ORIGINAL Nº 1

Copernicus Space Component

Technical Operating Arrangement

ESA – University of Chile



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Copernicus Space Component Technical Operating Arrangement

Between the European Space Agency on one side,

and the University of Chile on the other side,

executing the Cooperation Arrangement concluded between the European Commission and the Undersecretariat of Telecommunications of the Republic of Chile on their Cooperation in the area of data access and use of Sentinel data of 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 Sentinels missions are being developed to meet the operational needs of the programme.

According to Article 9 of the Regulation establishing the Copernicus Programme, the European Commission will manage, on behalf of the European Union (EU) and in its field of competence, relationships with third countries and international organisations.

In line with this Regulation, the European Commission has concluded Agreements with the European Space Agency (ESA) and the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) on the implementation of the space component of Copernicus.

These Agreements foresee that ESA and EUMETSAT will provide support to the EU for the 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 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 activities, 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, whose members meet whenever necessary, to oversee and stimulate cooperative activities as mentioned in the respective Cooperation Arrangement signed by the European Union and the international partner.

1.2 Purpose and objectives

The European Union, represented by the European Commission, and the Undersecretariat of Telecommunications of the Republic of Chile, acting as the Executive Secretariat of the Ministerial Council for Space Development, have signed on 08 March 2018 a Cooperation Arrangement ("the Arrangement") that reflects both sides' recognition of the current and potential value of Earth observation data.

The Arrangement identifies areas where the Republic of Chile and the European Commission see potential for cooperation to help realise this value.

In order to implement this Arrangement, the Undersecretariat of Telecommunications of the Republic of Chile signed on 09 March 2018 an agreement with the University of Chile ("UdeChile") and appointed UdeChile as the Technical Operator of the Arrangement.

UdeChile is a Higher Education institution created by the Laws of the Republic of Chile whose objectives are higher education, research, knowledge creation and dissemination in sciences, humanities and arts. UdeChile is interested in disseminating the benefits of Copernicus to the Chilean society and collaborating with the European Union and its partners in fostering the development of applications and services, taking advantage of the Copernicus Data.

As stipulated in the Arrangement, ESA on one side and UdeChile as the Chilean institution appointed for the technical implementation of this TOA on the other side, will coordinate the technical implementation covering the free, full and open Sentinel data access to UdeChile using high bandwidth connections from data hub to data hub with a view to foster the exchange of Earth observation data between Europe and Chile.

In the Arrangement both parties recognize that the European Union and the Chilean Government are pursuing Earth Observation 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 UdeChile and its partners will bring benefit to the Copernicus Programme. Both sides are committed to the principle for full, free and open access to European Sentinel and Earth Observation data and information, subject to applicable security restrictions.

The European Commission wishes to provide Chile with access to Sentinel data using high bandwidth connections from data hub to data hub with a view to foster the exchange of Earth Observation data between Europe and Chile. Furthermore, the European Commission would like to emphasise the importance of UdeChile's and partners' in-situ data for the Copernicus programme.



Acknowledging that the Copernicus Programme emphasises the importance of insitu observations and the complementarity with space-based observations, Chile wishes to support this objective and intends to facilitate access to data from local monitoring stations under its responsibility, including geophysical and meteorological networks, to support the enhancement of the Copernicus data architecture and the development of global products.

In order to give technical effect to relevant aspects of the Arrangement, ESA and Chile, acting through the University of Chile ("UdeChile"), will collaborate to undertake the necessary technical activities. These activities are described in the present Technical Operating Arrangements (TOA).

The purpose of this TOA is to define the ESA and UdeChile respective roles and responsibilities, as well as the terms and conditions under which they will cooperate to implement the exchange of satellite data foreseen in the Cooperation Arrangement in the area of data access and use of Sentinel data of the Copernicus Programme.

The TOA will be implemented based on voluntary, non-legally-binding cooperation without exchange of funds. In the event that either ESA or UdeChile 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 TOA will take effect on the date of the last signature by both Signatories to this TOA.

1.3 Scope

This non-binding ToA describes the technical operating arrangements (e.g. cooperative initiatives description, operational interfaces, required support) between UdeChile and ESA, necessary to give effect to relevant aspects of the Cooperation Arrangement.

