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Report on in-situ data requirements

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1 Introduction

1.1 Background and objectives

GMES (Global Monitoring for Environment and Security) is the European Initiative for the establishment of a European capacity for Earth Observation. It aims at monitoring and forecasting the state of the environment on land, at sea and in the atmosphere. Moreover it supports emergency response activities in and outside of Europe. To date, GMES builds on the research activities carried out under several work programmes of the European Community and the GMES Space Component Programme of ESA.

In September 2010 the European Council adopted the regulation on the GMES programme and its initial operations from 2011–2013 (GIO) to allow an operational GMES system by 2014[1]. The regulation entered into force in November 2010.

The GMES programme will comprise the following:

A. A service component ensuring access to information for the areas:
    - Atmosphere monitoring;
    - Climate change monitoring in support of adaptation and mitigation policies
    - Emergency management;
    - Land monitoring;
    - Marine environment monitoring;
    - Security

B. A space component ensuring sustainable space borne observations for the services;

C. An in-situ component ensuring observations through airborne, seaborne and ground-based installations for the services.

The GMES outputs will become a source of timely and up-to-date information about environment and security for the benefit of individual citizens and decision-makers (European, national, regional, local, corporations, etc).

Whereas the space component of GMES is managed and developed by the European Space Agency (ESA), the GMES in-situ component is based on an observation infrastructure owned and operated by a large number of national and European stakeholders. In some cases they are coordinated within the framework of European and international networks. The European Environment Agency (EEA) develops,

[1] Annex I of the Delegation Agreement between the European Union and the European Environment agency on the implementation of the GMES Operational Land Service in the framework of regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth Monitoring Programme (GMES) and its initial operations (2011 – 2013). Draft Version 10.02.2011. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:276:0001:0010:EN:PDF

through the FP7 funded Coordination Action "GMES In-situ Coordination – GISC"[2] an innovative and sustainable framework for open access to in-situ data for the future operational phase of GMES. The GISC project is acting between data providers and operational GMES services to stimulate an open access to all relevant in-situ data in a cost effective and sustainable way. The project's main objectives are to determine methods enabling networks to provide the required in-situ data for GMES. Moreover, the needs of GMES services for in-situ data are identified and prioritised in consultation with stakeholders. Finally, approaches for the integration of in-situ assets and networks into long-term sustainable frameworks for GMES services, including providing proofs of concept of operational in-situ architecture should be explored.

The GISC objectives are integrated in four interrelated work packages:

- WP1: Cooperating with the users, stakeholders, and service providers, as well as exploring and determining methods to enable networks to provide the required in-situ data for GMES;
- WP 2: Documenting the in-situ data needs and data requirements;
- WP 3: Exploring approaches to the integration of in-situ assets and networks into long-term sustainable frameworks for the GMES services;
- WP 4: Evaluation of in-situ data delivery in order to select 'quick-wins'.

The present report is an outcome of work package 2 (WP 2) of the project. The WP deals with the collection, assessment and evaluation of in-situ requirements of the different GMES services for Land, Marine environment, Atmosphere monitoring and Emergency management as outlined in the GIO regulation. According to the description of work of GISC the field of Security is excluded from the project's scope of work. The Climate Change service is still in conceptual phase. Moreover, the report aims at considering in-situ data requirements of ESA's activities in relation to the validation and provision of satellite imagery to the GMES services, and other environmentally related services provided through different EU organisations (e.g. the European Flood Alert System – EFAS of the Joint Research Centre (JRC)) which will be part of the future GIO Emergency response service.

Deliverable 2.1 (D 2.1) is a comprehensive catalogue of in-situ data needs of the above mentioned services. It is result of a consultation process with stakeholders from the current GMES Core Services, EEA's own summaries and knowledge of in-situ requirements, and different FP6/ FP7 related project reports. This report will help to identify potential in-situ data providers and stakeholders who could contribute to a long term in-situ data provision and with whom a dialogue is needed. Hence, it will be input to update and revise the initial stakeholder list (D 2.5) developed in WP 1. Moreover, GMES service providers might benefit by identifying key players for the provision of in-situ data. Furthermore, the report will enable the prioritisation of in-situ needs in the light of their importance, criticality and contribution to GMES services. Finally, D 2.1 will be the source for a future analysis of in-situ requirements to identify data gaps, synergies, overlaps, and critical constraints that need to be

[2] http://gisc.ew.eea.europa.eu/

addressed when considering a long term fully operational in-situ framework. In a further step the report will be basis for an estimate of the costs associated with a sustainable provision of in-situ data within GMES from 2014 onwards.

The report is structured in the following way. Following the introduction, section 2 gives an overview about the database which is the basis for cataloguing the collected in-situ requirements. Section 3 lists the requirements for pre-processing the satellite imagery which will be mainly the basis for further GIO Land activities. Section 4 to 7 covers the in-situ requirements of the GMES services. As an introduction to each section, short descriptions of the assessed service are made. Sections 8, 9 and 10 contain an overview of potential in-situ data providers for the GMES services. The given lists are not comprehensive due to the large amount of data providers from private industry, research institutions and other bodies offering numerous data products. However, they should help identifying stakeholders with whom a dialogue could be established to discuss in-situ data provision for GMES. The report finishes with a conclusion and outlook section.

The content of D 2.1 is based on a database which is used to store the collected in-situ requirements. This database will be periodically reviewed and updated in the course of the GISC project.

1.2 Materials and information gathering

The latest version (v 0.3) of D 2.1 considers requirements of the most mature GMES services:

Table 1: GMES services considered in this report

Theme	GMES Service	URL
Land (continental & local)	GIO Land GMES Fast Track Service Precursor on Land Monitoring 2006-2009 (composed of Corine Land Cover 2006, degree of Soil sealing 2006 and Urban Atlas) Geoland2	http://www.eea.europa.eu/publications/COR0-landcover http://www.gmes-gseland.info/sport/service/imperviousAreas.php http://www.gmes-gseland.info/sport/service/urbanAtlas.php http://www.gmes-geoland.info/
Emergency response	SAFER	www.emergencyresponse.eu
Atmosphere	Monitoring Atmospheric Composition and Climate project – MACC	www.gmes-atmosphere.eu
Marine	MyOcean	www.myocean.eu

A list of all materials used as input to this report can be found in section 12 – Applicable documents. Section 13 lists all meetings and workshops which were organised and/ or attended and provided information as well.

For a next version it is planned to consider also the requirements of the global land monitoring component, which is developed by JRC and for which no implementation plan is available yet, ESA's requirements in relation to the validation of remote sensing data products, and the requirements of the European Flood Alert System – EFAS.

1.2.1 The in-situ requirement spreadsheet

The catalogue of in-situ data needs of the GMES services is based on interviews with GMES service providers, different FP6/ FP7 related project reports, and EEA's own knowledge of in-situ requirements.

To have a guideline for the assessment of the in-situ requirements and the consultations with the service providers a spreadsheet was developed. The table was set up in accordance with the structure of the in-situ database (see section 2) and is described in Table 1. In cases where no direct interview with service providers took place the table had to be filled with information from other sources like reports.

Table 2 In-situ requirement spreadsheet

In-situ dataset	This describes the required in-situ dataset.
Relevant product group	The GMES Services provide different products or product groups. This is a description of the related product for which the in-situ data is required.
Use of the data	The required data could be used for several purposes, e.g. production, validation or calibration.
Specific requirements/ notes	Specific requirements or general comments can be inserted here.
Attributes/ characteristics	Required attributes or data characteristics can be specified here.
Criticality (essential, desirable, useful)	To be able to determine priorities three criticality classifiers are used. The classifiers were introduced in a related report on in-situ data analysis provided by the GMES-LMCS Land Monitoring Core Service Working Group In-Situ Component[3]: • *Essential:* A given product will not meet the product specification if essential data is unavailable. Data is used for product generation, validation or calibration.

[3] Working paper of the subgroup on the in-situ component of the GMES Land Monitoring Core Services (GMES-LMCS) - 05/03/2008.

	• *Desirable:* Data may be used for product generation, validation or calibration but only as a secondary source. Data could improve the product. Data is included for redundancy purposes. • *Useful:* Additional in-situ data not directly linked to product generation, validation or calibration. Data is primarily used to support the product generation.
Required geographic coverage	E.g. global, continental, local EU27: the 27 EU Member States EEA32: EU27 together with Iceland, Liechtenstein, Norway, Switzerland and Turkey. EEA39: EEA32 together with the Western Balkan countries Albania, Bosnia and Herzegovina, Croatia, the former Yugoslav Republic of Macedonia, Montenegro and Serbia, as well as Kosovo under UNSC Resolution 1244/99.
Timeliness	Timeliness describes either the maturity or up-to-datedness of the dataset (e.g. reference year must be 2012) or the frequency of delivery (e.g. Near Real Time, once a week, etc.).
Target accuracy/ resolution/ scale (the scale we would like to have)	It describes the accuracy or scale of the dataset that the service provider would prefer to work with.
Threshold accuracy/ resolution/ scale (the scale we can live with)	It describes the accuracy or scale of the dataset that is considered acceptable for the service provider to work with.
Data providers	Potential data providers, e.g. member countries, private industry, research organisations, etc.
Inspire Directive	In case the data set is related to one or more of the Inspire annexes it should be stated here. INSPIRE Annex I data specifications development provided through adopted Implementing Rule[4] on interoperability of spatial data sets and services and technical guidelines[5] for Annex I spatial data themes. Annex II and III data specifications are under development and all the links to the related Annex II and III themes in this paper are preliminary.

The spreadsheets for collecting in-situ requirements of the Atmosphere and Marine services were slightly modified due to the different nature of the in-situ data.

[4] http://eur-lex.europa.eu/JOHtml.do?uri=OJ:L:2010:323:SOM:EN:HTML
[5] http://inspire.jrc.ec.europa.eu/index.cfm/pageid/2

1.2.2 The data provider spreadsheet

Together with the list of in-situ requirements, potential data providers were identified. There can be several providers for one type of dataset. The lists in section 8, 9 and 10 are not comprehensive. It should help identifying the availability and/ or sustainability of data and the restrictions in data availability either in terms of access or sustainability of measurements. Table 2 describes the spreadsheet used. Similar to the spreadsheet for the requirement assessment, the spreadsheets for listing data providers for the Atmosphere and Marine services differ.

Table 3 Data provider spreadsheet

Available product	The name of an existing dataset.
Accuracy/ resolution/ scale	The scale of the available dataset.
Geographical coverage of dataset	The geographic coverage of the dataset, e.g. global, continental, regional, local.
License policy	Two types are distinguished: • free access (e.g. direct download from a website, even if registration is required) • restricted (e.g. if commercial or only for scientific purposes)
Level	The licensing level gives more details about the license policy and data access (e.g. free, but formal permission required; free, for academic use only).
WWW	A URL if available.
Address	Contact of the data provider.
Limitations	There might be limitations in using the product (e.g. Open Street Map is a crowd sourcing product. Thus accuracy can not be assessed).
Comments	Any other comments.

2 The in-situ requirement database

2.1 Background

A comprehensive catalogue of in-situ requirements of the GMES core services is a key outcome of WP2 of the GISC project. To fulfil this task it was decided to use a database for storing the collected in-situ requirements. This report can be seen as a snapshot of this database. Using a database for cataloguing the requirements provides several advantages compared to spreadsheets or simple text documents. First, the database provides a consistent way of storing the requirements in a standardised way. Moreover all information is stored in one system. Hence, data redundancy can be reduced. This allows for an easy updating of the system which is also expected to happen through the curse of the GISC project. The retrieving of information is easy and the ability of linking information layers or tables in a database enables the user also to form more complex queries.

GMES services deliver different products which are based on end user requirements. Each product requires several space and in-situ datasets for its creation. Thus, a link between products and in-situ requirements is mandatory to identify the amount of in-situ datasets per product. This allows for example justifying the future funding of certain in-situ sensors or networks. Moreover, unnecessary or uncritical requirements are avoided.

2.2 Design principles and implementation approach

The following operational objectives of the GISC project have governed the design principles and the implementation approaches used to create the database:

- deliver a comprehensive harmonised documentation and specification of the in-situ data requirements reflecting the current status of GMES service deliveries;
- establish and maintain a consistent overview of requirements, taking into account synergies, gaps, overlaps, constraints on priorities and other issues such as restriction to access or use, intellectual property rights (IPR), infrastructure and architecture ensuring sustainable data provision;
- prioritise in-situ needs in the light of their urgency and contribution to GMES services;
- provide the basis for cost estimations;
- identify data provider organisations or networks with whom a dialogue is needed.

The following principles have been used as basis for choosing the implementation approach:

- the solution should be flexible and easy to manage;
- it must provide the necessary reporting tools and possibilities for performing queries;
- the following basic information must be included: core services, products, requirements, candidate datasets, data providers, data costs;

- the in-situ data requirements must be traceable to the individual core services and their products; consequently, the in-situ data requirements should be traced back to the end user requirements governing the core service product portfolio;

- it must be possible to perform an analysis of data requirements, e.g. in terms of criticality, multiple use, coverage etc.;

- it must be possible to classify in-situ requirements in terms of required quantity, quality, coverage, timeliness, accessibility and intellectual property rights;

- the solution must enable the identification of gaps, overlaps, critical constraints and issues (such as intellectual property rights (IPR) obstacles and sustainability);

- the catalogue of the in-situ data requirements should be accessible (read and write) from within EEA, but external (via internet) multiuser access should not be excluded, e.g. GMES services may be granted access to update future products and requirements;

- the solution must support the dialogue with core services, data providers and stakeholders.

A relational database approach has been chosen for cataloguing in-situ data and observational information requirements of GMES services. The relational database is responsible for storing and managing the data including processing of data requests. The design of the relational database adheres to the principles of normalization focusing on data handling efficiency and flexibility.

3 Requirements for the European optical HR and VHR image coverage

Current Earth Observation data is provided to GMES services through a data access grant between the EC and ESA. From October 2010 a delegation agreement between EC and ESA ensures continuity of the data procurement. A data warehouse concept allows the provision of data to a broader user community. Two types of data will be provided through the data warehouse: (i) a fixed part called 'CORE datasets' which are typically well defined large datasets covering the needs of FP7 projects and other users and (ii) a flexible part called 'ADDITIONAL' datasets.

The rapid mapping activities of the emergency service for example require flexible satellite tasking. These datasets will be covered under ADDITIONAL datasets. On the contrary for the establishment of the land monitoring services the following CORE datasets are required[3]:

a) pan-EU (EEA39) high resolution (HR) image coverage (~ 20m resolution) for the analysis of land cover/land cover change activities (CLC2012-like), similar to data requested by Geoland 2 for Euroland .

b) One partial or full European very high resolution (VHR) coverage (~ 2–4m resolution) over EU matching the requirements of applications at EU level (Urban Atlas, monitoring of coastal areas, risk areas, protected areas, etc) and at national level.

c) For Dynamic Land monitoring: daily Low Resolution (LR) and Medium Resolution (MR) (~ 300m resolution) global coverage for the production of biogeophysical parameters similar to the BIOPAR service component.

d) For seasonal vegetation monitoring: monthly to 15-days composites of Medium Resolution (MR) (~ 100m resolution) full EU coverage during the vegetation period March-October.

e) Outside Europe (Africa): one full sub-Saharan HR coverage.

According to the data warehouse specifications[6] all datasets provided for the continental and local land component have to be orthorectified. Pansharpening is allowed to reach the required spatial resolution. The non-orthorectified images should also be made available.

The data needs for establishing the marine and atmosphere monitoring services will be based on MACC and MyOcean project requirements.

[6] GMES Data Access Specifications of the Earth Observation needs over the period 2011-2013 (Data Warehouse Requirements V1.8)

3.1 European very high resolution (VHR) coverage

The following two tables specify the requirements related to the preprocessing of the European very high resolution (VHR) coverage. For the orthorectification of the raw imagery ground control points (GCP) and a digital elevation model (DEM) are needed.

3.1.1 Ground control points

In-situ dataset	Ground control points - GCP
Relevant product group	European optical VHR image coverage
Use of the data	Production
Specific requirements/ notes	For those GCPs available, member countries should describe: - number of GCPs - source of GCPs - GCP contents (e.g. is it an image chip (a spreadsheet with 3-D coordinates or something else?) - GCP formats and naming conventions (e.g. xls files, tif files of image chips) - data volume (in terms of MB or TB) - Licence: Does EIONET have the right to provide those datasets to ESA contractors? Are there any use restrictions (usage, temporal restrictions)? Any licence cost? - Schedule: how quickly could EIONET supply such data to ESA?
Attributes/ characteristics	
Criticality (essential, desirable, useful)	Essential
Required geographic coverage	EEA39
Timeliness	2011 – 2012
Target accuracy/ resolution/ scale (the scale we would like to have)	< 5m RMSE versus checkpoints (absolute 1-D value meaning a RMSE computed between output images and reference checkpoints which should have 5 times better accuracy than the required tolerable RMSE. The RMSE should be valid in both X- and Y-directions separately).
Threshold accuracy/ resolution/ scale (the scale we can live with)	
Data providers	Member countries
Inspire Directive	

3.1.2 Digital elevation model

In-situ dataset	Digital elevation model
Relevant product group	European optical VHR image coverage
Use of the data	Production
Specific requirements/ notes	Any national DEM that could be made available to ESA shall be described in terms of: - source of DEM and is it compiled from one

	source or several - spatial resolution and accuracy (horizontal, vertical) - DEM format and naming convention (tif, hdf etc.) - data volume (in terms of MB or TB) - Licence: Do member countries have the right to provide those DEMs to ESA contractors? Are there any use restrictions (usage, temporal restrictions)? Any licence cost? - Schedule: how quickly could EIONET supply such data to ESA?
Attributes/ characteristics	
Criticality (essential, desirable, useful)	Essential
Required geographic coverage	EEA39
Timeliness	2011
Target accuracy/ resolution/ scale (the scale we would like to have)	< 5m RMSE versus checkpoints (absolute 1-D value meaning a RMSE computed between output images and reference checkpoints which should have 5 times better accuracy than the required tolerable RMSE. The RMSE should be valid in both X- and Y-directions separately).
Threshold accuracy/ resolution/ scale (the scale we can live with)	
Data providers	Member countries
Inspire Directive	Annex II

3.2 European high resolution (HR) coverage (Image2012)

For the orthorectification of the pan-EU high resolution (HR) image mosaic (Image 2012) the same input data will be required as already used for the processing of Image2006. These comprise a European wide digital elevation model (DEM) from SRTM-C band Version 2 of NASA, improved by inputs e.g. from MONAPRO, SRTM-X band and GLOBE. Moreover, ground control points (GCPs) will be used which were automatically (via image matching between the Image2000 / USGS Land Cover dataset and the new satellite scenes) and/or manually determined and used for the production of Image2000 and Image2006.[7]

[7] GMES Fast Track Land Service 2006-2008: IMAGE2006 European Coverage - Methodology and Results. May 2009.

4 The GIO Land Service

The GMES Initial Operations phase for land applications (GIO Land) (2011-2013) focuses on priorities which were defined during the consultation of the land use communities since 2005 (land cover at various scales, dynamic land monitoring including provision of sets of Essential Climate Variables, improved access to reference data, …). A portfolio of land services in the frame of GMES Initial Operations was identified, which currently comprises three components[8]:

A. Pan-EU Land Cover services
   - An update of the CORINE Land Cover time-series inventory including:
     1. Corine Land Cover Change mapping (2006-2012) of all land cover changes between 2006 and 2012 for the standard 44 Corine Land Cover classes.
     2. Production of Corine land cover map 2012. The output shall be an update of 2000 /2006 Corine land cover map with 2012 changes included.
   - The production of up to 5 High Resolution (HR) layers of dominant land-cover classes. The production of the five high resolution layers shall cover:
     1. Artificial surfaces: mapping of imperviousness as land cover characteristic.
     2. Forest areas: mapping of forest cover characteristics such as crown density and leaf-type.
     3. Agricultural areas: mapping of permanent grassland with possible distinction of agricultural/ semi-natural areas.
     4. Wetlands: mapping of wetlands for designated areas of international importance e.g. from the Ramsar Convention and European classifications.
     5. Water bodies: mapping of small inland and coastal surface waters based on high resolution satellite images.

B. A local component producing very high resolution (VHR) information on specific areas of interest. Potential activities are:
   1. Urban Atlas;
   2. Biodiversity hot spot monitoring linked to Natura2000 areas
   3. Coastal areas
   4. Soil carbon monitoring
   5. Open pit mining sites

C. A global land component encompassing global scale land monitoring (production of biogeophysical parameters) and thematic elements at international level

[8] Annex I of the Delegation Agreement between the European Union and the European Environment agency on the implementation of the GMES Operational Land Service in the framework of regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth Monitoring Programme (GMES) and its initial operations (2011 – 2013). Draft Version 10.02.2011. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:276:0001:0010:EN:PDF

(addressing for example European contribution to UNFCCC and its Kyoto protocol, the millennium development goals, food security issues etc.).[9]

This report covers the in-situ requirements of the local and the continental component. On local level only the Urban Atlas is fully specified. The definition of the other local service components (biodiversity, coastal areas, soil carbon, open pit mining) is on-going in coordination with relevant EC services, Member States and remote sensing experts. Hence the related requirements are not listed in this report. The requirements for the global land component will follow as soon as a detailed service description will be available. This service component will be designed and its technical implementation coordinated by the Joint Research Centre (JRC).

The activities of the local and continental GIO Land services are based on the GMES Fast Track Service Precursor on Land monitoring (namely Corine land cover change mapping 2000-2006 and high resolution core land cover data including degree of soil sealing, renamed to imperviousness layer) and projects operated under FP6 and FP7, e.g. Geoland and Geoland 2.

Figure 1 gives an overview about GIO Land products planned as yet.

