Copernicus Space Component

Technical Operating Arrangement

ESA - Observatoire du Sahara et du Sahel

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Copernicus Space Component Technical Operating Arrangement

between the European Space Agency on one side,

and

Observatoire du Sahara et du Sahel on the other side,

executing the Cooperation Arrangement concluded between the European Commission and the African Union Commission on their cooperation in the area of data access and use of Copernicus Sentinel data from the Copernicus programme.

1 INTRODUCTION

1.1 Background

Copernicus is a European programme, providing Earth Observation information for environmental monitoring and civil security. The dedicated Copernicus Sentinel missions are being developed to meet the operational needs of the programme.

Copernicus now forms part of the European Union's Space Programme, which was established under Regulation (EU) 2021/696 of the European Parliament and of the Council of 28 April 2021 establishing the Union Space Programme and the European Union Agency for the Space Programme ('the EU Space Programme Regulation'). Within the frame of the EU Space Programme Regulation, the European Commission has concluded agreements with the European Space Agency (ESA) and the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) for continuing the implementation of the space component of Copernicus.

These agreements foresee that ESA and EUMETSAT will provide support to the EU for matters concerning the international technical cooperation of the Copernicus Programme. In particular, ESA and EUMETSAT will assess the impact of international technical cooperation requests and will implement and be responsible for technical actions with international partners subject to the prior approval of the European Commission and prerequisite funding provided by the European Union.

On this basis, the European Commission requests ESA and EUMETSAT to establish relevant technical operating arrangements with international partners, primarily focusing on the Copernicus Sentinels operated by ESA and EUMETSAT and addressing issues such as liability and technical data interface specifications.

ESA and EUMETSAT will be responsible for the implementation of the technical actions, in coordination and subject to prior consultation with the European Commission.

The implementation of the technical operating arrangements will be facilitated by a joint 'Copernicus Cooperation group', involving the European Commission, ESA, EUMETSAT, the European Environment Agency (EEA) and the international partners. The members of the Copernicus Coordination group will meet whenever necessary, to oversee and stimulate cooperative activities as mentioned in the relevant Cooperation Arrangement.

1.2 Purpose and objectives

The European Union, represented by the European Commission, and the African Union, represented by the African Union Commission, signed a Cooperation

Arrangement on 12 June 2018 on Cooperation in the area of data access and use of Sentinel data of the Copernicus programme ("the Cooperation Arrangement"). The Cooperation Arrangement reflects both sides' recognition of the current and potential value of Earth Observation (EO) data, and identifies areas where the African Union Commission and the European Commission see potential for cooperation to help realise this value.

In the Cooperation Arrangement, both signatories recognise that the European Union and African Union Member States are pursuing EO activities in a number of areas of common interest and that sharing each other's data based on reciprocity should provide mutual benefits. Both sides acknowledge that access to in-situ data provided by the African Union Commission and the African Union Member States will bring benefit to the Copernicus Programme.

Both sides are committed to the principle of full, free and open access to Copernicus Sentinel and other European EO data and information, subject to applicable security restrictions.

The European Commission wishes to provide African organisations access to Copernicus Sentinel data using high bandwidth connections from data hub to data hub, with a view to fostering the exchange of EO data between Europe and Africa.

Furthermore, the European Commission would like to emphasise the importance for the Copernicus programme of in-situ data from the African Union and its Member States.

Acknowledging that the Copernicus programme emphasises the importance of in-situ observations and the complementarity with space-based observations, the African Union Commission wishes to support this objective and intends to facilitate access to data from local monitoring stations throughout Africa, including geophysical and meteorological networks, to support the enhancement of the Copernicus data architecture and the development of global products.

This Technical Operating Arrangement (TOA) is established in order to give technical effect to relevant aspects of the Cooperation Arrangement. ESA and the Observatoire du Sahara et du Sahel (OSS) will collaborate to undertake the necessary technical activities. These activities are described in the present TOA.

The TOA defines the respective roles and responsibilities of ESA and OSS, as well as the terms and conditions under which they will cooperate to implement the exchange of data foreseen in the Cooperation Arrangement in the area of data access and use of Copernicus Sentinel data.

The TOA will be implemented based on voluntary, non-legally-binding cooperation, without exchange of funds. In the event that either ESA or OSS is unable to continue one or several of the activities described in this TOA, each signatory may discontinue

participation in such activities. In such cases, the signatories will endeavour to consult each other and provide each other with reasonable notice of their intentions.