Where other entities (e.g. Institutes, Ministries, commercial enterprises, etc.) are involved in the implementation of the ToA on UdeChile or ESA side, UdeChile and ESA will act as the sole interface and contact point with such entities.

For in-situ data of relevance for the Copernicus services, UdeChile and the European Commission and/or the EEA (delegated entity for the cross-cutting coordination of the Copernicus in-situ component) will act as the interface and contact points. The detailed arrangements covering this specific cooperation are outside the scope of this ToA.

It is intended that the in-situ data made available by UdeChile and/or its partners in the course of the implementation of this ToA will be made available for distribution on the European "Copernicus Data Information Access Systems" (DIAS). Therefore, the provision of the in-situ data from Chile to the Copernicus Ecosystem needs to be addressed by the present TOA.

1.4 References

An overview of the overall Copernicus dedicated Sentinel missions is available in the Sentinel Online portal at <u>sentinels.copernicus.eu</u>. In particular, the portal contains up to date information on:

- Mission description, including space and ground segment aspects, and operational news
- Products definition, including contents and format specifications
- Detailed mission user handbook
- Link to data access hubs, including registration, user manuals, operational news

The following documents are referenced in this ToA and provide further detailed information.

- CSC Operations Concept document, GMES-GSEG-EOPG-PD-12-0056, Issue
 1.1
- "Legal notice on the use of Copernicus Sentinel Data and Service Information", https://sentinel.esa.int/documents/247904/690755/Sentinel_Data_Terms_ and_Conditions

2 EUROPEAN ACCESS TO UNIVERSITY OF CHILE CALIBRATION AND IN SITU DATA

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

It is understood that UdeChile will endeavour to conclude the necessary legal documents with all Chilean Government Agencies generating in-situ data, in order to



allow and to facilitate the access to these data by the Copernicus ecosystem. By doing so, UdeChile will ensure that the publicly available in-situ data will be provided in a timely manner to the Hub and the entire Copernicus ecosystem. A related "Roadmap for the identification of Calibration/Validation activities" has been elaborated by UdeChile and is attached hereto as Annex C.

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.

Other means of access, including near-real time protocol access and file transfer services, may also be available to the Copernicus programme and UdeChile will facilitate discussions on these matters where requested by ESA, the European Commission and/or EEA.

A report describing these facilities in more detail will be available from http://www.datoscopernicus.cl/ and will be updated by UdeChile from time to time.

Where ESA identifies a desire to access data to support calibration and validation, or wishes to discuss complementary calibration/validation activities, UdeChile will act as a coordinating point to facilitate such discussions. Where the European Commission and/or the EEA identify a desire to access UoCUdeChile in situ data to support the Copernicus services, UdeChile will act as a coordinating point to facilitate such discussions.

3 ARRANGEMENT OF TECHNICAL INTERFACES

In the frame of Copernicus, a technical operating arrangement aims, among others, at providing:

- a supplementary access to Sentinel Mission data, i.e. through specific data acquisition services (data hub to data hub), specific data (higher-level) products, mirror sites, etc., thus further valorising the Sentinel missions exploitation.
- access to relevant Partner data, i.e. through specific data acquisition services (data hub to data hub), specific data (higher-level) products, mirror sites, etc, thus further valorising the relevant networks of geophysical, meteorological, in - situ and other Earth observation data.

ESA will serve as facilitator for data transmission to the DIAS.



3.1 Technical Arrangement Types

The TOA provides a frame for specialized solutions in five main areas:

- Data acquisition and Quasi Real Time production (International Local Stations

 currently not foreseen)
- 2. Complementary collaborative data products and algorithms definition
- 3. Core data product dissemination and access (e.g. international mirror sites)
- 4. Development of innovative tools and applications
- 5. Complementary external validation support activities

The above technical arrangement types address on one side the Sentinel missions, and on the other side relevant UdeChile data.

In the case where access to UdeChile in-situ data is requested by the Copernicus services mme, technical arrangements will be discussed and agreed between UdeChile and the European Commission and/or the EEA.

In the context of the present TOA:

- additional areas of technical cooperation may be included in the future if relevant and prior endorsed by the European Commission.
- occasional technical meetings are intended to be held between UdeChile and ESA, e.g. within the Copernicus Cooperation Group, this latter led by the European Commission. The European Commission will be invited to all meetings and all meeting documentation will be forwarded to the European Commission for information.

The following Sections define the technical arrangements for the specific area of cooperation.



