Joint European Research Infrastructure network for Coastal Observatories

Second Data Management Report

D 5.7

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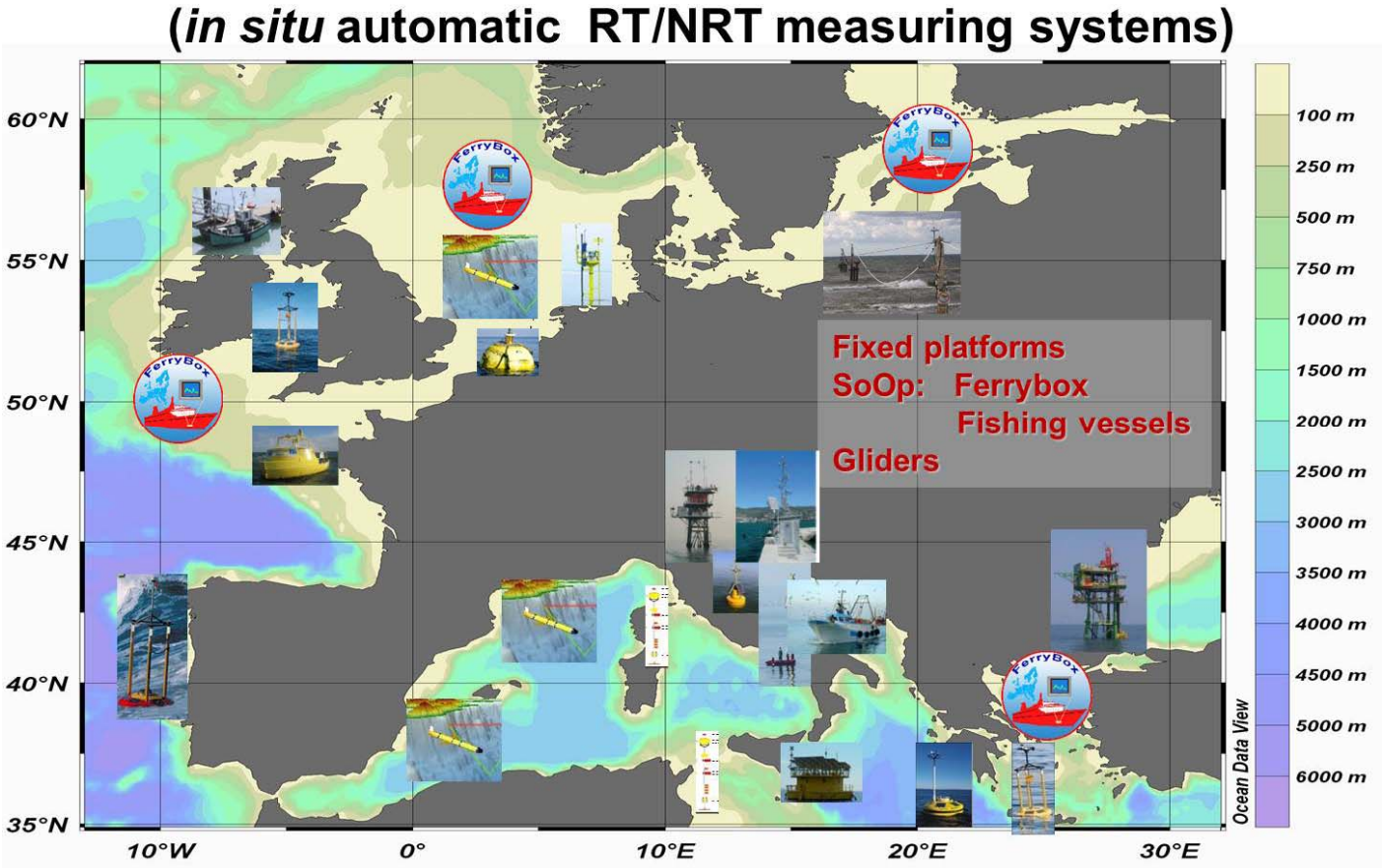
2. Executive summary

The success of the coastal observatory network created through the JERICO project depends on the reliability, accessibility and easy distribution of data coming from the participating observing systems. This necessarily implies the use of a standard platform and common procedures for handling the data produced by the network. The present document constitutes the Second Data Management Report of the project. It describes the general JERICO data management structure and policy, and gives a final overview of the actions and activities that were carried out within the framework of WP5, the work package of the project dealing with data management and distribution.

