European Commission

Copernicus Service in Support to EU External Action

Product Portfolio

Copernicus
Europe's eyes on Earth

Implemented by SatCen

Space

Contents

The Copernicus Service in Support to EU External Action
Product Portfolio
https://sea.security.copernicus.eu/

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A message from the Director

The European Union Satellite Centre – or SatCen – is proud to be supporting the Copernicus Programme as the Entrusted Entity for the operational management of the Service in Support to EU External Action (SEA).

Our agency has always focused on supporting European Union and Member States in the context of Common Foreign and Security Policy (CFSP), particularly in the Common Security and Defence Policy (CSDP). Our 26 years of experience in delivering geospatial intelligence and imagery analysis services highlights the SatCen capability to manage the Copernicus SEA Service for the benefits of the EU External Action.

The Copernicus SEA Service is designed to assist European actors enhancing their prevention, preparedness and response to regional crisis by offering a comprehensive approach for situational awareness and decision-making, including CFSP/CSDP.

In this service overview, we aim to guide the reader through the main elements of the Copernicus SEA service, offering the users a selected list of application domains and the most commonly-requested product types. Considering the Copernicus SEA service evolutionary character, always looking to the future, the list of product types and application domains are in constant development, focusing on offering the users new and advanced products, through the Copernicus SEA Service Evolution.

We trust the provided information will serve to strengthen the Copernicus SEA Service user uptake, to widen the community of users and to continue satisfying users in a reactive and interactive way.

Pascal Legai,
Director of the European Union Satellite Centre

Copernicus: Europe's eyes on Earth

Copernicus is the world's largest single programme for observing and monitoring the Earth, for the ultimate benefit of all European citizens. It is coordinated by the European Commission in partnership with the European Space Agency (ESA) and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT). It is implemented in partnership with the Member States and competent European agencies acting as Entrusted Entities. Copernicus provides a unified system of systems fed by vast amounts of data based on satellite Earth Observation and in situ (non-space) sources. Copernicus data, and the set of value-added Copernicus Services, help service providers, public authorities and other international organisations improve quality of life for the citizens of Europe inside and outside the EU borders. A set of dedicated satellites, the Sentinel family, supports the Copernicus programme, complemented by a large number of existing commercial satellites, known as the Contributing Missions, providing Very High Resolution imagery to the programme. Alongside this, in situ data are acquired from multiple sensors on land, in the sea and the atmosphere, and geospatial reference data are collected from competent authorities, such as national mapping agencies.

Copernicus Services for Security applications

Copernicus supports EU policies in response to Europe's security challenges, improving crisis prevention, preparedness and response through its three Services for Security applications. The services are:

Support to EU External Action

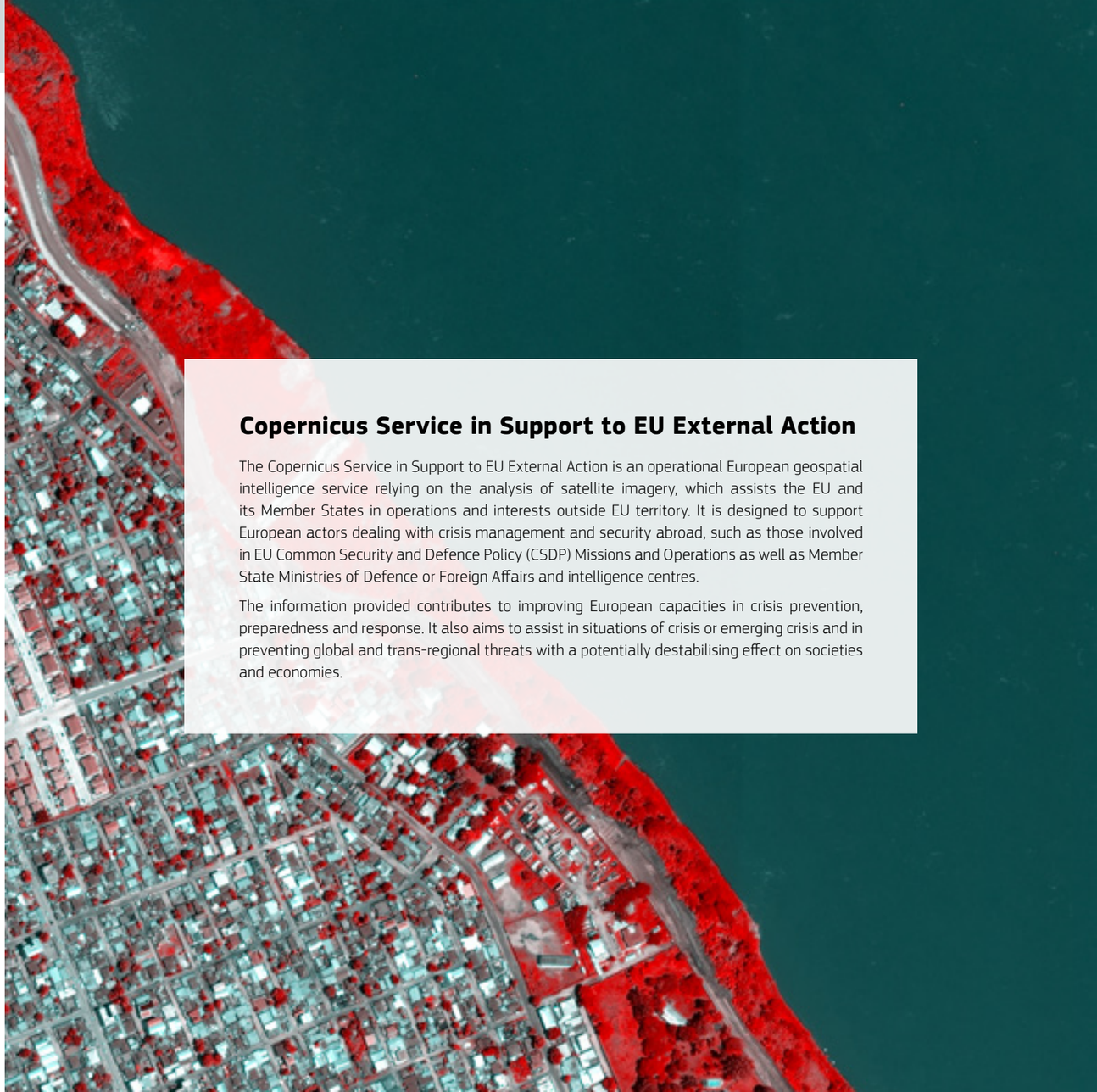
On-demand, mission-ready and rapidly - delivered geospatial information in support of EU foreign policy, crisis management, and monitoring of security issues outside the mainland European Union territory.

Border Surveillance

Supporting border authorities in managing the external land and sea borders of the EU.

Maritime Surveillance

Supporting tasks such as monitoring of fisheries, combatting marine pollution, ensuring safety of navigation, and customs and law enforcement.



Copernicus Service in Support to EU External Action

The Copernicus Service in Support to EU External Action is an operational European geospatial intelligence service relying on the analysis of satellite imagery, which assists the EU and its Member States in operations and interests outside EU territory. It is designed to support European actors dealing with crisis management and security abroad, such as those involved in EU Common Security and Defence Policy (CSDP) Missions and Operations as well as Member State Ministries of Defence or Foreign Affairs and intelligence centres.

The information provided contributes to improving European capacities in crisis prevention, preparedness and response. It also aims to assist in situations of crisis or emerging crisis and in preventing global and trans-regional threats with a potentially destabilising effect on societies and economies.

Key features

A flexible, responsive, custom-designed geospatial intelligence service

The Copernicus SEA service is designed to flexibly satisfy the information needs of users. Responses to user requests are individually tailored, taking advantage of a variety of Earth Observation techniques. The categories of products presented in this portfolio provide examples of the most common use cases, and they have been designed for broad adaptability. Copernicus SEA experts assess user needs and translate them into a customised service offer which best suits the challenges presented.

Detailed, rapid and high-quality information on remote or inaccessible areas

Making use of the fleet of available satellites through the Copernicus programme, the Copernicus SEA service is capable of providing intelligence on any location on Earth – in some cases within a day or two of the request[1]. This allows remote, dangerous or inaccessible areas to be monitored, enabling informed planning of potential interventions in the field – or providing valuable insights for policy or planning purposes.

Specialised space and terrestrial data processing technologies

The service makes extensive use of innovative data sources and processing techniques which exploit the unique properties of the available satellite sensors, placing a set of specialised capabilities at the disposal of the expert analysts. Examples include detecting surface changes corresponding to vehicle tracks in desert sand, identifying temperature differences in buildings, or satellites whose radar sensors can acquire imagery through clouds or at night.

[1] Dependent on a range of conditions including weather, satellite overpass timing, and the complexity of the processing.

Insights and expert interpretation by experienced geospatial imagery analysts

Teams of imagery analysts within the Copernicus SEA service comb through satellite imagery, processing results and terrestrial data sources seeking to extract insights in response to the questions posed by the user. The analysis is delivered by means of a set of products (see pp. 30-33), with detailed annotations, interpretation and comments on the features or phenomena identified.

Time-sensitive delivery

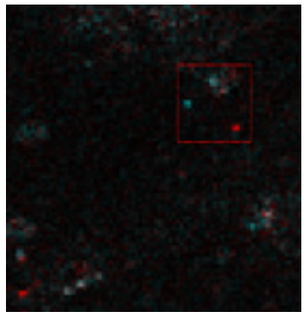
The service can be activated to respond within very short timescales, as is necessary in cases of responses to crises such as political or armed conflicts. The service can equally carry out monitoring campaigns over longer periods of time in order to provide an understanding of how phenomena are changing.

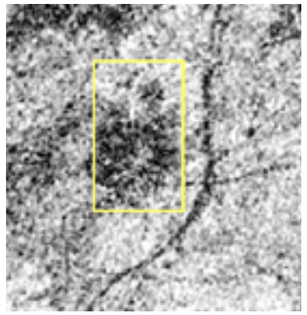
Mission-ready products

The service supports a range of tasks, from operational to strategic planning and decision-making through its extensive offer of products: from First Impression Reports (FIR) for rapid insights, to comprehensive Briefing Notes (BN) covering multiple complex locations.