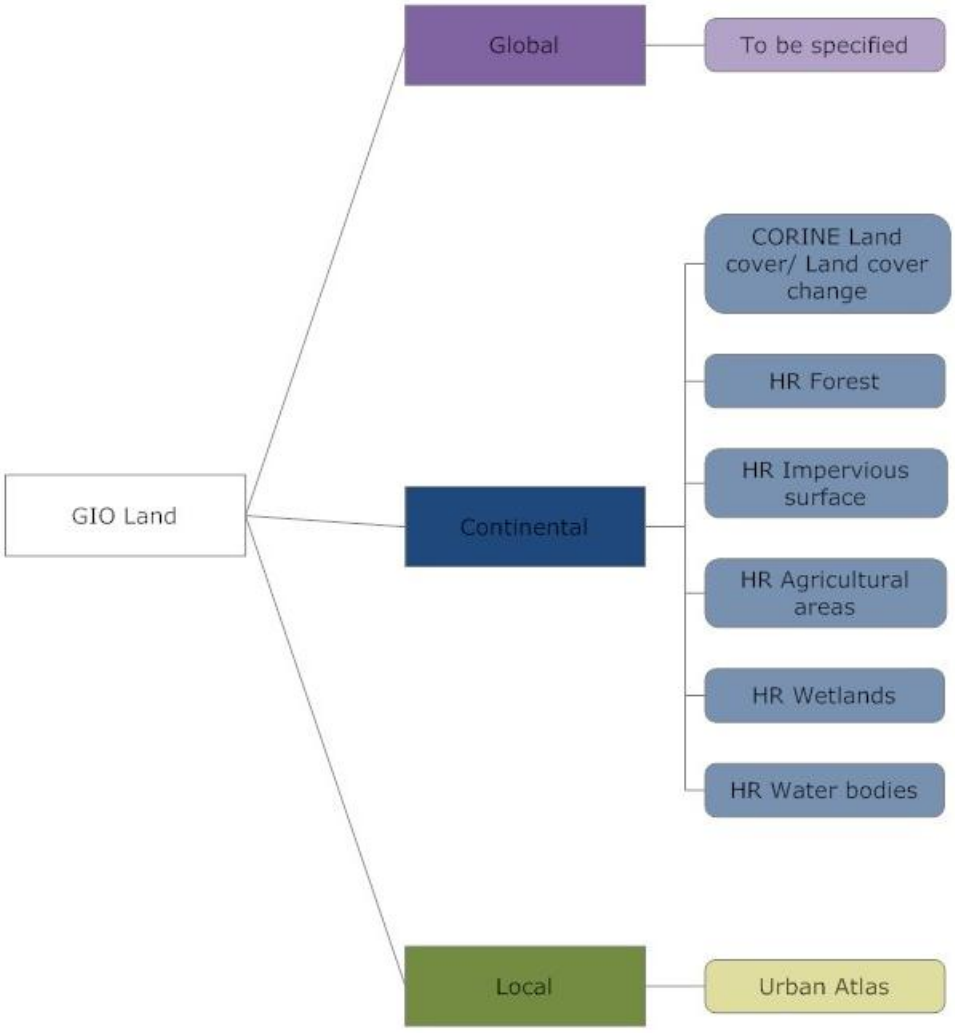

Figure 1 Planned GIO Land products

[9] GMES Global Land Working Group: Global component of the GMES Land Monitoring Core Service v0.2: 27/03/2009

Several of the in situ data required for GMES Land are considered being essential for the different products. However, it has to be considered that "essential" has a different meaning be it for production or validation purposes. An essential dataset for production means that the product cannot be created when the dataset is not available. Furthermore, a delayed delivery would lead to a delayed product delivery which could make it unusable. When using essential data for validation more flexibility exists for the availability and timeliness of in situ data, as delayed data can still be used and useful for the validation of land products.

4.1 Corine Landcover 2012 requirements

4.1.1 Topographic maps

In-situ dataset	Topographic maps
Relevant product group	CLC 2012 update
Use of the data	Production and validation
Specific requirements/ notes	
Attributes/ characteristics	Administrative units, transport networks, hydrography, geographical names, urban areas, etc.
Criticality (essential, desirable, useful)	Essential
Required geographic coverage	EEA39
Timeliness	Latest version available
Target accuracy/ resolution/ scale (the scale we would like to have)	1:25.000
Threshold accuracy/ resolution/ scale (the scale we can live with)	1:50.000
Data providers	Member countries (National mapping agencies)
Inspire Directive	Annex I: Administrative units, Transport networks, Hydrography, Geographical names

4.1.2 Orthophotos

In-situ dataset	Orthophotos
Relevant product group	CLC 2012 update
Use of the data	Production
Specific requirements/ notes	Used as ground truth for classification
Attributes/ characteristics	
Criticality (essential, desirable, useful)	Essential
Required geographic coverage	EEA39
Timeliness	Latest version available as well as from 2006 for determining and validating land cover changes.
Target accuracy/ resolution/ scale (the scale we would like to have)	0.5 m
Threshold accuracy/ resolution/ scale (The scale we can live with)	2 m

Data providers	Member countries (National mapping agencies) Private industry, e.g. AeroGrid
Inspire Directive	Annex II: Orthoimagery

4.1.3 Field data

In-situ dataset	Field data
Relevant product group	CLC 2012 update
Use of the data	Production (used as ground truth for classification) or validation
Specific requirements/ notes	Sampling grid at least 2km x 2km (LUCAS)
Attributes/ characteristics	Land cover, land use, landscape photos
Criticality (essential, desirable, useful)	Desirable/ Useful
Required geographic coverage	EEA39
Timeliness	reference year 2012 (same as satellite data acquisition, preferably in the same vegetation season)
Target accuracy/ resolution/ scale (the scale we would like to have)	2km x 2km grid
Threshold accuracy/ resolution/ scale (The scale we can live with)	2km x 2km grid
Data providers	Eurostat
Inspire Directive	

4.1.4 Land Parcel Identification System

In-situ dataset	Land Parcel Identification System (LPIS)
Relevant product group	CLC 2012 update
Use of the data	Production and validation
Specific requirements/ notes	Separation grassland/ arable land
Attributes/ characteristics	reference parcel with land use/ land cover information
Criticality (essential, desirable, useful)	Useful
Required geographic coverage	EEA39
Timeliness	Latest version available 2012 (reference year)
Target accuracy/ resolution/ scale (the scale we would like to have)	
Threshold accuracy/ resolution/ scale (The scale we can live with)	Parcel level
Data providers	Member countries
Inspire Directive	

4.1.5 Land cover inventories

In-situ dataset	National land cover inventories
Relevant product group	CLC 2012 update

Use of the data	Production
Specific requirements/ notes	
Attributes/ characteristics	Land cover data on national level
Criticality (essential, desirable, useful)	Useful
Required geographic coverage	EEA39
Timeliness	Latest version available 2012 (reference year)
Target accuracy/ resolution/ scale (the scale we would like to have)	1:25.000 or better
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:50.000
Data providers	Member countries
Inspire Directive	Annex II: Land cover

4.1.6 Conservation and protected areas

In-situ dataset	Conservation and protected areas
Relevant product group	CLC 2012 update
Use of the data	Production
Specific requirements/ notes	Useful e.g. in separating CLC pastures and natural grassland
Attributes/ characteristics	
Criticality (essential, desirable, useful)	Useful
Required geographic coverage	EEA39
Timeliness	Latest version available 2012 (reference year)
Target accuracy/ resolution/ scale (the scale we would like to have)	1:25.000 or better
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:50.000
Data providers	Member countries
Inspire Directive	Annex I: Protected sites Annex III: Habitats and biotopes

4.1.7 Thematic maps

In-situ dataset	Thematic maps
Relevant product group	CLC 2012 update
Use of the data	Production
Specific requirements/ notes	Some thematic maps have special importance in some countries, especially in those which are not applying photo interpretation.
Attributes/ characteristics	Forest areas, forest species, vegetation maps, snow and

	ice cover, buildings, city maps, settlements, development plans, agricultural datasets/inventories, vineyards, yearly burnt areas, new forest clear-cuts, rangeland map (rangeland map only used in TR in 2006), Mineral extraction and dump sites
Criticality (essential, desirable, useful)	Useful - depending on thematic and country
Required geographic coverage	EEA39, depending on country
Timeliness	Latest version available 2012 (reference year)
Target accuracy/ resolution/ scale (the scale we would like to have)	1:25.000 or better
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:50.000
Data providers	
Inspire Directive	Annex III: Buildings Annex III: Mineral resources, Agricultural and aquaculture activities, more possibilities for dumping sites: theme Utility and governmental services or Area management/restriction/regulation zones and reporting units

4.1.8 Soil information

In-situ dataset	Soil
Relevant product group	CLC 2012 update
Use of the data	Production
Specific requirements/ notes	Can be useful in stratification for automated processing of RS data.
Attributes/ characteristics	
Criticality (essential, desirable, useful)	Useful
Required geographic coverage	EEA39
Timeliness	Latest version available 2012 (reference year)
Target accuracy/ resolution/ scale (the scale we would like to have)	
Threshold accuracy/ resolution/ scale (The scale we can live with)	
Data providers	Member countries, ISRIC, JRC
Inspire Directive	Annex III: Soil

4.1.9 Digital elevation model

In-situ dataset	Digital Elevation Model (DEM)
Relevant product group	CLC 2012 update
Use of the data	Production, orthorectification
Specific requirements/ notes	
Attributes/ characteristics	
Criticality (essential, desirable, useful)	Useful
Required geographic coverage	EEA39
Timeliness	Latest version available
Target accuracy/ resolution/ scale (the scale we would like to have)	
Threshold accuracy/ resolution/ scale (The scale we can live with)	
Data providers	Member countries, EuroGeographics, Intermap, SRTM
Inspire Directive	Annex II: Elevation

4.2 Forest requirements

As part of its continental component, the GIO Land monitoring implementation plan proposes the production of a high resolution forest dataset. A per-pixel classification of forest cover, leaf type (broadleaved, mixed, coniferous) and crown coverage (0-100%) should be provided for contiguous forest areas.

The following in-situ requirements are based on the Geoland 2 in-situ requirement specification for a high resolution forest layer as part of its Euroland activities.

4.2.1 Topographic information

In-situ dataset	Topographic information
Relevant product group	High Resolution Forest Layer
Use of the data	Ortho-rectification / Validation
Specific requirements/ notes	
Attributes/ characteristics	
Criticality (essential, desirable, useful)	Essential* / Desirable * When national forest inventories are unavailable.
Required geographic coverage	EEA 39
Timeliness	Latest update
Target accuracy/ resolution/ scale (the scale we would like to have)	1:10 000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:25 000
Data providers	Member countries
Inspire Directive	Annex I

4.2.2 Forest inventories

In-situ dataset	Forest Inventory Data (spatial)
Relevant product group	High Resolution Forest Layer
Use of the data	Validation and verification
Specific requirements/ notes	
Attributes/ characteristics	Forest density, forest types
Criticality (essential, desirable, useful)	Essential
Required geographic coverage	EEA 39 (covering 1-2 % throughout different sites of total country area)
Timeliness	Latest update and historical date for change analysis
Target accuracy/ resolution/ scale (the scale we would like to have)	1:5.000 – 1:25.000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:25.000
Data providers	EEA Member countries' forest authorities; ICP Forest; Eurostat – LUCAS
Inspire Directive	

4.2.3 Digital elevation model

In-situ dataset	Digital elevation model (DEM)
Relevant product group	High Resolution Forest Layer
Use of the data	Ortho-rectification / Validation
Specific requirements/ notes	
Attributes/ characteristics	
Criticality (essential, desirable, useful)	Desirable
Required geographic coverage	EEA 39
Timeliness	Latest update
Target accuracy/ resolution/ scale (the scale we would like to have)	1:25 000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:100 000
Data providers	Member countries, Intermap, Eurogeographics, CGIAR, NASA/METI
Inspire Directive	Annex II: Elevation

4.2.4 Road network

In-situ dataset	Road network
Relevant product group	High Resolution Forest Layer
Use of the data	Production
Specific requirements/ notes	
Attributes/ characteristics	

Criticality (essential, desirable, useful)	Desirable
Required geographic coverage	EEA 39
Timeliness	Latest update
Target accuracy/ resolution/ scale (the scale we would like to have)	1:10 000 – 1:20 000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:20 000
Data providers	Tele Atlas; AND – Automative Navigation Data;
Inspire Directive	Annex I: Transport networks (roads)

4.2.5 Administrative and geographical regions

In-situ dataset	Administrative and geographical regions
Relevant product group	High Resolution Forest Layer
Use of the data	Production
Specific requirements/ notes	
Attributes/ characteristics	
Criticality (essential, desirable, useful)	Desirable
Required geographic coverage	EEA 39
When does production start	
Target accuracy/ resolution/ scale (the scale we would like to have)	1:100 000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:250 000
Data providers	Eurogeographics, Eurostat, Europa Technologies
Inspire Directive	Annex I: Administrative units

4.2.6 LIDAR

In-situ dataset	LIDAR - Light Detection And Ranging
Relevant product group	High Resolution Forest Layer
Use of the data	Quasi-ground truth like reference data (forest inventories substitute)
Specific requirements/ notes	Extremely costly, but very accurate biomass/volume estimates possible
Attributes/ characteristics	
Criticality (essential, desirable, useful)	Desirable, if no forest inventory data are available
Required geographic coverage	EEA 39
Timeliness	Latest update

Target accuracy/ resolution/ scale (the scale we would like to have)	Resolution between 0.3m and 5m
Threshold accuracy/ resolution/ scale (The scale we can live with)	Resolution between 0.3m and 5m
Data providers	A list of potential data providers is presented here: http://www.lidardata.com/
Inspire Directive	Annex II: Elevation

4.2.7 Orthophotos

In-situ dataset	Orthophotos
Relevant product group	High Resolution Forest Layer
Use of the data	Validation
Specific requirements/ notes	
Attributes/ characteristics	Colour Infrared (for forest types)
Criticality (essential, desirable, useful)	Essential
Required geographic coverage	EEA39
Timeliness	Ortho-photos for current and past reference year (i.e. 2006 and 2012) to validate status and changes
Target accuracy/ resolution/ scale (the scale we would like to have)	0.25m
Threshold accuracy/ resolution/ scale (The scale we can live with)	1m
Data providers	Member countries, private industry (e.g. Google Earth)
Inspire Directive	Annex II: Orthoimagery

4.3 Impervious surface requirements

As part of its continental component, the GIO Land monitoring implementation plan proposes the production of a high resolution impervious surface layer. Building on the initial dataset of 2006, it is foreseen to create change detection layers between 2006-2009-2012, on a pixel basis.

The 2012 dataset will also provide a mask for all built-up/non-built-up areas, depending on the threshold defined for the degree of imperviousness.

The following in-situ requirements are based on the final report of the GMES Fast Track Service Precursor on land monitoring (High resolution core land cover data for built-up areas including degree of soil sealing, 2007) and Geoland 2 in-situ requirement specification for a high resolution soil sealing layer as part of its Euroland activities.

4.3.1 Topographic maps

In-situ dataset	Topographic maps
Relevant product group	Impervious surfaces
Use of the data	Production
Specific requirements/ notes	
Attributes/ characteristics	Administrative units
Criticality (essential, desirable, useful)	Essential (for a country by country delivery)
Required geographic coverage	EEA39
Timeliness	Latest version available
Target accuracy/ resolution/ scale (the scale we would like to have)	1:100.000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:250.000
Data providers	Member countries (National mapping agencies), EuroGeographics, Europa Technologies
Inspire Directive	Annex I

4.3.2 Corine land cover

In-situ dataset	Corine land cover
Relevant product group	Impervious surfaces
Use of the data	QA (stratification of the QA sample plots)
Specific requirements/ notes	The Corine layer is a product of the GIO Land service itself. However, CLC2012 will not be available for hi-res surveys in GIO 2011-2013 until the end of 2013. For stratification CLC2006 is also fine.
Attributes/ characteristics	
Criticality (essential, desirable, useful)	Useful
Required geographic coverage	EEA39
Timeliness	2012 (reference date of HR satellite data)
Target accuracy/ resolution/ scale (the scale we would like to have)	1:100.000 (the reference scale of Corine)
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:100.000
Data providers	EEA
Inspire Directive	Annex II: Land cover

4.3.3 Orthophotos

In-situ dataset	Orthophotos
Relevant product group	Impervious surfaces
Use of the data	Validation
Specific requirements/ notes	
Attributes/ characteristics	Colour

Criticality (essential, desirable, useful)	Essential
Required geographic coverage	EEA39
Timeliness	Ortho-photos for current and past reference year (i.e. 2006 and 2012) to validate status and changes
Target accuracy/ resolution/ scale (the scale we would like to have)	0.5m
Threshold accuracy/ resolution/ scale (The scale we can live with)	2m
Data providers	Member countries, private industry (e.g. Google Earth)
Inspire Directive	Annex II: Orthoimagery

4.4 Agricultural areas – permanent grassland

For some reporting obligations the existing Corine Landcover dataset does not provide sufficient spatial resolution and differentiation for grassland including and differentiation between within mixed classes. For that reason a high resolution layer of permanent grassland types will be produced. As minimum standard the distinction between natural and cultivated grassland is planned. Moreover seasonal variations should be considered to further characterize grassland areas. Furthermore change detection (permanent /non-permanent change) is envisaged for the periods 2006 – 2009 – 2012. The grassland classification is still under research. An evaluation of Geoland 2 results is still needed for a final specification of this HR layer. The Land Parcel Identification System (LPIS) is seen as an important in-situ dataset for the production production of the grassland layer. Thus, its open access would support the production process. All other input data that was previously used for the production by the Geoland2 are GIO Land products.

4.4.1 Land Parcel Identification System

In-situ dataset	Land Parcel Identification System (LPIS)
Relevant product group	HR Agriculture
Use of the data	Production and validation
Specific requirements/ notes	Separation of arable land and permanent grassland
Attributes/ characteristics	reference parcel with land use/ land cover information
Criticality (essential, desirable, useful)	Desirable
Required geographic coverage	EEA39
Timeliness	Latest version available 2012 (reference year)
Target accuracy/ resolution/ scale (the scale we would like to have)	
Threshold accuracy/ resolution/ scale (The scale we can live with)	Parcel level

Data providers	Member countries
Inspire Directive	

4.4.2 Forest layers

In-situ dataset	Forest area
Relevant product group	HR Agriculture
Use of the data	Production and validation
Specific requirements/ notes	
Attributes/ characteristics	
Criticality (essential, desirable, useful)	desirable
Required geographic coverage	EEA39
Timeliness	latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	Pixel level
Threshold accuracy/ resolution/ scale (The scale we can live with)	1 ha
Data providers	GIO Land
Inspire Directive	

4.4.3 Soil sealing layer

In-situ dataset	Sealed area mask and sealing density
Relevant product group	HR Agriculture
Use of the data	Production and validation
Specific requirements/ notes	
Attributes/ characteristics	
Criticality (essential, desirable, useful)	useful
Required geographic coverage	EEA39
Timeliness	latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	Pixel level
Threshold accuracy/ resolution/ scale (The scale we can live with)	1 ha
Data providers	GIO Land
Inspire Directive	

4.4.4 Corine land cover

In-situ dataset	Corine land cover
Relevant product group	HR Agriculture
Use of the data	Production and validation
Specific requirements/ notes	The Corine layer is a product of the GIO Land service

	itself. However, CLC2012 will not be available for hi-res surveys in GIO 2011-2013 until the end of 2013. For stratification CLC2006 is also fine.
Attributes/ characteristics	
Criticality (essential, desirable, useful)	useful
Required geographic coverage	EEA39
Timeliness	2006-2012
Target accuracy/ resolution/ scale (the scale we would like to have)	1:100.000 (the reference scale of Corine)
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:100.000
Data providers	EEA
Inspire Directive	Annex II: Land cover

4.4.5 National grassland inventories

In-situ dataset	National grassland inventories
Relevant product group	HR Agriculture
Use of the data	Validation
Specific requirements/ notes	
Attributes/ characteristics	
Criticality (essential, desirable, useful)	essential
Required geographic coverage	EEA39
Timeliness	2006-2012
Target accuracy/ resolution/ scale (the scale we would like to have)	1:5.000 – 1:25.000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:25.000
Data providers	EEA Member countries' agricultural authorities; Eurostat – LUCAS
Inspire Directive	

4.5 Wetlands

In GIO Land the presence of surface water during the reference year (2012) shall be mapped for wetland areas. Seasonal changes using AWiFS data will be used to map areas covered temporarily by water surfaces, as well as areas covered during the whole reference year. Minimum 3, maximum 8 dates will be analysed depending on the availability of medium resolution data.

