D8.1 Management Plan.

Project number
313238

Project title
LOTUS— Preparing Land and Ocean Take Up from Sentinel-3

Call (part) identifier
FP7-SPACE-2012-1

Funding scheme
Collaborative project

Deliverable Number D8.1
Title: “Project Management Plan.”
Nature: Report
Dissemination level: Public

Status: Draft, version 1.
Date: 15 September 2013.

DOCUMENT CHANGE LOG				
Rev.	Date	Sections modified	Comments	Changed by
1	2013-09-15	All	Draft submitted to REA	Per Knudsen

Table of Contents

1 Work Plan

1.1 Work packages and Tasks

The work of the LOTUS project is structured in eight work packages and the following tasks to prepare the take-up of data from Sentinel-3:

WP1. Processing of SRAL SAR mode waveforms over ocean.
Task 1.1 State of the art review
Task 1.2 Scientific Requirements Consolidation
Task 1.3 Selection of test areas
Task 1.4 Develop processing for Open Ocean
Task 1.5 Develop processing for Polar Ocean
Task 1.6 Develop processing for Coastal Zone

WP2. Processing of SRAL SAR mode waveforms over land.
Task 2.1 State of the art review
Task 2.2 Scientific Requirements Consolidation
Task 2.3 Selection of test areas
Task 2.4 Develop processing for River and Lake levels
Task 2.5 Develop processing for Soil Moisture
Task 2.6 Develop processing for Snow depths

WP3. Definition of new data products and processing chains.
Task 3.1: Definition and design of ocean data products
Task 3.2: Definition and design of land data products
Task 3.3: Specific products dedicated to applications
Task 3.4: Data product formats and dissemination services
Task 3.5: Specification and development of dedicated processing chains

WP4. Production of demo data and assessment
Task 4.1 Processing of Cryosat-2 ocean data
Task 4.2 Processing of Cryosat-2 land data
Task 4.3 Preparation of prototype data sets
Task 4.4 Dataset for validation and long term referencing
Task 4.5 Assessment of Cryosat-2 ocean prototype data
Task 4.6 Assessment of Cryosat-2 land prototype data

WP5. Applications of new GMES data in value-adding ocean services
Task 5.1 Improved wave design data
Task 5.2 Characterization of coastal scale hydrodynamics
Task 5.3 New current design and forecast data
Task 5.4 Environmental vulnerability maps
Task 5.5 MyOcean Perspectives

WP6. Applications of new GMES data in value-adding land services
Task 6.1 Monitoring river and Lake levels
Task 6.2 Monitoring snow depth
Task 6.3 Monitoring of Soil moisture
Task 6.4: Hydrological modelling and data assimilation

WP7. Disseminations and exploitation.
Task 7.1 Project web site
Task 7.2 GMES land and ocean
Task 7.3 SME exploitation
Task 7.4 Climate Change monitoring
Task 7.5 Security and emergency management

WP8. Management

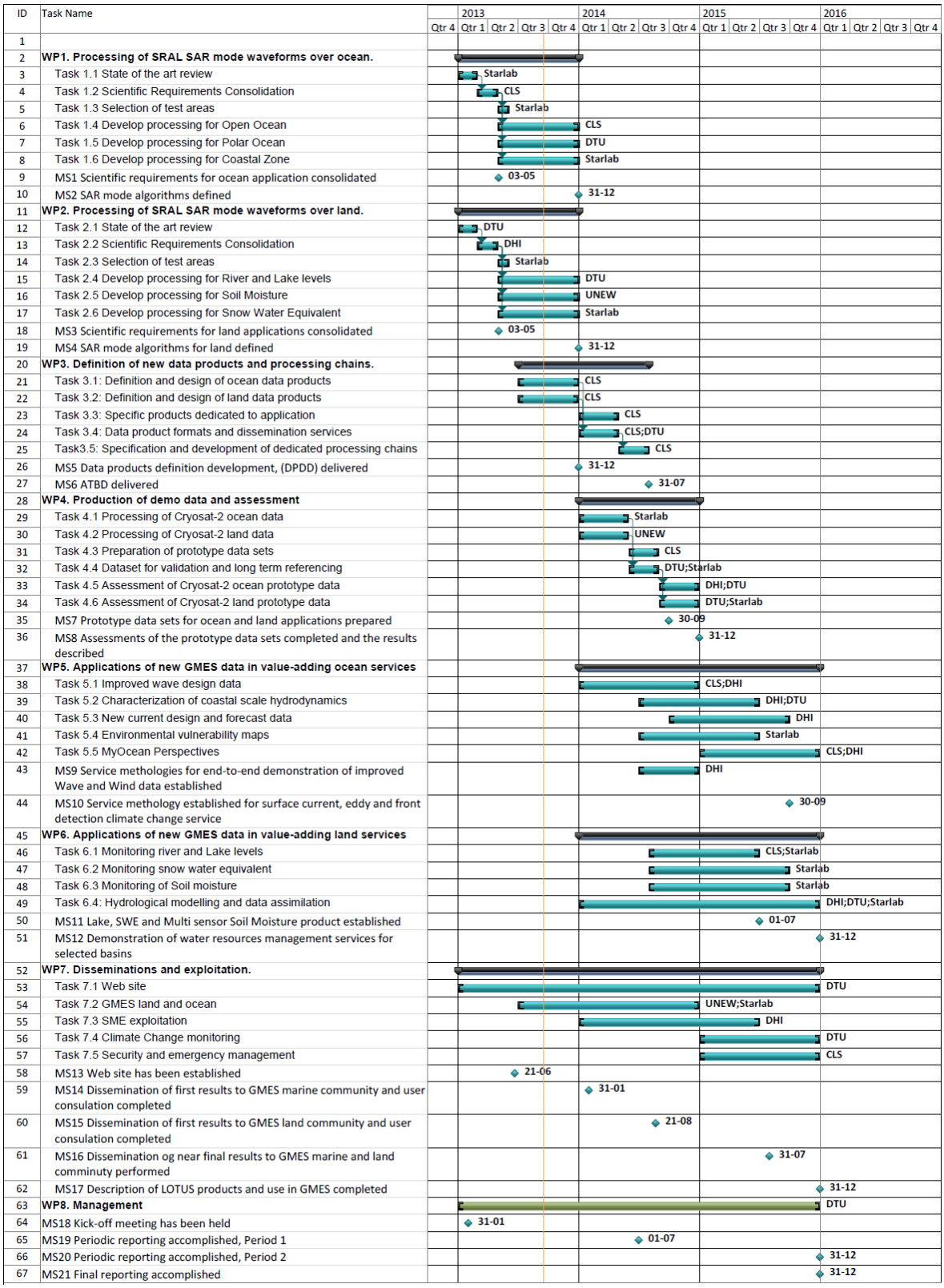
A detail description of each work package and its associated tasks are described in Tables WT1 and WT3 in Section 3: Work Plan Tables. The work package descriptions also include the distribution of resources.

1.2 Milestones and Deliverables

The 39 deliverables, their nature and expected delivery date are described in Table WT2 and the 21 milestones in Table WT4 in Section 3.