Expert knowledge

Identifying the footprint of a wide variety of human activities in an area not only requires access to all available imagery and processing techniques, but also experience and knowledge to accurately spot and identify meaningful indicators of human activity. The Copernicus Service in Support to EU External Action relies on a pool of imagery analysts with different backgrounds, whose specialised knowledge underpins the quality and usability of the final products.





Application domains

The Copernicus SEA service finds application in a number of domains related to European policies in the external action field. These domains provide the context for specific use cases showing how the products can service various institutional levels to support strategic decision-making and planning, as well as operations and intervention.

Support to humanitarian aid

The Copernicus SEA service provides support to EU actors involved in delivering humanitarian aid in areas affected by armed conflict through products based on satellite imagery. The products allow for conflict event confirmation, impact and a-priori assessment, and provide a foundation on which to initiate response planning.

Rule of law

The Copernicus SEA service provides support to EU actors involved in the promotion of the rule of law outside the EU, delivering to users an analysis of human activities and enabling the monitoring of potentially illegal activities in a range of contexts. The service can support early warning, monitoring and situational awareness in unstable areas where maintaining the rule of law is a subject of concern.

Crisis, conflict and critical assets

The Copernicus SEA service provides support to EU actors involved in crisis and conflict analysis outside EU borders, and supports the safeguarding of critical assets abroad. The service can support early warning, monitoring and situational awareness in areas of conflict and crisis, providing EU actors with a range of analyses supporting planning, intervention and operations.

Stability and resilience for development

The Copernicus SEA service provides support to EU development actors involved in fostering stability, security and prosperity with neighbouring states. The Copernicus SEA enables efficient mechanisms to plan and monitor the implementation of development interventions linked to reinforcing stability and resilience, thus supporting informed decision-making and policy implementation.

Security of EU citizens abroad

The Copernicus SEA service provides support to EU actors involved in fostering the security of EU citizens abroad, particularly in armed conflict situations. It can deliver an analysis of key facilities and buildings, allowing the update of evacuation plans and routes.

Cultural heritage

The Copernicus SEA service provides support to EU actors involved in monitoring damages to world cultural heritage in areas affected by armed conflicts. The service can assess potential damage to cultural heritage sites over areas of conflict inaccessible to the international community and offers supplemental information when access is possible.

Using the portfolio

Offering tailor-made solutions that best address each individual activation, the Copernicus SEA Service presents a portfolio of products which should be considered neither prescriptive nor exhaustive. The portfolio offers a reference catalogue of SEA Service products, available for a variety of applications across six application domains (see pp. 6-7).

Copernicus SEA products can take the form of maps and/or reports (see pp. 30-33). Each product is comprised of one or more layers of information. The selection of products presented in this portfolio aims to provide the user with an example of the kinds of products available and what information is included.

Map scale

The scale (of a map) refers to the relationship (ratio) between the distance on the map and the corresponding distance on the ground (represented as 1:*x*; one unit on the map represents *x* of the same units on the ground). For example, in a 1:100.000 map scale, 1cm on the map equals 1km on the ground. As the map scale increases, the level of detail depicted on the map decreases. For example, a map scale of 1:5.000 provides more detailed information than 1:10.000. The products are offered in a range of available map scales, as shown below.

SCALE	GROUND DISTANCE OF 1CM ON MAP	LEVEL OF DETAIL
1: 5.000	50m	Very detailed areas
1: 25.000	250m	Small urban areas
1: 50.000	500m	Large urban areas
1: 100.000	1km	Small regions
1: 500.000	5km	Large regions

Satellite imagery

The satellite imagery used by the SEA Service to generate products can be optical, radar or a combination of both. The imagery that is used in each case depends on the specific request and the information to be provided.

Observation mode

This identifies the available options concerning the duration and timing of the observations underpinning the activation.

Single-look

The product provides information on a target area at a specific moment in time. In this case, a single set of imagery (sometimes, a single image) is acquired.

Monitoring

The product provides information on a target area over a period of time. For this type of observation, satellite imagery is collected periodically during the requested timespan, and the products reflect the changes observed in the area.

Some products offer both forms of observation mode.

Information content

The products of the Copernicus SEA service contain layers of information, which may be extracted from satellite imagery (e.g. a transportation network), carry the results of analysis (e.g. a damage assessment) or be externally acquired (e.g. from open sources).

The information contained in the products can be grouped as follows:

Transport

Transportation networks, comprising either basic or detailed feature classification. Includes specific layers for features of special interest such as road blocks or bridges.

Populated Area and Demography

Populated areas (urban or rural), optionally including trends in population change.

Administrative Units

Boundaries delineating units of administrative control at local or regional levels.

Points of Interest

Locations of special interest such as health-related, diplomatic and administrative buildings and facilities.

Terrain

A range of features and properties associated with terrain, including land use and land cover, topography and hydrography.

Place Name

Standard labelling of places, including with multilingual support.

Impact

Special category denoting phenomena of interest such as damage, detected changes and flooding.

Critical Infrastructure

Critical infrastructures such as power generation facilities and major transportation hubs (harbours or airports) as well as (optionally) their operational status.

Analysis

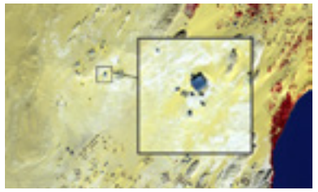
Special category denoting analytical outputs, including a range of features or phenomena of interest, such as enclosures and security measures, evacuation routes, helicopter landing areas, gathering points, areas under construction and indicators of activity.

Settlements

Areas of temporary human settlement, namely camp dwellings and other buildings, as well as (optionally) changes to these structures.

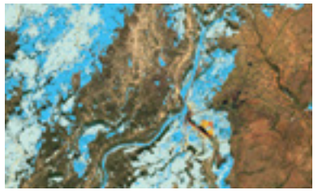
The Copernicus SEA categories

The Copernicus SEA is conceived as a responsive, customisable service, in which user needs are evaluated by an expert team which recommends a solution based on geoinformation products. The products showcased in the following pages represent some common categories of user needs, and provide insight into the range and flexibility of the service's capabilities.

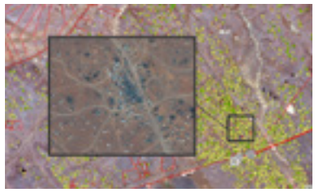


Activity Report

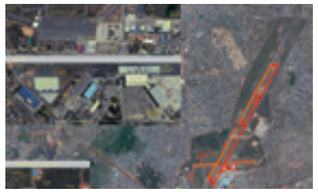
Support to Evacuation Plan



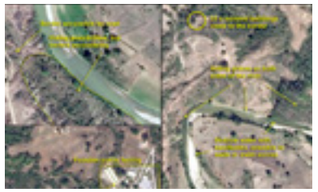
Road Network Status Assessment



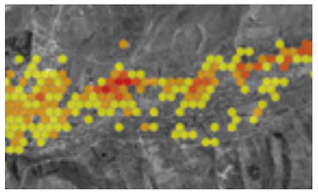
Camp Analysis



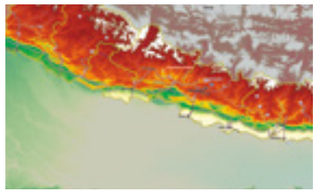
Critical Infrastructure Analysis



Non-EU Border Map



Conflict Damage Assessment



Crisis Situation Picture

Reference Map

Please visit the Copernicus SEA website for further details: **https://sea.security.copernicus.eu/categories/**

Activity Report

All human activity leaves a trace or a footprint and, in many cases, this footprint may be observed using satellite imagery. The Activity Report can be used to confirm intelligence about a given location or to monitor an area in which activities of interest are suspected of taking place. This multi-purpose product category can be used to audit development projects of the EU abroad, assess whether an illegal activity is taking place in a given location, or identify suspicious locations matching the user request based on patterns of activity.