The signatories agree that any future evolution of the technologies in the infrastructure and operational domain, having the potential to become relevant for the implementation of the present TOA and going beyond the current capabilities of the signatories, will be duly considered by them, without creating an obligation for the signatories to adopt/ acquire these new technologies. The signatories will consult each other should this case materialise, endeavouring to ensure continuity of the TOA's implementation.

The TOA will take effect on the date on which the second of the two signatories signs the TOA.

1.3 Scope

This non-binding TOA describes the technical operating arrangements between OSS and ESA which are necessary to give effect to relevant aspects of the Cooperation Arrangement. The technical operating arrangements include a description of the initiatives over which the signatories will cooperate, the necessary operational interfaces, and the support required from each signatory.

1.3.1 **The main activities intended to be operated by OSS are**:

a. The development of a data centre providing regional access to Copernicus Sentinel data covering the geographical area of interest that includes the land and marine territories of the countries identified in Annex A, as described in detail at Section 4.1 below.

b. Facilitating the uptake of Copernicus Sentinel data from the data centre by OSS's partner institutions in the GMES and Africa programme.

c. Providing the in-situ data described at Section 3 below for the benefit of the European Copernicus programme. Taking into account its regional role, the OSS will, where possible, facilitate access for Copernicus to in-situ data available from regional data sources in addition to national data sources.

1.3.2 **The main activities intended to be operated by ESA are**:

Providing OSS with access to the Copernicus Sentinel International Hub operated by ESA, as described in detail at Section 4.2 below, or to any equivalent privileged data access service for Copernicus Sentinel data operated on behalf of ESA for its Copernicus international partners which is put into operation after the date of signature of this TOA, and the related technical support.

1.3.3 Additional areas of technical cooperation may be included in the future, if relevant and endorsed in advance by the European Commission.

1.3.4 The Annexes to this TOA form an integral part of the TOA, but they can be revised and updated through explicit joint agreement in writing and such a revision or update shall not require a formal signed amendment of the TOA.

1.4 References

An overview of the Copernicus Sentinel missions is available on the Sentinel Online portal at sentinels.copernicus.eu. In particular, the portal contains up to date information on:

- Each of the Copernicus Sentinel missions which is operated by ESA, describing both the space and ground segment aspects, and providing news from the operations;
- Available products, including the contents and format specifications;
- Detailed user handbooks; and
- How to link to the data access hubs, including registration process, user manuals, and operational news.

The following documents are referenced in this TOA and provide further supporting information for the cooperation:

- *CSC Operations - ESA Framework - Operations Concept*, Issue 1.0, ESA-EOPG-EOPGC-TN-19, dated 18 January 2021. A copy of this document is appended to this TOA at Annex C.
- The European Commission's legal notice setting out the conditions of the licence under which Copernicus Sentinel data and information may be used: "Legal notice on the use of Copernicus Sentinel Data and Service Information", accessible online via

  https://sentinels.copernicus.eu/documents/247904/690755/Sentinel_Data_Legal_Notice

  A copy of this document is appended to this TOA at Annex D.

2 TECHNICAL INTERFACES

OSS will act as the technical interface to ESA for carrying out the activities described in this TOA.

Where other entities (e.g. institutes, ministries, commercial enterprises, etc.) are involved in the implementation of the TOA on behalf of OSS, OSS will act as the sole interface to ESA and the contact point for any such entities.

Where ESA identifies a desire to access data to support calibration and validation, or wishes to discuss complementary calibration/validation activities, OSS will act as a coordinating point to facilitate such discussions.

Where the European Commission and/or the European Environment Agency ('EEA', the delegated entity for the cross-cutting coordination of the Copernicus in-situ component) identify a desire to access in-situ data from OSS country members to support the Copernicus Services, OSS will act as a coordinating point to facilitate such discussions. The detailed arrangements covering this specific cooperation are outside the scope of this TOA.

Occasional technical meetings are intended to be held between OSS and ESA, for instance within the Copernicus Cooperation Group which will be led by the European Commission. The European Commission will be invited to all meetings between OSS and ESA, and all meeting documentation will be forwarded to the European Commission for information.

3 EUROPEAN ACCESS TO OSS CALIBRATION AND IN SITU DATA

OSS and its collaborators operate networks of climatological, meteorological and other in-situ and EO data that can support the calibration and validation of satellite Earth observations and derived products, as well as provide input to the Copernicus Services. A number of these facilities have been specifically established to support satellite Earth observation calibration and validation activities.