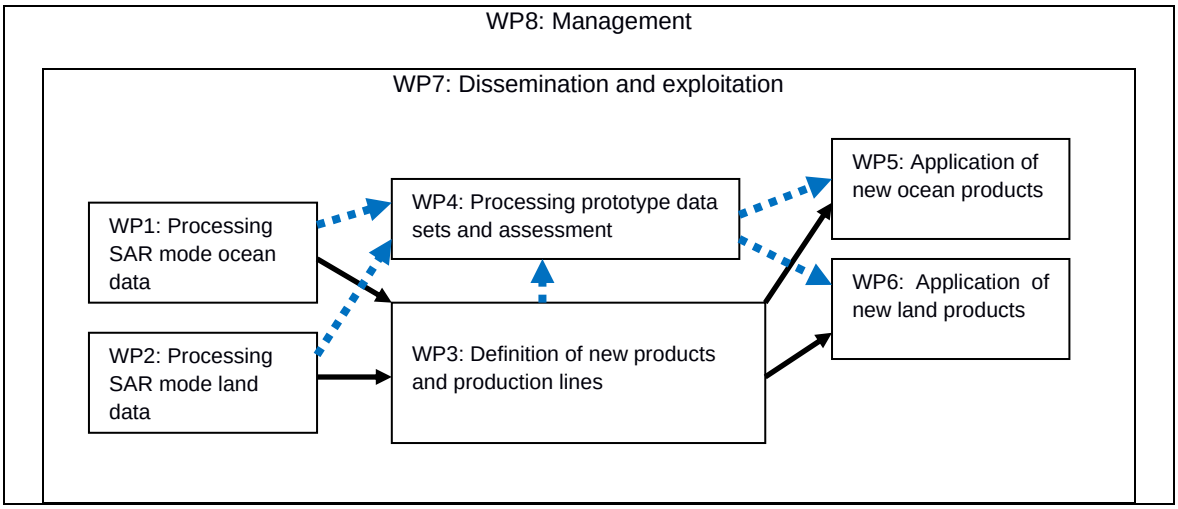
1.3 Gantt Chart

The Gantt chart below shows the timing of the different WPs and their components.



Pert diagram

The Pert diagram below providing a graphical presentation of the components showing their interdependencies. Black arrows show interdependences for the RTD activities developing the new products and the new services. Blue arrows indicate the flow of knowledge for deriving prototype data.



1.4 Risk assessment and related communication strategy:

Any potential risks (real or perceived) for society/citizens associated with the project and the communication strategy adopted in this regard should be fully described.
Several potential sources of risks have been identified and appropriate measures are foreseen to minimize the consequences of these risks. Source of risks includes:

1. Risks linked to data management, such as loss of data, data destruction or corruption, poor quality of data provided;
2. Risks concerning technical developments such as complexity of technologies used, delayed developments, software anomalies;
3. Risks concerning the project organization, such as failure of one or more of the partners.

The consortium is already very well accustomed to the risks linked to data management. However, several tasks are planned with the objective to minimize these data management risks. Data management guidelines will be maintained in line with best practices worldwide.

Delays in the release of technical elements are critical because tasks are interrelated. In that case, the delivery of the prototype data sets will experience delays. In order to minimize the risks linked to technical developments, preventative measures have been adopted.

Risks concerning the project organization are essentially related to the failure of one or more partners and depend on which partner is failing:

- The risk is high for the project management activities, as it will have an impact on the further coordination and implementation of the work plan..
- The risk is relatively high for the ambitious developments of the technical components, since these are developed by a relatively small number of partners. In case one of those partners fails, then it might be necessary to replace the partner and to reallocate the tasks to another

partner. Within the consortium there is enough expertise available to overcome this case. However it will cause delays in the overall progress and a subsequent prolongation (without additional funding) of the project may be needed.

Risks concerning unavailability of essential data are relatively low, since most of the required data are available already in the ESA archives through the Principal Investigators' FTP site. Parts of the Cryosat-2 SAR altimeter data have already been delivered to the partners as part of the SAMOSA projects. In addition, access to the FBR will be needed. Some developments in the project will need the Raw telemetry data. These data are archived by CNES in his Long Term Archive Center. The LOTUS project is not depending of the availability of Sentinel-3 data. As Sentinel-3 data become available during the project those data will be included in the project.

2. Management structure and procedures

The project coordinator will act as the overall project manager and will be the main point of contact between the Research Executive Agency and the project partners. As part of the scientific coordination different partners will manage particular aspects of the work plan. Work package managers have been selected who are senior scientists with prior experience with EU projects. They will be responsible for overseeing the respective work packages, to ensure that tasks are performed on time, and that deliverables are delivered to the project partners with agreed content and format. They will interact with the coordinator, and will assist in the reporting process.

As part of the project management the coordinator will implement appropriate management and organizational activities to monitor the short and long term development and deployment of LOTUS. It includes:

- maintenance of the consortium agreement,
- chairing of the steering committee and the advisory board, and
- the overall legal, ethical, financial and administrative management including, for each of the beneficiaries, the obtaining of the certificates on the financial statements and on the methodology and costs relating to financial audits and technical reviews.

2.1 Steering Committee

The Steering Committee (SC) of the consortium includes the coordinator and one representative from each partner. The SC will have meetings jointly with the progress meetings and, if needed, to make decision regarding scientific-technical planning and work implementation including eventually necessitating amendment of the GA with the approval of the REA , etc. The SC will make decision regarding involvement of users, IPR issues, and publication of results, as well as other dissemination activities.

2.2 Advisory board

To ensure that the developments in the LOTUS project progress consistently with the developments of the Sentinel-3 mission including data processing and data flows, an advisory board is established into which a EUMETSAT representative will be invited. Also, to ensure a successful take up in the GMES marine and land services, representatives from MyOcean-2 and the GMES Initial Operations (GIO) land Pan-Eu and Global land services will be invited to join the advisory board. Furthermore, to facilitate further involvement of SMEs Giovanni Cecconi from Thetis in Italy will be invited to join the Advisory board.

In September 2013 the Advisory Board is:

- Hans Bonekamp (EUMETSAT)
- Johnny Johannessen (MyOcean),
- Paul Bates (Uni. Bristol) and
- Giovanni Cecconi (Thetis)

In addition, Jerome Benveniste (ESA) will attend as an observer. Appointment of an representative for Copernicus Land service is still pending. Hans Dufourmont (EEA) may be contacted to obtain EEA views.

2.3 Project meetings

To strengthen the project management and to secure exchange of knowledge inside the project a number of project meetings have been scheduled. During the project period meeting are planned every 9 months (see WT5). PM2 and PM4 will be organised in conjunction with the project review meeting at M18 and M36 respectively. Other project meetings will be organised in conjunction with intermediate reviews at M9 and M27.

2.4 Individual participants

Each participant in the project along with information about the staff members who will be undertaking the work is included below.

Participant 1. Danmarks Tekniske Universitet (*Technical University of Denmark*) (DTU)

Main role: WP8: Management (coordinator), WP4: Production of demo data and assessment (WP leader), and WP7: Dissemination and exploitation (WP leader).

Staff:
Dr. Per Knudsen,
Dr. Ole Andersen.
Dr. Lars Stenseng
Dr. Peter Bauer-Gottwein

Participant 2. Starlab Barcelona SL (Starlab)

Main Tasks: WP1 and WP6 leaders, scientific contributors to WP2 and WP3 and data providers to WP5.