Imagery used
SAR and/or Optical Imagery

Observation mode
Single-look
Monitoring

Map scale
1:5.000
1:25.000
1:50.000

Products
Quick Report
First Impression Report
Briefing Note

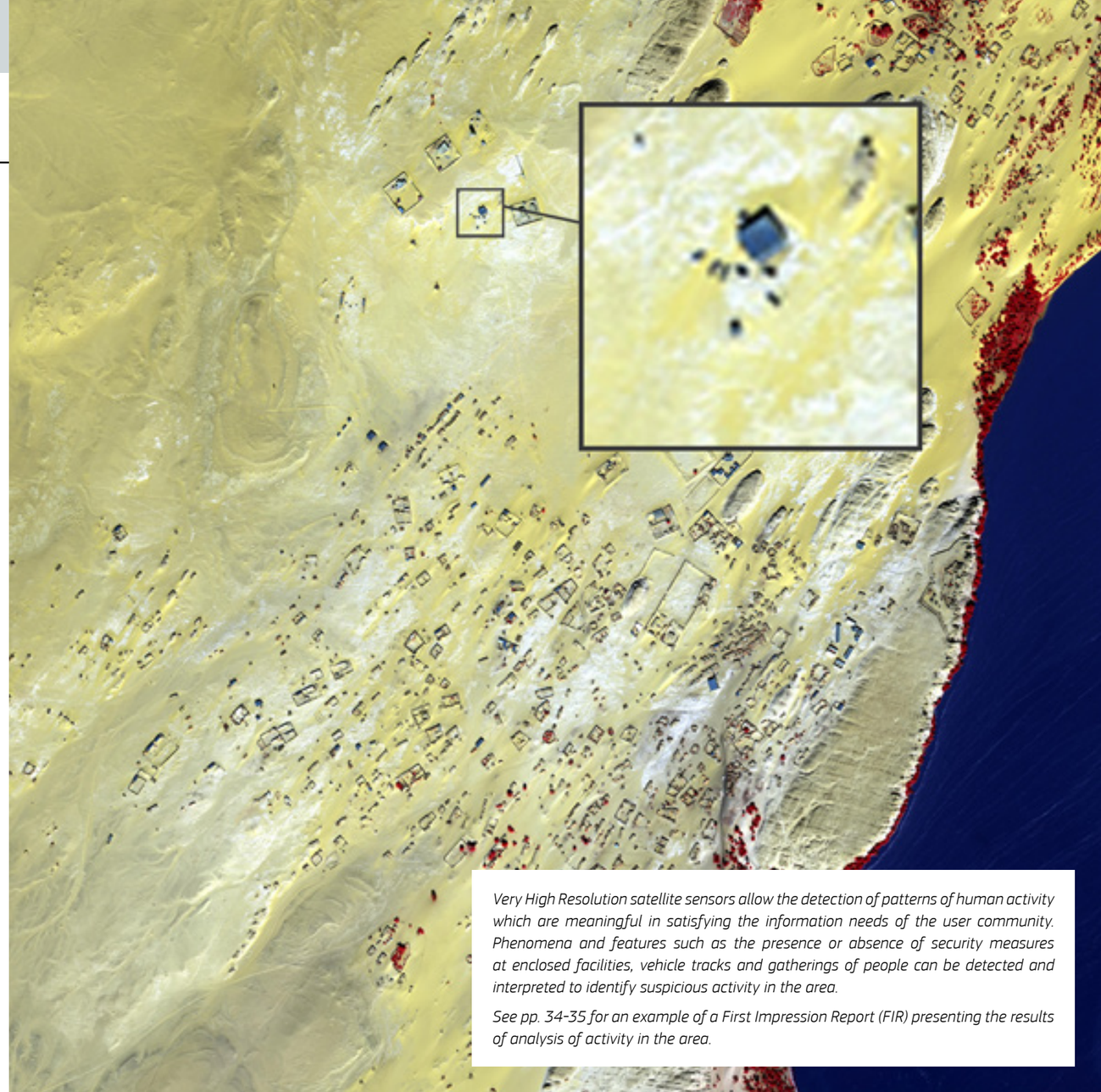
Information content

Analysis

- Indicators of activity
- Areas under construction
- Areas abandoned or without activity
- Features relevant to the activity monitored

Impact

- Changes detected
- Indicators of human activity associated with user needs



Very High Resolution satellite sensors allow the detection of patterns of human activity which are meaningful in satisfying the information needs of the user community. Phenomena and features such as the presence or absence of security measures at enclosed facilities, vehicle tracks and gatherings of people can be detected and interpreted to identify suspicious activity in the area.

See pp. 34-35 for an example of a First Impression Report (FIR) presenting the results of analysis of activity in the area.

Support to Evacuation Plan

EU citizens living abroad enjoy the protection of EU Member States and the EU as a whole. Individuals responsible for the protection and security of these citizens need to be able to anticipate crisis situations and create contingency plans to prepare for them. In this context, SEA provides a powerful multi-layered product category supporting the development of evacuation plans in urban areas. Products are built on a base layer comprising an accurate and up-to-date mapping of the road network. Using this base product as a reference, the optimal routes between key origins (such as diplomatic facilities) and destinations (such as airports) are calculated. Furthermore, an analysis of the distances and projected travel times is carried out and presented in a separate information layer. This provides decision-makers with ample data to design their evacuation plans.

Upon request, a live web mapping tool can be made available to users. The tool allows users to introduce modifications to the input data (origins, destination and restricted areas) and design their evacuation plans on demand, adapting them to changing situations in the field.

Imagery used

SAR and/or Optical Imagery

Observation mode

Single-look

Monitoring

Map scale

1:5.000

1:25.000

Products

Digital Geographic Information - City Map

MapBook

Information content

Transport

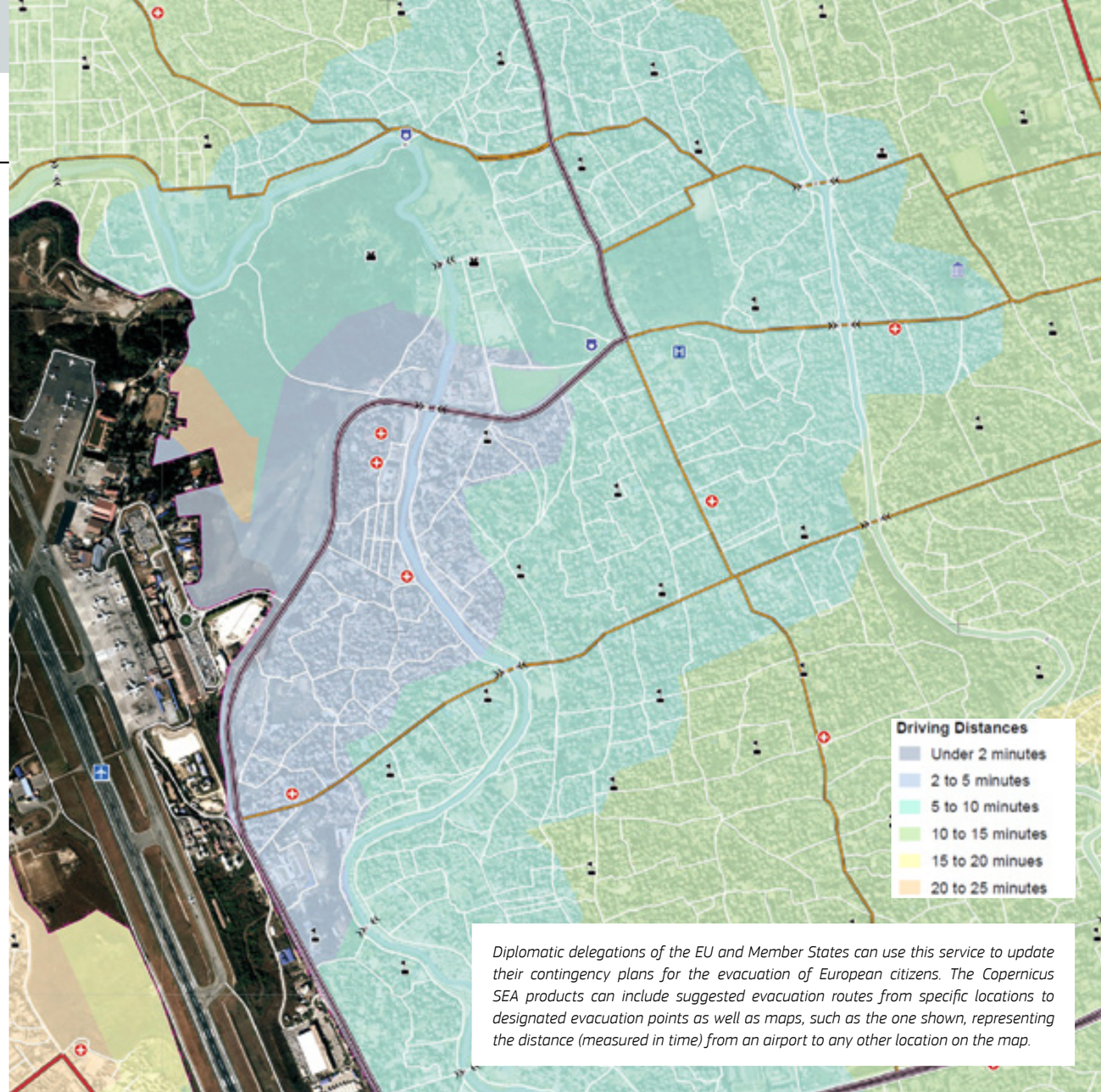
- Basic Transportation Network
- Road Blocks (e.g. checkpoints, destroyed, debris)
- Detailed Transportation Network (classified according to hierarchy, bridges, culverts, tunnels)
- Tools to input rally points and automatically generate evacuation routes and convoy routes to the evacuation point

Points of Interest

- Diplomatic buildings
- Medical facilities
- Administrative buildings
- Public services (e.g. police, fire stations, schools)
- Transport-related buildings

Analysis

- Evacuation routes
- Potential helicopter landing areas
- Gathering areas
- Driving and walking distances



Diplomatic delegations of the EU and Member States can use this service to update their contingency plans for the evacuation of European citizens. The Copernicus SEA products can include suggested evacuation routes from specific locations to designated evacuation points as well as maps, such as the one shown, representing the distance (measured in time) from an airport to any other location on the map.

Road Network Status Assessment

CSDP missions and operations usually require the movement of assets across a territory outside the European Union. This can be particularly hazardous, for example, in countries exposed to heavy seasonal rains, in combination with a large, unpaved road network. These hazards could potentially jeopardise the mandate of the operations, and it is therefore important to be able to plan for effective alternative routing of vehicles. Products in this category can help to identify and assess the impact of the rainy season on the transport network, assisting in identifying feasible routes through a flooded area. Products are created by analysing a long time series of multispectral imagery, allowing the level of surface moisture to be measured. The impact on the existing road network can then be assessed by comparison with the flooded state.

