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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>PU</td>
<td>Public</td>
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<td>PP</td>
<td>Restricted to other programme participants (including the Commission Services)</td>
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<td>RE</td>
<td>Restricted to a group specified by the consortium (including the Commission Services)</td>
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<tr>
<td>CO</td>
<td>Confidential, only for members of the consortium (including the Commission Services)</td>
</tr>
</tbody>
</table>
Executive Summary

The series of reports “Specification report for demonstration actions—…” are meant to support the work of the operators of the ESONET demonstration missions. Together with the deliverable “Report of testing facilities survey” they are containing recommendations and guidelines in regard to implementing best practices into the preparation, deployment and operation work of the ESONET demonstration missions. It can be seen as a first step towards introducing quality management principles into ocean observatory field work. The “Specification report for demonstration actions – quality assurance” is defining the framework for the other documents explaining the high level principles underlying the other reports. All documents will undergo revisions based on the feedback of demo mission operators.

It is not expected that with these documents a comprehensive quality management system can be set in place. However, it can be expected that this first step into this direction will provide valuable information about how to implement these principles into ocean observatory work.

To support the European integration of regional ocean observatory it will be of importance to follow recommended procedures that are based on the experience of the involved partner institutions. To fix these procedures is the main intention of the series of the reports and by this it will enable the future definition of an ESONET label that essentially describes a certification process.

D35 Recommendations for ESONET registration in GEOSS

This document informs the ESONET community on the process of data holdings services registration in GEOSS, summarizes the concepts and the corresponding terminology used within GEOSS and lists a set of recommendations for ESONET to implement an internal strategy in order to make ESONET an operational component of GEOSS. Finally, the process of registering a service within the GEOSS infrastructure is briefly described.
Recommendations for ESONET registration in GEOSS

Author(s): Eric Delory, dBscale & IEEE Committee on Earth Observations Standards Working Group

Abstract:
This document describes how ESONET can register as a sustainable Global Earth Observation System of Systems (GEOSS) component and states a set of recommendations to this aim. Considering the on-going effort taking place both in ESONET and GEOSS, this document will be periodically updated.
ESONET as a sustainable GEOSS component

1.0 SCOPE

This document informs the ESONET community on the process of data holdings services registration in GEOSS, summarizes the concepts and the corresponding terminology used within GEOSS and lists a set of recommendations for ESONET to implement an internal strategy in order to make ESONET an operational component of GEOSS. Finally, the process of registering a service within the GEOSS infrastructure is briefly described.

2.0 DESCRIPTION

We hereby describe the parts of the GEOSS infrastructure and services that are relevant to the objectives of the document.

2.1 GEOSS components and services

In GEOSS, observatories are represented as Components. A component is an earth observation resource, an entry and contact point for the observatory organization, lead entity and service infrastructure (e.g. FAO, NASA ECHO, ESONET, etc.), while a service is an operational function of this component that has been registered for this component according to a given set of prerequisites such as interoperability.

“...To enable implementation of the GEOSS architecture, GEOSS will draw on existing Spatial Data Infrastructure (SDI) components as institutional and technical precedents in areas such as geodetic reference frames, common geographic data, and standard protocols. GEO Members and Participating Organizations and their contributions will be catalogued in a publicly accessible, network-distributed clearinghouse maintained collectively under GEOSS. The catalogue will itself be subject to GEOSS interoperability specifications, including the standard search service and geospatial services.” (from GEOSS 10 year implementation plan)

Interoperability

Interoperability, one of the key criteria for GEOSS, is achieved through the implementation of common procedures and data product formats at component level. The observatory is responsible for this implementation. To be efficient on a global scale, these procedures and formats need to be and are generally specified in globally agreed upon and accessible specifications, i.e. international standards. In GEOSS standards are registered in the Standards and Interoperability Registry (SIR) (http://seabass.ieee.org). A GEOSS standard is an international standard that has been approved by the GEOSS Standards and Interoperability Forum (SIF), after evaluation by a team of subject matter experts.
2.2 Component and Service Registration

As two functionally distinct and complementary parts of the GEOSS Common Infrastructure (GCI), the GEOSS Components and Services Registry (CSR) and the GEOSS Standards and Interoperability Registry are on-line tools that provide registration interfaces and searchable databases for the adequate registration of data holdings services in GEOSS.