Staff:
Alejandro Egido
Laura Moreno-Patricio

(Participant 3 has been removed from the project.)
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Participant 4. Collecte Localisation Satellites SA (CLS)

Main tasks: Leader of WP3: Define new data products and processing chains for completing these products

Staff:
Dr. G. Larnicol
Dr. P. Thibaut
Dr. J.P. Dumont

Participant 5. DHI (DHI)

Main Tasks: WP5 leaders, scientific contributors to WP1, WP2 and WP6.

Staff:
Dr. Jacob V. Tornfeldt Sørensen
Dr. Henrik Madsen

Participant 6. University of Newcastle Upon Tyne (UNEW)

Main Tasks: WP2 leaders, scientific contributors to WP1 and WP3 and data providers to WP4.

Staff:
Professor Philippa Berry
Professor Philip Moore

2.5 Consortium as a whole

The project is undertaken by a pan-european consortium of 5 partners from four countries. These comprise key actors in the following fields:

- Processing of altimetric data (including retracking of waveform data) from multi-mission altimetry over both ocean and land surfaces (including Cryosat-2),
- Generation of high-level satellite altimeter data products for both research and operational purposes,
- Management and operation of data bases for data products for MyOcean, Aviso, ESA Rivers and Lakes, etc.,
- Assimilation of satellite based sea level data in coastal ocean models,
- Assimilation of satellite based water level data in hydrological models,
- Development and operation of marine services,
- Development and operation of land water management services

All partners are currently actively involved in activities related to GMES services in Europe, both in development activities, operational activities, and in value-adding activities.

A majority of the project partners are innovative companies active in developing commercial products and services based on satellite data worldwide. P5-DHI has departments in several countries both inside and outside Europe where the results of LOTUS will be applied.

Hence, the consortium comprises of the frontline European partners to ensure the success of the take-up of new information from the Sentinel-3 satellite.

2.5.1 Third parties

Not applicable in this project.

2.5.2 Subcontractors

Not applicable in this project.

2.6 Resources to be committed

The total budget of the project is 2,912,435.26 Euro of which 1.994.162 Euro is requested from EU. Other direct costs in euro cover audit certificates and travel and subsistence for project meetings and are specified further below.

The percentage for management activities (MGT), including costs for audit certificates, is 2.3% of the total costs and 3.4% of the EU-contribution.

Minor Subcontracts
Subcontracts are foreseen to cover the costs of one audit certificate for partners 1 (DTU), 4 (CLS) and 5 (DHI) due to EU contribution equal or superior to EUR 375,000. Costs for audit certificates are estimated to be around 1,500 Euro.

Other direct costs estimation
Other direct costs cover travel and subsistence for project meetings. In the calculation of travel costs we have used approximately 1100 Euro for travels within Europe for one person for two days. Project meetings will be held at the partners' premises to reduce costs and to facilitate participation of other team members involved in the project.

A breakdown of subcontract and other direct costs per partner per type of activity is found below:

Beneficiary 1 - DTU

Cost category	Activity type	Cost (€)	Description
Subcontracting	MGT	1,500	Audit certificate
Travels	RTD	13,200	Participation of 4 persons in 3 project meetings. (€1100*4*3)
Travels	OTH	10,300	Participation of 5 Advisory Board members in two project meetings.(€1030*5*2)
Travels	OTH	1,650	Participation of 1 person in 2 scientific conferences (€825*1*2)

Beneficiary 2 – Starlab

Cost category	Activity type	Cost (€)	Description
Travels	RTD	11,000	Participation of 2 persons in 4 project meetings and of one additional person for participation in 3 project meeting at +18 and +27. (€1100*(2*4+1*2))
Travels	OTH	1,650	Participation of 1 person in 2 scientific conferences (€825*1*2)

Beneficiary 3 -
The participant has been removed from the project.

Beneficiary 4 - CLS

Cost category	Activity type	Cost (€)	Description
Subcontracting	MGT	1,500	Audit certificate

Travels	RTD	11,000	Participation of 2 persons in 4 project meetings and for one additional person for participation in project meeting at +9 and +27. (€1100*(2*4+1*2))
Travels	OTH	2,200	Participation of 1 person in 2 scientific conferences (€1100*1*2)

Beneficiary 5 - DHI

Cost category	Activity type	Cost (€)	Description
Subcontracting	MGT	1,500	Audit certificate
Travels	RTD	9,900	Participation of 3 persons in 3 project meetings and of one additional person for participation in project meeting at +24 and +30. (€1100*3*3)
Travels	OTH	825	Participation of 1 person in 1 scientific conferences (€825*1*1)

Beneficiary 6 - UNEW

Cost category	Activity type	Cost (€)	Description
Travels	RTD	8,800	Participation of 2 persons in 4 project meetings. (€1100*2*4)
Travels	OTH	825	Participation of 1 person in 1 scientific conference (€825*1*1)

Complementary resources

Complementary resources are provided by the partners to cover costs not covered by the EU-contribution. That is the 25% of the total costs for RTD activities and 50% of the total costs for DEMO activities. Other contributions from the consortium partners cover costs for dissemination material such as website establishment and maintenance, promotional items and printing of reports.

The main data source in LOTUS is Cryosat-2 SIRAL data. The test regions have not yet been finalised. They will be selected in WP1 and WP2 for ocean and land respectively. For both ocean and land regions the LOTUS project wish to have access to Cryosat-2 SIRAL SAR, LRM, and SARin mode data in both L1B and L2. Those data are to be provided by ESA, e.g. through the Principal Investigators' FTP site. In addition, access to the FBR will be needed.

In the frame of other projects, CLS has developed with CNES their Cryosat L1B and L2 processing using the Raw telemetry data. These data are archived by CNES in his Long Term Archive Center (which is not the case for the FBR products). We could propose is to ESA, in the frame of the LOTUS project, the authorization to use these RawTM data and to take it directly from CNES LTA center.

The LOTUS project will also use data from the ESA River&Lake System where time series of water levels have been constructed using altimetric satellite missions as Envisat and JASON. Other data for assessment and validation will be compiled by the participants.

Finally, as Sentinel-3 data becomes available the LOTUS project wish to access both SRAL SAR mode and LRM data from both ocean and land regions, as well as OLCI and SLSTR data over ocean.

2.7 Management of knowledge and IPR in LOTUS

The Steering Committee (SC) for the project having one representative for each partner will be established when the project is initiated (see Management description) and will have the overall responsibility for management of IPR issues. The SC will manage the exploitable results from the project and clarify ownership following the IPR conditions formulated in the Consortium Agreement. Access rights and IPR issues related to foreground and background are agreed within Sections 8 and 9 in the Consortium Agreement cover:

Section 8: Foreground
8.1 Joint ownership
8.2 Transfer of Foreground
8.3 Dissemination

Section 9: Access Rights
9.1 Background covered
9.2 General Principles
9.3 Access Rights for implementation
9.4 Access Rights for Use
9.5 Access Rights for Affiliated Entities
9.6 Additional Access Rights

With regard to external users the prototype data sets (D4.1, D4.2, D4.3, and D4.4) are publically available data sets that will be made available through the dedicated web site. No licences or agreements related to their use are envisaged. Other deliverables are publically available reports that will be made available at the project website. In addition, results of the LOTUS project will be presented at scientific conferences and in scientific manuscripts when appropriate. Ownership of such scientific publications will follow the guidelines of the specific publisher.