4.5.1 Digital elevation model

In-situ dataset	Digital Elevation Model
Relevant product group	HR Wetlands
Use of the data	Production
Specific requirements/ notes	Digital Elevation Models for land and ice
Attributes/ characteristics	Raster image
Criticality (essential, desirable, useful)	essential
Required geographic coverage	EEA39
Timeliness	Latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	30m - 90m resolution horizontal CE90: 5m - 15m vertical LE90: 4m - 6m X, Y Z: 6m
Threshold accuracy/ resolution/ scale (The scale we can live with)	30m - 90m horizontal CE90: 15m - 30m vertical LE90: 7-14m
Data providers	European Commission-EEA-JRC, (Project EUDEM-Aster GDEM corrected with SRTM)
Inspire Directive	Annex II: Elevation

4.5.2 RAMSAR database

In-situ dataset	RAMSAR database
Relevant product group	HR Wetlands
Use of the data	Validation
Specific requirements/ notes	The Ramsar Sites Information Service (RSIS) provides access to information on wetlands designated as internationally important under the Convention on Wetlands.
Attributes/ characteristics	Point location file and wetland type/characteristics
Criticality (essential, desirable, useful)	desirable
Required geographic coverage	EEA39
Timeliness	2006-2012
Target accuracy/ resolution/ scale (the scale we would like to have)	
Threshold accuracy/ resolution/ scale (The scale we can live with)	
Data providers	RAMSAR
Inspire Directive	Annex I: Hydrography

4.5.3 National wetlands databases

In-situ dataset	National wetlands databases
Relevant product group	HR Wetlands
Use of the data	Validation

Specific requirements/ notes	Different quality depending on the country
Attributes/ characteristics	Point/polygon location/delineation file and wetland type/characteristics
Criticality (essential, desirable, useful)	desirable
Required geographic coverage	EEA39
Timeliness	2006-2012
Target accuracy/ resolution/ scale (the scale we would like to have)	1:25.000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:100.000
Data providers	Member countries
Inspire Directive	Annex I: Hydrography

4.5.4 Corine land cover

In-situ dataset	Corine land cover
Relevant product group	HR Wetlands
Use of the data	Production and validation
Specific requirements/ notes	The Corine layer is a product of the GIO Land service itself. However, CLC2012 will not be available for hi-res surveys in GIO 2011-2013 until the end of 2013. For stratification CLC2006 is also fine.
Attributes/ characteristics	Wetland location and area
Criticality (essential, desirable, useful)	essential
Required geographic coverage	EEA39
Timeliness	2006-2012
Target accuracy/ resolution/ scale (the scale we would like to have)	1:100.000 (the reference scale of Corine)
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:100.000
Data providers	EEA
Inspire Directive	Annex II: Land cover

4.5.5 MedWet database

In-situ dataset	MedWet database
Relevant product group	HR Wetlands
Use of the data	Validation
Specific requirements/ notes	
Attributes/ characteristics	Point/ polygon location file and wetland type/ characteristics
Criticality (essential, desirable, useful)	desirable
Required geographic	EEA39

coverage	
Timeliness	2006-2012
Target accuracy/ resolution/ scale (the scale we would like to have)	1:25.000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:100.000
Data providers	Wetlands International
Inspire Directive	

4.5.6 Natura 2000

In-situ dataset	Natura 2000
Relevant product group	HR Wetlands
Use of the data	Production and validation
Specific requirements/ notes	
Attributes/ characteristics	Point/polygon location file and wetland type/characteristics
Criticality (essential, desirable, useful)	useful
Required geographic coverage	EEA39
Timeliness	2006-2012
Target accuracy/ resolution/ scale (the scale we would like to have)	1:25.000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:100.000
Data providers	EEA
Inspire Directive	Annex I: protected sites

4.5.7 Hydrographic information – water bodies

In-situ dataset	Hydrographic information
Relevant product group	HR Wetlands
Use of the data	Production & validation
Specific requirements/ notes	water networks, rivers, canals, lakes, reservoirs, watersheds, floodplain limits
Attributes/ characteristics	Mask water vs. no water
Criticality (essential, desirable, useful)	essential
Required geographic coverage	EEA39
Timeliness	Latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	1:25 000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:100 000

Data providers	JRC, EEA, NGA, Europa Technologies, European Commission-EEA (project EUDEM)
Inspire Directive	Annex I: Hydrography

4.5.8 Topographic maps

In-situ dataset	Topographic maps
Relevant product group	HR Wetlands
Use of the data	Validation
Specific requirements/ notes	
Attributes/ characteristics	Administrative units, transport networks, hydrography, geographical names, urban areas, etc.
Criticality (essential, desirable, useful)	Essential
Required geographic coverage	EEA39
Timeliness	Latest version available
Target accuracy/ resolution/ scale (the scale we would like to have)	1:25.000
Threshold accuracy/ resolution/ scale (the scale we can live with)	1:50.000
Data providers	Member countries (National mapping agencies)
Inspire Directive	Annex I: Administrative units, Transport networks, Hydrography, Geographical names

4.5.9 BirdLife Species

In-situ dataset	BirdLife species database
Relevant product group	HR Wetlands
Use of the data	Validation
Specific requirements/ notes	
Attributes/ characteristics	Point/ polygon location file and wetland type/characteristics
Criticality (essential, desirable, useful)	Useful
Required geographic coverage	EEA39
Timeliness	Latest version available
Target accuracy/ resolution/ scale (the scale we would like to have)	
Threshold accuracy/ resolution/ scale (the scale we can live with)	
Data providers	BirdLife International
Inspire Directive	Annex III: Habitats and biotopes

4.6 Water bodies

Permanent water bodies will be mapped at 20m spatial resolution and aggregated at 100m x 100m grid (1ha). The analysis will use the 3 reference years 2006 – 2009 - 2012 to detect the permanent presence of surface water. Seasonal AWiFS data will be used to separate temporary from permanent water bodies for the reference year 2012 and exclude effects of seasonal changes in water levels.

4.6.1 Hydrographic information – water bodies

In-situ dataset	Hydrographic information
Relevant product group	HR Water bodies
Use of the data	Production & validation
Specific requirements/ notes	water networks, rivers, canals, lakes, reservoirs, watersheds, floodplain limits
Attributes/ characteristics	Names, types
Criticality (essential, desirable, useful)	Useful
Required geographic coverage	EEA 39
Timeliness	Latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	1:25 000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:100 000
Data providers	JRC, EEA, NGA, Europa Technologies
Inspire Directive	Annex I: Hydrography

4.6.2 Digital elevation model – low to medium resolution

In-situ dataset	Low to medium resolution digital elevation model
Relevant product group	HR Water bodies
Use of the data	Production & validation
Specific requirements/ notes	
Attributes/ characteristics	
Criticality (essential, desirable, useful)	essential
Required geographic coverage	EEA39
Timeliness	latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	30m - 90m resolution horizontal CE90: 5m - 15m vertical LE90: 4m - 6m X, Y Z: 6m
Threshold accuracy/ resolution/ scale (The scale we can live with)	30m - 90m horizontal CE90: 5m - 15m vertical LE90: 4m - 6m
Data providers	CGIAR, NASA, METI
Inspire Directive	Annex II: Elevation

4.6.3 Topographic maps

In-situ dataset	Topographic maps
Relevant product group	HR Water bodies
Use of the data	Validation
Specific requirements/ notes	
Attributes/ characteristics	Administrative units, transport networks, hydrography, geographical names, urban areas, etc.
Criticality (essential, desirable, useful)	desirable
Required geographic coverage	EEA39
Timeliness	Latest version available
Target accuracy/ resolution/ scale (the scale we would like to have)	1:25.000
Threshold accuracy/ resolution/ scale (the scale we can live with)	1:50.000
Data providers	Member countries (National mapping agencies)
Inspire Directive	Annex I: Administrative units, Transport networks, Hydrography, Geographical names

4.7 Urban Atlas requirements

The Urban Atlas provides a very high resolution land use map of urban areas for currently 300 large European cities having more than 100.000 inhabitants. The classification is based on the Corine LC nomenclature and GUS (GMES Urban Services) legend.

The Urban Atlas update and extension will be closely coordinated with priorities of DG-Regio and DG-ENTR as overall coordinating body.

4.7.1 City maps

In-situ dataset	City maps
Relevant product group	Urban Atlas
Use of the data	Production and validation
Specific requirements/ notes	
Attributes/ characteristics	Land use information
Criticality (essential, desirable, useful)	Essential
Required geographic coverage	EU-27 Selected cities >100.000 inhabitants or the biggest city in a region. Still to be decided for GIO land
Timeliness	2011 – 2013 (reference date of VHR satellite data)
Target accuracy/ resolution/ scale (the scale we would like to have)	1:5.000
Threshold accuracy/ resolution/ scale (The scale we can live with)	Better than 1:50.000
Data providers	Member countries (National mapping authorities),

	private map resellers
Inspire Directive	

4.7.2 Impervious surface layer

In-situ dataset	Impervious surface HR layer
Relevant product group	Urban Atlas
Use of the data	Production
Specific requirements/ notes	The impervious surface layer is a product of the GIO Land service itself.
Attributes/ characteristics	Sealing degrees of urban residential areas
Criticality (essential, desirable, useful)	Essential
Required geographic coverage	EU-27 Selected cities >100.000 inhabitants or the biggest city in a region. Still to be decided for GIO land
Timeliness	2011 – 2013 (reference date of VHR satellite data)
Target accuracy/ resolution/ scale (the scale we would like to have)	20 m pixel
Threshold accuracy/ resolution/ scale (The scale we can live with)	20 m pixel
Data providers	EEA
Inspire Directive	Annex III: Population distribution - demography

4.7.3 Orthophotos

In-situ dataset	Orthophotos
Relevant product group	Urban Atlas
Use of the data	For interpretation (not delineation) / validation
Specific requirements/ notes	Selected cities >100.000 inhabitants or the biggest city in a region. Still to be decided for GIO land.
Attributes/ characteristics	Colour
Criticality (essential, desirable, useful)	Desirable
Required geographic coverage	EU-27
Timeliness	2011 – 2013 (reference date of VHR satellite data)
Target accuracy/ resolution/ scale (the scale we would like to have)	0.5m
Threshold accuracy/ resolution/ scale (The scale we can live with)	2m
Data providers	Member countries
Inspire Directive	Annex II: Orthoimagery

4.7.4 Cadastral data

In-situ dataset	Cadastral data of land parcels
Relevant product group	Urban Atlas
Use of the data	Validation

Specific requirements/ notes	Local cadastral data required for certain classes
Attributes/ characteristics	
Criticality (essential, desirable, useful)	Desirable
Required geographic coverage	EU-27 Selected cities >100.000 inhabitants or the biggest city in a region. Still to be decided for GIO land.
Timeliness	2011 – 2013 (reference date of VHR satellite data)
Target accuracy/ resolution/ scale (the scale we would like to have)	1:5.000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:25.000
Data providers	Member countries
Inspire Directive	Annex I: Cadastral parcels

4.7.5 Field information

In-situ dataset	Field information from on the spot visits
Relevant product group	Urban Atlas
Use of the data	Validation
Specific requirements/ notes	On-site visits
Attributes/ characteristics	
Criticality (essential, desirable, useful)	Desirable
Required geographic coverage	EU-27 Selected cities >100.000 inhabitants or the biggest city in a region. Still to be decided for GIO land
Timeliness	2011 – 2013 (reference date of VHR satellite data)
Target accuracy/ resolution/ scale (the scale we would like to have)	Building level
Threshold accuracy/ resolution/ scale (The scale we can live with)	Building block
Data providers	Eurostat LUCAS, Google Streetview
Inspire Directive	

5 The Emergency Response Service

The GIO regulation foresees an operational emergency response service in order to coordinate the existing capacities of the European Union and its Member States to be better prepared for, to respond to and to recover from natural and man-made disasters. This will be achieved by delivering timely geospatial information to support emergency and humanitarian responses at international, European, national and regional levels in relation to different types of disasters. The service should also support climate change adaptation measures as part of the prevention, preparedness, response and recovery activities in Europe.[10]

In GIO, priority will be given to the emergency response phase i.e. emergency response maps and reference maps should be provided on-demand to support relief efforts in the immediate aftermath of a crisis event inside and outside the EU. To develop service products supporting the other phases of the disaster cycle namely prevention and preparedness, mitigation and recovery, funding could be provided through FP7.

The GIO emergency response service will build on previous research activities carried out under FP7 (GMES Safer) and the GMES Space Component Programme of ESA (GSE Respond). The requirements listed in the next chapters are based on a consultation with partners from the Safer project. These were the German Aerospace Centre (DLR) coordinating the rapid mapping activities and Infoterra UK coordinating the emergency support mapping activities within the project. According to its service portfolio[11] the following products are currently provided through Safer:

- A **rapid mapping service** provides reference maps based on data acquired after the event, and aims at providing a rapid assessment of the event‘s extent, the damage, and/or the evolution of the situation. Two different product types are defined in this category: **Disaster Extent** and **Damage Assessment**. Disaster extent mapping products are either directly derived from satellite images acquired during the crisis or indirectly obtained through digital modeling and comparison between post-crisis and archive information. These products would be provided “on-demand” in case of crisis. Damage assessment maps focus on the situation-specific nature and extent of damages. Emergency Response products are expected to be delivered in rush mode within 8 hours after the service provider receives the satellite imagery. After several days or possibly weeks (maximum 4 weeks) after the crisis, necessary products to monitor the evolution are available.
- **Emergency support mapping** aims at disaster preparedness and prevention. The related products are differentiated into two categories: **Geographic Reference** and **Pre-disaster situation** products. The former can be considered

[10] Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES) and its initial operations (2011-2013).
[11] GMES Emergency Management Service as developed by SAFER – Product/ Service Portfolio, November 2010.

as topographic map products produced over areas vulnerable to natural hazards to allow rapid delivery should a crisis occur. Pre-disaster situation maps provide relevant and up-to-date thematic information that can help civil protection and humanitarian aid agencies plan for contingencies. For example, location of actors and information about their activity in the operational theatre (who-what-where), road access, climatic conditions, health centres, security zones etc. Usually, pre-disaster situation products are built "on top" of geographic reference products, highlighting the situation before a crisis or a natural disaster. Pre-disaster situation products can be updated frequently.

- **Recovery maps** will succeed the emergency response maps (rapid maps). They may be produced many weeks or months after the emergency. **Post-disaster situation** products will comprise key features common to Geographic Reference products overlaid with situation-specific information typically in the rehabilitation phase of the crisis cycle. Examples of Post-disaster situation products could address themes like health, environment, reconstruction and rehabilitation. Post-disaster situation products can be updated frequently.

All mentioned map categories will be available in small/ medium scale overviews and large scale detailed maps. The following requirements are related to the above mentioned product types. However, Safer provides also specific mapping products about refugee/ IDP[12] camp situations (overviews and large scale detailed maps). Related requirements are not listed here. Safer's product and service portfolio gives examples of the different products provided and specifies their content in more detail.[13] To date the emergency response service's area of activity has mainly been outside of Europe. Thus, some of the required in-situ data might not be available at all or it might be difficult to access for certain areas. Alternatively global datasets may be used for the service but their limitations in relation to scale and detail of information have to be kept in mind. For activities inside Europe, many of the required datasets could be provided through the Member countries themselves. Figure 2 gives an overview of products provided through GMES Safer.

[12] IDP: Internally displaced person. Someone who is forced to flee their home but who, unlike a refugee, remains within their country's borders (http://en.wikipedia.org/wiki/Internally_displaced_person).
[13] GMES Emergency Management Service as developed by SAFER – Product/ Service Portfolio, November 2010.

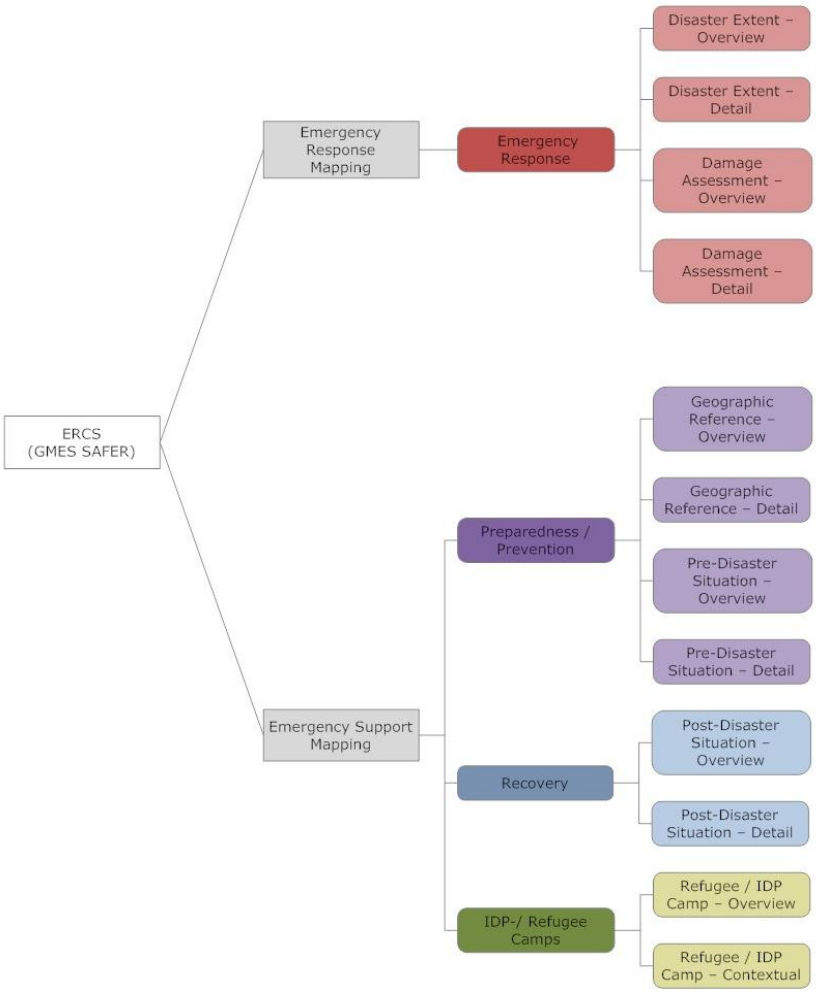

Figure 2 Mapping products provided through GMES Safer

5.1 Rapid mapping & Emergency support mapping

5.1.1 Administrative boundaries

In-situ dataset	Administrative boundaries
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production
Specific requirements/ notes	at the lowest administrative level as possible
Attributes/ characteristics	official administrative names, local names
Criticality (essential, desirable, useful)	Essential
Required geographic coverage	global
Timeliness	Latest version available
Target accuracy/ resolution/ scale (the scale we would like to have)	large (1:5 000 - 1:25 000)
Threshold accuracy/ resolution/ scale (The scale we can live with)	medium (1:25 000 - 1:80 000) small (1:80 000 - 1:250 000)
Data providers	FAO, UN Geographic Information Working Group

	(UNGIWG), GADM, Eurogeographics
Inspire Directive	Annex I: Administrative units

5.1.2 Settlement locations and toponyms

In-situ dataset	Settlement locations and toponyms
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production
Specific requirements/ notes	
Attributes/ characteristics	official administrative names, local names
Criticality (essential, desirable, useful)	essential
Required geographic coverage	global
Timeliness	latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	large (1:5 000 - 1:500 000)
Threshold accuracy/ resolution/ scale (The scale we can live with)	
Data providers	Geonames.org, NGA GEOnet Names Server (GNS)
Inspire Directive	Annex I: Geographical names

5.1.3 Precipitation information

In-situ dataset	Precipitation information
Relevant product group	Rapid mapping
Use of the data	Production
Specific requirements/ notes	mm/ day
Attributes/ characteristics	Real time rainfall location and intensity could also be useful for flooding work.
Criticality (essential, desirable, useful)	Desirable
Required geographic coverage	Global
Timeliness	daily forecast
Target accuracy/ resolution/ scale (the scale we would like to have)	Past rainfall: River catchments or better scale; Forecast: catchments or better: different locations (preferred along the rivers)
Threshold accuracy/ resolution/ scale (The scale we can live with)	
Data providers	ECMWF Met Forecast Data, free internet sources
Inspire Directive	Annex III: Meteorological geographical features

5.1.4 Wind information

In-situ dataset	Wind information
Relevant product group	Rapid mapping
Use of the data	Production
Specific requirements/ notes	Wind speed/ hour
Attributes/ characteristics	Specific data needs (for short/mid term) are: wind

	speed, wind direction and wind location in real time (for example, to fill fire propagation model or assess evolution of dust from volcano)
Criticality (essential, desirable, useful)	Desirable
Required geographic coverage	Global
Timeliness	daily forecast
Target accuracy/ resolution/ scale (the scale we would like to have)	
Threshold accuracy/ resolution/ scale (The scale we can live with)	
Data providers	ECMWF Met Forecast Data, free internet sources
Inspire Directive	Annex III: Meteorological geographical features

5.1.5 Transport networks – roads

In-situ dataset	Transport networks – roads
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production
Specific requirements/ notes	
Attributes/ characteristics	Vector data as precise as possible, i.e. road network + names of the networks if available + if available some definition of the types of roads and other attributes --> need every scale until most precise level.
Criticality (essential, desirable, useful)	Essential
Required geographic coverage	Global
Timeliness	Latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	large (1:5 000 - 1:25 000) medium (1:25 000 - 1:80 000) small (1:80 000 - 1:250 000)
Threshold accuracy/ resolution/ scale (The scale we can live with)	large (1:15 000 - 25 000) medium (1: 50 000 - 80 000) small (1:100 000 - 250 000)
Data providers	CIESIN - Columbia University, WFP - UNSDI-T, VMAP0 / VMAP 1, OpenStreetMap (OSM), Tele Atlas, Eurogeographics
Inspire Directive	Annex I: Transport networks (road network)

5.1.6 Transport networks – railways

In-situ dataset	Transport networks - railways
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production
Specific requirements/ notes	Railway network
Attributes/ characteristics	
Criticality (essential, desirable, useful)	essential
Required geographic	global

coverage	
Timeliness	latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	1:50 000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:100 000
Data providers	NGA, Europa Technologies, Eurogeographics
Inspire Directive	Annex I: Transport networks (rail network)

5.1.7 Transport networks – airports

In-situ dataset	Key infrastructure - airports
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production
Specific requirements/ notes	Airport location, air strips, helicopter landing spots
Attributes/ characteristics	
Criticality (essential, desirable, useful)	essential
Required geographic coverage	Global
Timeliness	Latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	positional accuracy: 20m of true position
Threshold accuracy/ resolution/ scale (The scale we can live with)	positional accuracy: 50m of true position
Data providers	NGA, Europa Technologies, WFP - UNSDI-T, Eurogeographics
Inspire Directive	Annex I: Transport netwroks (air transport network)

5.1.8 Transport networks – ports

In-situ dataset	Key infrastructure - ports
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production
Specific requirements/ notes	Ports, harbours
Attributes/ characteristics	
Criticality (essential, desirable, useful)	essential
Required geographic coverage	global
Timeliness	latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	1:100 000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:200 000
Data providers	NGA, Europa Technologies, WFP - UNSDI-T,

	Eurogeographics
Inspire Directive	Annex I: Transport networks (water transport network)

5.1.9 Population data – large scale

In-situ dataset	Population data
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production
Specific requirements/ notes	Large scale population information (at admin level 3 or higher/ urban level) based on administrative units, statistics and/ or maps. This data would be useful but needs very high resolution. Usually events are at very specific area and authorities need to have a clear indication on the population there.
Attributes/ characteristics	number of people, forecasted population numbers, gender, literacy, resilience level, poverty levels
Criticality (essential, desirable, useful)	essential
Required geographic coverage	global
Timeliness	latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	0.01km2 (100m x 100m)
Threshold accuracy/ resolution/ scale (The scale we can live with)	0.0625km2 (250m x 250m)
Data providers	National Census data and municipal authorities - likely to be variable in timeliness, availability and quality.
Inspire Directive	Annex III: Population distribution - demography

5.1.10 Population data – small scale

In-situ dataset	Population data
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production
Specific requirements/ notes	Global population dataset (GIS ready), with reasonable raster size
Attributes/ characteristics	number of people, forecasted population numbers, gender, literacy, resilience level, poverty levels
Criticality (essential, desirable, useful)	essential
Required geographic coverage	global
Timeliness	latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	0.25km2 (500m x 500m)
Threshold accuracy/ resolution/ scale (The scale we can live with)	1km2 (1km x 1km)
Data providers	Oak Rich National Laboratory, CIESIN – Columbia