2.3 Standards and Special Arrangements

An observatory, component or EO Resource organization may send a request to the SIF for the registration of an interoperability procedure (special arrangement) or standard that is currently unavailable in the registry. The SIF will launch an evaluation procedure on this request and inform that organization on the outcome. Once the standard or special arrangement has been approved, it will be registered and accessible from the service registration interface. The organization will henceforth be able to proceed with the registration of the corresponding services that use this standard or special arrangement. In ESONET, an observatory could for example ask for the registration of a standard or special type of lossless data compression and encoding for acoustic data as a standard or special arrangement respectively before registering a streaming service in GEOSS. If MP3 were the standard in use, the SIF would create a task item for this standard and evaluate whether this standard responds to GEOSS “quality thresholds” for interoperability (this standard would probably not pass in its current form). Another more generic example is the registration of a searchable database hosted by an ESONET observatory accessible as a web service which implements the CSW standard or is defined in WSDL on UDDI. As these standards are GEOSS standards, this EU resource service owned by the observatory will be registered without tasking the SIF.

2.4 CSR and SIR interrelation

The following figure summarizes how a GEO member organization (examples are a country, an international organization (WMO, WHO, FAO), the European Commission) registers a component in GEOSS. For ESONET, the organization is the European Commission, the GEOSS component is ESONET, GEOSS services are all services offered by ESONET organizations and observatories. On this figure, USA (George Mason University) and IEEE are here to reflect the country and organization that currently host the CSR and SIR respectively.
Figure 1. by Douglas Nebert, excerpted from the GEOSS Core Architecture Implementation Report [Editors: George Percivall and Ingo Simonis] with slight modification.
3.0 RECOMMENDATIONS

We will here after list a set of recommendations for the registration of ESONET as a component of GEOSS. It should be highlighted that GEOSS and ESONET are currently on-going efforts, i.e. these recommendations may be updated periodically.

3.1 A first recommendation is that in ESONET we identify which observatories are ready today to offer a data access service as well as the standards these services are based on.

3.2 If services are not implementing a GEOSS standard, the method utilized in the encoding of data shall be registered as special arrangement.
3.3 In an initial period, to accelerate the registration of current operational resources, registered services can be owned and administrated by the regional observatory owner, which means that each service will come up with its own URL and service description with direct connection to the observatory cyber-infrastructure. This registration will have to be accepted by ESONET Steering Committee which verify compliance with the ESONET Label.

3.4 When ESONET is ready to act as a service provider for all registered services, URLs will be updated accordingly on the GEOSS component and services registry. This will imply that the ESONET clearinghouse takes charge of the registration process for new services from then on. These URLs will transparently redirect to the regional observatory services URLs. This will insure that the user accessing these services can maintain their connection active independently of a change in the regional URLs as they will be updated by the regional observatory on the ESONET clearinghouse service registry.

3.5 ESONET shall eventually be, as a component, the registrar of these services for which there shall be a single point of contact.

3.6 ESONET will create a registry along with a registration interface where all regional services will be registered so as to enable ESONET to keep the GEOSS service registry updated.

3.7 ESONET acting as a clearinghouse implies that regional services be tested by expert users prior to registering these services on the GEOSS service registry.

3.8 Service operation shall be insured by the regional observatory, which will inform the ESONET clearinghouse on disconnection, failures, and maintenance activities for that service. ESONET will update the GEOSS registry accordingly.

3.9 ESONET will be able to provide its own services as integrated structure of regional observatories'services. These, for example, could be services integrating data from different regional observatories. (These could be called ESONET integrated services)

3.10 ESONET will encourage the use of a reduced set of standards and will explicitly validate specific standard proposed by a peculiar regional observatory.
7.0 ANNEXE 1

A survey will be sent to ESONET regional observatories’ contact points. This survey is meant to create a record of the level of standardization in ESONET and to create a short list of potential contact points for the ESONET:GEOSS discussion forum where the survey results will be posted and commented.