The SC will have meetings every 9 months, jointly with progress meetings (see management description). In addition to ownership of results, IPR management will also include coordination of dissemination and exploitation activities as well publications and presentations of project results.

3. Work Plan Tables

Workplan Tables

Project number

313238

Project title

LOTUS—Preparing Land and Ocean Take Up from Sentinel-3

Call (part) identifier

FP7-SPACE-2012-1

Funding scheme

Collaborative project

WT1
List of work packages

Project Number [1]	313238	Project Acronym [2]	LOTUS

LIST OF WORK PACKAGES (WP)

WP Number [53]	WP Title	Type of activity [54]	Lead beneficiary number [55]	Person-months [56]	Start month [57]	End month [58]
WP 1	Processing of SRAL SAR mode waveforms over ocean.	RTD	2	37.00	1	12
WP 2	Processing of SRAL SAR mode waveforms over land	RTD	6	30.00	1	12
WP 3	Definition of new data products and processing chains	RTD	4	40.75	7	18
WP 4	Production of demo data and assessment	DEM	1	39.75	13	24
WP 5	Applications of new GMES data in value-adding ocean services	RTD	5	28.00	13	36
WP 6	Applications of new GMES data in value-adding land services	RTD	2	32.50	13	36
WP 7	Dissemination and exploitation	OTHER	1	28.75	1	36
WP 8	Management	MGT	1	5.00	1	36
			Total	241.75		

WT2:
List of Deliverables

Project Number [1]	313238	Project Acronym [2]	LOTUS

List of Deliverables - to be submitted for review to EC

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D1.1	SAR mode for Ocean State of the art review	1	2	5.00	R	PU	2
D1.2	SAR mode for Ocean Scientific Requirements	1	4	5.00	R	PU	4
D1.3	SAR mode for Ocean Algorithms Theoretical Basis Document	1	2	27.00	R	CO	12
D2.1	State of the art review of SAR mode data over land	2	1	3.00	R	PU	2
D2.2	Scientific requirements for SAR mode	2	5	5.00	R	PU	4
D2.3	Theoretical Basis Document for river and lake levels algorithms	2	6	10.00	R	PU	12
D2.4	Theoretical Basis Document for soil moisture	2	6	8.00	R	PU	12
D2.5	Theoretical Basis Document snow depth	2	2	3.00	R	PU	12
D2.6	Snow depth determination with SRAL	2	2	1.00	R	PU	12
D3.1	Data Product Definition Document detailing each type of product (DPDD)	3	4	11.53	R	PU	12
D3.2	Data Product User Manual (DPUM), presented as an interactive	3	4	12.22	R	PU	18

WT2:
List of Deliverables

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
	on-live handbook						
D3.3	Algorithm Theoretical Baseline Document (ATBD) detailing the high level specification of the process	3	4	8.00	R	PU	16
D3.4	SAR Mode for Ocean Corrections Theoretical Basis Document	3	4	9.00	R	PU	18
D4.1	Processed ocean SAR data	4	2	7.00	P	PU	18
D4.2	Processed land SAR data	4	6	10.00	P	PU	18
D4.3	Prototype data sets for ocean and land applications	4	4	8.00	P	PU	21
D4.4	Dataset for validation and long term referencing	4	2	6.75	P	PU	21
D4.5	Report describing results from the assessment of the prototype data sets	4	2	8.00	R	PU	24
D5.1	End-to-end demonstration of improved wave and wind design data	5	5	4.00	R	PU	24
D5.2	Characterization of coastal scale hydrodynamics using SRAL SAR	5	5	8.00	R	PU	30
D5.3	End-to-end demonstration of improved surface current design data	5	5	8.00	R	PU	33

WT2:
List of Deliverables

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D5.4	Environmental vulnerability maps combining MERIS, S3 and surface ocean current products	5	2	3.00	R	PU	30
D5.5	Surface current, eddy and front detection climate change services	5	5	5.00	R	PU	33
D6.1	Lake and river level monitoring service	6	2	8.00	R	PU	30
D6.2	Snow depths monitoring service	6	2	3.00	R	PU	33
D6.3	Multi sensor Soil Moisture product	6	2	2.50	R	PU	33
D6.4	Prototype modelling and data assimilation system	6	5	11.00	O	PU	33
D6.5	Demonstration of water resources management services for selected basins	6	5	8.00	O	PU	36
D7.1	Report describing web site	7	1	2.00	R	PU	6
D7.2	Report describing Sentinel-3 SRAL SAR mode data and new products for GMES land and marine services	7	2	7.75	R	PU	24
D7.3	New LOTUS products and their potential use in value adding applications described in report	7	5	7.00	R	PU	30

WT2:
List of Deliverables

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D7.4	Report describing the results to European services and projects contributing to Climate monitoring	7	1	6.00	R	PU	36
D7.5	LOTUS results to GMES services for security and emergency management described in report	7	4	6.00	R	PU	36
D8.1	Project Management Plan	8	1	1.00	R	PU	4
D8.2	Minutes of Kick-off meeting	8	1	0.20	R	PU	1
D8.3	Minutes of project RV1	8	1	0.20	R	PU	10
D8.4	Minutes of project RV2	8	1	0.20	R	PU	19
D8.5	Minutes of project RV3	8	1	0.20	R	PU	28
D8.6	Minutes of project RV4	8	1	0.20	R	PU	36
			Total	238.75			

WT3:
Work package description

Project Number [1]	313238	Project Acronym [2]	LOTUS

One form per Work Package

Work package number [53]	WP1	Type of activity [54]	RTD
Work package title	Processing of SRAL SAR mode waveforms over ocean.		
Start month	1		
End month	12		
Lead beneficiary number [55]	2		

Objectives

The objective of this workpackage is to develop processing scheme for:
• Extracting high-resolution sea surface heights, wave heights and wind speeds from SAR mode data, secure seamless transitions between SAR mode and the open ocean LRM products.
• Apply the RDSAR technique to convert SAR mode data into LRM data to complement the open ocean LRM data sets in the coastal areas, secure seamless transitions between converted SAR mode and open ocean LRM products. Using RDSAR heights has a crucial importance to be able to validate precisely the SAR surface heights.

Description of work and role of partners

The work to be done in this work package will be subdivided per sub-themes. The sub-themes include:
• Open ocean [lead by CLS, with the support from Starlab]
• Polar ocean [lead by DTU, with support from UNEW]
• Coastal zone [lead by Starlab, with the support from CLS]
The work to be done within this WP is subdivided in 6 tasks. These are:

Task 1.1 State of the art review [Starlab]
This task envisions to:
• Undertake a detailed review of existing algorithms to process SAR mode data over ocean most suitable per sub-theme (open ocean, polar ocean and coastal zone). This will be done based on available literature (CryoSat plus, other) and partner's know-how.
• Undertake a detailed review of available corrections, and their status, for the derivation of Ocean geophysical parameters from SAR mode. This will be done based on available literature (CryoSat plus, other) and partner's know-how.
• Undertake a detailed review of existing algorithms to derive RDSAR data from SAR mode data over ocean. This will be done based on available literature (CryoSat plus, other) and partner's know-how.

