity				Possible Archaeological Sites	Probable Archaeological Sites
	Total	Highly Likely	Likely	Plausible	Total	Total
16/09/2002	**6**	0	6	0	**2**	**2**
23/12/2005	**4**	0	0	4	**2**	**0**
08/10/2008	**21**	14	7	0	5	3
15/07/2009	**22**	19	3	0	**1**	**2**
07/06/2010	**81**	68	9	4	**3**	**3**
15/02/2011	**34**	14	16	4	**3**	**2**
21/03/2012	**31**	21	8	2	**1**	**3**
04/03/2013	**0**	0	0	0	**1**	**0**
20/06/2014	**1**	0	0	1	**0**	**0**
06/11/2015	**3**	3	0	0	**4**	**0**
19/11/2016	**0**	0	0	0	**0**	**0**
29/03/2017	**0**	0	0	0	**0**	**0**
24/07/2018	**0**	0	0	0	**0**	**0**
12/06/2019	**0**	0	0	0	**0**	**0**
20/07/2020	**0**	0	0	0	**0**	**0**
26/07/2020	**0**	0	0	0	**0**	**0**
Total	**203**	**139**	**49**	**15**	**22**	**15**

Table 3: Possible looting activity, possible and probable archaeological sites detected in the analysed area for each analysed image.

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Thank you!

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