**Survey on Standards in use by ESONET observatory infrastructures and on GEOSS aspects**

Authors: Eric Delory, DATA section revised by Siri Jodha Singh Khalsa, IEEE

Fields marked with * are required

Name of your organization *

Your name *

Your function/position *

Your email

**SENSORS AND PHYSICAL INTERFACE**

**Question 1 : Interface Communication Standards**

What communication standards are used in your observatory for communicating with the instruments interface? (ex., TCP/IP, RS232-485, IEEE1451, CAN, etc.)

**Question 2 : Interface Control Documentation and traceability**

What standard are used in documenting the instrument interfaces?

**Question 3: Other standards including data acquisition**

What standards are used in the acquisition of the data you serve, i.e. standards related to sensing, transmission, quality assurance, etc. What factors did your organization consider in choosing these standards?

**GEOSS**

**Question 1 : GEOSS in general**
Are you interested in making part of your datasets globally accessible? What would be your conditions if any?

**Question 2 : Interoperability implementation**

Are you operational in this respect, is it part of your organization’s agenda?

**Question 3 : ESONET as main european ocean observatories node for GEOSS**

Would you agree with ESONET being a clearinghouse (search tool and catalogue) for ESONET observatories’ connection to GEOSS?

**DATA**

**URL(s) of your organization data holdings**

(if for each holding the standards in use are different we would be grateful if you could fill-in and submit the form for each of them, in which case, just click on your browser's back button after submitting this one)

**Question 1: Data Formats**

Please indicate what formats you use for storing and distributing data (ASCII, binary, BUFR, geoTIFF, HDF, netCDF, SDTS, etc.) What factors did your organization consider in choosing these standards?

**Question 2: Metadata Standards**

Please tell us what metadata standard(s) are used to describe your data (ISO19115, FGDC, etc.). What factors did your organization consider in choosing these standards?

**Question 3: Catalog Interoperability Standards**

Are the holdings of your archive searchable via catalog interoperability standards (Z39.50, etc.)? If so, what are they? What factors did your organization consider in choosing these standards?

**Question 4: OGC Standards**

Are the holdings of your archive accessible through any of the Open Geospatial Consortium (OGC) standards? If so, which (WMS, WCS, WFS, etc.)? What made your organization decide to implement these standards?

**Question 6: Archival Standards**

Do you follow any formal standards for the long-term preservation of your data holdings (e.g. PREMIS)? What factors did your organization consider in choosing these standards?
Question 7: Interoperability

Are there any other standards or procedures that you follow to maximize the usability of and access to your data holdings?

Question 8: Process Standards

Are there any other standards or procedures that you follow in the systems engineering process?

8.0 ANNEXE 2

GEOSS activities are dedicated to a number of Societal Benefit Areas (Disasters, Water, Health, Biodiversity, etc.) and are organized either according to these areas, or according to so-called transverse areas like Data and Architecture, User Interface, etc. Activities that directly or indirectly address ocean issues are spread over these areas and henceforth do not show-up clearly when browsing through the GEOSS web.

This document henceforth lists the GEO tasks that address specifically, though to different degrees, the ocean domain. Further than providing generic information on GEOSS activities of interest to ESONET, this list allows ESONET participants to identify GEOSS tasks they can contribute to.

AR-09-02: Interoperable Systems for GEOSS

a) Virtual Constellations (former DA-07-03) 14
b) Sensor Web Enablement for In-Situ Observing Network Facilitation (former DA-07-04) 14
c) Sensor Web Enablement for In-Situ Observing Network Facilitation (former DA-07-04) 14

c) Sensor Web Enablement for In-Situ Observing Network Facilitation (former DA-07-04) 14