	University, Afripop
Inspire Directive	Annex III: Population distribution - demography

5.1.11 Digital elevation model – low to medium resolution

In-situ dataset	Low to medium resolution digital elevation model
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production
Specific requirements/ notes	
Attributes/ characteristics	
Criticality (essential, desirable, useful)	essential
Required geographic coverage	global
Timeliness	latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	30m - 90m resolution horizontal CE90: 5m - 15m vertical LE90: 4m - 6m X, Y Z: 6m
Threshold accuracy/ resolution/ scale (The scale we can live with)	30m - 90m horizontal CE90: 15m - 30m vertical LE90: 7-14m
Data providers	CGIAR, NASA, METI
Inspire Directive	Annex II: Elevation

5.1.12 Digital elevation model – high resolution

In-situ dataset	High resolution digital elevation model
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production
Specific requirements/ notes	DEM high res 1-5m Europe
Attributes/ characteristics	
Criticality (essential, desirable, useful)	desirable
Required geographic coverage	EU
Timeliness	Latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	$1m^2$ - $25m^2$
Threshold accuracy/ resolution/ scale (The scale we can live with)	1-5m ($1m^2$ - $25m^2$)
Data providers	National mapping agencies, Intermap, Euromap, Astrium Geoinformation Services
Inspire Directive	Annex II: Elevation

5.1.13 Critical infrastructures – Utilities

In-situ dataset	Critical infrastructures - utilities
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production

Specific requirements/ notes	power plants, transmission networks, water treatment plants, pipelines, bridges, hazardous installations
Attributes/ characteristics	Type?
Criticality (essential, desirable, useful)	essential
Required geographic coverage	global
Timeliness	latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	positional accuracy: 20m of true position
Threshold accuracy/ resolution/ scale (The scale we can live with)	positional accuracy: 50m of true position
Data providers	Ad hoc search via www or through project partners (EUSC), WFP – UNSDI-T
Inspire Directive	Requested features could be find in different INSPIRE themes. E.g. Annex III: Waste water treatment and sewage

5.1.14 Critical infrastructures – Public services

In-situ dataset	Critical infrastructures – public services
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production
Specific requirements/ notes	hospitals, schools, fire brigade stations
Attributes/ characteristics	
Criticality (essential, desirable, useful)	Essential
Required geographic coverage	Global
Timeliness	latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	positional accuracy: 20m of true position
Threshold accuracy/ resolution/ scale (The scale we can live with)	positional accuracy: 50m of true position
Data providers	Ad hoc search via www
Inspire Directive	Annex III: Utility and governmental services, Human health and safety

5.1.15 Landuse information

In-situ dataset	Landuse information
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production
Specific requirements/ notes	Land use classification that can be 'mapped' to global recognised classification, e.g. FAO LCCS
Attributes/ characteristics	Land use classes
Criticality (essential, desirable, useful)	desirable

Required geographic coverage	global
Timeliness	latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	0.1km^2 (100m x 100m) X, Y CE90: 20m
Threshold accuracy/ resolution/ scale (The scale we can live with)	0.625km^2 (250m x 250m) X,Y CE90: 50m
Data providers	ESA, EEA
Inspire Directive	Annex III: Land use

5.1.16 Forest maps

In-situ dataset	Forest maps
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production
Specific requirements/ notes	forest type
Attributes/ characteristics	
Criticality (essential, desirable, useful)	desirable
Required geographic coverage	National, EU?, Mediterranean?
Timeliness	latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	1:50 000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:100 000
Data providers	EEA, Member countries, GIO Land
Inspire Directive	Forest is not defined as an INSPIRE theme. It is not clear if any other INSPIRE theme will include forest topic.

5.1.17 Protected areas

In-situ dataset	Protected areas
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production
Specific requirements/ notes	Association with National, European or international protected areas classifications
Attributes/ characteristics	
Criticality (essential, desirable, useful)	desirable
Required geographic coverage	National, EU, global
Timeliness	latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	1:50 000 (or better)
Threshold accuracy/	1:100 000

resolution/ scale (The scale we can live with)	
Data providers	EEA, Member countries, UNEP
Inspire Directive	Annex I: Protected sites Annex III: Habitats and biotopes, Species distribution

5.1.18 Soil information

In-situ dataset	Soil information/ maps
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production
Specific requirements/ notes	Soil map classification that can be 'mapped' to global recognised classification, e.g. FAO Soil Map?
Attributes/ characteristics	soil type
Criticality (essential, desirable, useful)	desirable
Required geographic coverage	National, EU, global
Timeliness	latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	1:100 000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:250 000
Data providers	JRC, ISRIC - World Soil Information, Eurostat
Inspire Directive	Annex III: Soil

5.1.19 Geological maps

In-situ dataset	Geological maps
Relevant product group	Rapid mapping
Use of the data	Production
Specific requirements/ notes	
Attributes/ characteristics	
Criticality (essential, desirable, useful)	Desirable
Required geographic coverage	Global
Timeliness	
Target accuracy/ resolution/ scale (the scale we would like to have)	1:100 000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:250 000
Data providers	Eurogeosurveys
Inspire Directive	Annex II: Geology

5.1.20 Field information

In-situ dataset	Field information
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production and validation
Specific requirements/ notes	field photographs, population statistics, relief actors and deployment activities
Attributes/ characteristics	Photos including GPS coordinates
Criticality (essential, desirable, useful)	desirable
Required geographic coverage	for disaster affected areas
Timeliness	latest available during the first four weeks after a disaster event
Target accuracy/ resolution/ scale (the scale we would like to have)	10-20m
Threshold accuracy/ resolution/ scale (The scale we can live with)	
Data providers	Relief agencies, partner organisations, press agencies
Inspire Directive	

5.1.21 Aerial photographs

In-situ dataset	Aerial photography
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production and validation
Specific requirements/ notes	This kind of data is rarely available for the response phase. In the aftermath of the Haiti earthquake it was provided through the USA. JRC showed that visual damage assessments were improved by using VHR orthoimagery for interpretation.
Attributes/ characteristics	
Criticality (essential, desirable, useful)	desirable
Required geographic coverage	for disaster affected areas
Timeliness	latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	X,Y: 0.2m
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:15 000
Data providers	
Inspire Directive	Annex II: Orthoimagery

5.1.22 Built-up area/ settlement information

In-situ dataset	Built-up areas/ settlements
Relevant product group	Emergency support mapping
Use of the data	Production

Specific requirements/ notes	To be available as points and areas
Attributes/ characteristics	names
Criticality (essential, desirable, useful)	essential
Required geographic coverage	global
Timeliness	latest available
Target accuracy/ resolution/ scale (the scale we would like to have)	1:25 000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:100 000
Data providers	NGA, EEA, SAGE, GIO Land (HR imperviousness, Urban Atlas)
Inspire Directive	Annex III: Buildings Annex I: Geographical names

5.1.23 Hydrographic information – water levels

In-situ dataset	Hydrographic information
Relevant product group	Rapid mapping
Use of the data	Production
Specific requirements/ notes	water levels
Attributes/ characteristics	information about seasonal variations
Criticality (essential, desirable, useful)	desirable
Required geographic coverage	For disaster affected areas (globally)
Timeliness	NRT
Target accuracy/ resolution/ scale (the scale we would like to have)	
Threshold accuracy/ resolution/ scale (The scale we can live with)	
Data providers	GRDC
Inspire Directive	

5.1.24 Hydrographic information – water bodies

In-situ dataset	Hydrographic information
Relevant product group	Rapid mapping & Emergency support mapping
Use of the data	Production
Specific requirements/ notes	water networks, rivers, canals, lakes, reservoirs, watersheds, floodplain limits
Attributes/ characteristics	Names, types
Criticality (essential, desirable, useful)	essential
Required geographic coverage	global
Timeliness	Latest available

Target accuracy/ resolution/ scale (the scale we would like to have)	1:25 000
Threshold accuracy/ resolution/ scale (The scale we can live with)	1:100 000
Data providers	JRC, EEA, NGA, Europa Technologies, GIO Land
Inspire Directive	Annex I: Hydrography

5.1.25 Early warning information

In-situ dataset	Early warning and alerting systems support the Emergency response service to prepare for and monitor crisis situations (mainly the hazard situation). JRC provides services like the European Flood and Alert System (EFAS) and the Global Disaster Alert and Coordination System (GDACS).
Relevant product group	Rapid mapping
Use of the data	
Specific requirements/ notes	
Attributes/ characteristics	
Criticality (essential, desirable, useful)	Desirable
Required geographic coverage	EU, global
Timeliness	NRT, forecast
Target accuracy/ resolution/ scale (the scale we would like to have)	
Threshold accuracy/ resolution/ scale (The scale we can live with)	
Data providers	JRC
Inspire Directive	

6 The Marine Service

MyOcean's objective is to set up an integrated pan-European capacity for ocean monitoring and forecasting by pooling nationally-available skills and resources[14]. The application areas comprise:

1) Marine resources: MyOcean contributes to fish stock management and marine environment protection by providing real-time information to scientists and the fishery industry.
2) Marine safety: thematic fields are ship routing, submarine acoustics, safety at sea, surveillance, iceberg drift prediction, prevention of environmental risks (pollution) and climatic risks (flooding, storms and other extreme climatic phenomena).
3) Coastal and marine environment: MyOcean data on coastal currents are used for choosing the optimal locations for the implementation of offshore windmill parks.
4) Climate, Weather and Seasonal forecasting: Sea level rise is monitored at global and regional scales to predict possible increases in coastal erosion and storm-surge flooding. MyOcean also provides information on phenomena such as El Niño and La Niña, which are associated with floods, droughts and other weather disturbances in many regions of the world.

MyOcean's priority is not to conduct further scientific research in the field of operational oceanography, but to develop a System of Systems based on interoperable European subsystems avoiding a duplication of services. Moreover, the same quality standards have to be followed by the operational services to allow the provision of standardized products.

The project consortium is divided in 12 production centres and another 6 transverse work packages providing centralised functions.

TAC (Thematic Assembly Centres) Production Centres

Their role is to collect the measurements or observations, whether satellite or in-situ, and to calibrate, validate, edit, archive and distribute them. Five TACs provide reference marine information and a wide range of key ocean variables such as salinity (modelling and observation of salinity evolutions, sea ice thickness (e.g. observation and prediction of sea ice extent and movements, reactions to climate change), sea surface temperature and currents which are required to characterize the ocean state.

The work is subdivided into five TACs:

- Sea Level TAC
- Ocean Colour TAC
- Sea Surface Temperature
- Sea Ice and Wind TAC

[14] The following information is compiled from http://www.myocean.eu/

- In-situ TAC

The In-situ TAC (INS TAC) plays an important role in MyOcean as a distributed service integrating data from different sources for operational oceanography needs. The INS TAC is collecting and carrying out quality control in a homogeneous manner on data from outside MyOcean data providers to fit the needs of internal and external users. It provides access to integrated datasets of core parameters for initialization, forcing, assimilation and validation of ocean numerical models which are used for forecasting, analyses (nowcast) and re-analysis (hindcast) of ocean conditions. Since the primary objective of MyOcean is to forecast ocean state, the initial focus is on observations from automatic observatories systems at sea (e.g. floats, buoys, gliders, ferrybox, drifters, SOOP) which are transmitted in real-time to the shore. The second objective is to set up a system for re-analysis purposes that requires products integrated over the past 25 to 50 years working closely with SeaDataNet infrastructure that will also provide the connection with ICES. Within EuroGOOS the INS TAC regional portal will be extended to integrate other datasets that are useful for downstream services. The data policy is the MyOcean one which is open and free data access.[15]

MFC (Monitoring & Forecasting Centres) Production Centres

They correspond to the 6 European 'basins', plus the Global Ocean. By assimilating observation data in 3D Models, they are to predict the state of the ocean:

- Global MFC
- Arctic MFC
- Baltic MFC
- North West Shelves MFC
- Iberian, Biscay, Ireland MFC
- Med MFC
- Black Sea MFC

Figure 3 gives an overview about the current MyOcean products.

[15] Report of the EEA Workshop "In-situ data requirements for the GMES Marine Core Service", June 1-2, 2010, EEA, Copenhagen, October 8th, 2010

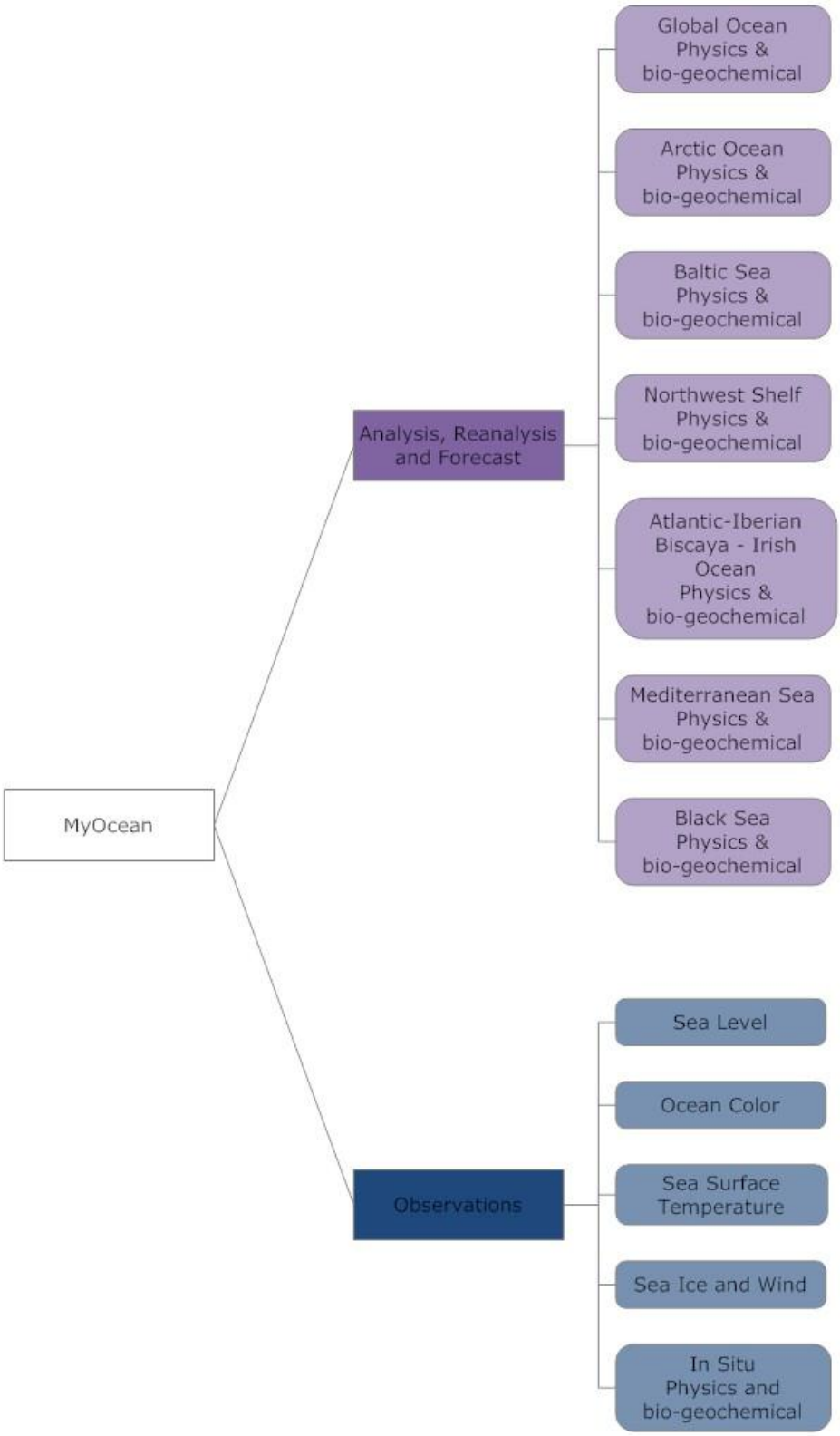

Figure 3 Products provided through MyOcean

The in situ data required for MyOcean and currently listed in this report are considered being essential for the different marine products. However, it has to be considered that "essential" has a different meaning be it for production or validation purposes. An essential dataset for production means that the product cannot be created when the dataset is not available. Furthermore, a delayed delivery would lead to a delayed product delivery which could make it unusable. When using essential data for

validation more flexibility exists for the availability and timeliness of in situ data, as delayed data can still be used and useful for the validation of marine products.

6.1.1 The marine in-situ requirement spreadsheet

To assess the marine in-situ requirements, the spreadsheet introduced in section 1.2.1 had to be modified due to the different nature of the in-situ data.

Table 4 Marine in-situ requirement spreadsheet

In-situ dataset	This describes the required in-situ dataset.
Relevant product	The GMES Services provide different products or product groups. This is a description of the related product for which the in-situ data is required.
Notes	Specific requirements or general comments can be inserted here.
Coverage	E.g. global ocean or regional seas
Data providers	Potential data providers, e.g. in situ networks or regional platforms
Inspire directive	In case the data set is related to one or more of the Inspire annexes it should be stated here, e.g. Annex III Oceanographic geographical features.

Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
The required variable (temperature, salinity, etc.) can be specified here.	The use for production or validation is specified here.	Availability of data after the last observation	Frequency of data delivery	It describes the accuracy or scale of the dataset that the service provider would prefer to work with.	All marine requirements are considered being essential. I.e. a given product will not meet the product specification if essential data is unavailable. Data is used for product generation, validation or calibration.

6.2 Analysis, reanalysis and forecast

6.2.1 Global Ocean physics and bio-geochemical analysis and forecast

In-situ dataset	Temperature and Salinity profiles, real time + bio-geochemical profiles
Relevant product	Global ocean physics and bio-geochemical analysis and forecast
Notes	In-situ observations gathered by Coriolis /INS TAC
Coverage	Global
Data providers	Argo/ EuroArgo
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).

Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Temperature	Production	24-48 hours after last observation	Daily	-	Essential
Salinity	Production	24-48 hours after last observation	Daily	-	Essential
Current	Validation				Desirable
Oxygen, Chlorophyll	Validation				Essential

In-situ dataset	Multi-disciplinary profiles, real time
Relevant product	Global ocean physics and bio-geochemical analysis and forecast
Notes	In-situ observations gathered by Coriolis /INS TAC
Coverage	Global
Data providers	OceanSites/EuroSites
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).

Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Temperature	validation		Daily	-	Essential
Salinity	Validation		Daily	-	Essential
Bio-chemical	Validation		Daily	-	Essential

In-situ dataset	Data from commercial and research vessels
Relevant product	Global ocean physics and bio-geochemical analysis and forecast
Notes	In-situ observations gathered by Coriolis and NIVA/INS TAC
Coverage	Global
Data providers	GOSUD, EUROFLEETS,EuroGOOS
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).

Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Temperature	Validation		Daily	-	Desirable
Salinity	Validation		Daily	-	Desirable
Bio-Geochemical	Validation		Weekly		Desirable

In-situ dataset	Ocean current, real time
Relevant product	Global ocean physics analysis and forecast
Notes	Obtained from drifting buoys
Coverage	Global

Data providers	DBCP				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Current	Validation		Weekly	-	Essential

In-situ dataset	Sea Level, real time				
Relevant product	Global ocean physics analysis and forecast				
Notes	Data from tide gauges				
Coverage	Global, Baltic, Northwest Shelf, IBI				
Data providers	GLOSS, EuroGOOS				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Sea Level	Validation	variable	-	-	Essential

6.2.2 Global observed ocean physics analysis and reanalysis

In-situ dataset	Temperature and Salinity profiles, delayed mode				
Relevant product	Global observed ocean physics analysis and reanalysis				
Notes	In-situ observations from the CORA data base: historical data provided via INS TAC and SeaDataNet				
Coverage	Global				
Data providers	INS TAC and SeaDataNet				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Temperature	Production	-	Once	-	Essential
Salinity	Production	-	once	-	Essential

In-situ dataset	Drifting buoys				
Relevant product	Global observed ocean physics analysis and reanalysis				
Notes	Surface velocities				
Coverage	Global				
Data providers	NOAA/AOML				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Current	Validation	-	Once	-	Essential

In-situ dataset	Ocean surface velocities				
Relevant product	Global observed ocean physics analysis and reanalysis				
Notes	Velocities derived from altimetry, drifters and ekman drift				
Coverage	Global				
Data providers	NOAA/AOML				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Current	Validation	-	once	-	Essential

In-situ dataset	Sea Level, delayed mode
Relevant product	Global observed ocean physics analysis and reanalysis
Notes	Tide gauges data
Coverage	Global

Data providers	GLOSS, EuroGOOS				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Sea Level	Validation	variable	-	-	Essential

6.2.3 Arctic Ocean physics and biogeochemical analysis and forecast

In-situ dataset	Temperature and Salinity profiles, near real time + bio-geochemical profiles				
Relevant product	Arctic Ocean physics and bio-geochemical analysis and forecast				
Notes	In Situ Observations gathered by IMR/ INS TAC				
Coverage	Arctic				
Data providers	EuroGOOS, Artic ROOS				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Temperature	Production	-	daily	-	Essential
Salinity	Production	-	daily	-	Essential
Bio-Geochemical	Validation		weekly		Essential

6.2.4 Arctic Ocean physics and biogeochemical reanalysis

In-situ dataset	In-situ T & S profiles and biogeochemical , delayed mode				
Relevant product	Arctic Ocean physics reanalysis				
Notes	historical data provided via INS TAC and SeaDataNet				
Coverage	Arctic				
Data providers	INS-TAC and SeaDataNet				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Temperature	Production	1988 – present	-	-	Essential
Salinity	Production	1988 – present	-	-	Essential
Biogeochemical	Validation				Essential

6.2.5 Baltic Sea physics and bio-geochemical analysis and forecast

In-situ dataset	Temperature & Salinity & bio-geochemical observations, real time				
Relevant product	Baltic Sea physics analysis and forecast				
Notes	In Situ Observations gathered by SMHI/ INS TAC				
Coverage	Baltic Sea				
Data providers	EuroGOOS, BOOS				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Temperature	Validation	Online validation if possible	daily	-	Essential
Salinity	Validation	Online validation if possible	daily	-	Essential
Bio-Geochemical	Validation	-	daily	-	Essential

In-situ dataset	Sea Level, real time
Relevant product	Baltic Sea physics analysis and forecast

Notes	Tide gages data				
Coverage	Baltic Sea				
Data providers	EuroGOOS, BOOS				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Sea level	Production	Online validation if possible	daily	-	Essential

6.2.6 Baltic Sea physics reanalysis

In-situ dataset	Temperature & Salinity, delayed mode				
Relevant product	Baltic Sea physics reanalysis				
Notes	historical data provided via INS TAC and SeaDataNet				
Coverage	Baltic Sea				
Data providers	INS TAC and SeaDataNet				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Temperature	Production	-	Daily	-	Essential
Salinity	Production	-	daily		Essential

6.2.7 Atlantic NW-Shelf physics and bio-geochemical analysis and forecast

In-situ dataset	Temperature & Salinity &bio-geochemical observations, real time				
Relevant product	Atlantic Northwest Shelf physics and bio-geochemical analysis and forecast				
Notes	In Situ Observations gathered by BSH/ INS TAC				
Coverage	North Atlantic, Northwest shelf				
Data providers	EuroGOOS, NOOS				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Temperature	Production	-	Daily	-	Essential
Salinity	Production		Daily		Essential
Current	Validation		Daily		Desirable
Bio-geochemical	Validation		Daily		Essential

In-situ dataset	Sea Level, real time				
Relevant product	NWS Sea physics analysis and forecast				
Notes	Tide gage data				
Coverage	North Atlantic, Northwest shelf				
Data providers	EuroGOOS, NOOS				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Sea level	Validation		-daily	-	Essential

6.2.8 Atlantic NW-Shelf physics and bio-geochemical reanalysis

In-situ dataset	Temperature & Salinity profiles, Bio-geochemical data delayed mode
Relevant product	Atlantic Northwest Shelf physics and bio-geochemical reanalysis
Notes	historical data provided via INS TAC and SeaDataNet
Coverage	North Atlantic, Northwest shelf
Data providers	INS TAC and SeaDataNet
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).

Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Temperature	Production	-	-	-	Essential
Salinity	Production	-	-	-	Essential
Bio-geochemical	Validation				Essential

In-situ dataset	Ocean current data
Relevant product	Atlantic Northwest Shelf physics and bio-geochemical reanalysis
Notes	Drifters and moored instrument data
Coverage	North Atlantic, Northwest shelf
Data providers	INS TAC, SeaDataNet
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).

Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Current	Validation	-	-	-	Essential

6.2.9 Atlantic Iberia Biscay Irish Area physics analysis and forecast

In-situ dataset	Temperature & Salinity profiles, real time
Relevant product	Atlantic Iberia Biscay Irish Area physics analysis and forecast
Notes	In Situ Observations gathered by PdE/ INS TAC
Coverage	IBI
Data providers	EuroGOOS, IBI-ROOS
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).

Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Temperature	Validation	-	Daily (between 1 am and 1:30 am UTC)	-	Essential
Salinity	Validation	-	Daily (between 1 am and 1:30 am UTC)	-	Essential

In-situ dataset	Currents, real time
Relevant product	Atlantic Iberia Biscay Irish Area physics analysis and forecast
Notes	Currents from the moorings. Surface velocities from drifting buoys. gathered by PdE/ INS TAC
Coverage	IBI
Data providers	EuroGOOS, IBI-ROOS
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).

Variable	Usage	Timeliness	Frequency	Accuracy	Criticality

Currents	Validation	-	Daily	-	Essential

In-situ dataset	Sea level, Real Time				
Relevant product	Atlantic Iberia Biscay Irish Area physics analysis and forecast				
Notes	Tide gauges data gathered by PdE/ INS TAC				
Coverage	IBI				
Data providers	EuroGOOS, IBI-ROOS				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Sea level	Validation	Variable	daily	-	Essential

6.2.10 Mediterranean Sea physics and biogeochemical analysis and forecast

In-situ dataset	Temperature & Salinity profiles and Biogeochemical, real time				
Relevant product	Mediterranean Sea physics analysis and forecast				
Notes	In Situ Observations gathered by HCMR/ INS TAC				
Coverage	Mediterranean				
Data providers	EuroGOOS, MOON				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Temperature	Production/ Validation	-	daily	-	Essential
Salinity	Production/ Validation	-	daily	-	Essential
Bio-geochemical	Validation	-	daily	-	Essential

6.2.11 Mediterranean Sea physics and biogeochemical reanalysis

In-situ dataset	Temperature & Salinity profiles, Bio-geochemical data delayed mode				
Relevant product	Mediterranean physics and bio-geochemical reanalysis				
Notes	historical data provided via INS TAC and SeaDataNet				
Coverage	Mediterranean				
Data providers	INS TAC and SeaDataNet				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Temperature	Production/ Validation	-	1985-present	-	Essential
Salinity	Production/ Validation	-	1985-present	-	Essential
Biogeochemical	Validation		1985-presene		Essential

6.2.12 Black Sea physics and Biogeochemical analysis and forecast

In-situ dataset	Temperature & Salinity profiles and Biogeochemical, real time
Relevant product	Black Sea physics and biogeochemical analysis and forecast
Notes	In Situ Observations gathered by IOBAS/ INS TAC
Coverage	Black sea
Data providers	EuroGOOS, Black sea GOOS
Inspire directive	Annex III Oceanographic geographical features. Physical

	conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Temperature	Validation	-	daily	-	Essential
Salinity	Validation	-	daily	-	Essential
Bio-geochemical	Validation	-	daily	-	Essential

6.2.13 Black sea physics reanalysis

In-situ dataset	Temperature and salinity profiles, delayed mode				
Relevant product	Black Sea physics reanalysis				
Notes	historical data provided via INS TAC and SeaDataNet				
Coverage	Black Sea				
Data providers	INS TAC and SeaDataNet				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Temperature	Production	-	-	-	Essential
Salinity	Production	-	-	-	Essential

In-situ dataset	Ocean currents, delayed mode				
Relevant product	Black Sea physics analysis and forecast				
Notes	historical data provided via INS TAC and SeaDataNet				
Coverage	Black Sea				
Data providers	EuroGOOS, BlackSeaGOOS				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Currents	Production	-	-	-	Essential

6.3 Observations

6.3.1 Sea level

In-situ dataset	Sea Level, real time				
Relevant product	Sea level – Global Ocean Sea level – Mediterranean Sea Sea level – Arctic Sea level – IBI Sea level – Black Sea				
Notes	Tide gauges data				
Coverage	Global Ocean and European regional seas				
Data providers	INS TAC, GLOSS				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Sea Level	Validation	Variable	-	-	Essential

6.3.2 Ocean colour

In-situ dataset	Ocean colour in-situ data
Relevant product	Ocean colour - Global Ocean, European, Arctic, Baltic areas
Notes	BOUSSOLE buoy and SPMR in-situ data SeaBASS NOMAD in-situ data MERIS Matchup In-situ Database

Coverage	Global Ocean, European, Arctic, Baltic areas
Data providers	LOV NASA SEABASS IFREMER water quality observing network JRC INS TAC SeaDataNet
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).

Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Ocean colour	Validation	-	-	-	Essential

In-situ dataset	Aerosol data
Relevant product	Ocean colour - Global Ocean, European area
Notes	AERONET in-situ data (sites Abu_Al_Bukhoosh, COVE_SEAPRISM, Gustav_Dalen_Tower, Helsinki_Lighthouse, MVCO, Venise)
Coverage	Global Ocean, European area
Data providers	AERONET
Inspire directive	Annex III. Atmospheric conditions. Physical conditions in the atmosphere. Includes spatial data based on measurements, on models or on a combination thereof and includes measurement locations.

Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Ocean colour	Validation	-	-	-	Essential

6.3.3 Sea Ice and Wind

In-situ dataset	Sea ice drift and ocean currents
Relevant product	Sea Ice
Notes	Any in-situ drift buoy data available
Coverage	Global Ocean, Arctic
Data providers	IABP
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).

Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Sea ice	Validation	-	-	-	Essential

In-situ dataset	In-situ wind speed and direction data
Relevant product	Wind
Notes	In-situ buoys
Coverage	Global Ocean
Data providers	ECMWF
Inspire directive	Annex III. Meteorological geographical features. Weather conditions and their measurements; precipitation, temperature, evapotranspiration, wind speed and direction.

Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Wind	Validation	-	monthly	-	Essential

In-situ dataset	Sea ice parameters
Relevant product	Sea Ice – Baltic Sea
Notes	Ground truth from observation stations, Finnish and Swedish icebreakers, and ships is used.

Coverage	Baltic sea				
Data providers	Baltic MFC, EuroGOOS, BOOS				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
Sea ice	Validation	-	When consecutive SAR data is available during the Baltic Sea ice season	-	Essential

6.3.4 Sea Surface Temperature

In-situ dataset	Sea Surface Temperature				
Relevant product	Sea Surface Temperature – Global Ocean Sea Surface Temperature – European Area Sea Surface Temperature – Arctic Sea Sea Surface Temperature –Baltic Sea Sea Surface Temperature – Northwest Shelf Sea Surface Temperature – Mediterranean Sea and Black Sea				
Notes	NRT in-situ SST measurements gathered by INS TAC				
Coverage	Global Ocean and regional seas				
Data providers	DBCP, E-SURFMAR, EuroGOOS, INS TAC				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
SST	Production/ Validation	variable	-	-	Essential

In-situ dataset	Historic sea surface temperature in-situ measurements				
Relevant product	Sea Surface Temperature – Global Ocean				
Notes	Historical In-situ SST measurements from the COADS dataset archived at the Met Office				
Coverage	Global Ocean				
Data providers	SST TAC, COADS				
Inspire directive	Annex III Oceanographic geographical features. Physical conditions of oceans (currents, salinity, wave heights, etc.).				
Variable	Usage	Timeliness	Frequency	Accuracy	Criticality
SST	Validation	-	-	-	Essential

6.3.5 Bathymetry

In-situ dataset	Bathymetry
Relevant product group	Oceanographic models
Use of the data	Production
Notes	Bathymetric data is essential input in oceanographic models.
Parameters	Depth
Criticality (essential, desirable, useful)	Essential
Required geographic coverage	Global
Timeliness	TBD (quasi-static dataset)
Data providers	Member countries, tbd.
Inspire directive	Inspire annex II: Elevation

	Digital elevation models for Land, ice and Ocean Surface. Includes terrestrial elevation, bathymetry, and shore line.

7 The Atmosphere Service

The GMES[16] Atmosphere service 'Monitoring Atmospheric Composition and Climate' (MACC) monitors the global distributions and long-range transport of greenhouse gases such has carbon dioxide and methane, aerosols that result from both natural processes and human activities, and reactive gases such as tropospheric ozone and nitrogen dioxide. It evaluates how these constituents influence climate, and estimates their sources and sinks.

MACC also provides specific products covering Europe:

- Maps and data for regional air-quality forecasts;
- Retrospective assessments of air quality;
- Identifications of sources of pollution episodes;
- Toolbox for evaluating possible emergency emission control measures;
- Inputs to local air-quality forecasts, health information and warnings.

MACC takes as its input comprehensive sets of satellite data from many tens of instruments supplying information on atmospheric dynamics, thermodynamics and composition. The satellite data are supplemented by *in-situ* data from meteorological networks and a limited amount of data from networks providing *in-situ* measurements of atmospheric composition. Additional *in-situ* data are used for validating the processing systems and the products they supply.

MACC provides various services that can be grouped in four main themes: European Air Quality, Global Atmospheric Composition, Climate, and UV and Solar Energy.

- The Global Atmospheric Composition (model and satellite monitoring products) Service provides a wide array of products. The service monitors the composition of the atmosphere in near-real-time as well as retrospectively, provides forecasts up to 4 days ahead, monitors greenhouse gas concentrations and their surface fluxes with a delay of 6 months, and monitors wildfire activity.
- Climate forcing (model and satellite monitoring products); MACC provides support to climate change studies by monitoring atmospheric concentrations of carbon dioxide and methane and their fluxes as well as aerosols.
- The European air quality provides forecasts and reanalyses of the air quality over Europe. An ensemble of regional models driven by the same boundary conditions from the global MACC system provides daily forecasts up to 3 days ahead. Forecasts are available as maps as well as ensemble prediction plots that reflect the spread among the models.
- Radiation (satellite monitoring); MACC provides UV and Solar Energy services based on the ozone and aerosol global data assimilation results.

[16] The following information is compiled from http://www.gmes-atmosphere.eu/

The requirements for *in-situ* data for the different products under each theme (or product group) are to a very large degree identical. Consequently, to avoid redundant information the *in-situ* data requirements listed in the tables in the next chapter are linked to the themes and not the individual products. Figure 3 provides an overview of MACC product groups.

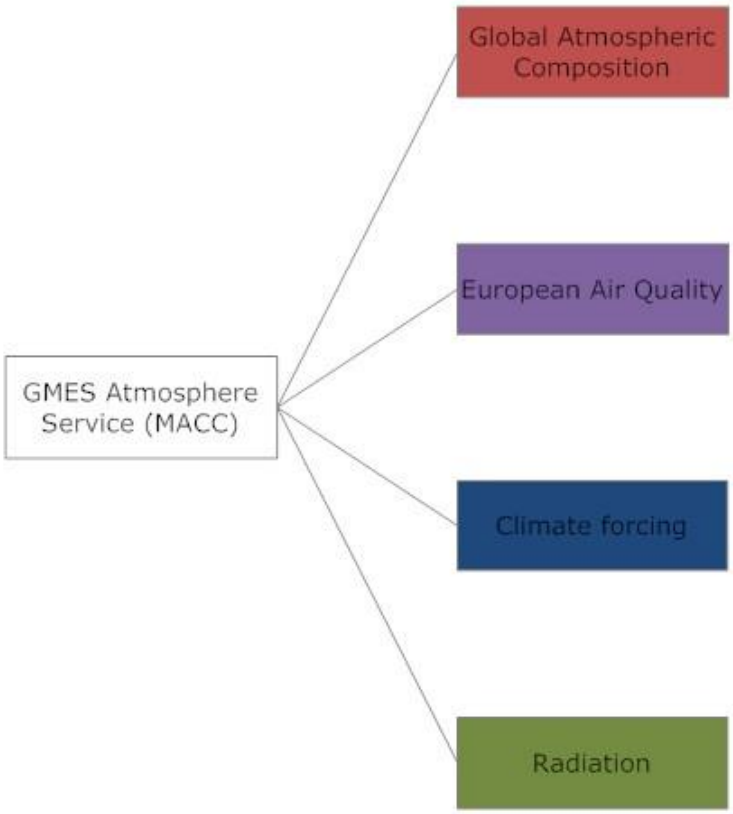

Figure 4 MACC product groups

7.1 Aerosol optical depth

In-situ dataset	Aerosol optical depth
Relevant product group	Global atmospheric composition Climate forcing Climate forcing (satellite monitoring) Solar radiation (satellite monitoring)
Notes	Currently aerosol optical depth is the only required parameter but other aerosol parameters, including vertical profiles, are being used to improve understanding of atmospheric processes and to develop new products.
Coverage	Global
Data providers	Aeronet; EARLINET; WMO GAW; GALION; WDCA; EUSAAR; SKYNET;
Inspire directive	Inspire annex III: Atmospheric conditions. Physical conditions in the atmosphere. Includes spatial data

	based on measurements, on models or on a combination thereof and includes measurement locations;				
Parameter	Usage	Timeliness	Frequency	Accuracy[17]	Criticality
Aerosol optical depth	Assimilation	3h (target) 24h (threshold)	15 min.	0.005 (target) 0.01 (threshold)	Essential
Aerosol optical depth	Validation	1d (target) 3d (threshold)	15 min.	0.005 (target) 0.01 (threshold)	Essential

7.2 Vertical atmosphere profiles - aircrafts

In-situ dataset	Vertical atmosphere profiles - aircrafts
Relevant product group	Global atmospheric composition Climate forcing European air quality
Notes	Vertical profiles are primarily used for validation and for R&D purposes including model and product development. Currently lack of near-real-time measurements hinders the use of aircraft profile data for assimilation but initiatives are underway to make (IAGOS) profile data available via GTS. TBC: for 'frequency' it is assumed that a given profile is needed on a daily basis but the parameter is measured every e.g. 1 min.
Coverage	Global
Data providers	MOZAIC; IAGOS; NOAA ESRL;
Inspire directive	Inspire annex III: Atmospheric conditions. Physical conditions in the atmosphere. Includes spatial data based on measurements, on models or on a combination thereof and includes measurement locations;

Parameter	Usage	Timeliness[18]	Frequency	Accuracy	Criticality[19]
O3	Assimilation	3h (target) 24h (threshold)	Daily, 1 min. Ground based: 1h	5 ppb	Essential
O3	Validation	1d (target) 3d (threshold)	Daily, 1 min. Ground based: 1h	5 ppb	Essential
CO2	Validation	1m (target) 6m (threshold)	Daily, 1 min	0.5 ppm 0.1 ppm	Desirable
CH4	Validation	1m (target) 6m (threshold)	Daily, 1 min	0.5 ppb 2-4 ppb (UTLS)	Desirable
NOx	Validation	1m (target) 6m (threshold)	Daily, 5 min.	50 ppt	Essential
PM2.5	Validation	1m (target) 6m (threshold)	Daily, 1 min.		Essential

[17] Source: GMES atmosphere core service, implementation group; final report; April 2009.
[18] Timeliness, Frequency and Accuracy are taken from *GMES atmosphere core service report; implementation group; final report; April 2009*.
[19] Source: Criticality is taken from *MACC requirements for Near Real Time Air Quality Data Exchange; MACC D-INSITU; September 2010.*

7.3 Vertical atmosphere profiles – sondes

In-situ dataset	Vertical atmosphere profiles - sondes
Relevant product group	Global atmospheric composition Climate forcing European air quality
Notes	TBC: for 'frequency' it is assumed that a given profile is needed on a daily basis but the parameter is measured every e.g. 1 min.
Coverage	Global
Data providers	NILU;
Inspire directive	Inspire annex III: Atmospheric conditions. Physical conditions in the atmosphere. Includes spatial data based on measurements, on models or on a combination thereof and includes measurement locations;

Parameter	Usage	Timeliness[20]	Frequency	Accuracy	Criticality[21]
O3	Assimilation	3h (target) 24h (threshold)	Daily, 1 min Ground based: 1h	5 ppb	Essential
O3	Validation	1d (target) 3d (threshold)	Daily, 1 min. Ground based: 1h	5 ppb	Essential

7.4 Vertical atmosphere profiles – ground based remote sensing

In-situ dataset	Vertical atmosphere profiles – ground based remote sensing
Relevant product group	Global atmospheric composition Climate forcing
Notes	Vertical profiles are primarily used for validation and for R&D purposes including model and product development. TBC: for 'frequency' it is assumed that a given profile is needed on a daily basis but the parameter is measured every e.g. 1 min.
Coverage	Global
Data providers	EARLINET; EUSAAR;
Inspire directive	Inspire annex III: Atmospheric conditions. Physical conditions in the atmosphere. Includes spatial data based on measurements, on models or on a combination thereof and includes measurement locations;

Parameter	Usage	Timeliness[22]	Frequency	Accuracy	Criticality[23]
PM2.5 (mass)	Validation	1m (target) 6m (threshold)	Daily, 1 min.		Essential
PM10 (mass)	Validation	1m (target) 6m (threshold)	Daily, 1 min.		Essential

[20] Timeliness, Frequency and Accuracy are taken from *GMES atmosphere core service report; implementation group; final report; April 2009*.
[21] Source: Criticality is taken from *MACC requirements for Near Real Time Air Quality Data Exchange; MACC D-INSITU; September 2010.*
[22] Timeliness, Frequency and Accuracy are taken from *GMES atmosphere core service report; implementation group; final report; April 2009*.
[23] Source: Criticality is taken from *MACC requirements for Near Real Time Air Quality Data Exchange; MACC D-INSITU; September 2010.*

PM (speciation)	Validation	1m (target) 6m (threshold)	Daily, 1 min.		Essential

7.5 UV radiation

In-situ dataset	UV radiation
Relevant product group	Global atmospheric composition Solar radiation (satellite monitoring)
Notes	
Coverage	Global
Data providers	WOUDC; EUVDB;
Inspire directive	TBD

Parameter	Usage	Timeliness[24]	Frequency	Accuracy	Criticality[25]
UV index	Production	3h (target) 24h (threshold)	1h	5-10 %	Essential
UV index	Validation	1m (target) 6m (threshold)	1h	5-10 %	Useful
Erythemal UV	Production	3h (target) 24h (threshold)	1h	5-10 %	Essential
Erythemal UV	Validation	1m (target) 6m (threshold)	1h	5-10 %	Useful
Spectral UV	Validation	1m (target) 6m (threshold)	1h	1-5 %	Useful

7.6 Surface air quality validated measurements

In-situ dataset	Surface air quality validated measurements
Relevant product group	Global atmosphere composition (reanalysis)
Notes	
Coverage	Global
Data providers	EMEP (NILU); WMO GAW; Airbase; AirNow; ICOS; IMECC;
Inspire directive	Inspire annex III: Atmospheric conditions. Physical conditions in the atmosphere. Includes spatial data based on measurements, on models or on a combination thereof and includes measurement locations;

Parameter	Usage	Timeliness[26]	Frequency	Accuracy	Criticality[27]
O3	Validation	1m (target) 6m (threshold)	30 min to 1h	5 ppb. (15 % acc. to EU directive)	Essential
CO	Validation	1m (target) 6m (threshold)	30 min to 1h	TBD	Essential
NO	Validation	1m (target) 6m (threshold)	30 min to 1h	100 ppb. (15 % acc. to EU directive)	Essential
NO2	Validation	1m (target) 6m (threshold)	30 min to 1h	100 ppb. (15 % acc. to EU	Essential

[24] Timeliness, Frequency and Accuracy are taken from *GMES atmosphere core service report; implementation group; final report; April 2009*.
[25] Source: Criticality is taken from *MACC requirements for Near Real Time Air Quality Data Exchange; MACC D-INSITU; September 2010*.
[26] Timeliness, Frequency and Accuracy are taken from *GMES atmosphere core service report; implementation group; final report; April 2009*.
[27] Source: Criticality is taken from *MACC requirements for Near Real Time Air Quality Data Exchange; MACC D-INSITU; September 2010*.