3. Introduction

The FP7 JERICO project embodies the first operational network of coastal observatories - assemblages of distributed sensor systems with extensive coverage - on a truly pan-European scale. The network is strikingly heterogeneous, marked by a surprising richness in the range of parameters handled, the frequency and spatial distribution of measurements, equipment maintenance practices, and the quality assurance schemes employed for sensors and data. All the coastal observatories forming the JERICO network share the same goal: to help detect and investigate coastal processes in a timely fashion, and provide crucial operational data for planning, assessment, mitigation, and model assimilation and validation purposes. The current composition of the JERICO network of coastal observatories is summarized in Fig 1.



Source: Sparnocchia et al. (Journal of Operational Oceanography, submitted)

Fig 1: Current composition of the JERICO network of coastal observatories showing the main kinds of real-time (RT) or near real-time (NRT) observing platforms in use.

As shown, the network mainly comprises four kinds of observing platforms: fixed or station-keeping structures, Ferryboxes on ferries, fishing vessels equipped with sensors mounted on fishing gear, and gliders; in more than a few cases, operators manage complex systems incorporating more than one of these platforms. The measuring instruments and sensors on the platforms can differ widely in number, kind, scope, and technical configuration from platform to platform, and from operator to operator. The sets of targeted parameters also vary considerably across the network, though salinity, temperature and pressure (depth) are nearly always measured. Table 1 provides a breakdown of the principal parameters being handled in the JERICO project.

Table 1. The JERICO parameter list; only the core parameters are presented.

	PARAMETER	CORE	OPTIONAL
PHYSICAL	Salinity	‼	
	Temperature	‼	
	Turbidity	‼	
	Sea level	‼	
	Surface waves	‼	
	Surface currents		‼
	Chlorophyll-a	‼	
	Turbidity	‼	
	CDOM		‼
	Noise Passive Acoustic Listener (PAL)		‼
CHEMICAL	Dissolved nutrients		‼
	Dissolved oxygen	‼	
	CO2 partial pressure	‼	
	Contaminants		‼
	pH or Alkalinity		‼