Imagery used
SAR and/or Optical Imagery

Observation mode
Single-look

Map scale
1:50.000
1:100.000
1:500.000

Products
Quick Report

First Impression Report

Briefing Note

Digital Geographic Information - Image Map

Information content

Transport

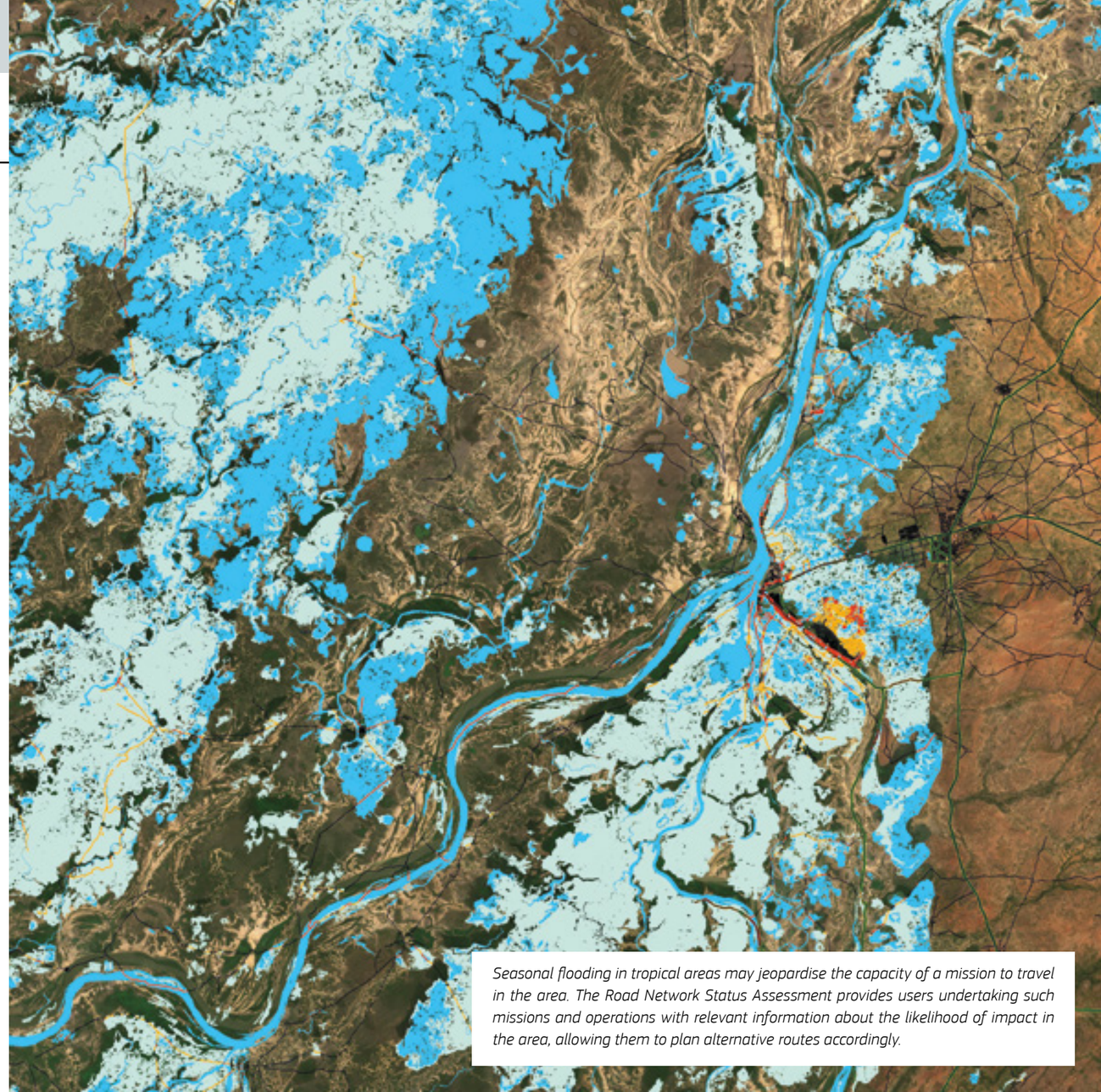
- Basic Road Network
- Road Blocks (e.g. checkpoints, destroyed areas, debris)
- Bridges (operational status)
- Detailed Road Network (e.g. roads classified according to surface)

Populated Areas and Demography

- Populated areas

Impact

- Wet Season Impact (optionally added for the case of logistic deployments in tropical regions)



Seasonal flooding in tropical areas may jeopardise the capacity of a mission to travel in the area. The Road Network Status Assessment provides users undertaking such missions and operations with relevant information about the likelihood of impact in the area, allowing them to plan alternative routes accordingly.

Camp Analysis

As a major international humanitarian actor, the EU monitors, funds and coordinates responses to refugee (or Internally Displaced Persons – IDP) crises, providing aid and support to many individuals in dire situations at IDP or refugee camps. In this context, EU humanitarian responders face the challenge of managing material, resource and personnel requirements in a constantly evolving situation. Products developed in the category Camp Analysis use a combination of new and previous satellite imagery to measure and monitor the changes in the size and distribution of IDP or refugee camps. The main aim is to support accurate assessments of needs, in order to enable a proportional and sufficient humanitarian response, but alternatively, questions such as assessing the security, safety and morphology of the camp, can also be addressed.

Imagery used
Optical Imagery

Observation mode
Single-look
Monitoring

Map scale
1:5.000
1:25.000
1:50.000

Products
Quick Report
First Impression Report
Briefing Note

Information content

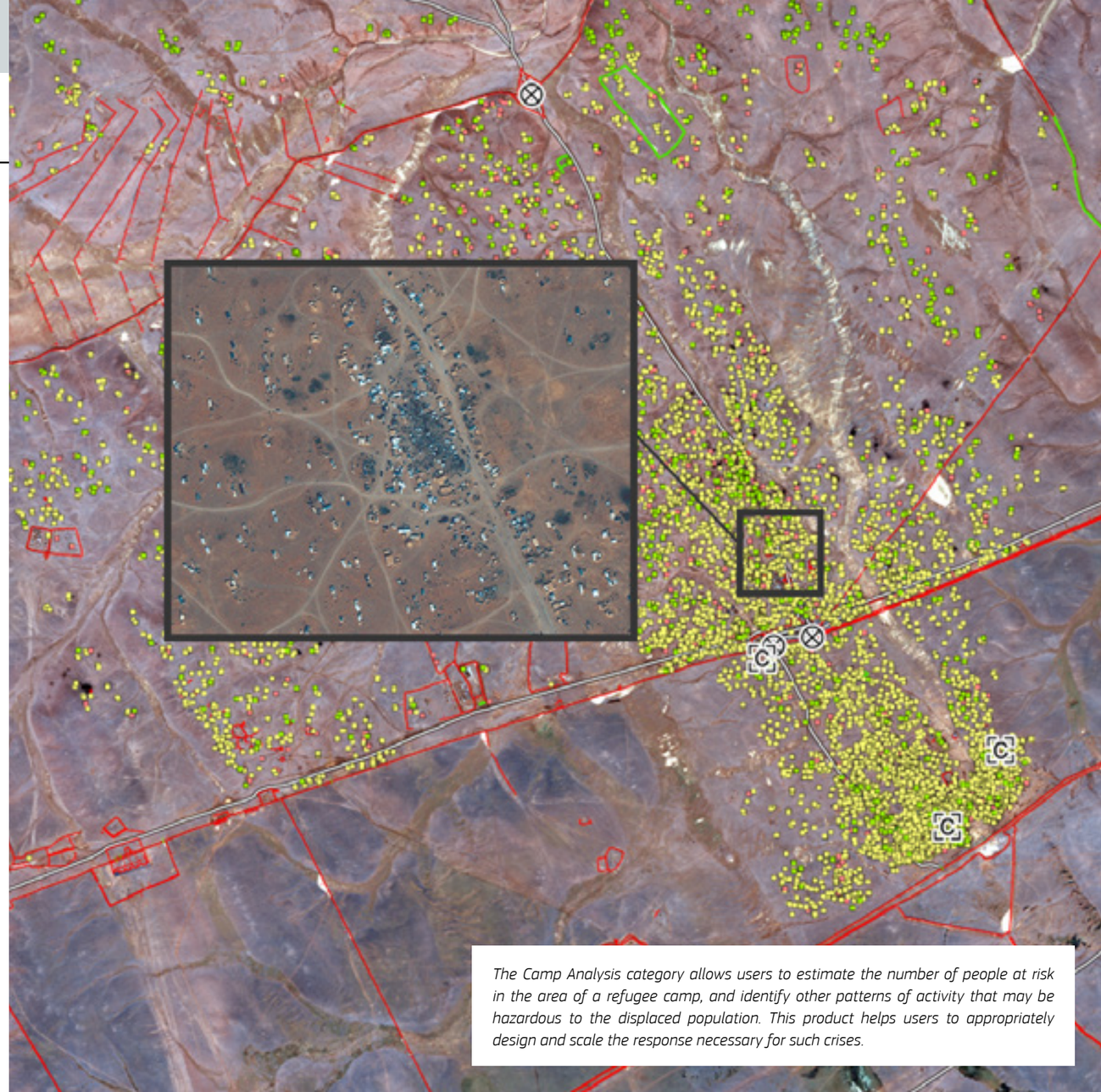
Settlements
- Camp dwellings
- Camp non-dwelling buildings
- Changes in the camp (if applicable)

Transport
- Transportation Network

Populated Areas and Demography
- Trends in population changes
- Urban areas (non-camp)

Terrain
- Hydrography
- Land Use/Land Cover (agricultural exploitation)

Analysis
- Enclosure



The Camp Analysis category allows users to estimate the number of people at risk in the area of a refugee camp, and identify other patterns of activity that may be hazardous to the displaced population. This product helps users to appropriately design and scale the response necessary for such crises.

Critical Infrastructure Analysis

Critical infrastructures are assets (in this context, located outside the EU), of which the operational status is critical to the functioning of systems whose failure could seriously disrupt EU interests and impact ongoing EU policy activities. Transportation and industrial infrastructure are typical examples. Using one or more satellite images, analysts create products in which they assess the operational status of the facility. Multiple images are used for longer-term monitoring of activities in and around the infrastructure of interest. The analysis can determine whether an airfield is operational and usable for logistical deployment, the progress in the construction of a dam or whether an oil refinery is performing normally.