Task 1.2 Scientific Requirements Consolidation [CLS]
Based on the experience of LOTUS team members in the use and exploitation of CryoSat-2 data, and with the support of literature review and results from Task 1.1, as well as, based on the knowledge of WP1 team members of the Sentinel-3 SRAL technical specifications, this task aims at:
• Defining a consolidated list of scientific requirements to adapt current algorithms (defined for CryoSat-2) to be applied to Sentinel-3. Identifying scientific constrains for the methods and models to this purpose, if any, and propose remedial solutions
• Defining a consolidated list of scientific requirements to enhance current available corrections in CryoSat-2 data, and to derive those corrections missing in CryoSat-2 L2 at present that are relevant for the retrieval of ocean geophysical parameters.

Task 1.3 Selection of test areas [Starlab]
Based on the consortiums experience with CryoSat-2 data and the outcome of Task 1.1 and Task 1.2, the LOTUS WP1 team members will in this task aim at:
• Define a list of potential test areas for each of the four ocean focus areas: Open Ocean, Polar Ocean, and Coastal Zone,

• Asses the availability of independent datasets for validation within the test areas

Task 1.4 Develop processing for Open Ocean [CLS]
This activity will depend on previous tasks results, as well as experience from the consortium in ESA/CNES funded predecessor projects. The activities envisioned by this task include:
• SAR mode algorithm improvements for RCS retrieval
• SAR mode algorithm improvements for range, SWH and RCS precision improvement. This includes to study different techniques, as range bin weighting, with the scope to improve the precision of results
• Open Ocean algorithms adaptation to be applied to Sentinel-3
• RDSAR adaptation to be applied to Sentinel-3 data
• Processing of SAR mode data (CLS and Starlab) and RDSAR data (CLS and Starlab) for quantitative comparison and validation purposes and for cross-calibration of results.

Task 1.5 Develop processing for Polar Ocean [DTU and UNEW]
This activity will depend on the result of Task 1.1 and Task 1.2, as well as on previous work done by the consortium in ESA/DTU funded predecessor projects. The activities in this task aims at:
• Improve algorithm to identify open water leads in SAR mode data over sea ice in the polar ocean. This includes a study of existing and new suggested methods.
• SAR mode algorithm for retrieving range from specular open water lead returns. Existing SAR mode models for Open Ocean needs to be adapted to specular returns. Alternative methods for range retrieval will be studied.
• Processing of SAR mode data for comparison, validation and cross-calibration of results.

Task 1.6 Develop processing for Coastal Zone [Starlab]
This activity will depend on the results of previous tasks, as well as on previous work done by the consortium in ESA/CNES funded predecessor projects. The activities envisioned by this task include:
• SAR mode algorithm improvements for their application to the observation of coastal regions. SAR mode models have been derived for Open Ocean. These need to be adapted to account for the singularities of the coastal zone phenomena.
• Coastal Zone algorithms adaptation to be applied to Sentinel-3
• Processing of SAR mode data for coastal zone scenarios (CLS and Starlab) and RDSAR data (CLS and Starlab) for quantitative comparison and validation purposes and for cross-calibration of results.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	DTU	13.00
2	Starlab	15.00
4	CLS	8.00
5	DHI	0.00
6	UNEW	1.00
	Total	37.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D1.1	SAR mode for Ocean State of the art review	2	5.00	R	PU	2
D1.2	SAR mode for Ocean Scientific Requirements	4	5.00	R	PU	4

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D1.3	SAR mode for Ocean Algorithms Theoretical Basis Document	2	27.00	R	CO	12
		Total	37.00			

Description of deliverables

D1.1) SAR mode for Ocean State of the art review: [month 2]

D1.2) SAR mode for Ocean Scientific Requirements: [month 4]

D1.3) SAR mode for Ocean Algorithms Theoretical Basis Document: [month 12]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS1	Scientific requirements for ocean applications consolidated	4	4	Report submiited
MS2	SAR mode algorithms for ocean defined	2	12	Report submitted

WT3:
Work package description

Project Number [1]	313238	Project Acronym [2]	LOTUS

One form per Work Package

Work package number [53]	WP2	Type of activity [54]	RTD
Work package title	Processing of SRAL SAR mode waveforms over land		
Start month	1		
End month	12		
Lead beneficiary number [55]	6		

Objectives

The objective of this workpackage is to develop processing scheme for:
• Extracting high-resolution river and lake heights,
• Extraction of soil moisture,
• Extraction of snow depth.

Description of work and role of partners

The work to be done in this work package will be subdivided per sub-themes. The sub-themes include:
• River and lake levels [lead by UNEW, with the support from CLS and DTU]
• Soil moisture [lead by UNEW with support from Starlab]
• Snow depths [lead by Starlab]
The work to be done within this WP is subdivided in 6 tasks. These are:

Task 2.1 State of the art review [DTU]
This task envision to:
• Perform a detailed review of existing algorithms to process SAR mode data over land most suitable per sub-theme (river and lake levels, soil moisture, and snow depths). This will be done based on available literature (CryoSat Plus, other) and partner's know-how.
• Perform a detailed review of available corrections for the derivation of land geophysical parameters per sub-theme from SAR mode altimetry.

Task 2.2 Scientific Requirements Consolidation [DHI]
Based on the experience of LOTUS team members in the use and exploitation of Cryosat-2 data, and with the support of literature review and results from Task 2.1, as well as, based on the knowledge of WP2 team members of the Sentinel-3 SRAL technical specifications, this task aims at:
• Defining a consolidated list of scientific requirements to adapt current algorithms (defined for Cryosat-2) to be applied to Sentinel-3. Identifying scientific constrains for the methods and models to this purpose, if any, and propose remedial solutions
• Defining a consolidated list of scientific requirements to enhance current available corrections in Cryosat-2 data, and to derive those corrections missing in Cryosat-2 L2 at present that are relevant for the retrieval of land geophysical parameters.

Task 2.3 Selection of test areas [Starlab]
Based on the consortiums experience with Cryosat-2 data and the Task 2.1 and Task 2.2 results, the LOTUS members will in this task aim at:
• Define a list of potential test areas for each of the three sub-theme land focus areas.
• Asses the availability of independent datasets for validation within the test areas for each sub-theme.

Task 2.4 Develop processing for River and Lake Levels [UNEW and DTU]
This activity will depend on the results of Task 2.1 and Task2.2, as well as on previous work done by the consortium in ESA funded predecessor projects. The activities envisioned by this task include:
• Enhance existing global masks for river and lake locations, to allow retrieval of inland water heights utilising the SAR FBR capability of Sentinel-3

• Augment the existing BES (Berry Expert System) and the LARS (the Lars advanced retracking system) to retrack SRAL waveforms (SAR 20Hz, SAR FBR) over land, utilising novel retrackers already prototyped and successfully utilised in the BES with Cryosat-2 FBR waveforms.
• Globally retrack Sentinel-3 altimeter data over inland water, and obtain river and lake time series of orthometric heights for dissemination to the global community.

Task 2.5 Develop processing for Soil Moisture [UNEW]
This activity will depend on the result of Task 2.1 and Task 2.2, as well as on previous work done by the consortium in ESA funded predecessor projects. The activities in this task aims at:
• Utilising the successful DREAMS approach (DRy EArth ModelS) which obviates the requirement for detailed ground truth, extend the application of this technique from the current generation of radar altimeters to SRAL altimeters, to determine soil moisture in arid and semi-arid regions.