AR-09-03: Advocating for Sustained Observing Systems

a) Legacy of the International Polar Year 2007-08 (former CL-06-05) 14
b) Global Ocean Observation System (former CL-06-06) 15
c) Global Ocean Observation System (former CL-06-06) 15
d) Global Observing System (GOS) (former WE-06-01 and WE-06-02) 15

d) Global Observing System (GOS) (former WE-06-01 and WE-06-02) 15

CB-09-03: Building Institutional Capacity to Use Earth Observations

da) Building Capacity for Operational Oceanography 15
d) Building Capacity for Operational Oceanography 15

c) Building Capacity for Operational Oceanography 15

DI-09-01: Systematic Monitoring for Geohazards Risk Assessment

a) Tsunami Early Warning System of Systems (former DI-06-04) 16
b) Seismographic Networks Improvement and Coordination (former DI-06-02) 16

DI-09-03: Warning Systems for Disasters

a) Tsunami Early Warning System of Systems (former DI-06-04) 16
b) Seismographic Networks Improvement and Coordination (former DI-06-02) 16

HE-09-02: Monitoring and Prediction Systems for Health

a) Aerosol Impacts on Health and Environment: Research, Monitoring and Prediction (former HE-07-03) 16

EN-07-01: Management of Energy Sources 17

EN-07-02: Energy Environmental Impact Monitoring 17
CL-09-03: Global Carbon Observation and Analysis System  
   a) Integrated Global Carbon Observation (IGCO) (former EC-06-01)  

WA-08-01: Integrated Products for Water Resource Management and Research  
   g) Global Water Quality Monitoring (former WA-07-01)  

EC-09-01: Ecosystem Observation and Monitoring Network (GEO EcoNet)  
   a) Ecosystem Classification and Mapping (former EC-06-02)  
   b) Ecosystem Status and Trends  

EC-09-02: Ecosystem Vulnerability to Global Change  
   a) Impact of Tourism on Environmental and Socio-Economic Activities  
   c) Vulnerability of Sea Basins  

AG-06-02: Data Utilization in Fisheries and Aquaculture
AR-09-02: Interoperable Systems for GEOSS
Address the various interoperability aspects of contributing systems, including observing, modeling and information systems.

a) Virtual Constellations (former DA-07-03)

This sub-task is led by CEOS (mary.kicza@noaa.gov) and GTOS (GOFC-GOLD)
Advocate rapid development of the “CEOS Constellations Concept”. Observations from a virtual constellation would provide better temporal, spatial, and spectral resolution and related data management and dissemination. A series of virtual constellations are in definition by space agencies, in consultation with user communities within the CEOS framework, each addressing key GEOSS observation gaps in the process. Prototype Constellations address:
- Precipitation, which aims to strengthen international cooperation on space-based observations of precipitation, including realisation of the GPM mission and providing guidance to new;
- Land Surface Imaging, designed to ensure the relevant synergy with High Resolution Multispectral Imager Continuity;
- Ocean Surface Topography, designed to ensure continuity of Sea Level measurement in accordance with GCOS requirements;
- Atmospheric Chemistry, which will address many of the needs for atmospheric observations of the climate community;
- Ocean Colour Radiometry which will provide scientific data products related to marine ecosystems and ocean biogeochemistry for near-surface global ocean and coastal waters (pending on final approval by CEOS Members);
- Ocean Surface Vector Winds to collect observations of ocean surface vector winds over the global ice-free ocean that will be used for operational analyses and forecasts, as well as retrospective research (pending on final approval by CEOS Members)

Other cases, for instance constellations of SAR systems or micro-satellites for a range of Earth observation applications, will be considered along the line.

c) Sensor Web Enablement for In-Situ Observing Network Facilitation (former DA-07-04)

This sub-task is led by South Africa (CSIR, tvzyl@csir.co.za)
Foster the development of space-borne, air-borne, sea-based and ground-based sensing networks (advances in communication technology and ground-based in-situ technologies have made it feasible to consider webs of sensors on all types of platforms with rapid access to observations; this technology is referred to as Sensor Webs and Sensor Networks). Develop scenarios or use cases that demonstrate the value of Sensor Webs to the GEOSS societal benefit areas e.g. Disasters, Health, Biodiversity, Ecosystems and Water. Evaluate the applicable standards, and coordinate with AR-09-01.