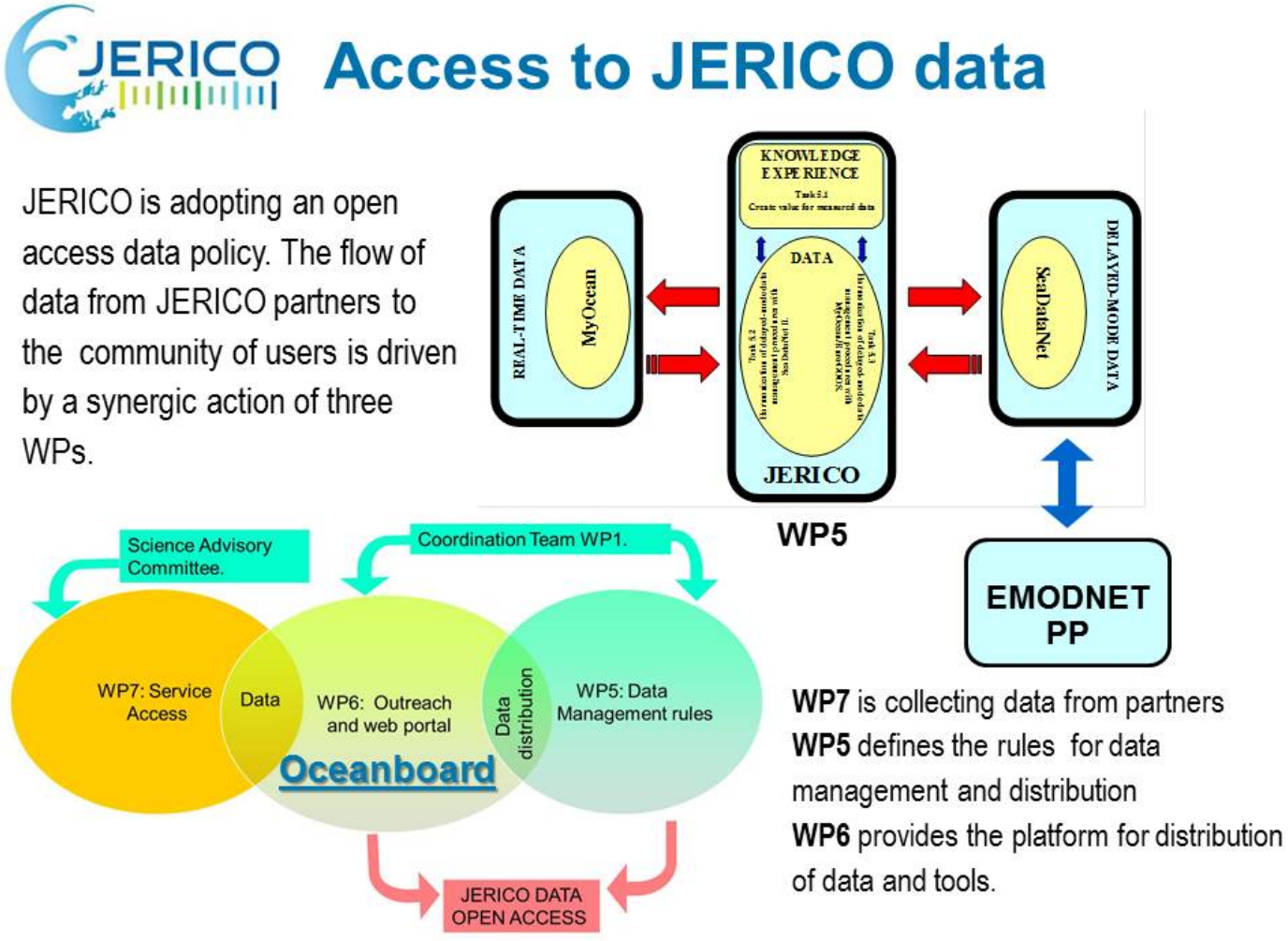
Source: Sparnocchia et al. (Journal of Operational Oceanography, submitted)

The JERICO network is geared towards ensuring continuous, timely access to coastal observations. The emphasis is on assuring valid data streams for coastal data at the transnational level in near real-time to ensure prompt availability and in delayed-mode for more deferred use.

4. Main Report

4.1. Overview of the JERICO data management structure and principal data flows

The JERICO approach to data handling is outlined in Figure 2. It is based on an “open” data access policy, following the conventional European outlook in these matters. The flow of data from partners to the community of users concerns three Work Packages: WP7 is collecting data from partners, WP5 defines the rules for data management and distribution, and WP6 provides the platform for the distribution of data and related tools.



Source: Sparnocchia et al. (submitted)

Fig 2: Outline of the JERICO data management scheme, featuring the driving actions and main information flows.

The data management structure is built on the principle of “using what exists”. Suitable partnerships have been created with ongoing European data management initiatives so as to minimize possible duplication of efforts. Thus, there has been no dedicated development of a specific data management structure for JERICO. Instead, the use of, and integration with, already available data management infrastructure has been pursued, a strategy consistent with the policy behind SeaDataNet and MyOcean, the major ongoing European initiatives for the establishment and coordination of infrastructures for the management and distribution of marine data and products.

The JERICO data management framework for delayed-mode data uses the SeaDataNet infrastructure while the near real-time data are being routed through MyOcean. There is continuous interaction with SeaDataNet, MyOcean, EuroGOOS and EMODnet to enable the seamless integration of the JERICO data stream into these two established European marine data management infrastructures. Many difficulties remain to be overcome, though, especially in relation to parameters and data types that are not actually being handled in SeaDataNet and/or in MyOcean.