Data from these networks, and other data and information of value to calibration/validation activities and the Copernicus Services is made available to the Copernicus programme in accordance with national, state/territory and organisation-level policies.

It is understood that the data made available by OSS and/or its partners in the course of the implementation of this TOA will be made available for distribution on the European "Copernicus Data Access and Information Systems" (DIAS), or equivalent publicly accessible Copernicus data access service operated on behalf of ESA. Consequently, the transmission of these data will allow for such a distribution, without restriction. ESA will serve as facilitator for data transmission to the DIAS, or equivalent Copernicus data access service.

4 INTERNATIONAL ARCHIVING AND DISSEMINATION CENTRES, MIRROR SITE

4.1 OSS Data Mirror Site

OSS intends to establish a regional Copernicus data access/analysis mirror site ("Data Mirror Site"), to improve access to, and the exploitation of Copernicus Sentinel data in the North-Africa region.

In the context of the present TOA, this Data Mirror Site is intended to retrieve data from ESA-operated Copernicus Sentinel missions from ESA-operated data systems, and then to store and make available such data to government, industry, research and general public users for download and/or online analysis. The Data Mirror Site is intended to access all data products produced by all ESA-operated Copernicus Sentinel missions for a geographical area of interest that includes the land and marine territories of countries identified in the map in Annex A.

The specific data products to be retrieved, and the scope of the geographic region for which data will be retrieved/stored/re-distributed, may change from time to time. OSS will discuss such changes with ESA prior to implementing them in the Data Mirror Site. For the purpose of technical efficiency, simpler geographical boundaries may be employed that encompass an area larger than the specific area of interest.

The Data Mirror Site is intended to be a distributed system, designed according to the characteristics agreed by the parties and ESA's previous experience.

OSS intends to utilise Academic Research Networks peering to GEANT on the European side (potentially via INTERNET2), as the backhaul connection from ESA-operated systems to the Data Mirror Site. Such networks are scaled for data of the size of Copernicus Sentinel data products, and are a cost-effective way of moving large amounts of scientific data. OSS understands that ESA intends to directly connect ESA-operated data systems with the European GEANT network using high-bandwidth connections.

The types and levels of service provided by the Data Mirror Site (such as web service access, direct file download, etc.) will be determined from time to time by OSS in consultation with its partners and ESA.

Access to data will always be provided in a manner consistent with the overarching terms documented in the Cooperation Arrangement.

OSS will implement a simple and un-bureaucratic user registration process for the Data Mirror Site, in order to support the distribution of Copernicus Sentinel data in the North-Africa region and to share aggregated information with ESA and the European Commission. As part of the user registration process, users will be asked to state, by choosing from a drop-down menu, the country in which they operate, the category of user into which they fall, and their intended field of use for the data, to

enable the OSS to provide ESA with the annual statistics described at Section 4.4 below.

4.2 ESA Support

4.2.1 Access to the Copernicus Sentinel International Data Hub

ESA grants OSS access to the Copernicus Sentinel International Data Hub (IntHub), which is a rolling archive, providing bulk dissemination capabilities for Copernicus Sentinel data products. Throughout the lifetime of this TOA, ESA shall likewise grant OSS access to any equivalent privileged data access service for Copernicus Sentinel data operated on behalf of ESA for its Copernicus international partners which is put into operation after the date of signature of this TOA.

OSS or a delegated partner will directly connect to the IntHub, or equivalent Copernicus Sentinel data access point. Other partners may be engaged as required, following prior consultation with ESA and the European Commission.

The IntHub will continuously store Copernicus Sentinel data acquired during the previous month(s) at the processing levels agreed as part of the Copernicus Sentinel core data product list and the associated timeliness as defined in the document '*CSC Operations - ESA Framework - Operations Concept*', Issue 1.0, ESA- EOPG-EOPGC-TN-19, dated 18 January 2021, a copy of which is appended to this TOA at Annex C. The IntHub enables searching, browsing, previewing and downloading the Copernicus Sentinel data. The time interval covered by the IntHub rolling archive will be scalable and include at least the previous 21 days of data.

Access to the Copernicus Sentinel archived data is provided via a separated data access infrastructure which is not the subject of this TOA. If required in the future, ESA and OSS may discuss specific campaigns, which may also be coordinated with other international partners, to transfer missing data. Such campaigns, including publishing of selected archived data in the IntHub, may also apply in the future to make re-processed Copernicus Sentinel data available.