4 INTERNATIONAL ARCHIVING AND DISSEMINATION CENTRES, MIRROR SITE

4.1 Involved Entities

UdeChile or delegated partner¹ will directly connect to the ESA interface (i.e. the International Data Hub).

Other partners may be engaged as required, following prior consultation with ESA and the European Commission.

4.2 UdeChile Activity

UdeChile, through the Center for Mathematical Model (CMM) and its specialized units, in particular the HPC Center and its Image Processing Working Group, intends to establish a Regional Copernicus Data Access/Analysis Mirror Site ("UdeChile Data Mirror Site") to improve access to, and exploitation of, Sentinel data initially in Chile and later on also in the Latin American region.

In the context of the present TOA, this UdeChile Data Mirror Site is intended to retrieve data from ESA-operated Copernicus Sentinel missions from the data hubs operated by ESA, and then to store and make available such data to government, industry, research and general public users for download and online analysis. The UdeChile 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 in the identified Latin American region (Map in Annexe 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. UdeChile will discuss such changes with ESA prior to implementing them in the UdeChile Data Mirror Site. For purposes of technical efficiency, simpler geographical boundaries may be employed that encompass an area larger than the specific area of interest.

The UdeChile Data Mirror Site is intended to be a distributed system:

O B°

¹ UdeChile may appoint partners at a later date

- The primary entry point of data into the UdeChile Data Mirror Site, the primary online archive of products, and the primary point facilitating access for re-distribution/analysis, being established at the Center for Mathematical Model,
- A backup entry point of data (to assure continued download of data in case of an outage of the UdeChile) being established at facilities operated by a UdeChile's partner, to be appointed at a later stage. The backup entry point will only retrieve data from ESA systems in case of an outage of the CMM, and will re-synchronise with the primary archive following resolution of the outage.
- Long-term archives, not intended for day-to-day use for re-distribution or analysis, being hosted by CMM.

UdeChile intends to utilise Academic Research Networks on the Chilean side peering to GEANT on the European side (potentially via INTERNET2), as the backhaul connection from ESA-operated systems to the UdeChile Data Mirror Site. Such networks are scaled for data of the scale of Copernicus, and are a cost-effective way of moving large amounts of scientific data. UdeChile 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 UdeChile Data Mirror Site (such as web service access, direct file download, etc.) will be determined from time to time by UdeChile in consultation with its partners and ESA.

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

4.3 ESA Support

4.3.1 Access to the Sentinel International Data Hub

ESA grants UdeChile access to the International Data Hub (IntDH), a rolling archive, providing bulk dissemination capabilities for Sentinel data products.

The IntDH will continuously store Sentinel data acquired during the previous month(s) at the processing levels agreed as part of the Sentinel core data product list and the associated timeliness as defined in the CSC Operations Concept Document, it enables searching, browsing, previewing and downloading the Sentinel data. The time interval covered by the IntDH rolling archive will be scalable and include at least the previous 30 days of data.



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

Access to the IntDH is allowed via a web authentication module. ESA will provide UdeChile with a username and password to access the IntDH. This username and password may be used only by UdeChile (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.

UdeChile will use the IntDH access only for the purpose of its activity in the initiative described above. Through registration at the IntDH, accessing and\or downloading available content, UdeChile will not misuse or interfere with the service of the IntDH portal. In particular, UdeChile aims at building a mirror archive of Sentinel data and hence will not repeat the download of identical datasets from the IntDH, but store downloaded Sentinel data for re-use and re-dissemination.

All functionalities and contents offered by the IntDH are provided by ESA on a best efforts-basis. The transmission of content from the IntDH 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 Partner will be enabled later taking into account other users' requests.

4.3.2 Data Transfer

ESA will provide appropriate interfaces, to transfer Sentinel data to UdeChile and partners via internet. If required, ESA supports network performance analysis to help fully utilize available bandwidth.

4.4 Time Schedule

The IntDH will be available from the sentinels.copernicus.eu portal. ESA will provide Sentinel data sets as they become available in accordance with ESA data provision plan (e.g. after launch, commensurate with the commissioning and ramp-up plan for data provision).

UdeChile will be ready to accept data transfers indicatively from 30/04/2019.



4.5 Reporting

UdeChile will keep the European Commission and ESA informed about the course and success of the activity.