4.2. Task 5.1: Create value for measured data

(Leader: OGS; other partner involved: HCMR)

This task was devised as a first step towards making the metrological concept of uncertainty in measurement an integral part of the JERICO observing and data management spheres. To this end, two technical documents treating this topic have been prepared. The first one, simply called “Guidelines for Uncertainty”, presents the essential principles and concepts central to the determination of measurement uncertainty. It describes the different steps involved in an uncertainty calculation, and introduces reporting conventions. Some guidance on the proper preparation of relevant documentation is also included, and the importance of uncertainty determinations in the context of coastal marine observing activity is outlined. The second document, entitled “Uncertainty estimation for temperature, salinity & chlorophyll-a” explains how one could proceed when attempting to establish measurement uncertainty for marine temperature, salinity and chlorophyll-a sensors. It presents descriptions of the three measurands from a metrological standpoint, and discusses the approaches that could be taken to prepare uncertainty budgets for relevant sensors with some suitable examples and useful advice.

4.3. Task 5.2: Harmonization of delayed-mode data management procedures with SeaDataNet (Leader: IFREMER; other partners involved: HCMR, MUMM, OGS)

In JERICO, the delayed-mode (DM) data stream is being handled through the SeaDataNet data management infrastructure. This infrastructure (Figure 3) is built around the National Oceanographic Data Centres (NODCs) of the different European countries involved in the SeaDataNet initiative.

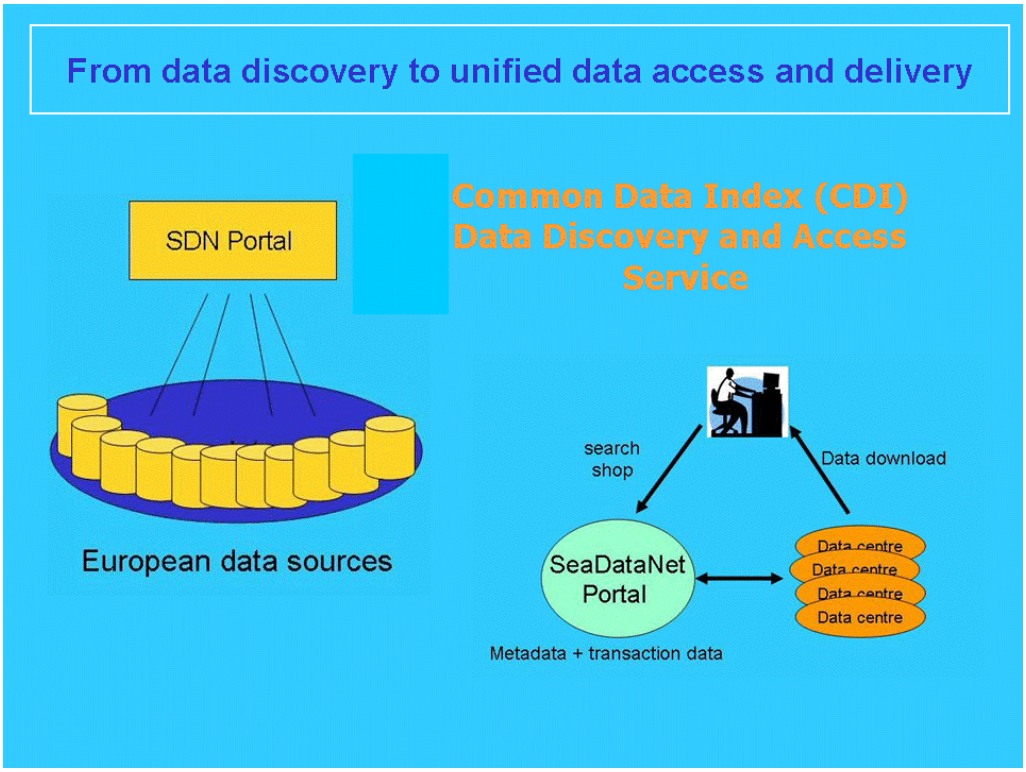


Figure 3. The main elements of the SeaDataNet data management infrastructure.

Each NODC is in charge of making relevant data from its specific country available to SeaDataNet. A NODC is normally not allowed to share the data from a country other than its own through SeaDataNet, although there is the possibility for this condition to be waivered upon specific request, especially when the whole dataset from a single project is accessible from a single repository. Furthermore, nRT data can be re-submitted as DM

data, particularly in the case where their original quality has been subsequently enhanced by ulterior quality checks and and/or calibrations.