Task 2.6 Develop processing for Snow Depths [Starlab]
This activity is focussed in the extraction of the snow depth by SRAL data. The activity will adapt current algorithms (defined for Cryosat-2) to be applied to Sentinel-3. Identifying scientific constrains for the methods and models to this purpose, if any, and propose remedial solutions. This parameter will be used to be combined with Snow density (from polarimetric SAR) in order to extract Snow Water Equivalent (parameter to be assimilated into the hydrological model)
The activities envisioned by this task include:
• SAR mode algorithm improvements for their application to snow depth retrieval.
• Algorithm development and improvement for determination of snow density from full polarimetric SAR.
• Adaption of algorithms to Sentinel-3.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	DTU	5.00
2	Starlab	11.00
4	CLS	4.00
5	DHI	3.00
6	UNEW	7.00
	Total	30.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D2.1	State of the art review of SAR mode data over land	1	3.00	R	PU	2
D2.2	Scientific requirements for SAR mode	5	5.00	R	PU	4
D2.3	Theoretical Basis Document for river and lake levels algorithms	6	10.00	R	PU	12
D2.4	Theoretical Basis Document for soil moisture	6	8.00	R	PU	12
D2.5	Theoretical Basis Document snow depth	2	3.00	R	PU	12
D2.6	Snow depth determination with SRAL	2	1.00	R	PU	12

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
		Total	30.00			

Description of deliverables

D2.1) State of the art review of SAR mode data over land: [month 2]

D2.2) Scientific requirements for SAR mode: [month 4]

D2.3) Theoretical Basis Document for river and lake levels algorithms: [month 12]

D2.4) Theoretical Basis Document for soil moisture: [month 12]

D2.5) Theoretical Basis Document snow depth: [month 12]

D2.6) Snow depth determination with SRAL: [month 12]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS3	Scientific requirements for land applications consolidated	5	4	Report submitted
MS4	SAR mode algorithms for land defined	6	12	Report submitted

WT3:
Work package description

Project Number [1]	313238	Project Acronym [2]	LOTUS

One form per Work Package

Work package number [53]	WP3	Type of activity [54]	RTD
Work package title	Definition of new data products and processing chains		
Start month	7		
End month	18		
Lead beneficiary number [55]	4		

Objectives

Based on experiences from various ESA and CNES projects, including recent specification and development of Sentinel-3 processing chains, simplified, easy-to-use or higher-level products will be designed from the algorithms proposed in previous work packages. Then the processing chains producing these demonstration products will be specified in synergy with the Sentinel-3 ground segment and in close relationship with the GMES services and downstream applications likely to use these data products.
Several kinds of data products and processing chains will be defined and designed:
• New Level-2 data products, complementing the ESA Sentinel-3 L2 data products
• Higher level data products, Level-3, Level-4, so that end users get an easy access to the specific higher-level information they need.
All these products will address the different surface targets of the Sentinel-3 topography measurements:
• Sea surface heights, wave heights and wind speeds,
• River and lake levels,
• Soil moisture, and
• Snow depths.
Apart from defining and producing new products for end users, the fitness for purpose of these products regarding the target end applications will be an important issue. This will put strong requirements in terms of content and format related to dissemination means of these products that this WP will have to address and answer.

Description of work and role of partners

Task 3.1: Definition and design of ocean data products (CLS, Starlab, DTU and UNEW)
This task will cover definition and design of sea surface heights, wave heights and wind speeds over ocean completing, with refined algorithms (from WP1) the Level-2 data products nominally generated by the Sentinel-3 ground segment.
The task will be carried out by CLS with support of Starlab (as responsible of WP1), DTU and UNEW (involved in WP1). The algorithms developed in WP1 will be directly used in order to specify and develop processing chains to produce new data level 2 products. Under the assumption that Sentinel-3 will inherit CryoSat-2 corrections as in CryoSat-2 L2 data products, this task aims also at improving these corrections corrections (wet tropospheric correction, high-wind response, sea state bias and ionospheric corrections).
In addition, higher-level products will be designed in order to ease the use of Sentinel-3 ocean data. It is proposed to define:
• Level-3 data products over ocean, taking benefit of multi-mission processing. Indeed, it is important to notice that in the Sentinel-3 mission requirements, the multi-mission concept is referenced as an important concept for oceanography (in particular operational oceanography). The Sentinel-3 mission concept is based on the combination with a Jason-like altimeter mission in order to reach the minimum objectives of the ocean applications. Innovative techniques will be required in order to apply multi-mission processing to high resolution along track data (as the ones provided by Sentinel-3 SRAL measurements) using low-resolution altimetry from other missions.
• Level-4 products: from Level-3 data, higher-level data products will be designed to produce grids of Sea level anomalies (SLA). In this task, one particular study will consist in analysing to which extent high-resolution data can be combined to low-resolution data in the same two-dimensional maps of Sea Level Anomalies. In addition, thanks to the multi-mission processing, more sophisticated products will be studied taking benefit

of the improvement in the along-track resolution of the Sentinel-3 altimeter: specific products dedicated to oceanography will be investigated such as surface currents, eddy detection and front detection products.

Task 3.2: Definition and design of land data products (CLS, UNEW, Starlab and DHI)
This task will cover definition and design of land topography and soil moisture completing, with refined algorithms (from WP1) the Level-2 data products nominally generated by the Sentinel-3 ground segment.
The task will be carried out by CLS with support of UNEW (as responsible of WP2), Starlab and DHI (involved in WP2).
The algorithms developed in WP2 will be directly used in order to specify and develop processing chains to produce new data level 2 products.

In addition, higher level products (level-3 and Level-4) will be designed in order to ease the use of Sentinel-3 ocean data. It is proposed to define:
• Water level temporal series for dedicated sites: these series could be directly used by hydrologists with the evolution of the temporal average water level associated with error bars. These products would require prior processing (defined in WP1) in terms of data selection, discrimination (water/land) retracking and post-processing (temporal averages)
• Gathering different sites in a particular geographical zone, maps of anomalies of water level relative to the mean level could be produced as a higher level product. Among other applications, these data could be useful for climate impact estimation and water resources management.

Task 3.3: Specific products dedicated to applications (CLS)
This study will be an opportunity to define innovative products dedicated to specific applications. Different products will be generated in the Sentinel-3 ground segments according to different latencies: Near Real Time (NRT) products, Slow Time Critical (STC) products and Non Time Critical (NTC) products. However all these product address several types of applications.
In this study, after definition of innovative algorithms, generating different products according to specific applications will be studied. This should make easier the use of these products by scientists or end users.
Several features will be studied for generating different products, such as:
• Different along-track resolution according to different applications (e.g. climate applications /eddies and fronts detection) and targets (e.g. open ocean /coastal applications)
• Different Sea Surface Height computation (different tide models, atmospheric corrections, models, etc)

Task 3.4: Data product formats and dissemination services (CLS, DTU)
Past and present projects in the field of altimetry and oceanography have shown the importance of user-friendly formats and standards in order to allow an easy dissemination of products. For instance, several studies have been carried out in the frame of the MyOcean project (implementing the GMES Marine Service). It is proposed that the experience CLS has acquired in this project (as responsible for central engineering and information system) is used in this study to design standard formats allowing high performance data access services. This is also an important aspect to take into account for an easy use of the Sentinel-3 data.
Apart from data encoding and format (such as NetCDF), it is also important to optimise the way the datasets are aggregated and organised so that download and visualisation perform well. Users should be able to browse, select, gather datasets according to their needs without any complex technical procedure.
The above technical choices will be driven by advanced data access service requirements such as aggregation of data and subsetting capabilities. A simple, user-friendly and standard interface will be developed using well recognised and internationally experimented standards (OpenDap, WMS, etc.).
For all these technical issues the study will take benefit from the experience of the MyOcean project.