Access to the IntHub is allowed via a web authentication module. ESA will provide OSS with a username and password to access the IntHub. This username and password may be used only by OSS (including its representatives, employees and contractors involved in the initiative) for the purpose of the initiative and will not be shared with other natural or legal persons.

OSS will use the IntHub access, or equivalent Copernicus Sentinel data access service only for the purpose of its activity in the Data Mirror Site initiative described above. Through registration at the IntHub, or to the equivalent Copernicus Sentinel data access service, accessing and\or downloading available content, OSS will not misuse or interfere with the service of the IntHub portal or that of the equivalent Copernicus Sentinel data access service. In particular, OSS aims at building a mirror archive of

Copernicus Sentinel data and hence will not repeat the download of identical datasets from the IntHub, or from the equivalent Copernicus Sentinel data access service, but will store downloaded Copernicus Sentinel data for re-use and re-dissemination.

All functionalities and contents offered by the IntHub, or by the equivalent Copernicus Sentinel data access service, are provided by ESA on a best efforts-basis. The transmission of content from the IntHub, or from the equivalent Copernicus Sentinel data access service, may be interrupted or delayed by ESA in the event of technical constraints, such as the internet bandwidth. In such case, the download requested by OSS will be enabled later taking into account other users' requests.

4.2.2 Data Transfer

ESA will provide appropriate interfaces to transfer Copernicus Sentinel data to OSS and partners. If required, ESA can support network performance analysis to help fully utilise available bandwidth.

4.3 Time Schedule

ESA will provide Copernicus Sentinel data sets as they become available in accordance with ESA's data provision plan (e.g. after launch, commensurate with the commissioning and ramp-up plan for data provision).

4.4 Reporting

OSS will keep ESA and the European Commission informed about the course and success of the Data Mirror Site.

OSS will submit regular reports regarding the Data Mirror Site on at least an annual basis. The annual reports will, as a minimum, contain information regarding:

- The use which OSS has made of Copernicus Sentinel data during the year, and any applications it has developed;
- Onward use or dissemination of Copernicus Sentinel data, including in particular statistics regarding user activity on the Data Mirror Site;
- Any changes to the pre-agreed set up of activities that may have an impact on ESA's support to the partner's activities;
- OSS will provide feedback to ESA on the Copernicus data access mechanism.

More specifically, as concerns Data Mirror Site usage statistics, OSS will provide an annual set of statistics covering as a minimum:

a) Statistics on the Copernicus Sentinel data offer on the Data Mirror Site:
   - Volume of Sentinel data acquired for the Data Mirror Site from an ESA-operated data access interface;

- Number and volume of Sentinel user-level data products published on the Data Mirror Site, by mission and user-level data type.

b) Statistics on the level of user-uptake from the Data Mirror Site:

- Number of registered users on each collaborative or international Sentinel data access system, number of new users, and number of active users during the reporting period, including users' geographic origin, affiliation, thematic activity, and sector of activity;
- Number and volume of Sentinel user-level data products downloaded by the users via each collaborative or international Sentinel data access system, by mission, by product type, including users' geographic origin, affiliation, thematic activity, and sector of activity;
- Complementary Sentinel data and information developed by OSS or its partners;
- Support provided to Copernicus calibration and validation activities by OSS or its partners.

The template for providing this information to ESA is attached at Annex E below.

The collection of these statistics will require the OSS to structure the user registration process so that when users register, they provide the following information to be associated anonymously with their user account:

a) User geographic origin

Users will be asked during the registration process to state the country from which they will primarily download the data.

b) User's organisation

Users will be asked during the registration process to state the type of organisation for which they work, using the following list of categories:

- GMES and Africa participating institutions;
- European Union institutions and bodies;
- African Union institutions and bodies;
- National or regional public authorities in the European Union or Copernicus participating states;
- National or regional public authorities in African Union member states;
- National or regional public authorities outside European Union member states, Copernicus participating states or African Union member states;
- Research and education organisations;

- Commercial and private bodies – SMEs[1];
- Commercial and private bodies – non SMEs;
- Charities and non-governmental organisations;
- Intergovernmental and international public organisations;
- Natural persons for non-commercial purposes;
- Other (specify).

c) User thematic activity

Users will be asked to select their main intended area of application for the data from the following list of application areas:

- Land;
- Marine environment, maritime affairs, and fisheries;
- Arctic policy and polar areas;
- Transport;
- Energy;
- Environmental compliance;
- Raw materials;
- Air quality and atmospheric composition;
- Health;
- Tourism;
- Climate change;
- European civil protection and humanitarian aid operations;
- African civil protection and humanitarian aid operations;
- International development and cooperation;
- Migration and home affairs;
- Security;
- Research and innovation;
- Other (specify).

d) User sector of activity

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[1] The definition of an SME follows https://ec.europa.eu/growth/smes/sme-definition_en

Users will be asked to state their main sector of activity, using the following categories:

- Policy support - support to EU policy or EU national or regional policy;
- Policy support - support to AUC policy or African national or regional policy;
- Policy support – other;
- Commercial activity;
- Research and education;
- Media and public relations;
- Other (specify).

OSS intends to implement an automated means for the Data Mirror Site to collect the required statistical information on Copernicus Sentinel data re-distribution and analysis, and intends to cooperate with ESA on the technical means for ensuring such data is formatted/structured to ensure it is of maximum value.

It is highlighted that ESA may pass the information provided in the annual report to a third-party contractor for processing and analysis. The information and an analysis of the statistics will be sent to the European Commission and subsequently made publicly available.

The OSS will design the user registration process so that the statistical information can be collected while preserving the anonymity of the user, and in compliance with national and/or regional legislation for protecting the users' personal data. The OSS will not disclose any personal data (i.e. information from which a natural person can be identified) of its Data Mirror Site users to ESA.

4.5 Sentinel Data Governance

Copernicus Sentinel data made available via the IntHub are governed by the "Legal notice on the use of Copernicus Sentinel Data and Service Information", a copy of which is appended to this TOA at Annex D.

In the event that the EU, in the future, designates Copernicus Sentinel data as "sensitive"[2], the access to such Copernicus Sentinel data through the IntHub or equivalent Copernicus Sentinel data access service, and its use and distribution may be subject to different licensing conditions.

This also applies for Copernicus Sentinel data already received by OSS or a partner through the IntHub or equivalent Copernicus Sentinel data access service, in the event

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[2] As defined in Art. 13 of the COMMISSION DELEGATED REGULATION (EU) no 1159/2013 of 12 July 2013 supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council of the European Earth monitoring programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information.

the Copernicus Sentinel data are assessed to be "sensitive" after the time of data download.

Where Copernicus Sentinel data are identified as "sensitive", OSS will endeavour to remove such data from the Data Mirror Site. It is understood that OSS will be unable to retract data which has already been re-distributed.

5 INTERNATIONAL COMPLEMENTARY EXTERNAL VALIDATION SUPPORT

5.1 OSS Activity

OSS intends to conduct complementary Copernicus Sentinel data calibration and/ or validation activities in collaboration with ESA, with the aim of improving the quality of both core Copernicus Sentinel core user-level data and of derived higher-level user-level data.

Copernicus Sentinel data required for those projects may be supplied directly from the Copernicus Open Access Hub (http://scihub.copernicus.eu) to the project, or from the Data Mirror Site. In the latter case, reporting and data governance are handled as per Sections 4.4 and 4.5 above.

OSS may conduct these calibration/validation projects together with partner entities. In such a case, OSS will act as the interface and contact point between ESA and the other entity.

Details of on-going and planned calibration/validation projects are described in separate documents, describing the involved entities, the scope of the calibration/validation project, applied methodology, expected results and related use/licence conditions, geographic area of interest, mechanism for supply of Copernicus Sentinel data, time schedule and reporting.

Annex B contains a list of the currently on-going and planned projects. Annex B will be updated as and when necessary.

5.2 ESA technical support to complementary validation activity

ESA will provide relevant data sets from the Sentinel -1, -2, -3 and -5p core user-level data (i.e. L1 and L2. In special cases also L0) as they become available, to support joint validation and calibration activities.

5.3 Reporting

Reporting regarding the complementary external validation activities will be defined in the related separate technical documentation.

5.4 Copernicus Sentinel Data Governance

Copernicus Sentinel data used by the complementary validation activity are governed by the "Legal notice on the use of Copernicus Sentinel Data and Service Information.", a copy of which is attached to this TOA at Annex D.