As mentioned before, the data generated with the JERICO network mainly come from four kinds of observing platforms: fixed or station-keeping structures, ferryboxes on ferries, fishing vessels equipped with sensors mounted on fishing gear (Fishery Observing Systems), and gliders. SeaDataNet is able to handle most of the data types involved. The work of streamlining the interaction between JERICO and SeaDataNet was supervised by IFREMER and MARIS.

4.4. Task 5.3: Harmonization of real-time data management procedures with MyOcean

(Leader: IFREMER; other partners involved: CNR, NIVA, IMR, HCMR, PUERTO, SMHI)

In JERICO, the near real-time (nRT) data stream is being handled by MyOcean's system of Thematic Assembling Centres (TACs). This system comprises 7 components: a central Distribution Unit (DU), hosted by the CORIOLIS network (France), and 6 in-situ TACs that, in turn, operate as DUs. The in-situ TACs and their regional domains, which can overlap sometimes, are as follows:

- SMHI (Sweden) → Baltic Sea
- IMR (Norway) → Arctic seas
- BSH (Germany) → North West shelves
- IOBAS (Bulgaria) → Black Sea
- HCMR (Greece) → Mediterranean Sea
- Puertos Del Estado (Spain) → South West shelves

Note that the central DU handles global ocean data as well as data regarding European seas. It also acts as a backup for the regional TACs, which also serve the EuroGOOS ROOSs.

Within JERICO, some specific dataset indexing procedures were developed to help ensure compatibility with MyOCean requirements. An appropriate indexing and data distribution scheme was created. A distinct tag, an explicit JERICO index, was designed to enable easily recognition and selection of JERICO data from larger archives. This measure also allows to clearly define the JERICO contribution to the global marine observing system.

Furthermore, procedures using the OGC's SWE suite and SensorML format were developed to help implement standardized descriptions of the different elements of the

JERICO observing infrastructure. This work was overseen by IFREMER and MARUM. SWE is a set of OGC standards enabling real-time integration of heterogeneous sensors into an information infrastructure. These standards cover: platform/sensor and process descriptions (sensorML, TML), the observational data flow from sensors (O&M) and the

management of sensor requests, planning and alerts (SOS, SPS, SAS, WNS). SensorML is the XML format dedicated to sensor system descriptions: it describes sensor and observation networks hierarchically, and can be used to implement valuable platform catalogues. Most importantly, during the development of these procedures, synergies with earlier studies in ESONET and OceanSites, and current work within SeaDataNet and ODIP, were considered and taken into account.

An example of the description of a JERICO infrastructure element using the new procedures is shown in Figure 4. At the moment, the descriptions can contain technical specifications of platforms and sensors, details of instrument settings, calibrations and performances, and some information on data processing procedures.

Mooring with 14 sensors (atmospheric, sea-surface and water-column)

```
<!-- ++++++++++++++++++ -->
<!-- Instrument sensors -->
<!-- ++++++++++++++++++ -->
<sml:components>
<sml:ComponentList>
<sml:component name="young_04106" xlink:href="sensors/young_04106.xml"/>
<sml:component name="vaisala_PTB_220A" xlink:href="sensors/vaisala_PTB_220A.xml"/>
<sml:component name="fugro_oceanor_wavsense" xlink:href="sensors/fugro_oceanor_wavsense.xml"/>
<sml:component name="omega" xlink:href="sensors/omega.xml"/>
<sml:component name="aanderaa_3919A" xlink:href="sensors/aanderaa_3919A.xml"/>
<sml:component name="nortek_aquadopp_400" xlink:href="sensors/nortek_aquadopp_400.xml"/>
<sml:component name="seabird_37SI" xlink:href="sensors/seabird_37SI.xml"/>
<sml:component name="aanderaa_seaguard_395" xlink:href="sensors/aanderaa_seaguard_395.xml"/>
<sml:component name="contros_ch4" xlink:href="sensors/contros_ch4.xml"/>
<sml:component name="contros_co2" xlink:href="sensors/contros_co2.xml"/>
<sml:component name="aanderaa_turb" xlink:href="sensors/aanderaa_turb.xml"/>
<sml:component name="awt_126" xlink:href="sensors/awt_126.xml"/>
<sml:component name="aanderaa_optode_499" xlink:href="sensors/aanderaa_optode_499.xml"/>
<sml:component name="paroscientific" xlink:href="sensors/paroscientific.xml"/>
</sml:ComponentList>
</sml:components>
</sml:System>
</sml:member>
```

Figure 4. A sensorML description of HCMR's Poseidon - Pylos Platform.