AR-09-03: Advocating for Sustained Observing Systems
Establish actions for the maintenance and expansion of GEOSS-underpinning observing systems, including atmospheric, terrestrial and oceanic, both in-situ and space-based. Promote stable, reliable and long-term operations of Earth observing networks within the framework of national policies and international obligations. In line with the “Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC”, accelerate the implementation of the Global Climate Observing System (GCOS) through enhanced support for the Global Ocean Observing System (GOOS), the Global Terrestrial Observing System (GTOS), the WMO Global Observing System (GOS) and Global Atmospheric Watch (GAW), and the global hydrological networks.

b) Legacy of the International Polar Year 2007-08 (former CL-06-05)
This task is led by WCRP (vryabinin@wmo.int), and is supported by the Cryosphere Community of Practice. Coordinate with the International Polar Year (IPY) to enhance the utilization of Earth observations in all appropriate realms (including, but not limited to, sea and land ice, permafrost, coastal erosion, physical and chemical polar ocean changes, marine and terrestrial ecosystem change, biodiversity monitoring and impacts of increased resource exploitation and marine transport). Ensure an appropriate legacy for IPY projects and advocate for the continuation of relevant efforts beyond the duration of the IPY.

c) Global Ocean Observation System (former CL-06-06)

This sub-task is led by GOOS (b.lee@unesco.org), IEEE and POGO, and is supported by the Coastal Zone Community of Practice. Enhance and improve the coordination of coastal/open-ocean observations and modelling initiatives, in support of a global ocean observation system. Related activities will include: Improve the global coverage and data accuracy of the coastal/open ocean observing systems as well as the management and archiving of the resulting data and information. Contribute to the implementation of global coastal and open ocean observing networks using the mechanism of GOOS and Regional Alliances. In particular sustain and extend the network of Argo buoys and encourage the establishment of a Program Office to ensure the ongoing implementation of this global array of profiling floats in the ocean. Building on existing capabilities, develop a global coordinated information and data system for deep-ocean monitoring to better understand the dynamics of the ocean processes throughout the ocean water column.

d) Global Observing System (GOS) (former WE-06-01 and WE-06-02)

This sub-task is led by WMO. Achieve a complete and stable Global Observing System (GOS). The surface-based component should include in-situ, airborne, land and possibly ocean measurements; high priority should be given to a stable, and as much as possible automated, fully functional World Weather Watch Upper Air Network and the further development of the Aircraft Meteorological Data Relay (AMDar) programme. The space-based component should include operational geostationary and polar components building upon WMO efforts to (i) increase spatial and temporal resolution for geostationary imagers and sounders, and (ii) provide a broader availability of polar Doppler wind profiles for initial operational testing.

CB-09-03: Building Institutional Capacity to Use Earth Observations

Coordinate, strengthen and sustain existing capacity building networks within Earth observation communities. As appropriate facilitate the construction of new networks.

d) Building Capacity for Operational Oceanography

This sub-task is led by Denmark (DMI, js@DMI.dk). Facilitate ocean data sharing and use by stimulating a global cooperation on operational oceanography, especially in developing countries. In the first stage, establish a global operational oceanography network connecting advanced operational forecasting centres in developed countries and quasi-operational centres in e.g. Asia, Africa and Latin America. In the second stage, establish regional cooperation projects (between advanced and less-developed operational centres). The first cooperation example will be based on EU project YEOS, a cooperation among China, EU and Korea.

DI-09-01: Systematic Monitoring for Geohazards Risk Assessment

Define and implement a unified and integrated approach to geohazards risk assessment. Build upon synergies and integrate data from global insitu seismographic networks and remote sensing. Coordinate multi-level efforts and implement decision-support tools to facilitate and support data access for selected “Supersites” locations.
b) Seismographic Networks Improvement and Coordination (former DI-06-02)

This sub-task is led by China (CENC), EC (EMSO), USA (USGS), FDSN and ISC, and supported by the Geohazards Community of Practice. Improve the capabilities of global seismographic networks such as GSN, FDSN (including regional and global components), GNSS networks and new ocean bottom networks such as VENUS, NEPTUNE and ESONET. Facilitate sharing of data and event products among GEO members. Expand and coordinate efforts to provide access, using GEOSS interoperability methods, to real-time and archived seismological data and products. Develop a portal that will interlink distributed seismological data centers and provide seamless access to other GEOSS components. Broaden the scope of this activity to identify and build upon synergies across in-situ observing network types (e.g., seismological, GNSS, hydrological). Synergies could range from the use of the same best practices and operational approach, to the use of a common part of the infrastructure for collection and dissemination, and co-location of in-situ instruments.