6 DISCLAIMER

6.1 Access to data from the Copernicus Sentinel missions is on an "as is" basis. ESA disclaims all conditions, representations and warranties of any kind, whether express, implied statutory or otherwise, including but not limited to what concerns the functionalities of the IntHub or equivalent Copernicus Sentinel data access service, and the data transferred. This disclaimer includes the warranties regarding availability, continuity, accuracy, integrity, reliability, fitness for or compatibility with a particular purpose or meeting the users' requirements, satisfactory results or non-infringement of third-party rights.

6.2 ESA will not be held liable for any damage that may result from the support activities provided under this TOA, including in particular the functionalities of the IntHub or equivalent Copernicus Sentinel data access service, the data transfer, and advice and communication by ESA personnel.

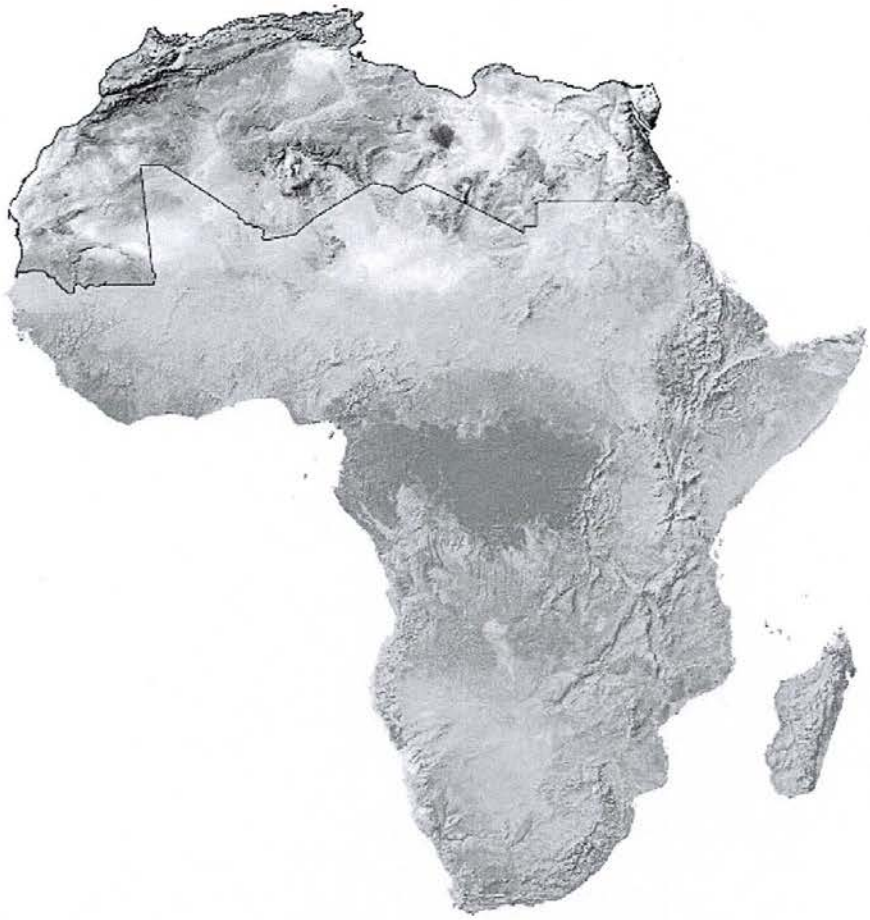
6.3 ESA may at any time review, modify, suspend or terminate the support activities under this TOA, including but not limited to on the occurrence of the following events:

(i) lack of sufficient funding for sustaining the Copernicus Sentinel missions, and associated facilities and activities;
(ii) satellite or ground system failure; or
(iii) suspension or cancellation of planned activities of related Copernicus Sentinel systems and facilities, in order for ESA or the EU to carry out activities considered of a higher priority.

6.4 ESA may modify the Copernicus Sentinels' operations plans at any time, according to operational priorities or if it considers corrective action is necessary for ensuring the safety and success of the missions.

Annex A. Map of region of interest

The following represents the map of region of interest at the time of entering in force of the TOA. The scope of the geographic region for which data will be retrieved/stored/re-distributed, may change from time to time.



Annex B. Complementary External Validation Support Projects

The following contains a list of the currently on-going and planned projects aimed at complementary Copernicus Sentinel data calibration and/ or validation activities in collaboration between OSS and ESA with the aim of improving the quality of both core Copernicus Sentinel core user-level data and of derived higher-level user-level data:

- GMES&Africa
- Copernicea