Task3.5: Specification and development of dedicated processing chains (CLS)
Following the precise definition of innovative products for the Sentinel-3 topography mission, processing chains will have to be designed and developed so that demonstration products can be generated and disseminated to users.
To carry out this task, a thorough knowledge of the Sentinel-3 topography ground segment is required. CLS, in charge of definition, specification and development of the Sentinel-3 processing prototype (GPP) will be fully skilled for defining these processing chains.

The processing chains that will be developed in the frame of this study will be designed as operational prototypes: they should follow the main steps of a rigorous development cycle, but also allow quick modifications in an R&D context. The main phases will be:
• Analysis of the technical scope (from data product definition)

• High level Specification of the processing chains
• Design and architecture
• Development
• Software Validation: this will require a significant amount of data.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	DTU	6.00
2	Starlab	9.32
4	CLS	19.43
5	DHI	3.00
6	UNEW	3.00
	Total	40.75

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D3.1	Data Product Definition Document detailing each type of product (DPDD)	4	11.53	R	PU	12
D3.2	Data Product User Manual (DPUM), presented as an interactive on-live handbook	4	12.22	R	PU	18
D3.3	Algorithm Theoretical Baseline Document (ATBD) detailing the high level specification of the process	4	8.00	R	PU	16
D3.4	SAR Mode for Ocean Corrections Theoretical Basis Document	4	9.00	R	PU	18
		Total	40.75			

Description of deliverables

D3.1) Data Product Definition Document detailing each type of product (DPDD): [month 12]

D3.2) Data Product User Manual (DPUM), presented as an interactive on-live handbook: [month 18]

D3.3) Algorithm Theoretical Baseline Document (ATBD) detailing the high level specification of the process: [month 16]

D3.4) SAR Mode for Ocean Corrections Theoretical Basis Document: [month 18]

WT3:
Work package description

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS5	Data products Definition development, (DPDD) delivered	4	12	Report submitted
MS6	ATBD delivered	4	19	Report submitted

WT3:
Work package description

Project Number [1]	313238	Project Acronym [2]	LOTUS

One form per Work Package

Work package number [53]	WP4	Type of activity [54]	DEM
Work package title	Production of demo data and assessment		
Start month	13		
End month	24		
Lead beneficiary number [55]	1		

Objectives

The objective of this work package is to prepare prototype datasets to demonstrate the capabilities of the processing schemes developed in WP1 and WP2 and the new data products and processing chains defined in WP3.
The prepared prototype datasets will support the further development of new value-adding applications for ocean and land services in WP5 and WP6, respectively.
Based on the input from WP1 and WP2 suggested test areas will be investigated for their existing and relevant in-situ data (i.e. Jason-2 and AltiKa altimetry and river or ocean gauges) and the and the relevance in demonstrating the applications foreseen in WP5 and WP6.
The selected Cryosat-2 SAR datasets and if possibly Sentinel-3 will be processed in specific targeted test areas using the methods recommended in WP1, WP2, and WP3 to prepare prototype datasets demonstrating the ability to retrieve:
• Sea surface heights, wave heights and wind speeds,
• River and lake levels,
• Soil moisture, and
• Snow depths.
Subsequently, the derived data products will be assessed using conventional methods for low-resolution altimetry data on conventional altimetry data and Cryosat-2 RDSAR data as well as in-situ data (e.g. tide gauges, buoys, etc as well as conventional low resolution altimetry from ENVISAT Jason-2 and AltiKa).
Finally, higher level datasets will be prepared or produced to support the activities in WP5 and WP6.

Description of work and role of partners

Task 4.1 Processing of Cryosat-2 ocean data. (Starlab)
In this task Cryosat-2 and available Sentinel-3 ocean SAR data are processed using the methods that are recommended in WP1. The processing will be focused on the three ocean target types, Open Ocean, Polar Ocean, and Coastal Zone. Based on the list of potential test areas derived in WP1, the final test areas are defined so that the ocean prototype data sets will support the developments in WP5.

Task 4.2 Processing of Cryosat-2 land data. (UNEW)
In this task Cryosat-2 and available Sentinel-3 land SAR data are processed using the methods that are recommended in WP2. The processing will be focused on the three land target types, River and Lake Levels, Soil Moisture, and Snow Depths. Based on the list of potential test areas derived in WP2, the final test areas are defined so that the ocean land prototype data sets will support the developments in WP6.

Task 4.3 Preparation of prototype data sets (CLS)
In this task new data products and the processing chains set up in WP3 will be applied to compile prototype data from the Cryosat-2 and available Sentinel-3 data. The complied L2 and higher-level prototype data will support the development of new and/or improved ocean services to be used in WP5 and land services in WP6.

Task 4.4 Development of multi-satellite and in-situ validation and long term referencing data set. (Starlab and DTU)
In this task reference data for assessing the prototype will be compiled. The reference data will include both multi-mission satellite data and in-situ data. In ocean regions multi-mission conventional low resolution altimetric data from i.e. Jason-2 and AltiKa, output from ocean models as well as in-situ data from tide gauges and Bouys

data (i.e., Argo) will be compiled. In the land regions conventional low resolution altimetric data from Jason-2 and AltiKa, conventional SAR data as well as in-situ data from river gauges will be compiled. To ensure higher frequency acquisition rate data (constant) we will complement altimetric lake measurements with the results acquired with an instrument based on GNSS reflectometry (GNSS-R) from Starlab (name of the instrument is Oceanpal; http://starlab.es/products/oceanpal) which is already functioning as lake level monitoring instrument.

Task 4.5 Assessment of Cryosat-2 ocean prototype data. (DHI and DTU)
In this task the produced ocean prototype data sets will be assessed. The assessment will be carried out using independent dataset e.g. conventional low resolution altimetric data, output from ocean models as well as in-situ data from tide gauges.