Imagery used

SAR and/or Optical Imagery

Observation mode

Single-look

Monitoring

Map scale

1:5.000

1:25.000

Products

Quick Report

First Impression Report

Briefing Note

Digital Geographic Information - Image Map

MapBook

Information content

Critical Infrastructure

- Operational elements (along with their operational status)
- Changes in the infrastructure or in its operational status (in monitoring mode)

Transport

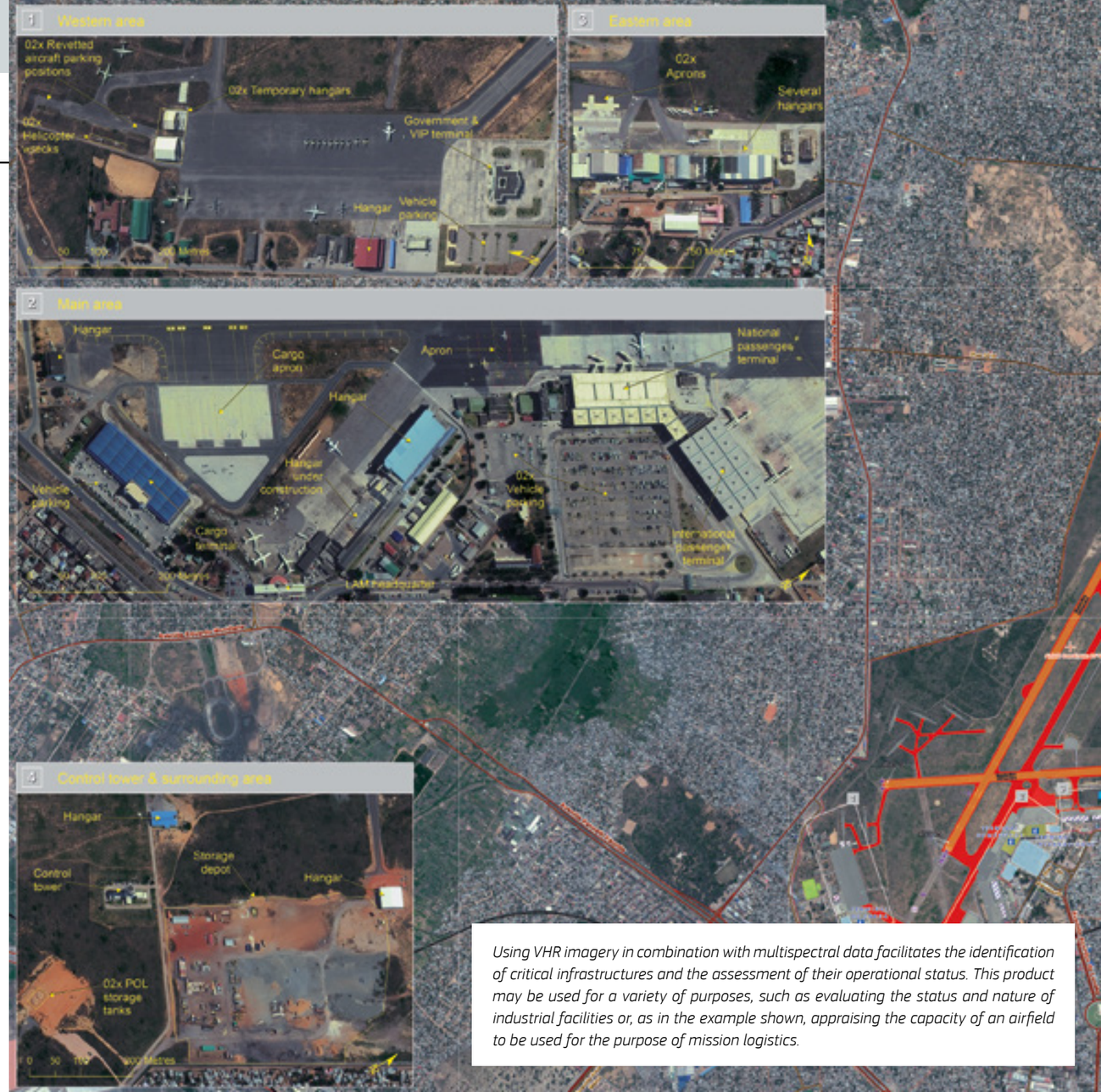
- Transportation Network

Populated Areas and Demography

- Populated areas

Analysis

- Enclosure and security measures
- Operational status
- Relevant measures and distances
- Indicators of activity



Using VHR imagery in combination with multispectral data facilitates the identification of critical infrastructures and the assessment of their operational status. This product may be used for a variety of purposes, such as evaluating the status and nature of industrial facilities or, as in the example shown, appraising the capacity of an airfield to be used for the purpose of mission logistics.

Non-EU Border Map

As a global actor, the EU is party to numerous bilateral agreements between countries. These agreements (as well as other circumstances) may give rise to the need for information on non-EU borders - a need to which this product directly responds. A combination of satellite imagery at different resolutions with other sources of geographic information is used to generate relevant multi-layered products along a selected border or segment. Through this product category, users can obtain an overview of the complete border area, allowing informed decision-making on questions such as at which points it is easier to hide vehicles or goods, or the border is more permeable or harder to patrol. The analysis is based on the location of natural features such as rivers, mountains or foliage, as well as assessments of distance to infrastructure (such as jetties and roads) or settlements.

Imagery used
Optical Imagery

Observation mode
Single-look

Map scale
1:5.000
1:25.000
1:50.000

Products
Digital Geographic Information - Image Map

MapBook

Information content

Critical Infrastructure
- Facilities (power generation, harbours, airports)

Transport
- Transportation Network (roads, bridges, fords, ferry crossing points)

Analysis
- Border Crossing Points (checkpoints, enclosure, capacity, current activity)
- Indicators of activity along the border

Administrative Units
- Administrative boundaries

Terrain
- Hydrography
- Land Use/Land Cover (forested areas, swamps, mangroves)

Settlements
- Camp dwellings

Points of Interest
- Potential hiding places
- Potential crossing points

Border regions outside the European Union can potentially become a source of conflict that may impact the foreign policy of the EU. In-depth analysis of a border area may provide intelligence about locations potentially used for illegal border crossing activity such as smuggling or treaty violations.

See pp. 36-37 for an example of a MapBook containing the results of the analysis in the area.

Conflict Damage Assessment

Assessment of damage to human-made structures is possible thanks to the availability of satellite imagery. Satellite imagery acquired immediately after destructive events can be used in combination with images taken prior to the event, to assess the extent and type of damage in the area. In the case of damage linked to conflict, specific analytic skills are required in order to identify the type of damage caused by different types of ammunition and weaponry. Conflict Damage Assessment is an analytical product that will provide users with a trustworthy source of information diagnosing the extent and type of damage over an area, including its impact on the operational status of local infrastructure (such as runways).

Imagery used
SAR and/or Optical Imagery

Observation mode
Single-look

Map scale
1:25.000
1:50.000
1:100.000

Products
Quick Report
First Impression Report
Briefing Note
Digital Geographic Information - Image Map
MapBook

Information content

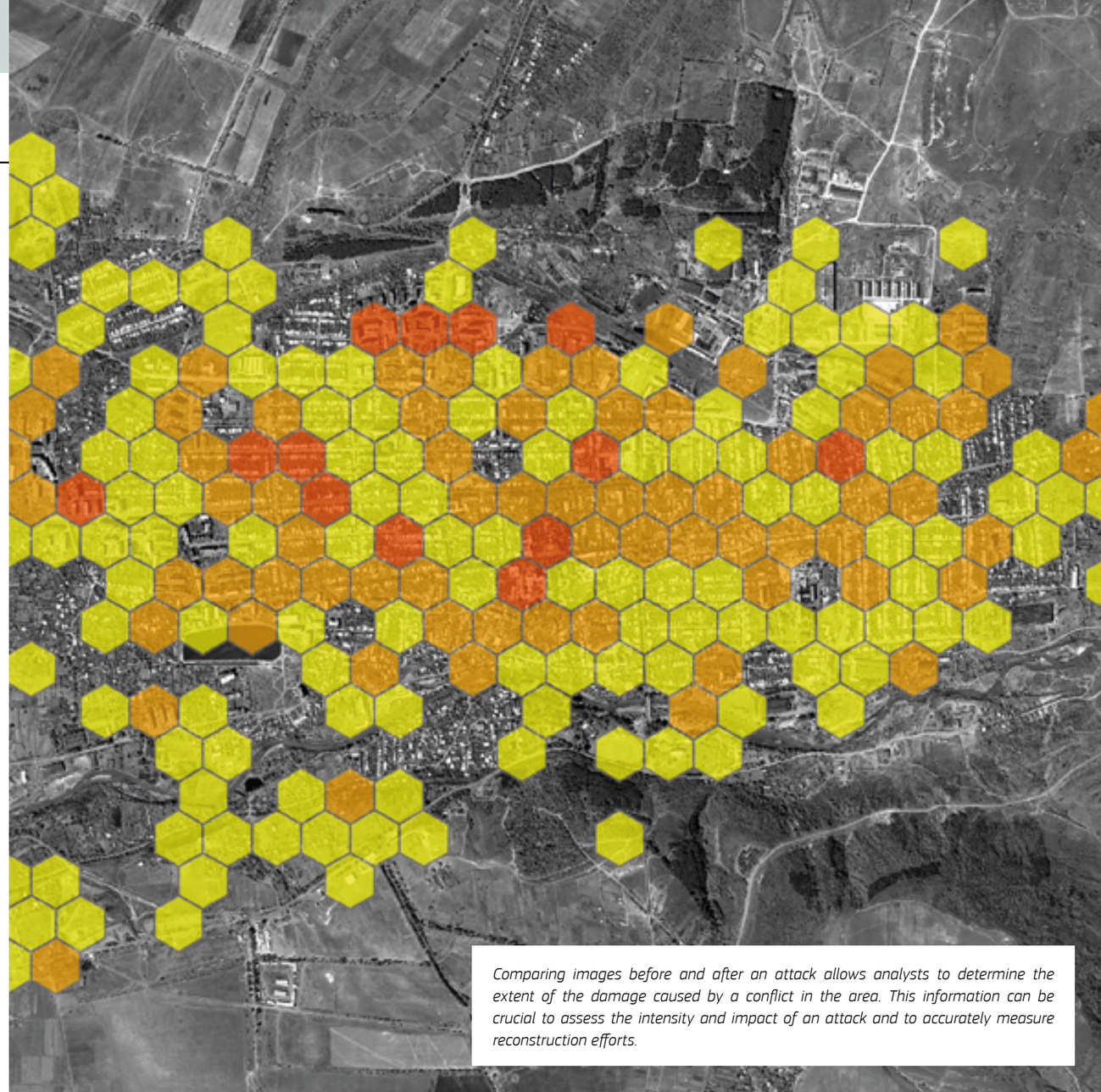
Transport
- Transportation Network

Populated Areas and Demography
- Populated areas

Impact
- Distribution of damage (per urban block in urban areas, heat map in dispersed areas)
- Damaged buildings
- Damage on sites of cultural heritage

Critical Infrastructure
- Airports, harbours and industrial facilities, as well as their operational status

Points of Interest
- Areas of special interest such as health-related, diplomatic and administrative buildings and locations



Comparing images before and after an attack allows analysts to determine the extent of the damage caused by a conflict in the area. This information can be crucial to assess the intensity and impact of an attack and to accurately measure reconstruction efforts.