Some of the main JERICO infrastructure components furnishing nRT data are listed in Table 2. Data are being sent continuously, barring periods of downtime when elements are offline for some serious reason, usually maintenance, malfunction or repair.

Table 2a. A list of the leading systems that have been contributing to the JERICO near real-time (nRT) data stream.

1) MOLIT & Mesurho buoys
2) RECOPESCA (158 vessels)
3) Alg@line 3 Ferrys : - Finnmaid (call sign = OJMI) : data reaching the Coriolis/MyOcean data flow. - Silja Serenade (call sign = OJCS) and Kristina Brahe (call sign = OIEC) : No data. Contact taken. Data will flow through NIVA
4) CRS - Coastal Research Station - 1 coastal station (platform_code = 66060) - 1 mooring (platform_code = 66059)
5) NorFerry - Norwegian Ferrybox network 3 Ferrys : - Norbjorn (call sign = LAKM4) - Trollfjord (call sign = LLVT) - Bergensfjord (call sign = OUZI2)
6) NorFerry - ColorFantasy Color Fantasy (call sign = LMSD)
7) IMR - Coast observatories No data. Would like to identify contributor in the NetCDF files. Discussion pending
8) OGS-NACObs - FVG-MMS Data will be available may 2013 Development for data integration is started
9) OGS-NACObs - MAMBO Data reaching Coriolis/MyOcean data flow since June 2013
10) CNR - NAMS Data reaching Coriolis/MyOcean data flow since July 2013

Data set circulating in NRT
Data set not yet integrated in a NRT data stream
Contact taken with the data provider. Development for data integration is started

11) CNR - FOS Contact taken Data will flow to Coriolis/MyOcean through HCMR
12) POSEIDON Buoy Network 8 stations
13) POSEIDON Buoy Network 3 stations 1 Ferry : Olympic Champion (call sign = SYWD)
14) POL - COBS No answer to a mail sent by coordinator
15) COSYNA 3 Ferrys : - Hafnia Seaways (call sign = 2AMH9) : No data - FunnyGirl (call sign = DFPZ) : Data reaching Coriolis/MyOcean Database - LysBris (call sign = LJLN3) : Data reaching Coriolis/MyOcean Database - Wadden Sea Piles : Data integration process started
16) SMHI - MOS Ferry Transpaper (call sign = SKEC) + 1 Buoy (Huvudskaer East Buoy)
17) SMHI - Laesoe => will be replaced by a new buoy in the Skagerrak
18) SmartBay Galway
19)Puertos del Estado Deep Water Network

Table 2b. Other platforms from JERICO partners reporting data through MyOcean.