				directive)	
SO2	Validation	1m (target) 6m (threshold)	30 min to 1h	TBD	Essential
PM2.5	Validation	1m (target) 6m (threshold)	30 min to 1h	0.1 μg.m-3 (25% acc. to EU directive)	Essential
PM10	Validation	1m (target) 6m (threshold)	30 min to 1h	0.1 μg.m-3 (25% acc. to EU directive)	Essential
PM spec.	Validation	1m (target) 6m (threshold)	30 min to 1h	5 ppb	Essential
CO2 (conc. & fluxes)	Validation	1m (target) 6m (threshold)	Hourly	0.5 ppm 0.1 ppm	Essential
CH4 (conc. & fluxes)	Validation	1m (target) 6m (threshold)	Hourly	2-4 ppb	Essential

7.7 Total column greenhouse gases

In-situ dataset	Total column greenhouse gases
Relevant product group	Global atmosphere composition Climate forcing
Notes	Assimilation of (global) CO2 observations provided by *IMECC* has been tested. It is currently not known if routinely assimilation of CO2 is foreseen in the future.
Coverage	Global
Data providers	IMECC; ICOS; TCCON; WDGCC;
Inspire directive	Inspire annex III: Atmospheric conditions. Physical conditions in the atmosphere. Includes spatial data based on measurements, on models or on a combination thereof and includes measurement locations;

Parameter	Usage	Timeliness[28]	Frequency	Accuracy	Criticality[29]
CO2	Validation	1m (target) 6m (threshold)	Daily	0.5 ppm	Desirable
CH4	Validation	1m (target) 6m (threshold)	Daily	2 ppb	Desirable

7.8 Meteorological observations

In-situ dataset	Meteorological observations
Relevant product group	Global atmospheric composition Climate forcing Solar radiation (satellite monitoring) European air quality
Notes	Meteorological observations are available to the GMES atmosphere core service via ECMWF and National Meteorological Services that contribute to the service. Meteorological observations are in most cases made available as model fields (boundary conditions for downstream models)

[28] Timeliness, Frequency and Accuracy are taken from *GMES atmosphere core service report; implementation group; final report; April 2009*.
[29] Source: Criticality is taken from *MACC requirements for Near Real Time Air Quality Data Exchange; MACC D-INSITU; September 2010.*

	and thus meteorological observations are in a way only an indirect requirement. TBD: Probably not all required parameters are listed. TBD: It is currently not known if near real time access to meteorological observations is needed for the Solar radiation product.
Coverage	Global
Data providers	WMO; EUMETNET;
Inspire directive	Inspire annex III: Meteorological geographical features. Weather conditions and their measurements; precipitation, temperature, evapotranspiration, wind speed and direction;

Parameter	Usage	Timeliness[30]	Frequency	Accuracy	Criticality[31]
Wind (speed)	Assimilation	12 h	30 min to 1 h	TBD	Essential
Wind (direction)	Assimilation	12 h	30 min to 1 h	TBD	Essential
Air Pressure	Assimilation	12 h	30 min to 1 h	TBD	Essential
Humidity	Assimilation	12 h	30 min to 1 h	TBD	Essential
Temperature	Assimilation	12 h	30 min to 1 h	TBD	Essential
Precipitation	Assimilation	12 h	30 min to 1 h	TBD	Essential
Longwave Radiation	Assimilation	12 h	30 min to 1 h	TBD	Essential
Shortware Radiation	Assimilation	12 h	30 min to 1 h	TBD	Essential

7.9 Surface air quality near-real-time measurements

In-situ dataset	Surface air quality near-real-time measurements
Relevant product group	European air quality (analysis and forecast)
Notes	Seven regional air-quality analysis and forecasting systems are operated routinely for MACC and require surface air quality measurements for assimilation and validation. Surface air quality measurements delivered in near real time are un-validated.
Coverage	Global, EU27, EEA39
Data providers	EEA NRT Airbase; EEA Airbase; WMO GAW; EMEP (NILU); AirNow; ICOS; IMECC;
Inspire directive	Inspire annex III: Atmospheric conditions. Physical conditions in the atmosphere. Includes spatial data based on measurements, on models or on a combination thereof and includes measurement locations;

Parameter	Usage	Timeliness[32]	Frequency	Accuracy	Criticality[33]

[30] ECMWF IFS cut-off time is 12 hours.
[31] Source: Criticality is taken from *MACC requirements for Near Real Time Air Quality Data Exchange; MACC D-INSITU; September 2010.*
[32] Timeliness, Frequency and Accuracy are taken from *GMES atmosphere core service report; implementation group; final report; April 2009*.
[33] Source: Criticality is taken from *MACC requirements for Near Real Time Air Quality Data Exchange; MACC D-INSITU; September 2010.*

O3	Assimilation	3h (target) 24h (threshold)	30 min to 1h	5 ppb. (15 % acc. to EU directive)	Essential
O3	Validation	1m (target) 6m (threshold)	30 min to 1h	5 ppb. (15 % acc. to EU directive)	Essential
CO	Assimilation	3h (target) 24h (threshold)	30 min to 1h	TBD	Essential
CO	Validation	1m (target) 6m (threshold)	30 min to 1h	TBD	Essential
NO	Assimilation	3h (target) 24h (threshold)	30 min to 1h	100 ppb. (15 % acc. to EU directive)	Essential
NO	Validation	1m (target) 6m (threshold)	30 min to 1h	100 ppb. (15 % acc. to EU directive)	Essential
NO2	Assimilation	3h (target) 24h (threshold)	30 min to 1h	100 ppb. (15 % acc. to EU directive)	Essential
NO2	Validation	1m (target) 6m (threshold)	30 min to 1h	100 ppb. (15 % acc. to EU directive)	Essential
SO2	Validation	1m (target) 6m (threshold)	30 min to 1h	TBD	Useful
PM2.5	Assimilation	3h (target) 24h (threshold)	30 min to 1h	0.1 $\mu g.m^{-3}$ (25% acc. to EU directive)	Essential
PM2.5	Validation	1m (target) 6m (threshold)	30 min to 1h	0.1 $\mu g.m^{-3}$ (25% acc. to EU directive)	Essential
PM10	Assimilation	3h (target) 24h (threshold)	30 min to 1h	0.1 $\mu g.m^{-3}$ (25% acc. to EU directive)	Essential
PM10	Validation	1m (target) 6m (threshold)	30 min to 1h	0.1 $\mu g.m^{-3}$ (25% acc. to EU directive)	Essential
PM spec.	Validation	1m (target) 6m (threshold)	30 min to 1h	5 ppb	Essential
CO2 (conc. & fluxes)	Validation	1m (target) 6m (threshold)	Hourly	0.5 ppm 0.1 ppm	Essential
CH4 (conc. & fluxes)	Validation	1m (target) 6m (threshold)	Hourly	2-4 ppb	Essential

7.10 Emission inventories - European

In-situ dataset	Emission inventories
Relevant product group	European air quality
Use of the data	Production
Notes	MACC (D-EMIS) is developing an emissions dataset.
Parameters	EMEP 2003 emissions inventory; TNO (2000) inventory; GEMS-TNO inventory; NKUA monthly biogenic emission potentials;
Criticality (essential, desirable, useful)	Essential
Required geographic coverage	EU27, EEA39
Timeliness	TBD (Quasi static dataset)
Data providers	EMEP; EEA;
Inspire directive	Inspire annex III: Production and industrial facilities Industrial production sites, including installations covered by Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control (1) and water abstraction facilities, mining, storage sites.

7.11 Emission inventories – Global

In-situ dataset	Emission inventories
Relevant product group	Global atmospheric composition Climate forcing Global atmospheric composition (satellite monitoring)
Use of the data	Production, validation
Notes	MACC (D-EMIS) is developing an emissions dataset for use with the global model;
Parameters	
Criticality (essential, desirable, useful)	TBD
Required geographic coverage	Global
Timeliness	TBD (Quasi static dataset)
Data providers	
Inspire directive	Inspire annex III: Production and industrial facilities Industrial production sites, including installations covered by Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control (1) and water abstraction facilities, mining, storage sites.

7.12 Land cover map

In-situ dataset	Land cover map
Relevant product group	Global atmospheric composition monitoring
Use of the data	Production
Notes	The combination of a land cover map and a vegetation model is crucial for estimation of fire emissions
Parameters	TBD: Biomass, vegetation map, leaf area index, soil types, land cover and use;
Criticality (essential, desirable, useful)	Essential
Required geographic coverage	Global
Timeliness	TBD (quasi-static dataset)
Data providers	EEA and Eionet (e.g. Corine land cover), ESA, EUMETSAT, GMES land monitoring service.
Inspire directive	Inspire annex II: Land cover Physical and biological cover of the earth's surface including artificial surfaces, agricultural areas, forests, (semi-)natural areas, wetlands, water bodies.

8 List of data providers and products for the Land - and Emergency Response Services

8.1 Member countries

Available product	The Member states/countries and related ministries, organisations, and agencies produce manifold in-situ datasets. These comprise topographic maps, forest inventories, cadastral data, air quality measurements and many others. Depending on the product requirements, each has to be analysed case by case, (meaning which in-situ data can be procured and provided through the Member countries). The INSPIRE Directive is obligatory for EU Member States and it shall build upon infrastructures for spatial information established and operated by the Member States providing spatial data sets related to one or more of the themes listed in Annex I, II or III.
Scale	At different scales from small to large scale
Geographical coverage of dataset	EU27/ EEA39
License policy	Tbd
Level	Tbd
WWW	
Address	
Limitations	
Comments	

8.2 Afripop

Available products	Afripop – African Population Dataset
Scale	~ 100m^2
Geographical coverage of dataset	Africa
License policy	free
Level	
WWW	http://www.clas.ufl.edu/users/atatem/index_files/AfriPop.htm
Address	Dr Andrew Tatem atatem@ufl.edu
Limitations	
Comments	

8.3 Aerogrid

Available products	Orthophotos
Scale	12.5cm - 50cm
Geographical coverage of dataset	EU, US, selected areas globally
License policy	restricted
Level	commercial

WWW	http://www2.aerogrid.net/
Address	Miles Taylor AeroGRID Limited Archipel, 16 Rue Claude Tillier, 75012 Paris France Tel +((33/0) 671 156 116
Limitations	No full EEA39 coverage
Comments	

8.4 AND Automative Navigation Data

Available product	AND's Global Road Data – Vector data Street-level and interconnecting road networks, major railways, rivers and lakes, boundaries of countries, provinces, urban areas, etc.
Scale	
Geographical coverage of dataset	Global, this product is continuously updated Highest level of detail: Austria, Belgium, Bulgaria, Croatia, Germany, Luxembourg, the Netherlands, Slovenia, Switzerland and Turkey
License policy	
Level	
WWW	http://www.and.com/products/digitalmaps.php
Address	AND Automotive Navigation Data Van Vollenhovenstraat 3, 3016 BE Rotterdam, Netherlands, info@and.com
Limitations	
Comments	This product is also available via de ESRI ArcGIS software package (ESRI road and railroad data are based on AND's Global Road Data)

8.5 Astrium Geoinformation Services

Available products	SPOT DEM
Scale	30 m
Geographical coverage of dataset	Global?
License policy	Restricted
Level	Commercial
WWW	http://www.spotimage.com/web/en/811-spot-dem.php
Address	SPOT Image 5, rue des Satellites BP 14 359 F 31030 Toulouse cedex 4 France
Limitations	
Comments	Post Spacing 5 m Vertical Accuracy < 10 m Horizontal Accuracy < 15 m Base Data SPOT 5 stereo data

8.6 BirdLife International

Available products	Birdlife Species database
Scale	
Geographical coverage of dataset	global
License policy	free
Level	
WWW	http://www.birdlife.org/datazone/species/search
Address	BirdLife International Wellbrook Court Girton Road Cambridge CB3 0NA UNITED KINGDOM
Limitations	
Comments	

8.7 CGIAR

Available products	Shuttle Radar Topography Mission - SRTM
Scale	90m (3 arc seconds)
Geographical coverage of dataset	80% Global (up to latitudes 60 degrees north and 60 degrees south)
License policy	free
Level	free for non-commercial use
WWW	http://srtm.csi.cgiar.org/
Address	
Limitations	
Comments	Mirror site maintained by JRC http://srtm.jrc.ec.europa.eu/

8.8 CIESIN – Columbia University

8.8.1 Gridded Population of the World - GPW

Available products	GPW
Scale	2.5 arc-minute
Geographical coverage of dataset	global
License policy	free
Level	CIESIN offers unrestricted access and use of data without charge, unless specified in the documentation for particular data. All other rights are reserved
WWW	http://sedac.ciesin.columbia.edu/gpw
Address	
Limitations	
Comments	

8.8.2 Global Rural-Urban Mapping Project - GRUMP

Available products	GRUMP
Scale	30 arc seconds
Geographical coverage of dataset	global

License policy	free
Level	CIESIN offers unrestricted access and use of data without charge, unless specified in the documentation for particular data. All other rights are reserved
WWW	http://sedac.ciesin.columbia.edu/gpw
Address	
Limitations	
Comments	GRUMP is a development based on GPW, different approach than Landscan, GRUMP currently only available as Alpha version

8.8.3 Global Roads Open Access Data Set

Available product	Global Roads Open Access Data Set
Scale	
Geographical coverage of dataset	large (1:5 000 - 1:25 000) medium (1:25 000 - 1:80 000) small (1:80 000 - 1:250 000)
License policy	free
Level	
WWW	http://www.ciesin.columbia.edu/confluence/display/roads/Global+Roads+Data
Address	
Limitations	different accuracy and different coverage depending of country
Comments	The gROADS initiative is sponsored by CODATA, it is an approved task of the UN-GAID e-SDDC (UN Global Alliance on ICT for Development Open Access to and Application of Scientific Data in Developing Countries), and is endorsed by the Global Spatial Data Infrastructure Association (GSDI) and GISCorps of the Urban and Regional Information Systems Association (URISA). In addition, the roads data development activity has also been listed as sub-task EC-09-02(a), "Human Dimension of Ecosystem Utilization and Conservation," of the Group on Earth Observations (GEO) 2009-2011 Work Plan. Finally, gROADS is linked into the United Nations Spatial Data Infrastructure (UNSDI) through its adoption of the UNSDI-Transport (UNSDI-T) data model.

8.9 ECMWF

Available product	ECMWF Met Forecast Data
Scale	
Geographical coverage of dataset	global
License policy	
Level	
WWW	http://www.ecmwf.int/products/forecasts/d/charts
Address	Data Services ECMWF Shinfield Park Reading RG2 9AX UNITED KINGDOM

Limitations	
Comments	

8.10 European Environment Agency

8.10.1 Biogeographical regions

Available product	Biogeographical regions – Polygon data Specification of the bio-geographical regions: Alpine, Anatolian, Arctic, Atlantic, Black Sea, Boreal, Continental, Macaronesia, Mediterranean, Pannonian, Steppic. Method based on the 'Map of natural vegetation of Europe' (Federal Nature Protection Agency, Germany 2003); Dataset contains the official delineations used in the Habitats Directive (92/43/EEC) and for the EMERALD Network set up under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)
Scale	1 : 1 000 000
Geographical coverage of dataset	2008: EU 27 (an older version of 2005 covers the Pan European area)
License policy	Free
Level	
WWW	http://www.eea.europa.eu/data-and-maps
Address	EEA, Kongens Nytorv 6, DK-1050 Copenhagen K
Limitations	
Comments	

8.10.2 Corine Landcover

Available products	Corine Landcover 2006 v14 (without GR)
Scale	25 ha (stock layer), 5 ha (change layer)
Geographical coverage of dataset	EEA38 (without Greece)
License policy	free
Level	
WWW	http://www.eea.europa.eu/data-and-maps/data/corine-land-cover-2000-raster
Address	EEA, Kongens Nytorv 6, DK-1050 Copenhagen K
Limitations	
Comments	Time series available (1990, 2000, 2006)

8.10.3 ECRINS

Available products	European Catchment and Rivers Network System (ECRINS)
Scale	1:250.000 – 1:500.000
Geographical coverage of dataset	
License policy	
Level	
WWW	
Address	EEA, Kongens Nytorv 6, DK-1050 Copenhagen K
Limitations	
Comments	Based on JRC CCM 2.1

8.10.4 Impervious surface layer

Available products	EEA Fast Track Service Precursor on Land Monitoring - Degree of soil sealing 100m
Scale	1 ha grid cell resolution
Geographical coverage of dataset	EEA38
License policy	Free
Level	
WWW	http://www.eea.europa.eu/data-and-maps/data/eea-fast-track-service-precursor-on-land-monitoring-degree-of-soil-sealing-100m-1
Address	EEA, Kongens Nytorv 6, DK-1050 Copenhagen K
Limitations	
Comments	

8.10.5 Protected areas

Available products	Natura 2000
Scale	
Geographical coverage of dataset	EU (without Austria)
License policy	free
Level	
WWW	http://www.eea.europa.eu/data-and-maps/data#c5=all&c11=biodiversity&c17=&c0=5&b_start=0
Address	EEA, Kongens Nytorv 6, DK-1050 Copenhagen K
Limitations	
Comments	

8.11 Eurogeographics

8.11.1 EuroBoundaryMap

Available product	EuroBoundaryMap
Scale	1:100 000
Geographical coverage of dataset	EU27, 4 EFTA countries (CH, IS, LI, NO) and Greenland, Faroe Islands,Guadeloupe, French Guiana, Martinique, Reunion and Monaco, Croatia, San Marino, Vatican, Kosovo, Moldova, Andorra, Gibraltar, Liechtenstein, Ukraine
License policy	restricted
Level	commercial
WWW	http://www.eurogeographics.org/products-and-services/euroboundarymap
Address	Rue du Nord 76 1000 Brussels BELGIUM
Limitations	License costs
Comments	EuroBoundaryMap (formerly known as SABE - Seamless Administrative Boundaries of Europe) provides a European geographic database for administrative and statistical regions that will be maintained at the source level by the National

	Mapping and Cadastral Agencies (NMCAs), and EuroGeographics is providing harmonized access conditions for this geographic information within the framework of EuroGeographics.

8.11.2 EuroRegionalMap

Available product	This is a multi-functional topographic reference dataset at the scale 1:250 000. It is seamless and harmonised data that is produced in cooperation by the National Mapping and Cadastral Agencies (NMCAs), using the official national databases.
Scale	1:250 000
Geographical coverage of dataset	Member countries EU The European Community of 27 Countries (besides Bulgaria), plus Iceland, Norway, Switzerland, Lichtenstein, Faeroe Islands and the Republic of Moldova
License policy	Commercial
Level	
WWW	http://www.eurogeographics.org/
Address	Rue du Nord 76 1000 Brussels BELGIUM
Limitations	Probably high license costs, to be figured out.
Comments	

8.12 Eurogeosurveys

Available product	Geological Map of Europe
Scale	1:1 000 000
Geographical coverage of dataset	EuroGeoSurveys members
License policy	Free
Level	Online service to save data as kml and xml
WWW	http://www.eurogeosurveys.org/home.html
Address	Rue Joseph II 36-38 1000 Brussels, Belgium Tel : +32 2 888 75 53 Fax : +32 2 503 50 25 E-mail: info@eurogeosurveys.org
Limitations	scale
Comments	

8.13 Euromap

Available products	Euro-Maps 3D
Scale	5 m
Geographical coverage of dataset	EU
License policy	Restricted
Level	Commercial
WWW	http://www.euromap.de/products/prod_008.html

Address	Euromap Satellitendaten- Vertriebsgesellschaft mbH Kalkhorstweg 53 17235 Neustrelitz Germany
Limitations	
Comments	Post Spacing 5 m Vertical Accuracy LE90 << 10 m Horizontal Accuracy CE90 10 m Scene-based DSM 27 km x 27 km Mosaicked DSM 0.5º x 0.5º tiles Orthoimage Pixel Size 2.5 m Base Data IRS-P5 Cartosat-1 PAN-A and PAN-F in-flight stereo data

8.14 European Space Agency – ESA

Available products	Globcover
Scale	
Geographical coverage of dataset	EU, global, Africa
License policy	free
Level	Africover on demand
WWW	http://www.africover.org/system/africover_data.php / http://ionia1.esrin.esa.int
Address	
Limitations	Thematic accuracy
Comments	Updates are based on independent processes, i.e. limited changes analysis possible.

8.15 Eurostat

8.15.1 LUCAS

Available product	EUROSTAT conducts LUCAS campaigns every 3 – 5 years. LUCAS (Land use/cover area frame survey) delivers data on different forms of land use in Europe and is a useful tool for environmental monitoring. Method: Stratification and location of sites using orthophotos, field plots and assessment of land cover, percentage of land cover (e.g. % crown coverage for forests), land use (15 classes), and agro-environmental information, in-situ photos; Sampling scheme: base sampling grid 2 km x 2 km, 235 000 plots in total. During the 2009 campaign more than 22 000 soil samples were also collected at LUCAS points.
Scale	NUTS II (approx.. 270.000 sample point)
Geographical coverage of dataset	2008/2009: all EU member states excl. Cyprus & Malta
License policy	Freely available on request
Level	
WWW	http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/LUCAS_%E2%80%94_a_multi-purpose_land_use_survey
Address	EUROSTAT Joseph Bech building

	5 Rue Alphonse Weicker L-2721 Luxembourg estat-dl-lucas@ec.eurostat.eu
Limitations	Next LUCAS campaign planned for 2012
Comments	

8.15.2 NUTS regions

Available product	NUTS regions – Polygon data Administrative boundaries and codes for the NUTS regions at 3 levels **Method:** level of the administrative region depends on its populations size: NUTS1: 3 to 7 million NUTS2: 800.000 to 3 million NUTS3: 150.000 to 800 000
Scale	1:3 Mio and coarser
Geographical coverage of dataset	2003-2006; regular updates: EU 27
License policy	Free download for non-commercial use
Level	
WWW	http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/introduction
Address	EUROSTAT Joseph Bech building 5 Rue Alphonse Weicker L-2721 Luxembourg
Limitations	Scale
Comments	Non-commercial use only

8.16 Europa Technologies

Available products	Global Discovery
Scale	1:1 000 000
Geographical coverage of dataset	global
License policy	restricted
Level	commercial
WWW	http://europa.uk.com/gd.php
Address	Europa Technologies Limited Coveham House Downside Bridge Road COBHAM Surrey KT11 3EP United Kingdom
Limitations	Scale, positional accuracy?
Comments	Would help to develop an online repository for storing and disseminating logistics data

8.17 Food and Agriculture Organisation (FAO)

Available product	Global Administrative Unit Layer - GAUL
Scale	
Geographical coverage of dataset	global
License policy	Free
Level	not be distributed to the general public formal permission to do something
WWW	http://www.fao.org/geonetwork/srv/en/metadata.show?id=12691
Address	
Limitations	Data might not be officially validated by authoritative national sources and cannot be distributed to the general public. Problems in disputed areas
Comments	The Global Administrative Unit Layers (GAUL) is an initiative implemented by FAO within the EC-FAO Food Security Programme funded by the European Commission (http://www.foodsecinfoaction.org/News/news_06_06.htm). The GAUL aims at compiling and disseminating the most reliable spatial information on administrative units for all the countries in the world, providing a contribution to the standardization of the spatial dataset representing administrative units. The GAUL is released once a year and the target beneficiary of the GAUL data is the UN community, the Universities and other authorized international and national institutions/agencies. A disclaimer should always accompany any use of the GAUL data.