Crisis Situation Picture

Situational awareness is a primary concern for involved international actors during the development of a crisis. Political decision-makers are in need of a strategic overview of the area in order to support proportionate and effective intervention. Products in this strategic category are formed by combining underlying geographic data with multiple open sources of information. Variables with a geographic dimension, such as the distribution of ethnicities or religions and the locations of the most recent violent episodes are put together in the form of a map or a report to support informed political decision-making.

Imagery used

Freely available ancillary information

Optical Imagery

Observation mode

Single-look

Monitoring

Map scale

1:100.000

1:500.000

Products

Digital Geographic Information - Image Map

MapBook

Country Map Coverage

Information content

Terrain

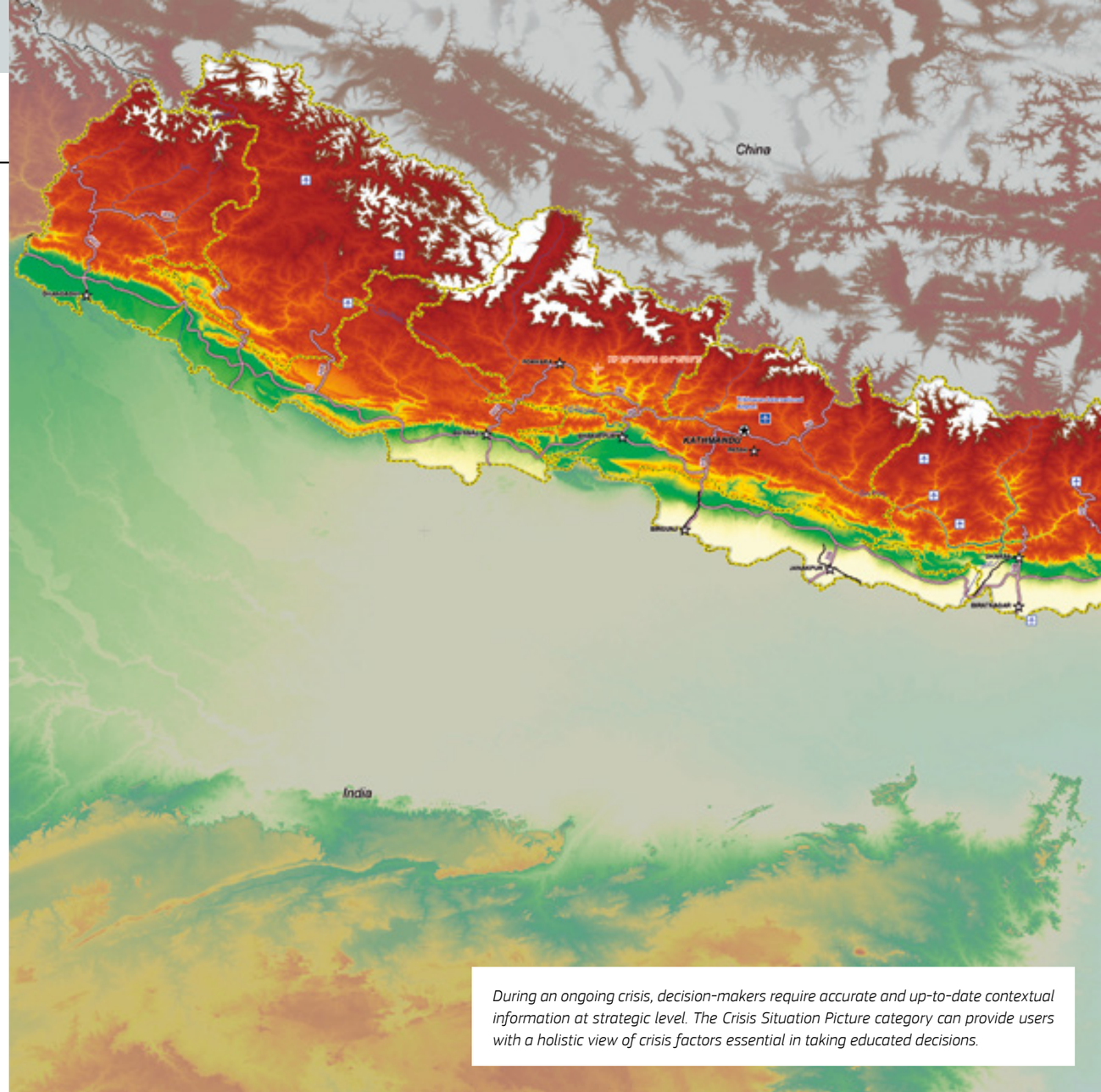
- Elevation
- Land use/land cover

Analysis

- Activity information related to the triggering of the crisis
- Human Geography: ethnic groups
- Human Geography: religious groups
- Geolocated pictures or reports associated with the crisis

Administrative Units

- Administrative boundaries



During an ongoing crisis, decision-makers require accurate and up-to-date contextual information at strategic level. The Crisis Situation Picture category can provide users with a holistic view of crisis factors essential in taking educated decisions.

Reference map

Reference Maps bring the capabilities of Earth Observation data into the world of cartography. In response to a user need for up-to-date information, imagery is acquired over the Area of Interest (AOI) and detailed extraction of information is performed by imagery analysts and cartographic specialists. The result is a map, containing a combination of layers specifically aimed at satisfying the user need. Map layers are extracted from recent imagery and render an up-to-date view on the location, which is essential for educated decision-making. This multi-purpose product category can help the user in a wide variety of scenarios.

Imagery used

Optical Imagery

Map scale

1:25.000

1:50.000

1:100.000

1:500.000

Products

Digital Geographic Information - Image Map

Digital Geographic Information - City Map

MapBook

Country Map Coverage

Information content

Transport

- Basic Transportation Network (e.g. main roads, harbours, airfields)
- Detailed Transportation Network (e.g. all roads classified by category, checkpoints, train and bus stations)

Populated Areas and Demography

- Populated areas

Terrain

- Hydrography
- Topography
- Land Use/Land Cover

Administrative Units

- Administrative boundaries at local, regional and national level

Points of Interest

- Locations of potential interest in the given area such as industrial, power production, dams and military or generic enclosed facilities

Place Name

- Place names (multilingual support)

Updated and reliable information at a given location is essential for adequate decision-making. It is therefore important to have up-to-date and complete datasets for locations at which staff are (or may be) deployed. A high-quality reference map provides the necessary comprehensive geospatial background for any decision-making in the area.

Products

A number of different products are available in order to satisfy a wide range of user needs. The selection of the appropriate product takes into account constraints such as timely responsiveness and accuracy. The user's request is evaluated with respect to the nature of the analysis required, the deadline and the temporal validity of the information to be provided. Products can be provided in printed or digital format, according to the operational needs of the user.

Reporting products

Quick Report (QR)

The QR is the fastest reporting and analysis product available from the Copernicus SEA service. It is focused on providing specific answers to a user request within a tight deadline. This product is 1 page in length.

Information included: *Satellite imagery and basic intelligence analysis.*

First Impression Report (FIR)

The FIR is a very fast reporting and analysis product, providing the results of analysis of the Location of Interest (LOI) extracted from satellite imagery and other collateral sources. The purpose of the product is timely analysis, monitoring of activity and change detection analysis of the specific LOIs. This product ranges from 2 to 4 pages in length (reaching a maximum of 10 pages).

Information included: *Satellite imagery, basic reference information, comprehensive and interpretative intelligence analysis.*

Briefing Note (BN)

The BN is a fast reporting and analysis product. It is produced using information from satellite imagery and collateral sources, and aggregated findings of previous analysis. The report includes description and analysis of the context and environment of the AOI. This product ranges from 3 to 15 pages in length.

Information included: *Satellite imagery, basic reference information, comprehensive and interpretative intelligence analysis and collateral information (in the form of charts and tables).*

The image above shows part of a ten-page FIR (under the Activity Report category) examining indicators of potential smuggling activities (see pp. 34-35 for a full analysis).

Cartographic products

Digital Geographic Information (DGI) - Image Map

The DGI – Image Map product provides up-to-date relevant cartographic and thematic information over a specific Area of Interest. It includes the necessary information to determine the key geographic characteristics of an AOI. This product may also include a detailed "map series", depending on the area and the distribution of data. There is no limit on the number of pages.

Information included: *Satellite imagery, extensive extraction of all feature classes present in the AOI, close-ups of highlighted features with annotations and collateral information (in the form of pictures, charts and tables).*

Digital Geographic Information (DGI) - City Map

The DGI – City Map product provides complete cartographic information over a city at a detailed scale. It includes all the vector layers necessary to create the city map, such as hydrology, transport, population-related features, land cover, hypsography (elevation) and toponyms. Relevant critical infrastructure within the city (e.g. airports, harbours, IDP camp) should be extracted in detail. This product may also include a detailed "map series", depending on the area and the distribution of data. There is no limit on the number of pages.

Information included: *Satellite imagery, extensive extraction of all feature classes present in the city, close-ups of highlighted features with annotations and collateral information (in the form of pictures, charts and tables).*

MapBook

The MapBook is a product combining cartographic information with analysis of activity. The MapBook may be complemented with thematic maps (e.g. population, socio-economic factors, terrain analysis, location of public services) based on Geographic Information System (GIS) analysis and open source data. This product type is useful for regional analysis, border monitoring or the design of security plans over a city, facility or event location. It includes basic vector information, mainly focused on the transport network, hydrology and hypsography. The imagery intelligence analysis will focus on the detailed description of relevant places or event locations within the AOI. There is no limit on the number of pages.