PLATFORM_CODE	NAME	INSTITUTION_CODE	LABEL
61001	Nice & Dyfamed	35MF	Meteo-France
61002	Lion	35MF	Meteo-France
61010	EuroSITES MOORING W1M3A	4817	CNR, CONSIGLIO NAZIONALE DELLE RICERCHE
6101001	Saronikos	3610	HELLENIC CENTER FOR MARINE RESEARCH (HCMR)
6101003	Athos	3610	HELLENIC CENTER FOR MARINE RESEARCH (HCMR)
6101603	DRIFTING BUOY	9900	UNKNOWN INSTITUTION
6101604	DRIFTING BUOY	9900	UNKNOWN INSTITUTION
6101605	DRIFTING BUOY	9900	UNKNOWN INSTITUTION
6101608	DRIFTING BUOY	9900	UNKNOWN INSTITUTION
61277	EuroSITES MOORING POSEIDON E1M3A	3610	HELLENIC CENTER FOR MARINE RESEARCH (HCMR)
61284	Mesurho	3548	IFREMER
62904	DRIFTING BUOY	9900	UNKNOWN INSTITUTION
62905	DRIFTING BUOY	9900	UNKNOWN INSTITUTION
62906	DRIFTING BUOY	9900	UNKNOWN INSTITUTION
62907	DRIFTING BUOY	9900	UNKNOWN INSTITUTION
62908	DRIFTING BUOY	9900	UNKNOWN INSTITUTION
62910	DRIFTING BUOY	9900	UNKNOWN INSTITUTION
62927	DRIFTING BUOY	9900	UNKNOWN INSTITUTION
62929	DRIFTING BUOY	9900	UNKNOWN INSTITUTION
62931	DRIFTING BUOY	9900	UNKNOWN INSTITUTION
62932	DRIFTING BUOY	9900	UNKNOWN INSTITUTION
62933	DRIFTING BUOY	9900	UNKNOWN INSTITUTION
62935	DRIFTING BUOY	9900	UNKNOWN INSTITUTION
62936	DRIFTING BUOY	9900	UNKNOWN INSTITUTION
62938	DRIFTING BUOY	9900	UNKNOWN INSTITUTION
68416	EuroSITES MOORING E2M3A	4816	OGS, ISTITUTO NAZIONALE DI OCEANOGRAFIA E GEOFISICA SPERMENTALE
68418	EuroSITES MOORING DYFAMED	3599	LOV, Laboratoire Océanographique de Villefranche
68422	EuroSITES MOORING POSEIDON PYLOS	3610	HELLENIC CENTER FOR MARINE RESEARCH (HCMR)
68452	Ideep00 deep Slocum glider	2995	IMEDEA, Mediterranean Institute for Advanced Studies
68452	Ideep00 deep Slocum glider	2995	IMEDEA, Mediterranean Institute for Advanced Studies
68452	Ideep00 deep Slocum glider	2995	IMEDEA, Mediterranean Institute for Advanced Studies
68452	Ideep00 deep Slocum glider	2995	IMEDEA, Mediterranean Institute for Advanced Studies
68452	Ideep00 deep Slocum glider	2995	IMEDEA, Mediterranean Institute for Advanced Studies
68452	Ideep00 deep Slocum glider	2995	IMEDEA, Mediterranean Institute for Advanced Studies
68452	Ideep00 deep Slocum glider	2995	IMEDEA, Mediterranean Institute for Advanced Studies
68452	Ideep00 deep Slocum glider	2995	IMEDEA, Mediterranean Institute for Advanced Studies
68457	sdeep00 deep Slocum glider	2995	IMEDEA, Mediterranean Institute for Advanced Studies
68457	sdeep00 deep Slocum glider	2995	IMEDEA, Mediterranean Institute for Advanced Studies
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68457	sdeep00 deep Slocum glider	2995	IMEDEA, Mediterranean Institute for Advanced Studies
68457	sdeep00 deep Slocum glider	2995	IMEDEA, Mediterranean Institute for Advanced Studies
68950	Eudoxus slocum glider	3598	ENSTA, Ecole Nationale Supérieure des Techniques Avancées
68950	Eudoxus slocum glider	3598	ENSTA, Ecole Nationale Supérieure des Techniques Avancées
6900636	APEX Profiling Float	2906	INSTITUTO ESPANOL DE OCEANOGRAFIA (MADRID)
6900659	APEX Profiling Float	2906	INSTITUTO ESPANOL DE OCEANOGRAFIA (MADRID)
6900662	APEX Profiling Float	2906	INSTITUTO ESPANOL DE OCEANOGRAFIA (MADRID)
6900786	APEX Profiling Float	2906	INSTITUTO ESPANOL DE OCEANOGRAFIA (MADRID)
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6900788	APEX Profiling Float	2906	INSTITUTO ESPANOL DE OCEANOGRAFIA (MADRID)
6901243	APEX Profiling Float	2906	INSTITUTO ESPANOL DE OCEANOGRAFIA (MADRID)
6901245	ARVOR-I Profiling Float	2906	INSTITUTO ESPANOL DE OCEANOGRAFIA (MADRID)
6901483	PROVOR II Profiling Float	3599	LOV, Laboratoire Océanographique de Villefranche
6901490	PROVOR Profiling Float	3599	LOV, Laboratoire Océanographique de Villefranche