The regular reports regarding the Sentinel data mirror site will have at least annual frequency, and will as a minimum contain information regarding:

- Sentinel data use and applications;
- Onward-dissemination of Sentinel data, including user statistics of the mirrored Sentinel data;
- Any changes to the pre-agreed set up of activities that may have an impact on ESA's support to the partner's activities.
- Feedback to ESA on the Copernicus Data access mechanism

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

UdeChile intends to collect UdeChile Data Mirror Site user and use information, and report this information to ESA and the European Commission, consistent with the terms documented in the Cooperation Arrangement.

In order to support the distribution of Sentinel data in the Latin American region and to share aggregated information with ESA and the European Commission, a simple and un-bureaucratic user registration process will be implemented.

As concerns Sentinel data Mirror Site usage statistics, the following minimum categories of information will be provided:

User statistics, including:

- Utilisation domain (i.e. research, commercial, education, other)
- Usage field (i.e. atmosphere, emergency, marine, land, security, climate, other)
- Country of the user

Note: the above fields should be requested as part of the user account registration.

Data dissemination statistics, including:

Data delivered per utilisation domain and usage field



- Data volume per utilisation domain and usage field
- Total number of distinct users
- Total volume of data distributed
- Total volume of data distributed by product
- Statistics on the core product delivered
- Proportions of data delivered per utilisation domain and usage field.

The statistics will be provided for reporting period and cumulatively.

4.6 Sentinel Data Governance

Sentinel data made available via the IntDH are governed by the "Legal notice on the use of Copernicus Sentinel Data and Service Information".

In the event that specific Sentinel data are assessed as "sensitive"², the access to such Sentinel data through the IntDH and its use and distribution may be subject to different licensing conditions.

This also applies for Sentinel data that may have already received by UdeChile, or a partner, and re-distributed.

Where Sentinel data are identified as "sensitive", UdeChile will endeavour to remove such data from the UdeChile Data Mirror Site, noting that it will be unable to retract data already re-distributed.

5 HHINTERNATIONAL COMPLEMENTARY EXTERNAL VALIDATION SUPPORT

5.1 UdeChile Activity

UdeChile intends to conduct complementary Sentinel data Calibration and/ or Validation activities in collaboration with ESA with the aim of improving the quality of both core Sentinel core products and of derived higher-level products.

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 on 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



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 UdeChile's Data Mirror Site, described in chapter 4 above. In the latter case, reporting and data governance are handled as per chapter 4 above.

UdeChile may conduct these Calibration/Validation projects together with partner entities. In such case, UdeChile acts as an 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 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 support

5.2.1 ESA technical support to complementary validation activity

ESA will provide relevant data sets from the Sentinel 1, 2, 3 and 5p core products (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 Sentinel Data Governance

Sentinel data used by the complementary validation activity are governed by the "Legal notice on the use of Copernicus Sentinel Data and Service Information." Provisions are defined in section 4.6.

6 Disclaimer

6.1 Access to data from the 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 Data Hub 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.

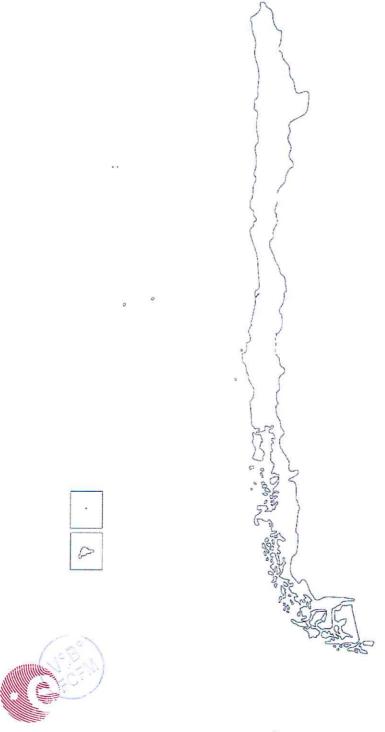
- **6.2** ESA will not be held liable for any damage that may result from the support activities provided under this TOA, including in particular the functionalities of the Data Hub, the data transfer, and advice and communication by ESA personnel.
- **6.3** ESA may at any time review, modify, suspend 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 Sentinel missions, and associated facilities and activities,
- (ii) satellite or ground system failure,
- (iii) suspension or cancellation of planned activities of related 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 Sentinels' operations plans at any time, if it considers such corrective action 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 initial interest, at the time of entering into force of the TOA, i.e. Chile.