DI-09-03: Warning Systems for Disasters

Support the development, improvement and coordination of early warning systems for natural disasters.

a) Tsunami Early Warning System of Systems (former DI-06-04)

This sub-task is led by IOC (p.koltermann@unesco.org) and UNOSAT, and supported by the Geohazards and Coastal Zone Communities of Practice. Support the establishment and continuation of a multi-hazard fully-operational global tsunami early warning and mitigation system of systems. Promote full and open exchange of publicly-funded, unclassified data relevant to tsunami warning/mitigation systems and enhancement/development of mechanisms for real-time data sharing, including seismic and sea level (deep ocean and tide gauge) data. Contribute to the operationalization of comprehensive observing networks (in-situ sea level, seismic stations and remote monitoring) and data management systems (including integration of the global ocean observing system (GOOS), international seismic networks, and related global telecommunication systems). Define and promote standards/protocols for operating observing systems, and managing data exchange/transmission for multiple observing systems relevant to tsunami detection, early warning and mitigation. Build upon GMES projects in the area of emergency response and marine aspects.

HE-09-02: Monitoring and Prediction Systems for Health

Support the development of operational health-related applications. Connect established and emerging cross-cutting observing systems to monitoring and prediction systems for health. Include and gradually consolidate contributions from different, not yet coordinated systems. This Task will feed into HE-09-01 and HE-09-03.

a) Aerosol Impacts on Health and Environment: Research, Monitoring and Prediction (former HE-07-03)

This sub-task is led by WMO (dparsons@wmo.int), and supported by the Air Quality & Health and Atmospheric Chemistry (former IGACO) Communities of Practice. Facilitate research and development activities that lead to the delivery of new services related to monitoring of the atmospheric cycles of various aerosols and their improved forecast in operational numerical models of the atmosphere. Reduce risks due to aerosol influences on health and public safety and assess aerosol effects on marine and terrestrial ecosystems. Support international initiatives such as the Sand and Dust Storm Warning, Advisory and Alert System (SDS-WAS) in developing dust storm warning system and assessments. Review current developments in the modelling and observation of bioaerosol transport/deposition and in the present understanding of impacts of the atmospheric deposition of dust (iron, phosphorus) to the ecosystem with the goal of extending the societal benefits of improved prediction of dust and aerosol.
EN-07-01: Management of Energy Sources

This Task is led by Germany (DLR, marion.schroedterhomscheidt@dlr.de), CEOS and IEEE, and is supported by the Energy Community of Practice.

Support the development of Earth observation products and services for the resource assessment, monitoring and forecasting of fluctuating energy sources (e.g. hydro, solar, wind, ocean). Consider end-to-end systems including generation, transmission, distribution, and integrated operations (e.g. efficient integration of energy sources into the electricity grid, and electricity grid management). Related activities will include: Promote collaboration between users and providers of Earth observation applications to foster the development of innovative Earth observation services in support of energy management. Expand the use of Earth observations in the development, operation and management of energy production systems. Assess the utility of Earth system models to inform energy sector decision-making on the future availability of resources in a changing climate.

EN-07-02: Energy Environmental Impact Monitoring

This Task is led by EC (EnerGEO, emile.elewaut@tno.nl), and is supported by the Energy Community of Practice.