8.18 GADM – database of Global Administrative Areas

Available product	GADM database of Global Administrative Areas
Scale	
Geographical coverage of dataset	Global
License policy	Free
Level	This dataset is freely available for academic and other non-commercial use. Redistribution, or commercial use, is not allowed without prior permission.
WWW	http://www.gadm.org/
Address	
Limitations	Problems in disputed areas
Comments	GADM is a spatial database of the location of the world's administrative areas for use in GIS and similar software. Administrative areas in this database are countries and lower level subdivisions such as provinces, departments, bibhag, bundeslander, daerah istimewa, fivondronana, krong, landsvæðun, opština, sous-préfectures, counties, and thana. GADM describes where these administrative areas are, and for each area it provides some attributes, foremost being the name and variant names.

8.19 Geonames.org

Available product	geonames.org
Scale	
Geographical coverage of dataset	Global
License policy	Free - Creative Commons Attribution 3.0 License
Level	
WWW	http://www.geonames.org
Address	
Limitations	Much of the geonames data is derived from the US NGA GEOnet Names Server and will inherit the spatial constraints described for that dataset.
Comments	The GeoNames geographical database contains over eight million geographical names and consists of 7 million unique features whereof 2.6 million populated places and 2.8 million alternate names. All features are categorized into one out of nine feature classes and further subcategorized into one out of 645 feature codes.

8.20 Google

Available product	Google Earth, Google Streetview
Scale	
Geographical coverage of dataset	Global, Google Streetview only for selected cities
License policy	Free
Level	
WWW	http://www.google.com/earth/index.html
Address	
Limitations	
Comments	no global VHR coverage

8.21 GRDC - Global Runoff Data Centre

Available product	Global Runoff Database (GRDC)
Scale	
Geographical coverage of dataset	Global (156 countries)
License policy	free
Level	No commercial use
WWW	http://grdc.bafg.de
Address	Global Runoff Data Centre (GRDC) in the Federal Institute of Hydrology (BfG) Am Mainzer Tor 1 56068 Koblenz, Germany Tel.: +49 261 1306 5224 Fax: +49 261 1306 5722 grdc@bafg.de
Limitations	
Comments	The Global Runoff Database at GRDC is a unique collection of river discharge data collected at daily or monthly intervals

	from more than 7300 stations in 156 countries. This adds up to around 280 000 station-years with an average record of 38 years. The GRDC provides discharge data and data products for non-commercial applications. From the website it is not clear if a NRT access is possible.

8.22 ICP Forest

Available product	ICP Forests Level I Yearly assessments of main forest parameters, crown condition, soil condition, foliar.
Scale	Sampling grid 16km x 16km, approx. 6,000 plots in total, sampling method depending on country (cluster sampling is most common), minimum of 10 sample trees per plot
Geographical coverage of dataset	39 European countries - Harmonised data set at European level
License policy	Data free available after request
Level	
WWW	http://www.icp-forests.org/MonLvI.htm
Address	http://www.icp-forests.org/
Limitations	
Comments	

8.23 Intermap

Available products	NextMap Europe – Digital Elevation Model
Scale	1.25m
Geographical coverage of dataset	Parts of EU
License policy	Restricted
Level	Commercial
WWW	http://www.intermap.com/nextmapeurope
Address	Intermap Technologies GmbH Heimeranstrasse 35 80339 Muenchen Germany Phone: +49 (0) 89 3090799-0 Fax: +49 (0) 89 3090799-19
Limitations	covering only parts of EU, expensive
Comments	Vertical accuracy: 1m Horizontal accuracy: 2m 1.25-meter pixel size Based on IFSAR

8.24 ISRIC

Available product	World Soil Information Database
Scale	mainly small-scale (1:250.000 or smaller) maps
Geographical coverage of dataset	For selected areas globally
License policy	free

Level	
WWW	http://library.wur.nl/isric/
Address	Duivendaal 9 6701AR Wageningen The Netherlands isric.library@wur.nl
Limitations	For selected areas only.
Comments	The World Soil Information has built up a collection of more than 20.000 articles, country reports, books and maps with emphasis on the developing countries. The subject emphasis is on soils, but related geographic information on climate, geology, geomorphology, vegetation, land use, and land suitability is also important The map collection contains over 6000 maps.

8.25 Joint Research Centre

8.25.1 European Soil Bureau (ESBN)

Available product	Soil Geographical Database of Europe
Scale	1:1.000.000
Geographical coverage of dataset	Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, FYROM (Former Yugoslav Republic of Macedonia), Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, The Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, the United Kingdom, Iceland, Belarus, Moldova, the Russian Federation and Ukraine
License policy	free
Level	
WWW	http://eusoils.jrc.ec.europa.eu/ESDB_Archive/ESDB_Data_Distribution/ESDB_data.html
Address	European Commission - Joint Research Centre Institute for Environment and Sustainability Via Enrico Fermi 21020 Ispra (VA) Italy Marc Van Liedekerke (tel. +39-0332-785179) Panos Panagos (tel. +39-0332-785574)
Limitations	
Comments	

8.25.2 Catchment Characterisation and Modelling (CCM)

Available product	Catchment Characterisation and Modelling
Scale	1:250 000 – 1:500 000
Geographical coverage of dataset	The CCM2 database covers the entire European continent, including the Atlantic islands, Iceland and Turkey.

License policy	free
Level	For non-commercial use
WWW	http://ccm.jrc.ec.europa.eu/php/index.php?action=view&id=23
Address	European Commission - Joint Research Centre Institute for Environment and Sustainability Via Enrico Fermi 21020 Ispra (VA) Italy Jürgen Vogt (+ 39) 0332 785481 juergen.vogt(at)jrc.ec.europa.eu
Limitations	
Comments	CCM includes a hierarchical set of river segments and catchments based on the Strahler order, a lake layer and structured hydrological feature codes based on the Pfafstetter system.

8.26 NASA/ METI

Available products	ASTER GDEM
Scale	30m
Geographical coverage of dataset	Global (up to latitudes 83 degrees north and 83 degrees south)
License policy	free
Level	This ASTER product is available at no charge for any user pursuant to an agreement between METI and NASA.
WWW	http://www.gdem.aster.ersdac.or.jp/ http://asterweb.jpl.nasa.gov/gdem.asp
Address	
Limitations	
Comments	Dataset is advertised as an 'alpha' release and caution is advised in its use. For information about the GDEM, see the Validation Report: https://lpdaac.usgs.gov/lpdaac/content/download/4009/20069/version/3/file/ASTER+GDEM+Validation+Summary+Report.pdf

8.27 NGA - National Geospatial-Intelligence Agency

8.27.1 GEOnet Names Server (GNS)

Available product	NGA GEOnet Names Server (GNS)
Scale	
Geographical coverage of dataset	Global
License policy	Free
Level	
WWW	http://earth-info.nga.mil/gns/html/ https://www1.nga.mil/ProductsServices/GeographicNames/Pages/default.aspx/html/index.html
Address	
Limitations	The GEOnet Names Server (GNS) does not contain any data

	for the United States of America or its Dependent areas. To obtain U.S. data, please access the United States Geological Survey (USGS) Geographic Names Information System (GNIS) database of names.
Comments	Toponyms are geocoded to an arc minute resolution which equates very approximately to a 2km grid. Weekly update

8.27.2 VMAP1/ VMAP0

Available product	VMAP0 / VMAP 1
Scale	small scale 1:1 000 000
Geographical coverage of dataset	Global
License policy	Free restricted
Level	
WWW	Not official site: http://gis-lab.info/qa/vmap0-eng.html http://gis-lab.info/qa/vmap1-eng.html
Address	
Limitations	scale and age
Comments	VMAP0 and VMAP1 data from the US NGA is often used despite scale and age limitations. VMAP0 is derived from 1:1M scale maps and provides worldwide coverage of geo-spatial data and is equivalent to a small scale (1:1,000,000). VMAP1 is derived from 1:250K mapping (horizontal accuracy: 125-500m, vertical accuracy: 0.5-2m). Coverage of VMAP1 is also limited. VMAP Level 1 is divided in 234 geographical tiles. Only 57 of them are currently available for download from NGA.

8.28 National statistical agencies

Available products	Large scale population information (at admin level 3 or higher/ urban level) based on administrative units, statistics and/ or maps
Scale	
Geographical coverage of dataset	global
License policy	
Level	
WWW	
Address	
Limitations	Scale, accuracy
Comments	

8.29 Oak Ridge National Laboratory

Available products	Landscan – Global population grid
Scale	30 arc seconds (~ 1 km)
Geographical	global

coverage of dataset	
License policy	restricted
Level	LandScan™ Dataset licenses are available free of charge for U.S. Federal Government, for United Nations Humanitarian efforts, and educational research use. Educational research is considered by U.S. to include K-12 schools, colleges, and universities. Commercial license fees are determined on a case-by-case basis.
WWW	http://www.ornl.gov/sci/landscan/
Address	Oak Ridge National Laboratory P.O. Box 2008 Oak Ridge, TN 37831
Limitations	Good global dataset, however, modelling approach is blackbox
Comments	

8.30 OpenStreetMap – OSM

Available products	OpenStreetMap
Scale	at different scales
Geographical coverage of dataset	Parts of the world
License policy	Free
Level	
WWW	http://www.openstreetmap.org/
Address	
Limitations	OSM is a crowdsourcing product. I.e. coverage and quality is dependent on user input. However especially a useful source for less developed areas. E.g. in the aftermath of the Haiti earthquake a global community digitised a large part of Haiti's transport infrastructure within a few days. Who is the right corresponding partner? Could be OpenStreetMap Foundation or OpenStreetMap Project?
Comments	from very detailed and large scale to very small scaled. Quality is variable and entirely dependent upon open community editing.

8.31 RAMSAR

Available products	Ramsar Sites Database
Scale	at different scales
Geographical coverage of dataset	global
License policy	Free
Level	Access to GIS data requires registration
WWW	http://ramsar.wetlands.org/Database/AbouttheRamsarSitesDatabase/tabid/812/language/en-US/Default.aspx
Address	Stephan Flink Technical Officer Biodiversity & Ecological Networks Wetlands International PO Box 471 6700 AL Wageningen The Netherlands
Limitations	

Comments	Often only point database

8.32 SAGE - Center for Sustainability and the Global Environment

Available product	MODIS 500-m Map of Global Urban Extent
Scale	
Geographical coverage of dataset	global
License policy	free
Level	Citation of source required
WWW	http://sage.wisc.edu/people/schneider/research/data.html
Address	Annemarie Schneider Center for Sustainability and the Global Environment, Nelson Institute for Environmental Studies and Department of Geography University of Wisconsin-Madison 1710 University Avenue, Room 264, Madison, Wisconsin 53726 USA aschneider4@wisc.edu
Limitations	Data used is from 2001-2002, resolution of the data is 500m
Comments	A dataset was developed depicting global urban land based on Moderate Resolution Imaging Spectroradiometer (MODIS) 500-m satellite data. Ongoing efforts are focused on creating updated maps of urban extent circa 2005-2006 and 2009-2010.

8.33 TomTom - Tele Atlas

Available products	MultiNet , Connect Plus, Connect
Scale	
Geographical coverage of dataset	Depending on product (global)
License policy	commercial
Level	
WWW	http://www.teleatlas.com/OurProducts/MapData/index.htm http://licensing.tomtom.com/OurProducts/MapData/index.htm
Address	Zuiderpoort Office Park Gaston Crommenlaan 4 bus 0501 B-9050 Gent Belgium Phone : +(32) 9 244 88 11 Fax : +(32) 9 222 74 12
Limitations	different accuracy and different coverage depending of country
Comments	MultiNet - The database for the navigation world. ConnectPlus is a new product to meet market demand for navigable coverage with an efficient time-to-market in new geographies. Connect supports global coverage in Tele Atlas formats with basic display and routing functionality.

8.34 UNEP/ IUCN

Available product	World Database on Protected Areas (WDPA)
Scale	
Geographical coverage of dataset	global
License policy	free
Level	No commercial use, sub-licensing or redistribution
WWW	http://www.wdpa.org/
Address	
Limitations	
Comments	The WDPA is the most comprehensive global spatial dataset on marine and terrestrial protected areas available.

8.35 UN Geographic Information Working Group (UNGIWG)

Available product	Second Administrative Level Boundaries - SALB
Scale	It is recommended not to use this data at a scale below 1:1'000'000
Geographical coverage of dataset	Global
License policy	Free
Level	
WWW	http://www.unsalb.org/
Address	World Health Organisation Office 3139 20, av Appia 1211 Geneva 27 Switzerland Tel: +41 22 791.47.44 Fax : +41 22 791.48.06 e-mail: SALB@un.org
Limitations	Problems in disputed areas
Comments	The Second Administrative Level Boundaries data set project (SALB) has been launched in 2001 in the context of the activities of the UN Geographic Information Working Group (UNGIWG) and has for objective to provide access to a working platform for the collection, management, visualization and sharing of sub national data and information in a seamless way from the national to the global level. This platform is developed in collaboration with and validated by the National Mapping Agencies (NMA) of each UN Member State. This database is standardized in terms of the international border, metadata profile, spelling, coding scheme, editing protocols used and can be downloaded at no cost.

8.36 Wetlands International

Available product	MedWet database
Scale	
Geographical coverage of dataset	Portugal, Greece, Albania, Slovenia, FYROM, Morocco, Croatia, Serbia, some regions of Italy, Spain and France

License policy	Open access
Level	
WWW	http://62.103.37.19/
Address	MedWet Secretariat Villa Kazouli, Kifissias & Gr. Lambraki 1, 145 61 Kifissia, Greece Tel.: +30 210 8089270, Fax : +30 210 8089274 E-Mail :info@medwet.org
Limitations	
Comments	

8.37 WFP – UNSDI-T

Available product	UNSDI-T
Scale	small scale 1:1 000 000
Geographical coverage of dataset	Global
License policy	Restricted
Level	
WWW	http://www.logcluster.org/tools/mapcentre/unsdi/unsdi-t-v2.0
Address	global.logisticscluster@wfp.org
Limitations	(currently) restricted (see below)
Comments	UNSDI-T, led to the design of a global transport and logistics geo-database schema tailored to humanitarian requirements, a data collection and processing methodology, and the development of an online repository for storing and disseminating logistics data. This dataset would be very valuable for GMES-ER “With the United Nations Logistics Cluster Geoportal we try to establish a public crowd-sourcing portal for emergency GIS data. Freelancer and NGO partners can participate to collect data for the cooperate logistic infrastructure and transportation database of the humanitarian community. The pilot project is available on geoportal.logcluster.org with public access through username and password public/public. For specific access to see the editing capabilities of the portal, please refer to peter.singler@wfp.org for a generic account. The aim is a data integration and synchronization platform for an Humanitarian Interagency Database (PostgreSQL/PostGIS), The SDI-T is a PostgreSQL/PostGIS database and will be opened to all participating people. Technologies can be chosen freely.” (http://www.wiki.rhok.org/Humanitarian_GIS_Data_Cleaning_for_Crowdsourcing_Data_Capture)

9 List of data providers for the Marine Service

9.1 In situ networks

9.1.1 Argo/ EuroArgo

Available product	Argo/ EuroArgo
Measured variable	Temperature, Salinity, Currents
Geographical coverage of dataset	Global
Periodicity	Daily
WWW	www.euro-argo.eu/
Comments	About 3000 active floats (500 floats from Europe, expected 800) providing T&S profiles every 10 days from surface to 2000m Chlorophyll, Oxygen, (nutrients) - extension

9.1.2 OceanSites/ EuroSites

Available product	OceanSites/ EuroSites
Measured variable	Temperature, Salinity, Currents, Chlorophyll, Oxygen, nutrients
Geographical coverage of dataset	global
Periodicity	Daily
WWW	www.eurosites.info
Comments	32 sites (among the 60 planned) presently providing time series at fix point 11 sites are operated by Europe days from surface to 2000m

9.1.3 GOSUD

Available product	GOSUD
Measured variable	Temperature, Salinity, Currents
Geographical coverage of dataset	global
Periodicity	Daily
WWW	www.ifremer.fr/gosud
Comments	About 20 vessels per month (it could be extended through EUROFLEET) providing sea surface temperature, sea surface salinity and sub-surface temperature and currents measurements, 30 different vessels in one year 75% are operated by Europe

9.1.4 DBCP/EUMETNET E-Surfmar

Available product	DBCP meteorological offices all around the world deploying drifters and maintaining reference stations (OceanSites see above) and processing the data in realtime
Measured variable	Drifters: Air Pressure, Temperature, Currents (a few with salinity) Moorings: Meteorological data

Geographical coverage of dataset	global
Periodicity	Daily
WWW	http://www.jcommops.org/dbcp http://surfmar.meteo.fr
Comments	1250 drifters are providing surface temperature 110 were deployed by Europe in 2010

9.1.5 Gliders

Available product	EGO, GROOM
Measured variable	Temperature, Salinity, Chlorophyll, Oxygen, (nutrients)
Geographical coverage of dataset	European (included in global products)
Periodicity	Daily when Gliders at sea
WWW	http://www.ego-network.org/dokuwiki/doku.php
Comments	Active Gliders operated by EGO partners

9.1.6 European Vessels/ Ferrybox

Available product	European Vessels (mainly ferrybox)
Measured variable	Temperature, Salinity, Chlorophyll, Oxygen, (nutrients)
Geographical coverage of dataset	European regional seas
Periodicity	Daily
WWW	http://www.ferrybox.com/
Comments	About 10 vessels transmitting daily

9.1.7 SeaDataNet

Available product	SeaDataNet
Measured variable	Large and diverse sets of historical data
Geographical coverage of dataset	-
Periodicity	-
WWW	http://www.seadatanet.org
Comments	

9.1.8 GLOSS

Available product	GLOSS
Measured variable	Sea Level
Geographical coverage of dataset	Global
Periodicity	Weekly
WWW	http://www.gloss-sealevel.org/
Comments	Relies on GLOSS data server

9.1.9 NOAA/ AOML

Available product	NOAA – Atlantic Oceanographic and Meteorological Laboratory (AOML)
Measured variable	AOML maintains a variety of databases that provide access to a wide range of publicly available oceanographic and meteorological data and products.

Geographical coverage of dataset	Atlantic
Periodicity	-
WWW	www.aoml.noaa.gov
Comments	

9.1.10 NASA SeaBASS

Available product	SeaWIFS bio-optical archive and storage system
Measured variable	Archived data include measurements of apparent and inherent optical properties, phytoplankton pigment concentrations, and other related oceanographic and atmospheric data, such as water temperature, salinity, stimulated fluorescence, and aerosol optical thickness.
Geographical coverage of dataset	Global
Periodicity	-
WWW	http://seabass.gsfc.nasa.gov/seabass/index.htm
Comments	Data are collected using a number of different instrument packages, such as profilers, buoys, and hand-held instruments, and manufacturers on a variety of platforms, including ships and moorings. SeaBASS includes data from over 1,500 field campaigns, collected by over 80 contributors from 55 institutions in 14 countries.

9.1.11 NASA AERONET

Available product	AERONET
Measured variable	Globally distributed observations of spectral aerosol optical depth (AOD), inversion products, and precipitable water in diverse aerosol regimes.
Geographical coverage of dataset	Global
Periodicity	-
WWW	http://aeronet.gsfc.nasa.gov/
Comments	AERONET is a global network of sun/sky radiometers that is monitoring AOD and aerosol optical properties for AOD trend analysis, optical properties characterization, and for validation of satellite retrievals.

9.1.12 IABP

Available product	International Arctic Buoy Programme
Measured variable	Sea level, pressure and ice motion and velocity, surface air temperature
Geographical coverage of dataset	Arctic ocean
Periodicity	-
WWW	http://iabp.apl.washington.edu/
Comments	Drifting buoys in the Arctic Ocean to provide meteorological and oceanographic data

9.1.13 COADS

Available product	International Comprehensive Ocean-Atmosphere Data Set
Measured variable	Surface marine data
Geographical coverage of dataset	Global
Periodicity	-
WWW	http://icoads.noaa.gov/
Comments	Surface marine data spanning the past three centuries, and simple gridded monthly summary products.

9.2 Regional platforms

9.2.1 Tide Gauges

Available product	Tide gauges
Measured variable	Sea Level
Geographical coverage of dataset	Arctic Ocean, Baltic Sea, Northwest Shelf, Ireland-Biscay-Iberia, Mediterranean Sea, Black Sea
Periodicity	Daily
WWW	
Comments	*Arctic-ROOS,* *BOOS* *NOOS* *IBI-ROOS* *MOON* *Black Sea GOOS*

9.2.2 Coastal and regional moorings

Available product	Coastal and regional moorings
Measured variable	Temperature, Salinity, Currents, Sea Level, bio-geochemical
Geographical coverage of dataset	Arctic Ocean, Baltic Sea, Northwest Shelf, Ireland-Biscay-Iberia, Mediterranean Sea, Black Sea
Periodicity	Daily
WWW	
Comments	*ARCTIC-ROOS* *BOOS* *NOOS* *IBI-ROOS* *MOON* *Black Sea GOOS*

10 List of data providers for the Atmosphere Service

The total amount of available in-situ data may be grouped in the following way:
Near real time (NRT) un-validated data will be used for NRT regional activities and for data assimilation and validation but may also be used by the global service for validation and possibly in the future for assimilation.
Validated (delayed mode) data will be used in regional reanalyses and ensemble hindcasts and for validation of the global system and for possible assimilation in the delayed stream and in global reanalysis runs. It should be noted that the availability of validated data is significantly higher than that of near real time un-validated data as the validated data include manual observations.
Data from research projects
The following table gives an overview about different databases, programmes and projects sorted according to the relevant data providing organisation.