Annex B.

Complementary External Validation Support Projects

The following contains a list of the currently on-going and planned projects aimed at complementary Sentinel data Calibration and/ or Validation activities in collaboration between GA and ESA with the aim of improving the quality of both core Sentinel core products and of derived higher-level products.

• None at the time of signing this TOA.



Annex c.

Roadmap for the identification of calibration/validation activities







Copernicus Data Hub Chile

Roadmap for the Identification of Calibration/Validation activities



1. Introduction

The University of Chile is Chile's oldest and most prestigious university. It is a state owned university and as such it has traditionally carried out several tasks of national interest. The University of Chile was the institution leading the first satellite tracking station from 1959 on and it has been leading Chile's development in Astronomy that has lead to its current position of being the house of a large part of the Astronomical instruments of the World. This is also the case of the National Seismology Service (www.csn.uchile.cl) providing seismic information and managing the national network of seismic stations and several other initiatives such as the Center for Science of Climate and Resilience (CR2, www.cr2.cl) and several other initiatives. The University of Chile is currently the house of Chile's National High Performance Computing hosted and operated by the Center for Mathematical Modelling (CMM, www.cmm.uchile.cl), where the Copernicus Repository is being deployed.

This preamble is important, since although the University of Chile is not the owner of the in situ data that Copernicus is interested in, this institution plays in Chile a central role in the development of initiatives of national interest and is recognized as such by all public bodies.

In order to organize the in situ data, CMM as the University of Chile department in charge of the task is currently working in establishing a series of agreements with Ministries and Government bodies that will allow it to make that data available to the Copernicus users and the world in general.



University of Chile's Rector Ennio Vivaldi and Minister Felipe Ward show the agreement signed on March 19, 2019

In particular, the University of Chile has recently signed an agreement with the Ministry of National Assets (Ministerio de Bienes Nacionales), organization that coordinates Chile's Spatial Data Infrastructure, IDE Chile (http://www.ide.cl/).

Through this agreement a large amount of Chile's public spatial data will be made available in the near future. To do this, technical and specific agreements will be needed, but the basis for the construction of such agreements is already in place.



2. Preliminary list of Agencies Managing In Situ Data

As indicated in the introduction, a large amount of Chile's spatial data is already available through IDE Chile (http://www.ide.cl/) but all information is in Spanish and there are several organizations that do not publish all their information through the IDE Portal. To mediate these facts, the plan we are putting in place consists of reaching agreements with the institutions and convince them to provide access to all their data through the Copernicus Repository. In the following paragraphs we describe the first data sets that we plan to make available within this year.

2. 1. National Seismology Service of the University of Chile

The National Seismology Center (Centro Sismológico Nacional, CSN) of the College of Physical and Mathematical Sciences of the University of Chile is the national technical organization monitoring the seismic activity along Chile's national territory. CSN's mission is to deliver data and seismic information with high quality standards and in in timely manner to the Chilean Office of Emergency management of the Ministry of the Interior and Public Safety of Chile (ONEMI), to the Hydrograhic and Oceanographic Service of the Navy (SHOA), to public authorities, the scientific world, experts in disaster prevention, management and seismic risk reduction, as well as the community at large.

The Service provides information registered by a network of seismographs, accelerometers and GPS stations along the Chilean territory. See below the maps showing the locations of GPS stations and seismometers. For further information (in Spanish) see: http://www.csn.uchile.cl/red-sismologica-nacional/introduccion/



GPS Stations managed by CSN



Seismometers managed by CSN



The data is currently available from CSN's website, we plan to integrate its data and make available through webservices at the Copernicus Repository Website (www.datos-copernicus.cl) 4 months after the Repository becomes fully operational.

2. 2. National Air Quality Monitoring System of the Ministry of the Environment

National Air Quality Monitoring System (SINCA) is in charge of providing Air Quality information for public use along all of Chile. SINCA provides access to its on line measurement stations (hourly non validated and daily validated) as well as time series with validated meteorological and air quality data. The location of the measurement stations is shown in the map below:



The measurement stations deliver periodic measurements of the following air quality parameters:

PM 2,5 PM 10 O₃ SO₂ NO₂ CO

The following meteorological parameters are also measured by some of the stations:

Temperature Pressure Wind direction Wind speed Relative humidity Rain Global Radiation HR Solar Radiation

The data is currently available in the SINCA website at https://sinca.mma.gob.cl/index.php/redes.