Promote the development of Earth observation systems for the monitoring and prediction of environmental impact from energy resource exploration, extraction, transportation and/or exploitation. Build upon the contribution of the European project EnerGEO (Earth observation for monitoring and assessment of the environmental impact of energy use). Related activities will include: Promote and develop the use of Earth observation data for impact monitoring. Support the development of modelling systems helping to quantify and anticipate changes e.g. to freshwater, biodiversity, ecosystems, atmospheric and oceanic composition, and ground elevation. Make relevant synergies with Task CL-09-03 (Global Carbon Observation and Analysis System) and carbon sequestration & greenhouse gas monitoring activities.

CL-09-03: Global Carbon Observation and Analysis System

Implement a global carbon observation and analysis system addressing the three components of the carbon cycle (atmosphere, land and ocean) and providing high-quality regional information on CO2 and CH4 concentrations and emission variations. Combine observations, reanalysis and product development to develop tools for carbon tracking and carbon storage evaluation. Build upon 2004 internationally accepted strategies and the work of the WMO Global Atmospheric Watch (GAW) to implement the atmospheric component of those strategies.

a) Integrated Global Carbon Observation (IGCO) (former EC-06-01)

This sub-task is led by EC (COCOS) and USA (NOAA, USGS), and supported by the Carbon Cycle Community of Practice (former IGCO including GAW, rogerd@unimelb.edu.au)

Support the development of an integrated global carbon observation system, including improved global networks of atmospheric CO2 observations, air-surface exchange flux networks as well as surface ocean CO2 and related marine biochemistry observations. Encourage the development of high resolution global and regional data-assimilation and modelling systems to enhance the utility of the spatial and temporal resolution of those observations and provide relevant regional-scale information.

WA-08-01: Integrated Products for Water Resource Management and Research

Improvements and expansion of in-situ networks, combined with new satellite missions (in addition to existing space-borne Earth observing systems) and emerging assimilation and prediction capabilities, are opening the door to a new era in global water-cycle management.

g) Global Water Quality Monitoring (former WA-07-01)

This sub-task is led by Australia (CSIRO) and USA (EPA, State of Wisconsin, steven.greb@Wisconsin.gov), and supported by the Water Cycle Community of Practice (former IGWCO)
Initiate projects to develop operational observation and monitoring systems of water quality, integrating in-situ water quality monitoring methods for terrestrial sources & the coastal ocean with remote-sensed operational systems of global-scale freshwater quality. Ensure that resulting information systems are compatible and interoperable as part of the system of systems. Make relevant synergies with HE-07-02 and develop models that relate water quality databases to exposure and health effects data; and identify mechanisms for alerting public health professionals on hazardous conditions identified by the monitoring of these parameters.

**EC-09-01: Ecosystem Observation and Monitoring Network (GEO EcoNet)**

Coordinate and improve the observation, characterization and monitoring of terrestrial (forest, urban agriculture, woodlands, grasslands, and deserts), freshwater, ice and oceans ecosystems – especially in terms of acquisition and use of satellite/aerial/in-situ observation. Develop a global integrated sampling frame in coordination with the GEOSS Geodesy activities

a) Ecosystem Classification and Mapping (former EC-06-02)

This sub-task is led by Paraguay (Guyra Paraguay) and USA (USGS, rsayre@usgs.gov), and supported by the Forest and Global Agricultural Monitoring Communities of Practice

Continue efforts to produce a standardized, robust, and practical classification and map of global ecosystems at management-appropriate scales for terrestrial, freshwater, and marine environments. Integrate the global ecosystems product with existing ecosystem maps and databases, and support ecosystem (GEO Trends Analysis Network) and biodiversity (GEO Biodiversity Observation Network) monitoring approaches.

b) Ecosystem Status and Trends

This sub-task is led by USA (USGS, dmuchoney@usgs.gov), and supported by the Forest and Global Agricultural Monitoring Communities of Practice

Coordinate the continuing characterization and monitoring of ecosystems status and trends. Using the GEO Ecosystem map as a framework, extract geospatial data on key indicators of all ecosystems’ status, health and functioning (key indicators include time series of land cover change, climate variables, population, transportation, water and fragmentation). Major sources will include: (i) the Global Biodiversity Information Facility (GBIF); (ii) the IUCN World Conservation and Monitoring Center; (iii) The Encyclopedia of Life – an ecosystem of websites that makes key information about all life on Earth accessible to anyone, anywhere in the world; and (iv) The Encyclopedia of Earth – a new electronic reference about the Earth, its natural environments, and their interaction with society. The Encyclopedia is a free, fully searchable collection of articles.