10.1 EEA

Airbase	AirBase is the public air quality database system of the EEA. It contains air quality monitoring data and information submitted by the participating countries throughout Europe. The air quality database consists of multi-annual time series of air quality measurement data and their statistics for a representative selection of stations and for a number of pollutants. It also contains meta-information on the involved monitoring networks, their stations and their measurements. The database covers geographically all countries from the European Union, the EEA member countries and some EEA potential candidate countries. The EU Member States are bound to report under the Council Decision 97/101/EC, a reciprocal Exchange of Information (EoI) on ambient air quality. Whereas, the EEA member countries and cooperating countries, which include EU (potential) candidate countries and the EFTA states, either committed themselves to report to the EEA following this EU-legislation, or develop the appropriate measuring and reporting infrastructure following EEA's EuroAirnet programme criteria. All data reported within EuroAirnet context is included in the database.

10.2 EUMETNET

	EUMETNET is a network grouping 26 European National Meteorological Services. EUMETNET provides a framework to organise co-operative programmes between the Members in the various fields of basic meteorological activities such as observing systems, data processing, basic forecasting products, research and development, training. Through EUMETNET Programmes, the Members intend to develop their collective capability to serve

	environment management and climate monitoring and to bring to all European users the best available quality of meteorological information. They will use EUMETNET to more efficiently manage their collective resources.

10.3 EU

CarboEurope	CarboEurope-IP aimed at understanding and quantifying the present terrestrial carbon balance of Europe and the associated uncertainty at local, regional and continental scale. This means to • determine the European carbon balance with its spatial and temporal patterns, • to understand the controlling processes and mechanisms of carbon cycling in European ecosystems and how these are affected by climate change and variability and human management • to develop an observation system to detect changes in atmospheric CO2 concentrations and ecosystem carbon stocks related to the European commitments under the Kyoto Protocol.
EARLINET	A quantitative dataset describing the aerosol vertical, horizontal, and temporal distribution, including its variability on a continental scale, is necessary. The dataset is used to validate and improve models that predict the future state of the atmosphere and its dependence on different scenarios describing economic development, including those actions taken to preserve the quality of the environment. The EARLINET data set is the most comprehensive compilation of data available for this purpose. EARLINET will continue to build a quantitative comprehensive statistical database of the horizontal, vertical, and temporal distribution of aerosols on a continental scale. The goal is to provide aerosol data with unbiased sampling, for important selected processes, and air-mass history, together with comprehensive analyses of these data. The objectives will be reached by operating a network of presently 15 stations distributed over most of Europe, using advanced quantitative laser remote sensing to directly measure the vertical distribution of aerosols, supported by a suite of more conventional observations. Special care is taken to assure data quality, including intercomparisons at instrument and evaluation levels. A major part of the measurements is performed according to a fixed schedule to provide an unbiased statistically significant data set. Additional measurements are performed to specifically address important processes that are localised either in space or time. Back-trajectories derived from operational weather prediction models are used to characterise the history of the observed air parcels, accounting explicitly for the vertical distribution.
EMEP	The main objective of the EMEP programme (Co-operative Programme for Monitoring and Evaluation of the Long-range

	Transmission of Air Pollutants in Europe) is to regularly provide governments and subsidiary bodies under the LRTAP Convention with qualified scientific information to support the development and further evaluation of the international protocols on emission reductions negotiated within the Convention. The EMEP programme relies on three main elements: (1) collection of emission data, (2) measurements of air and precipitation quality and (3) modelling of atmospheric transport and deposition of air pollutions. Through the combination of these three elements, EMEP fulfils its required assessment and regularly reports on emissions, concentrations and depositions of air pollutants, the quantity and significance of transboundary fluxes and related exceedances to critical loads and threshold levels. The combination of these components provides also a good basis for the evaluation and qualification of the EMEP estimates. Parties to the Convention on Long-Range Transboundary Air Pollution perform monitoring at regional monitoring sites across Europe. The data are subject to national quality assessment prior to submission to the EMEP Chemical Coordinating Centre at NILU. The submitted data are further assessed by the EMEP-CCC in collaboration with the data originators before they are reported on an annual basis. EMEP data are freely available for non commercial use and through this web-site most of the observations can be accessed. In addition, similar data from other Conventions, projects and programmes for which NILU is also having data storage and dissemination responsibilities can be also accessed here. Other data on atmospheric chemical composition can be found at NILU Data Centre.
EUSAAR	EUSAAR (European Supersites for Atmospheric Aerosol Research) is an EU-funded I3 (Integrated Infrastructures Initiatives) project carried out in the framework of the specific research and technological development programme "Structuring the European Research Area - Support for Research Infrastructures". The objective of EUSAAR is the integration of measurements of atmospheric aerosol properties performed in a distributed network of 20 high quality European ground-based stations. This integration contributes to a sustainable reliable operational service in support of policy issues on air quality, long-range transport of pollutants and climate change.
IAGOS	IAGOS-ERI is one of the new European Research Infrastructures on the ESFRI Roadmap 2006 . It will establish and operate a distributed infrastructure for long-term observations of atmospheric composition, aerosol and cloud particles on a global scale from a fleet of initially 10-20 long-range in-service aircraft of internationally operating airlines. Global climate change represents arguably the most serious environmental issue facing mankind today, with implications for

	global political stability and the global economy. Reliable predictions of the future climate using climate models are central and fundamental requirements for determining future mitigation strategies. The use of commercial aircraft allows the collection of highly relevant observations on a scale and in numbers impossible to achieve using research aircraft, and where other measurement methods (e.g., satellites) have technical limitations. IAGOS-ERI deploys newly developed high-tech instruments for regular in-situ measurements of atmospheric chemical species (O3, CO, CO2, NOy, NOx, H2O), aerosols and cloud particles. The data will be available in near real time to weather services and GMES service centres. • Meteo France is working on making the IAGOS data available in NRT via GTS. BUFR template for IAGOS presented by Meteo France and accepted by WMO ET on NRT; • The transmission of near real time data is being arranged with AMDAR in cooperation with the observations department at WMO;
ICOS	ICOS is a new European Research Infrastructure for quantifying and understanding the greenhouse balance of the European continent and of adjacent regions. It was realized early that, high precision long-term carbon cycle observations form the essential basis of carbon cycle understanding and that these observations must be secured beyond the lifetime of a research project. ICOS aims to build a network of standardized, long-term, high precision integrated monitoring of: Atmospheric greenhouse gas concentrations of CO2, CH4, CO and radiocarbon-CO2 to quantify the fossil fuel component ecosystem fluxes of CO2, H2O, and heat together with ecosystem variables. The ICOS infrastructure will integrate terrestrial and atmospheric observations at various sites into a single, coherent, highly precise dataset. These data will allow a unique regional top-down assessment of fluxes from atmospheric data, and a bottom-up assessment from ecosystem measurements and fossil fuel inventories. Target is a daily mapping of sources and sinks at scales down to about 10 km, as a basis for understanding the exchange processes between the atmosphere, the terrestrial surface and the ocean.
IMECC	The IMECC project aims to build the infrastructure for a coordinated, calibrated, integrated and accessible dataset for characterizing the function of the European terrestrial biosphere. Such an infrastructure is necessary since the critical measurements are spatially dispersed. Their interpretation, however, relies on precise knowledge of the spatial and temporal structures of measured quantities. Thus, the measurements must be of the highest quality and precisely calibrated in order to be useful. They should also be well planned, that is subject to some coordinated and targeted experimental design and should be accessible to a wide range of researchers. IMECC will deliver these services to the range of measurements within various European projects. As

	an added benefit, the improved measurements will also be increasingly compatible with the range of global measurements. IMECC will not only provide these services for the life of the project but will aid the development of strategies and techniques to streamline this coordination into the future. The IMECC project aims to build the infrastructure for a coordinated, calibrated and accessible dataset for characterizing the carbon balance of Europe Details 30 partners in 15 countries 4 years duration, Apr 2007-Mar 2011 European Commission contribution 6.7 million euros
MOZAIC	MOZAIC consists of automatic and regular measurements of reactive gases by five long range passenger airliners. A large database of measurements (about 30,000 flights since 1994) allows studies of chemical and physical processes in the atmosphere, validations of global chemistry transport models and satellite retrievals. MOZAIC data provide detailed climatology of trace gases at 9-12 km where subsonic aircraft emit most of their exhaust and which is a very critical domain (e.g. radiative and Stratosphere-Troposphere exchanges) still imperfectly described in existing models.
RAMCES	Real-time transmission and processing of atmospheric CO2 data activity in IMECC (Infrastructure for Measurement of the European Carbon Cycle) and GEOmon (Global Earth Observation and Monitoring) projects; In the framework of IMECC (Infrastructure for Measurement of the European Carbon Cycle) and GEOmon (Global Earth Observation and Monitoring) Projects, a (near) real-time data processing system has been implemented at LSCE to deliver in-situ CO2 records and is dedicated to the processing and reporting of ancillary atmospheric data for interpretation of these records. An operational real-time data transmission and processing chain for CO2 data and meteorology from the network has been developed. Raw CO2 data are automatically processed into concentration products of intermediate quality (NRT CO2), with a target precision of ±1 ppm. NRT CO2 product is then available with a maximum 24 hours delay.

10.4 NASA

Aeronet	AERONET is a global network of sun/sky radiometers that is monitoring AOD and aerosol optical properties for AOD trend analysis, optical properties characterization, and for validation of satellite retrievals. Aerosol radiative forcings are one of the largest uncertainties in climate change studies. • According to MACC access to Aeronet level 1.5 data is not a problem;
TCCON	TCCON is a network of ground-based Fourier Transform Spectrometers recording direct solar spectra in the near-infrared spectral region. From these spectra, accurate and precise column-averaged abundance of CO2, CH4, N2O, HF, CO, H2O, and HDO are retrieved.

	• Within MACC, it seems like that in-situ (ground-based) remote sensing data are not well exploited (while data from ground-based observational networks and satellite data are). Establishing a link between ground-based observational data and satellite data would be valuable and complementary for MACC, and ground-based remote sensing (from e.g. TCCON and NDACC) would be the ideal technique to bridge the gap between these types of data/networks. It is mentioned that MACC does have access to data from the TCCON network, but they don't retrieve the data yet. Data from TCCON are freely available and definitely useful. There is an opening for a GEOmon follow-up project providing ground-based remote sensing data, and to create interfaces with between the communities and different projects. The harmonization of networks is an important aspect. Data are needed on the European as well as on the global scale.

10.5 NOAA

AirNow	The U.S. EPA, NOAA, NPS, tribal, state, and local agencies developed the AIRNow Web site to provide the public with easy access to national air quality information. The Web site offers daily AQI forecasts as well as real-time AQI conditions for over 300 cities across the US, and provides links to more detailed State and local air quality Web sites.
ESRL	NOAA/ESRL's (Earth System Research Laboratory) Global Monitoring Division (formerly CMDL) of the National Oceanic and Atmospheric Administration, conducts sustained observations and research related to source and sink strengths, trends and global distributions of atmospheric constituents that are capable of forcing change in the climate of Earth through modification of the atmospheric radiative environment, those that may cause depletion of the global ozone layer, and those that affect baseline air quality; GMD accomplishes this mission primarily through long-term measurements of key atmospheric species at sites spanning the globe, including four fully-equipped Baseline Observatories. These key species include carbon dioxide, carbon monoxide, methane, nitrous oxide, surface and stratospheric ozone, halogenated compounds including CFC replacements, hydrocarbons, ulphur gases, aerosols, and solar and infrared radiation.

10.6 WMO

GALION	The Global Atmosphere Watch (GAW) aerosol programme strives "to determine the spatio-temporal distribution of aerosol properties related to climate forcing and air quality up to multidecadal time

	scales". Aerosol Optical Depth (AOD) is one of the parameters measured in GAW. More specific information is obtained by the GAW Atmospheric Lidar Observation Network (GALION) that provides the vertical aerosol distribution through advanced laser remote sensing in a network of ground-based stations.
GAW	The Global Atmosphere Watch (GAW) programme of WMO is a partnership involving 80 countries, which provides reliable scientific data and information on the chemical composition of the atmosphere, its natural and anthropogenic change, and helps to improve the understanding of interactions between the atmosphere, the oceans and the biosphere. GAW focuses on global networks for GHGs, ozone, UV, aerosols, selected reactive gases, and precipitation chemistry. • MACC is working on getting access to more NRT GAW measurements, e.g. through their involvement in the WMO GAW Expert team on NRT chemical data transfer. It has turned out to be very difficult to get access to the data. Data are collected by DWD for MACC. 10 to 15 GAW stations report regularly – out of approximately 350 stations; 7 stations out of 26 global stations are reporting. In the best case observations are less than 24 hours old but often observations are several days (or weeks) old. It is important that the number and the timeliness of stations reporting regularly to MACC improve over the next years. Data from the GAW stations are used primarily for validation purposes; • The Global Atmosphere Watch (GAW) programme performs global observations and provides calibrated and quality controlled measurements of many atmospheric constituents, which can potentially be of high value for the MACC validation activities. However, the procedures presently established at the GAW partner sites do not account for rapid delivery of observational data and some GAW stations have accumulated a multi-year lag of data delivery to the World Data Centre for Greenhouse Gases (WDCGG). • The GAW programme has set up the Expert Team on Near Real Time Chemical Data Transfer (ET-NRT-CDT) to respond to an increasing need for NRT data delivery from the modelling community, as this collaboration is important in the implementation of the integrated observing systems. • All continuously operating GAW stations are requested to submit data in the 'rapid delivery' (1 day – 1 week) mode to the MACC GAW validation group. It is desirable that the set of stations give global coverage.
WDCA	Metadata related to aerosol measurements within GAW and its contributing networks is hosted by the GAW Station Information System (GAWSIS), while the data are archived by the World Data Centre for Aerosols (WDCA). WMO and the SAGAerosols are pleased to announce that as of January 2010 the WDCA was transferred through an MOU from JRC ISPRA to NILU. The NILU effort is led by Kjetil Torseth and Marcus Fiebig, the latter having joined the SAGAerosols in conjunction with the transfer.

	The JRC Ispra is thanked for maintaining the centre for the past 15 years; the JRC manager and aerosol expert Julian Wilson will remain on the SAG.
WDCGG	The World Data Centre for Greenhouse Gases (WDCGG) is one of the World Data Centres under the GAW programme. It serves to gather, archive and provide data on greenhouse gases (CO_2, CH_4, CFCs, N_2O, surface ozone, etc.) and related gases (CO, NOx, SO_2, VOC, etc.) in the atmosphere and ocean, as observed under GAW and other programmes.
WOUDC	The World Ozone and Ultraviolet Radiation Data Centre (WOUDC) is one of the World Data Centres, which are part of the Global Atmosphere Watch (GAW) programme of the World Meteorological Organization (WMO). The WOUDC, which began in 1961, is operated by the Experimental Studies Section of Environment Canada and is located in Toronto.
WRDC	The World Radiation Data Centre (WRDC) is sponsored by the World Meteorological Organization (WMO) on the basis of Resolution 12 XIV Session of the EC and Resolution 6, XXXVI Session of the EC. The WRDC centrally collects and archives radiometric data from the world to ensure the availability of these data for research by the international scientific community. The WRDC issues the publication "Solar Radiation and Radiation Balance Data (The World Network)" with the purpose of providing the users with data on solar radiation, radiation balance and sunshine duration in convenient and readily accessible form. From 1964 the radiation data were published once a month. Since 1993 the publication has been issued four times a year. Observational data received by the WRDC with certain delay are published in the supplementary issues. The issues are distributed among the National Meteorological Services which send their solar radiation data to the WRDC.

10.7 UN

HTAP	To develop a fuller understanding of intercontinental transport of air pollution in the Northern Hemisphere, the Executive Body of the UNECE Convention on Long-range Transboundary Air Pollution (LRTAP Convention) established the Task Force on Hemispheric Transport of Air Pollution (TF HTAP) to: (a) Plan and conduct the technical work necessary to develop a fuller understanding of the hemispheric transport of air pollution for consideration in the reviews of protocols to the Convention; (b) Plan and conduct the technical work necessary to estimate the hemispheric transport of specific air pollutants for the use in reviews of protocols to the Convention and prepare technical reviews thereon for submission to the Steering Body of EMEP; (c) Carry out such other tasks related to the above work as the Executive Body may assign to it in the annual work-plan. [See

	Annex IV of ECE/EB.AIR/83/Add.1]

10.8 OTHER

SKYNET	SKYNET is an observation network to understand aerosol -cloud-radiation interaction in the atmosphere. The main instruments consist of a sky radiometer and radiation instruments such as a pyranometer and pyrgeometer as a basic site, and a super site has more instruments extended for analyzing atmospheric parameters of aerosol, cloud and radiation. The observation sites of SKYNET are located mainly in the Eastern Asia from Mongolia to Thailand as well as in Japan. The data observed at each site are collected into a site server and then transferred using an internet for super sites and sent by off-line transportation for other sites. These data are archived into a SKYNET server in Chiba University and then open to the public. The SKYNET is a voluntary-based activity, which is supported by many researchers and collaborators in the community.

11 Conclusions and outlook

This report represents a comprehensive list of in-situ requirements of the GMES Services (Emergency Response, Land, Atmosphere, and Marine). It is based on different project documents and personal meetings with stakeholders of the above mentioned services.

The report will help to identify potential in-situ data providers and stakeholders who could contribute to a long term in-situ data provision. This could be research projects, the private industry and EU/EEA Member Countries. Especially for the Member countries the provision of in-situ data could be considered as national contribution to GMES.

The report in its current version does not include the requirements from the GMES Global Land service, EFAS and ESA. Those will be considered in a future version.

It is expected that this report will be periodically reviewed and updated in the course of the GISC project to consider changes in the service's product portfolios and to cover in-situ requirements of future GMES services.

12 Applicable documents

This document is based on information obtained through a direct consultation process with the GMES Core Services as well as related documents (including information available on the internet).

GMES Core Service	Name	Author	Date
Image 2012	GMES Fast Track Land Service 2006-2008: IMAGE2006 European Coverage - Methodology and Results. May 2009.	DLR, Metria	12/05/2009
Land	CMS Euroland User Interface dossier – In-situ Data Quality Specification D-EL-014	Geoland2 consortium	31/07/2009
	CIS Forest User Interface Dossier – In-situ Data Quality Specification g2_FO-RP-D_FO014	Geoland2 consortium	27/07/2009
	Mapping Guide for Urban Atlas	EEA	26/08/2010
	GIO Land Monitoring Implementation Plan 2011 – 2013	EEA	12/2010
	Urban Atlas – Luz Delivery Report	SIRS	04/12/2009
	CLC 2006 Technical guidelines	EEA	17/12/2007
	GMES Fast Track Service Precursor on Land monitoring – EEA project implementation plan GMEs Land FTSP 2006-2008	EEA	16/11/2006
	Documents from the Euroland User Workshop on HR Layers	Geoland2 consortium	21-22/07/2010
Emergency Response	Personal consultation with GMES Safer	EEA/ Safer	22-23/09/2009
	GMES Emergency Management Service as developed by SAFER. Product/ Service Portfolio	Safer	11/2010

Atmosphere	Report of the MACC/GAW Session on the Near Real Time Delivery of the GAW Observations of Reactive Gases. GAW Report no. 189. WMO/TD-No 1527	MACC/GAW	04/2010
	Global Monitoring for Environment and Security Atmosphere Core Service (GACS) Implementation Group. Final report.	GACS	04/2009
	MACC Requirements for Near Real Time Air Quality Data Exchange. D-INSITU working group.	MACC	09/2010
	Towards a Federated Aerosol Network. A white paper on a workshop in Emmetten, Switzerland, 28-29 April 2009, Version 1.		12/2010
	WMO Global Atmosphere Watch (GAW) Strategic Plan: 2008 – 2015. WMO/TD No. 1384.	WMO	
	IGACO theme report. Integrated Global Observing Strategy.	IGACO	09/2004
	Monitoring Atmospheric Composition Change, Atmospheric Environment vol. 43 2009.	P. Laj et al.	2009
Marine	Product Dependencies Dataflow for external In-situ data – Technical Note based on "MYO-TOP-TN-PDD V2.8" DOCUMENT	MyOcean	27/01/2011
	The In-situ observation stakeholders for MyOcean	S. Pouliquen, P.Y. Le Traon/ Ifremer	21/01/2011
	Report of the EEA Workshop In-situ data requirements for the GMES Marine Core Service, June 1-2, 2010 EEA, Copenhagen	P.Y. Le Traon, S. Pouliquen/ Ifremer	08/10/2010

13 Meetings

In addition to the listed documents information was gathered during many workshops, conferences and meetings which were organised and/ or attended by GISC team members.

Meeting	Date
GEOmon	19.01.2010
EUMETNET	29.01.2010
ICOS	10.03.2010
GISC Marine Workshop	01.06.2010
Eurogeographics	16.06.2010
Eurosites	16.06.2010
EuroArgo	16.-17.06.2010
EUMETNET 2nd meeting	06.07.2010
GMES SAFER	08.09.2010
EUMETNET 3rd meeting	13.10.2010
NRC Air Quality Workshop	14.10.2010
MACC General Assembly	19.10.2010
NRC Marine Workshop	25.10.2010
NRC Land Workshop	15.-17.11.2010
GMES NFP Working Group 1st meeting	01.12.2010
MACC on NRT access to Air Quality data	13.12.2010
ESA	14.12.2010
GMES NFP Working Group 2nd meeting	03.03.2011
Expert meeting with EUMETNET	18.01.2011
MyOcean	20.01.2011
IAGOS	14.03.2011