Our goal in the Copernicus Repository website is to reorganize the data to make it easier to access to it through webservices for direct use by GIS systems and introduce a uniform interface that in English to make the data available worldwide.

2. 3. Chilean Meteorological Directorate (DMC) of the General Directorate of Civil Aeronautics (DGAC)

The Chilean Meteorological Directorate (DMC) is an organization depending upon the General Directorate of Civil Aeronautics (DGAC) of the Chilean Air Force (FACH) is in charge of providing the basic and processed meteorological information as requested by Aeronautics and to provide meteorological and climate services the different socio-economic activities developed in the country. The DMC operates meteorological stations located along Chile as seen in the on line website: http://www.meteochile.gob.cl/PortalDMC-web/index.xhtml where for each one of Chile's regions a map such as the one below is deployed showing the locations of the measuring stations.





In the current version of the software a click on the station allows the user to deploy the status of the station at that time as show below



The parameters shown are: temperature, humidity, wind speed and direction, air pressure and daily rain. The Lat/Long position of the station is also displayed.

Historical data as well as daily data can be obtained from the DMC website https://climatologia.meteochile.gob.cl/application/diario/recienteEma/330121

DMC operates also a national network of UV radiation measurement stations. The data from these stations can be obtained from http://www.meteochile.gob.cl/PortalDMC-web/index.xhtml

Recently, the University of Chile has signed an agreement with the Air Force (See photo below) to develop a series of initiatives in space technology, including Earth Observation Satellites and EO data that will allow the University to access this information for distribution through the Copernicus Repository website.



University of Chile's Rector and Air Force Commander in Chief sign collaboration agreement:

http://www.uchile.cl/noticias/152016/u-de-chile-y-fach-desarrollaran-programa-esp acial-nacional

Our plan consists of integrating the data in English in our portal to access the data through webservices. Currently this can be done from their Geoportal, but the information is only available in Spanish.

2. 4. Organizations with Agreements in Progress

CMM is actively seeking agreements with institutions managing spatial data in Chile. The following institutions have already been contacted in order to access and publish their data. In some cases this will simply imply to integrate them in a common interface and get their data through already established web services, but in other cases more complex data curation and organization processes will have to be established. The following is the list of institutions that we are currently working with in order to establish agreements

 National Service of Geology and Mining, SERNAGEOMIN. (https://www.sernageomin.cl/) Is Chile's technical organization responsible for



generating, maintaining and disseminate basic geological and geological resources information, as well as geological hazards in Chile's national territory. SERNAGEOMIN is also responsible to monitor the observance of mining regulations, in particular with respect to security issues and potential hazards.

Among key information managed by SERNAGEOMIN is the activity of Volcanoes through the National Volcanic Surveillance Network which manages a network of accelerometers, seismometers and GPS stations installed at key volcanoes along the Chilean territory.

Preliminary conversations with SERNAGEOMIN have opened the door to a detailed work to be carried out in the coming months to reach an agreement on methodology to access and publish the data they collect everyday.

- National Corporation for Forestry, CONAF (<u>www.conaf.cl</u>). Is Chile's organization in charge of forestry resources in Chile. Its goals are:
 - The promotion, renovation and handling of the forests
 - The increase of the urban wooded areas
 - The mitigation and adaptation to the climate change
 - The monitoring of the observance of forestry and environmental regulations
 - The protection of vegetation resources and the management of National Parks and State protected areas.

Key information managed by CONAF is the forest registry of all Chile's territory and the surveillance of forest fires and related data.

As in the case of SERNAGEOMIN, preliminary conversations have been started to analyse the data they collect and study how it can be published in the Copernicus Repository Portal.

3. Preliminary Chronogram

The following is the basic Chronogram that we are committed to follow:

| Service | Type of Data | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 |
|---------|-------------------------------|----|----|----|----|----|-------|----|----|
| CSN | Seismic and GPS Data | | | | | | | | |
| SINCA | Atmospheric and Environment | al | | | | | 44514 | | |
| DMC | Metheorological | | | | | | | | |
| IDE | Several types of Spatial Data | | | | | | | | |