**EC-09-02: Ecosystem Vulnerability to Global Change**

Identify and assess the risks posed by global change and human development to the environment, society and regional economies. Support the development of adaptation strategies to reduce these risks and mitigate impacts at local, regional and global levels.

a) Impact of Tourism on Environmental and Socio-Economic Activities

This sub-task is led by Greece (MKFES, greekgeo@admin.noa.gr)

Map potential impacts of global change on key sectors of Eastern Mediterranean's economy and society. Potential impacts include: (i) changes in agricultural production, fisheries and water supplies; (ii) Sea-level rise and its impact on tourism, manufacturing, land use, and urban areas; (iii) Impact on employment and other economic variables; and (iv) Intra-regional and extra-regional migration. Based on this mapping, identify potential measures for mitigating impacts. The tourism-intensive Eastern Mediterranean region features an extensive shoreline, thousand of islands, highly sensitive agricultural lands and an unstable economy. As a result, small environmental changes can negatively affect the region's social and economic conditions.

c) Vulnerability of Sea Basins
This sub-task is led by EC (EnviroGRIDS, anthony.lehmann@unige.ch) Develop a collaborative management system to store, analyze, visualize and disseminate crucial information on past, present and future states of European seas – to assess their sustainability and vulnerability. Build upon the European project EnviroGRIDS (gridded management system for environmental sustainability and vulnerability) to develop a Black Sea basin observation and assessment system. Make relevant synergies with AR-09-01 (GCI). EnviroGRIDS will rely on ultramodern technology using the largest gridded computing infrastructure in the world.

**AG-06-02: Data Utilization in Fisheries and Aquaculture**

This Task is led by Canada (BIO, forgetmh@mar.dfo-mpo.gc.ca), Spain (IEO) and POGO, and supported by the Coastal Zone Community of Practice Identify opportunities for the enhanced utilization of Earth observations in fisheries and aquaculture. Consult with experts from fisheries, aquaculture, coastal zone management and Earth observation communities at regional and international levels. Support the implementation of the SAFARI project and IOCCG monograph. Make relevant synergies with AR-09-02a and the proposed Virtual Constellation on Ocean Colour Radiometry that will provide products related to marine ecosystems and ocean biogeochemistry for near-surface global ocean and coastal waters.

9.0 ANNEXE 3

A website for GEOSS information relevant to ESONET:

http://sites.google.com/site/esonetgeoss/

Screenshots:
## Documents

This page harvests and annotates all documents that have been produced under ESONET-GEOSS related activities.

<table>
<thead>
<tr>
<th>Document Name</th>
<th>Description</th>
<th>Date</th>
<th>Time</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESONET-GEOSSREG-0309</td>
<td>The document lists all GEO tasks that address or are interested in ocean-related issues</td>
<td>15/01/2005</td>
<td>15:30</td>
<td>Eric Delory</td>
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<tr>
<td>GEO-OAM ESONET Ocean Acoustics Presentation (Eric Delory)</td>
<td>Presentation at GEO-OAM Workshop, Vienna, on globally distributed Ocean Acoustic Observatories and Marine Mammal Tracking</td>
<td>12/01/2005</td>
<td>17:44</td>
<td>Eric Delory</td>
</tr>
<tr>
<td>Marine Metadata Interoperability EOS Workshop (Kurtzville '06)</td>
<td>Workshop on Metadata Interoperability for Ocean Observatories</td>
<td>13/01/2005</td>
<td>09:16</td>
<td>Eric Delory</td>
</tr>
<tr>
<td>Workshop GEOSS Architecture Valencia '06</td>
<td>These are the minutes from workshop attendees' presentations; they are interesting for those who want an update on GEOSS architecture-related activities worldwide</td>
<td>13/01/2005</td>
<td>09:30</td>
<td>Eric Delory</td>
</tr>
</tbody>
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