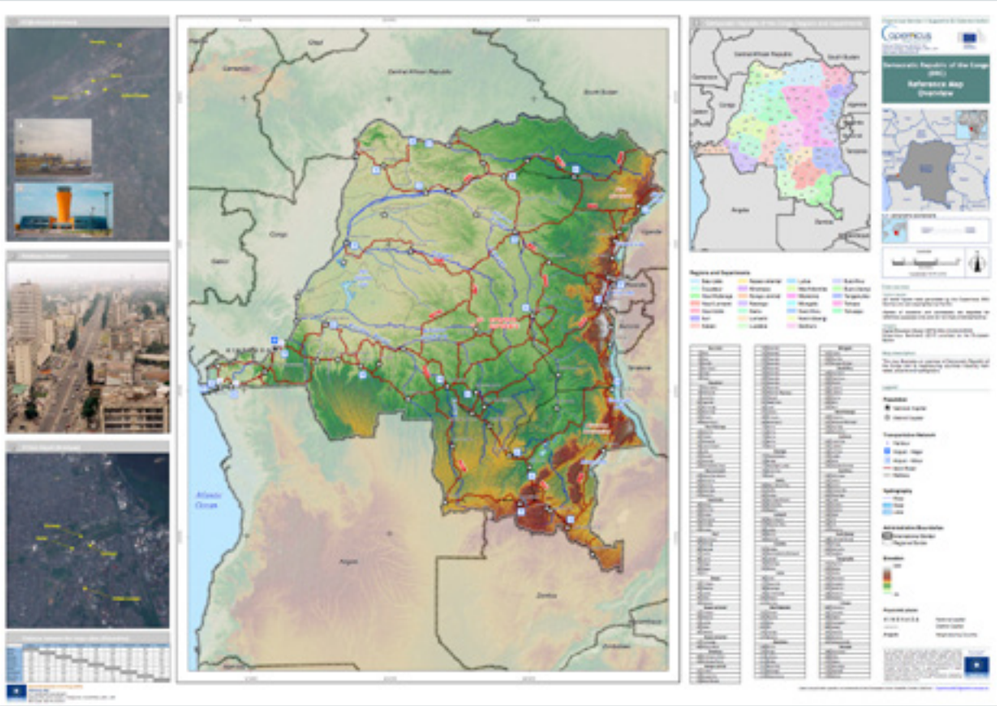
Information included: *Descriptive introduction, satellite imagery, extraction of the main feature classes present in the AOI, close-ups of highlighted features with annotations, collateral information (in the form of pictures, charts and tables), comprehensive and contextual intelligence analysis.*

The above image shows a MapBook product in the Non-EU Border Map category. The 75-page product presents analysis of a portion of a border between two non-EU countries, and highlights features exploitable by smugglers (see pp. 36-37).

Country Map Coverage (CMC)

The CMC is a single topographic map covering a region or a country. It includes very basic vector data such as administrative, transportation, population-related features, border-crossing points and toponyms. The purpose of the CMC is to quickly inform the user about the administrative organisation and main transportation network of the area, as well as the socio-economic context. This product is 1 page in length.

Information included: *Descriptive introduction, satellite imagery, very basic vector information (e.g. administrative units, elevation, major cities, main airports and harbours), close-ups of highlighted features with annotations, collateral information (in the form of pictures, charts and tables).*



This Country Map Coverage product provides an overview of a country and its immediate surroundings. Key topographic and infrastructural features such as the road network, airports, elevation and hydrography are depicted, and detail of key administrative boundaries (regions and departments) is supplied.

		FORMATS				
		PRINTABLE		GEO-REFERENCED MAP		LAYER GROUP
		.PDF	.GEOPDF	.TIFF	.JP2	.GDB
PRODUCTS	REPORTS	Quick Report	✓				
		First Impression Report	✓			✓	✓
		Briefing Note	✓			✓	✓
	CARTOGRAPHIC	Digital Geographic Information - Image Map		✓	✓	✓	✓
		Digital Geographic Information - City Map		✓	✓	✓	✓
		MapBook		✓	✓	✓	✓
		Country Map Coverage		✓	✓	✓	✓

The table above summarises the SEA products and indicates the formats in which they are available (printable paper documents, geo-referenced maps and layer groups) as well as the associated file types.

For more information on the Copernicus SEA products, please visit
https://sea.security.copernicus.eu/products/

Anatomy of a Copernicus SEA reporting product

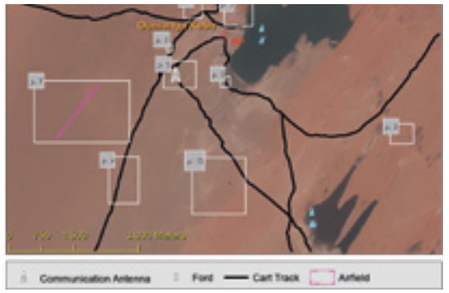
Example: First Impression Report (Activity Report)

Context:
Ounianga Kebir is a settlement in northern Chad, situated deep within the Sahara Desert. It is known that the area is located along illegal smuggling routes.

Challenge:
Identify indicators of activity that could be linked to illegal smuggling in the area.

Solution provided:
Activity Report identifying infrastructure, facilities and indicators of suspicious activity in the area, over the period indicated. Static or semi-permanent features which may be of utility to smugglers (concealment, storage etc.) were of interest – but in this case, dynamics were also monitored (e.g. movements of vehicles and new construction work).

The FIR is a short, rapidly-produced analysis product (see pp. 30-33), usually delivered in response to a crisis situation. Trading off depth of analysis against speed of delivery, the product usually takes the form of a 2 to 4 page document (reaching a maximum of 10), which includes (as the name suggests) initial observations of the LOI, basic vector and supported collateral information.



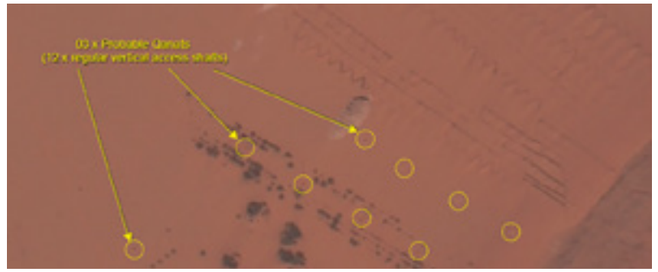
Detection of infrastructure and vehicles

The FIR is comprised of a series of "plates", each of which is built around a satellite image (or a set of images) and the corresponding analysis. Each plate focuses on locations in and around the settlement in which facilities or indicators of interest were identified. In this example, the product provided to the user consisted of 9 plates. One plate is dedicated to the analysis of an airstrip, which analysts concluded seemed to be abandoned. Gatherings of people and vehicles, as well as tents and other non-permanent structures were also identified in other plates.

This plate identifies four locations, for each of which an inset is supplied. In (1), a communications tower is identified as well as a tower with a probable satellite dish. The other insets show secure compounds and shed-like structures, as well as several clusters of vehicles and trucks.

Indicators of potential activity

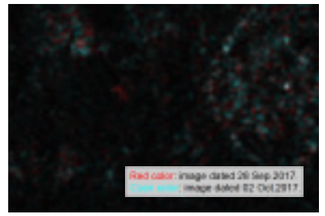
Patterns of activity in the satellite imagery allow inferring features of interest such as qanats, which are used locally to transport and store water underground.



The image (left) shows three rows of circular openings located at some distance from the settlement. These are the entrances to vertical access shafts which part of an ancient system of water transportation known as quanats (see photo above), comprised of sloping underground channels. Analysts identified the shafts as possible hiding places during the dry season.

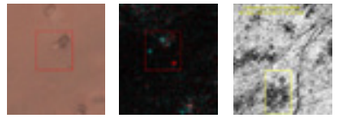
Detection of changes using advanced image processing

Exploiting the properties of radar imagery (which can capture images at night and also through clouds) and techniques such as coherence change detection and interferometry, analysts are able to quickly confirm movement or activity. Comparing radar imagery (which only shows differences in the intensity of the signal, shown as brightness in the image) with optical imagery allows further deduction of the nature of the phenomenon under observation. The timing and nature of the changes can often provide valuable insights.

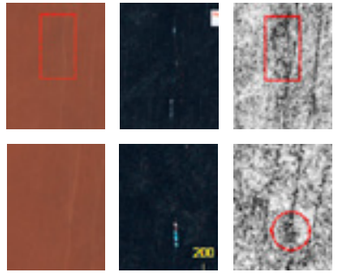


The left-hand image (optical) shows a vehicle parked on an off-road track. The right-hand image presents coherence between two radar images from different dates. The vehicle was confirmed to have departed by the time the second image was captured.

This example product is available for download on the Copernicus SEA service website: https://sea.security.copernicus.eu/categories/activity-report/



Using the same three images as in the example to the left, in a different area, close to an off-road track, frequent activity was observed in the 5-day period of analysis. An identified feature or element was not present in the second image .



In another location, vehicle tracks were detected next to a dirt road. Further down the road, an area of suspected construction was identified.

Anatomy of a Copernicus SEA cartographic product

Example: MapBook (Non-EU Border Map)

The MapBook is a product combining geographic information with the level of analysis usually present in a BN. It is often recommended in response to requests for analysis over larger areas and brings together a collection of maps in the form of a book. In this example, the request of the user resulted in the production of 4 MapBooks, each comprising ~75 pages.

Context:
In the framework of an agreement on border control between the Dominican Republic and Haiti, the EU provided policy support with a focus on improving border security, particularly as regards preventing and pre-empting smuggling.

Challenge:
Understand vulnerabilities and likely routes and locations used for smuggling activities along the Dominican-Haitian border.

Solution provided:
Identification of all (possible) border control posts along the border, and features (such as dirt roads, paths, rivers, riverbeds and bridges) which could be exploited by smugglers (such as for transport, layover, change of transport mode, storage and concealment), as well as buildings or other infrastructure which may prove useful to them (such as isolated buildings).

Overview and Index Map

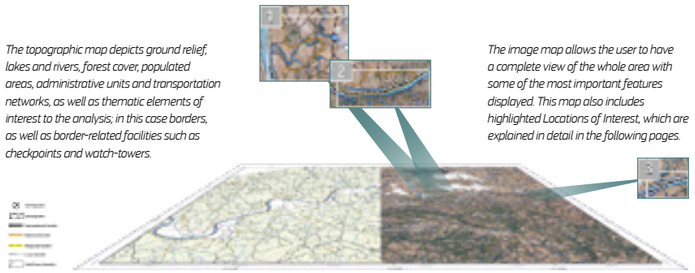
On the overview map, the AOI is outlined over a satellite image of the wider area. It contains an inset "Index Map", which shows how the AOI has been divided into smaller areas (map sheets) for the purposes of analysis. It serves as a reference for the contents of the Mapbook. The overview map also provides information related to the source, coverage and acquisition date of the satellite imagery.