6901510	PROVOR Profiling Float	3599	LOV, Laboratoire Océanographique de Villefranche
6901512	PROVOR Profiling Float	3599	LOV, Laboratoire Océanographique de Villefranche
6901513	PROVOR Profiling Float	3599	LOV, Laboratoire Océanographique de Villefranche
6901528	PROVOR Profiling Float	3599	LOV, Laboratoire Océanographique de Villefranche
6901529	PROVOR Profiling Float	3599	LOV, Laboratoire Océanographique de Villefranche
6901605	PROVOR II Profiling Float	3599	LOV, Laboratoire Océanographique de Villefranche
6901829	ARVOR Profiling Float	4816	OGS, ISTITUTO NAZIONALE DI OCEANOGRAFIA E GEOFISICA SPERMENTALE
6901830	ARVOR Profiling Float	4816	OGS, ISTITUTO NAZIONALE DI OCEANOGRAFIA E GEOFISICA SPERMENTALE
6901860	PROVOR-II Profiling Float	4816	OGS, ISTITUTO NAZIONALE DI OCEANOGRAFIA E GEOFISICA SPERMENTALE
6901861	PROVOR-II Profiling Float	4816	OGS, ISTITUTO NAZIONALE DI OCEANOGRAFIA E GEOFISICA SPERMENTALE
6901865	PROVOR-II Profiling Float	4816	OGS, ISTITUTO NAZIONALE DI OCEANOGRAFIA E GEOFISICA SPERMENTALE
6901877	ARVOR A3 Profiling Float	3548	IFREMER
6901881	PROVOR Profiling Float	3610	HELLENIC CENTER FOR MARINE RESEARCH (HCMR)
7900593	PROVOR II Profiling Float	1599	Institute of Oceanology-BAS,Varna
EABV	R/V SOCIB	2900	SPAIN (Unknown)

4.5. Status of JERICO WP5 deliverables

With the submission of the present Report, all the deliverables relating to WP5 (“Data Management and Distribution”) of JERICO will have been rendered. For the sake of thoroughness, the full list of deliverables is reproduced below:

- D5.1: “DM data management handbook, V1”;
- D5.2: “RT data management handbook, V1”;
- D5.3: “First data management report”;
- D5.4: “Guidelines for Uncertainty”;
- D5.5: “Report on uncertainty for selected key parameters: temperature, salinity and chlorophyll-a”;
- D5.6: “DM data management handbook, V2”;
- D5.7: “Second data management report” (this document);
- D5.8: “RT data management handbook, V2”.

5. Conclusions

This document gives a final overview of the actions and activities concerning data management and distribution carried out within the JERICO project. It constitutes the Second Data Management Report of the project.

6. List of acronyms

BSH: Bundesamt fur Seeschifffahrt und Hydrographie.

EMODnet: European Marine Observation and Data Network.

EuroGOOS: European Global Ocean Observing System.

HCMR: Hellenic Centre for Marine Research.

IFREMER: Institut Francais de Recherche pour l'Exploitation de la Mer.

IMR: Institute of Marine Research - Havforskningsinstituttet.

IOBAS: Institute of Oceanology - Bulgarian Academy of Sciences.

MARIS: Marine Information Service (Mariene Informatie Service).

MARUM: Zentrum fur Marine Umweltwissenschaften (Center for Marine Environmental Sciences).

NODC: National Oceanographic Data Centre.

O&M: Observations & Measurements.

OGC: Open Geospatial Consortium.

ROOS: Regional Operational Oceanographic System.

SAS: Secure Attention Sequence.

SensorML: Sensor Model Language.

SMHI: Sveriges Meteorologiska och Hydrologiska Institut.

SOS: Sensor Observation Service.

SPS: Sensor Planning Service.

SWE: Sensor Web Enablement

TML: Transducer Markup Language.

WMS: Web Map Service

XML: EXtensible Markup Language.