Index map, showing the partitioning of the AOI into 18 map sheets

Topographic and Image Maps

In this example, for each of the map sheets a dual representation is provided. One is the topographic map, which allows the identification of all the features of interest extracted in the area, and the other is an image map. This dual representation allows the user to have all the information available in an easy-to-read manner. The representation technique is selected by cartographic specialists during a task, with the aim of providing the user with the clearest and most complete information product.

The topographic map depicts ground relief, lakes and rivers, forest cover, populated areas, administrative units and transportation networks, as well as thematic elements of interest to the analysis; in this case borders, as well as border-related facilities such as checkpoints and watch-towers.



The image map allows the user to have a complete view of the whole area with some of the most important features displayed. This map also includes highlighted Locations of Interest, which are explained in detail in the following pages.

Geospatial analysis and insights (Inset Maps)

The full results of the analysis are presented in excerpts of the satellite map (close-up views of parts of the image). Annotations by the analyst on these areas (zoomed to the full available resolution) draw attention to specific features identified, which can represent indicators of potential or favourable conditions for illegal activity. Around 60 different insets were delivered to the user in this Mapbook. Analysts scanned the entire border area within the AOI, which for much of its length follows the course of rivers and streams. The insets below are representative examples drawn from the complete content of the Mapbook.

Facilities of interest, such as the watch tower in the above example, are displayed in sub-insets in higher levels of detail.

The natural environment along the border provides many potential hiding places for smugglers (above), as do culverts (below left). The above inset also shows potential crossing points at shallow areas along the river.

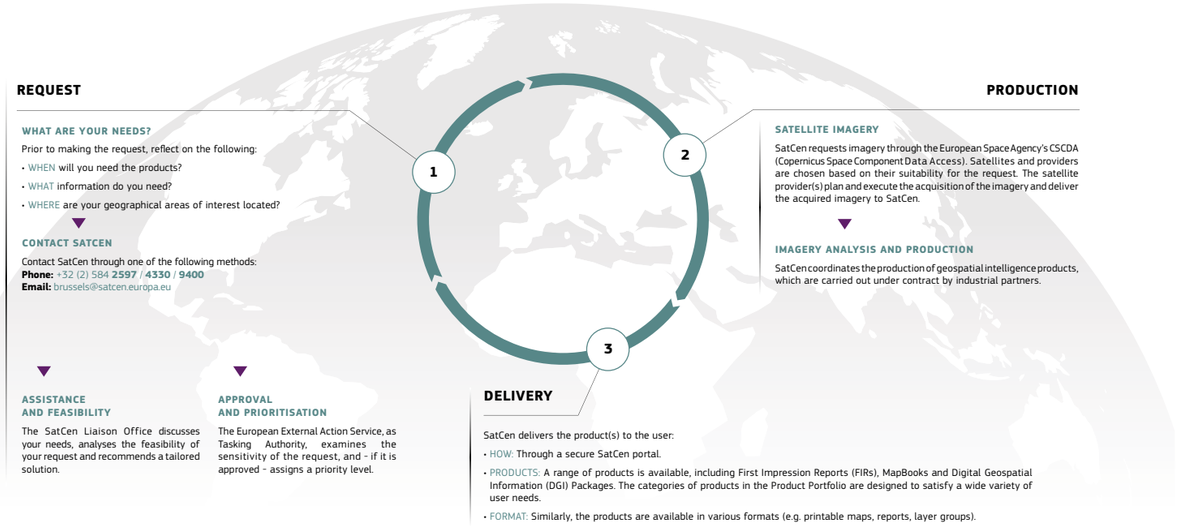
This example product is available for download on the Copernicus SEA service website: https://sea.security.copernicus.eu/categories/non-eu-border-map/

Indicators of possible activity are identified in the above image, as a number of trucks were detected near buildings which could serve as storage facilities.

How to access the service?

The Copernicus SEA Service can be activated only by Authorised Users. These include the European Commission services, the European Union's External Action Service, CSDP Missions and Operations, Member State Ministries of Defence or Foreign Affairs and intelligence centres, and elements within certain intergovernmental bodies, such as the United Nations' Department of Field Support (UN-DFS) or Department of Peace-Keeping Operations (DPKO).

The process of activating the service is described in the User Start Guide (available at the link below), which outlines the steps to be followed and the actors involved.



For more information on the Copernicus SEA service, please visit
https://sea.security.copernicus.eu/

or email: **CopernicusSEA_Coordination@satcen.europa.eu**

Frequently Asked Questions

How do I know that my case can be addressed by the SEA Service?

The Copernicus Service in Support to EU External action will address any case required by its Authorised Users (EEAS, Member States, EC and International Organisations) on topics pertaining to External Action policies outside the EU territory. Within this framework, any needs for information that may be solved with satellite imagery can be addressed by this service.

Is the SEA Service suitable only for crisis/ emergency purposes? Under what circumstances can the SEA service be requested?

The service can react to crisis events in highly time-sensitive conditions, providing immediate answers to information needs. Nonetheless, the crisis cycle for security and foreign policy issues normally calls for prevention, as well as monitoring of ongoing situations to provide intelligence for decision-makers. Users are encouraged to exploit the monitoring capacity of the service by requesting it in advance.

How soon will I receive the requested products? Does the SEA Service provide real-time updates?

The deadline for production is case-specific, and agreed with the SatCen Point of Contact (PoC) at the time of the tasking request. Rapid analytical products can be generated within 24h; other products oriented towards prevention (for which larger areas are analysed) may require several weeks. The service may provide on-line (optionally interactive) tools for the distribution of real-time data (e.g. for an Evacuation Plan).

Are there any restrictions on the use of the SEA products?

The information and data produced in the context of Copernicus SEA is the property of the European Union. SatCen shall grant and ensure that the European Commission has obtained from SatCen itself or from its Contractors a license for the rights of use, free of charge, of all results and outputs, even after the termination or expiry of the Delegation Agreement.

Are there any constraints when it comes to data acquired from space that may affect the products?

Operators of satellite systems have their own policies in place for data distribution. Via the ESA Copernicus Space Component Data Access (CSCDA) service, the SEA service has access to a large variety of satellite data providers - ensuring that satellite imagery will always be available. Nonetheless, it may be that due to weather or operational conditions, the provision of satellite imagery is delayed or cancelled. On the rare occasions when production cannot be met within the deadline due to a lack of satellite imagery, the user is informed in due time, and alternative solutions are proposed.

What is your policy on sensitive information? What level of information sensitivity can you handle?

The SEA service is, by nature, prone to (a) work in sensitive areas (b) deal with and (c) generate sensitive information. SEA will not generate products that are EU classified (EUCI). Procedures have been defined to assess the sensitivity of activations, to control the access to information and to prevent potential misuse: (a) Sensitivity Check procedures (b) Appropriate dissemination policies (c) Adoption of security rules for protection of the information. All products of the service are delivered under strict dissemination policies. Products are stored only at EU SatCen premises and delivered to users via a website with controlled access.

Glossary

Common Foreign and Security Policy (CFSP)

The CFSP is one of the major policies informing the European Union's external action. The latter provides the basis for the EU's foreign policy, covering matters of security and defence diplomacy as well as trade, commerce and funding (e.g. for development cooperation).

Common Security and Defence Policy (CSDP)

The CSDP is the part of the CFSP that relates to defence and crisis management, implemented by EU structures in CSDP missions drawing on civilian and military assets provided by Member States. The CSDP also entails a mutual defence clause amongst Member States as well as a Permanent Structured Cooperation (PESCO) amongst 25 national armed forces.

Coherence Change Detection

A method for analysing changes between two radar satellite images of the same target taken at different points in time, based on comparing their return signals.

Copernicus

Copernicus is the European Union's Earth Observation and monitoring Programme, examining our planet and its environment for the ultimate benefit of all European citizens. It offers information services based on satellite Earth Observation and in situ (non-space) data.

EU External Action

This refers to the actions of the EU abroad, comprising both diplomatic activity and other interventions linked to EU foreign policy, as enshrined in the Common Foreign and Security Policy.

Earth Observation

The activity of collecting data on the physical, chemical, and biological systems of the planet. This is usually achieved via remote sensing technologies, for which satellites serve as one amongst several possible platforms, including airplanes, ships, balloons and unmanned aerial vehicles (UAV).

Geospatial intelligence

Information gathered through the collection, processing, analysis and interpretation of geospatial information, including cartographic products, satellite imagery and ancillary data sources.

Multispectral imagery

Multispectral imagery is produced by sensors that measure reflected energy within several specific sections (or bands) of the electromagnetic spectrum. They usually have between 3 and 10 different band measurements for each pixel of the images they produce. Multispectral data allows the identification of specific phenomena such as the presence of humidity or temperature.

Optical imagery

Optical imagery is generated by visible, near-infrared and short-wave infrared sensors, which create images of the earth's surface by detecting the solar radiation reflected from targets on the ground.

Radar imagery

Radar imagery is created by transmitting radio waves and sensing the direction and delay of the reflected returning signal off the target object.

Synthetic-Aperture Radar (SAR)

Synthetic-Aperture radar is a form of radar imaging used to create two- or three-dimensional images of ground-based targets. The motion of the radar antenna over a target region is used to obtain finer spatial resolution than with the conventional beam-scanning radars.

Acronyms

AOI
Area of Interest

BN
Briefing Note

CFSP
Common Foreign and Security Policy

CMC
Country Map Coverage

CSCDA
ESA Copernicus Space Component Data Access

CSDP
Common Security and Defence Policy

DGI
Digital Geospatial Information

EC
European Commission

EEAS
European External Action Service

EMSA
European Maritime Safety Agency

ESA
European Space Agency

EU
European Union

EUCI
European Union Classified Information

EUMETSAT
European Organisation for the Exploitation of Meteorological Satellites

FIR
First Impression Report

FRONTEX
European Border and Coast Guard Agency

GDB
Geodatabase

GIS
Geographic Information System

IDP
Internally Displaced Persons

LOI
Location of Interest

PESCO
Permanent Structured Cooperation

PoC
Point of Contact

SAR
Synthetic-Aperture Radar

SATCEN
European Union Satellite Centre

SEA
Support to External Action

UAV
Unmanned Aerial Vehicle

UN-DFS
United Nations' Department of Field Support

UN-DPKO
United Nations Department of Peace-Keeping Operations

VHR
Very High Resolution