Task 4.6 Assessment of Cryosat-2 land prototype data. (Starlab and DTU)
In this task the produced land prototype data sets will be assessed. The assessment will be carried out using available independent datasets e.g. conventional low resolution altimetric data, conventional imaging SAR data as well as in-situ data from river gauges.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	DTU	11.00
2	Starlab	9.75
4	CLS	6.00
5	DHI	5.00
6	UNEW	8.00
	Total	39.75

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D4.1	Processed ocean SAR data	2	7.00	P	PU	18
D4.2	Processed land SAR data	6	10.00	P	PU	18
D4.3	Prototype data sets for ocean and land applications	4	8.00	P	PU	21
D4.4	Dataset for validation and long term referencing	2	6.75	P	PU	21
D4.5	Report describing results from the assessment of the prototype data sets	2	8.00	R	PU	24
		Total	39.75			

Description of deliverables

D4.1) Processed ocean SAR data: [month 18]

D4.2) Processed land SAR data: [month 18]

D4.3) Prototype data sets for ocean and land applications: [month 21]

D4.4) Dataset for validation and long term referencing: [month 21]

D4.5) Report describing results from the assessment of the prototype data sets: [month 24]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS7	Prototype data sets for ocean and land applications prepared	4	21	Data delivered
MS8	Assessment of the prototype data sets completed and the results described	2	24	Report submitted

WT3:
Work package description

Project Number [1]	313238	Project Acronym [2]	LOTUS

One form per Work Package

Work package number [53]	WP5	Type of activity [54]	RTD
Work package title	Applications of new GMES data in value-adding ocean services		
Start month	13		
End month	36		
Lead beneficiary number [55]	5		

Objectives

The objective of WP5 is to develop new and improved coastal oceanographic services by utilizing the data features emerging with Sentinel-3. The services will primarily utilize the increased resolution of the SRAL SAR and place emphasis on value adding integration with complementary data such as ocean modelling, in situ data and multiple sensors. The services are developed to have a global applicability.

Description of work and role of partners

The main features pursued for the development of new services are the increased resolution of SRAL SAR in the coastal zone. Standalone products are derived for waves and SSH on one hand and integrated products using state-of-the-art high resolution ocean modelling and advanced data assimilation techniques are derived on the other. The later will also integrate Sentinel-3 AATSR and MERIS data as a complimentary data sources. While in-situ data can be integrated as a value adding information source, it is primarily used for validation purposed in order to secure a global perspective of the new ocean services. For each service line, an explicit application will be defined and its socio-economic impact estimated by panel users defined for each area selected in WP1.3.

Task 5.1 Improved wave and wind design data (DHI and CLS)
This task will use the high resolution wind speed and wave height product from the SRAL SAR to improve the description of the high frequency and wavenumber components in deriving wave and wind design data in marine engineering. The new more high frequent spatial correlation scales of significant wave height and wind speed are important in this respect and can be integrated with modelling and in situ data via ergodicity for design data studies and related cost sensitive decision making. Potential application: Offshore Wind farms (Letter of support from DONG Energy)

Task 5.2 Characterization of coastal scale hydrodynamics (DHI and DTU).
The availability of accurate water level and wave height observations at 350m resolution is close to the spatial scale of wave groups and hence can be used for the estimation of conditions causing surf beat. Combination with the wind product as well as in situ and model estimates of wind velocity and wave spectra will allow addressing the aliasing of the signal and the wave direction and hence the periods and amplitudes associated with surf beat and potential local seiching in inlets or harbours. To the extent these signals can be proven to depend on particular conditions available in classical metocean data, a risk forecast of the phenomena can be developed. In addition detailed analysis of transient water level response to wind forcing in shallow seas, coastal jets and basin scale seiching is addressed using a combination of SRAL SAR and numerical modelling.

Task 5.3 New current design and forecast data (DHI, DTU, CLS, and Starlab)
This task will explore the combination of high resolution altimetry data and modelling of meso- and submesoscale processes on the continental shelf and shelf break. The SRAL SAR data and the availability of the newest GOCE based geoids allows a new level of accuracy of absolute sea surface height to be provided in very high along rack resolution along with an error description. At the same time, new generations of ocean models such as ROMS or MIKE 3 FM model all water level causing phenomena in increasing resolution now resolving the mesoscale and the submesoscale for selected areas. Hence, the road is paved for introducing a new data assimilation approach in which level 2 data is directly assimilated without correction for tides and barometer effects. This task will demonstrate such an approach while simultaneously integrating the assimilation of AATSR as a complimentary data set. The increased resolution will in particular help the representation of

extreme current speeds. Application is both hindcast, nowcast and forecasts of current velocity and is envisioned for North Sea and/or Gulf of Mexico offshore design data and oil spill protection.

Task 5.4 Environmental vulnerability maps (Starlab)
This task will provide coastal vulnerability maps for CHL and HABs in order to detect the most vulnerable zones in the coast characterized by a typical trend of currents and water quality blooms. This task is developed by analyzing the times series for Water Quality parameters such as chlorophyll_a and Harmful algal blooms (MERIS and S3) and subsequently applying surface currents estimates from Task 5.3 and Task 5.5.

Task 5.5 Climate change services (CLS and DHI)
Based on the products for surface currents, eddy detection and front detection developed in WP3 data will analysed in combination with the current estimates of Task 5.3 and additionally be integrated in the climate change data as assembled in parallel GMES climate change projects.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	DTU	6.00
2	Starlab	4.00
4	CLS	6.00
5	DHI	12.00
6	UNEW	0.00
	Total	28.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D5.1	End-to-end demonstration of improved wave and wind design data	5	4.00	R	PU	24
D5.2	Characterization of coastal scale hydrodynamics using SRAL SAR	5	8.00	R	PU	30
D5.3	End-to-end demonstration of improved surface current design data	5	8.00	R	PU	33
D5.4	Environmental vulnerability maps combining MERIS, S3 and surface ocean current products	2	3.00	R	PU	30
D5.5	Surface current, eddy and front detection climate change services	5	5.00	R	PU	33
		Total	28.00			

Description of deliverables

D5.1) End-to-end demonstration of improved wave and wind design data: [month 24]

D5.2) Characterization of coastal scale hydrodynamics using SRAL SAR: [month 30]

D5.3) End-to-end demonstration of improved surface current design data: [month 33]

D5.4) Environmental vulnerability maps combining MERIS, S3 and surface ocean current products: [month 30]

D5.5) Surface current, eddy and front detection climate change services: [month 33]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS9	Service methodologies for end-to-end demonstration of improved wave and wind data established	5	24	Report submitted
MS10	Service methodology established for surface current, eddy and front detection climate change service	5	33	Report submitted

WT3:
Work package description

Project Number [1]	313238	Project Acronym [2]	LOTUS

One form per Work Package

Work package number [53]	WP6	Type of activity [54]	RTD
Work package title	Applications of new GMES data in value-adding land services		
Start month	13		
End month	36		
Lead beneficiary number [55]	2		

Objectives

The objective of WP6 is to develop new and improved land services by utilizing the data features emerging with Sentinel-3. The services will be integrating different sources of information such as Earth Observation data (from different sensors and satellites),the land data products being prepared in WP4 with in- situ data available in global data archives (e.g. GRDC) or from previous partner activities, and also model data and hydrological modelling.

The services to be developed will have a global applicability and will be demonstrated in selected case study regions (to be selected based on availability of data and existing hydrological models). WP6 will be targeting the following applications:

- Monitoring of river and lake levels
- Monitoring of Snow depths
- Contributions to climate monitoring and soil moisture monitoring
- Integration of the land data products with in-situ data and hydrological modelling using data assimilation

Description of work and role of partners

Task 6.1 Monitoring river and Lake levels (Starlab and CLS)
This task will focus on the definition of a downstream service capable to monitor river and lake levels. The technologies and algorithms to be used will be combining:
- The outcome of WP2.1 (lake and river level L2 from SRAL), including the assessment of the CLS approach, as consolidated within WP2.1 . For conventional altimetry, CLS has developed new retracking algorithms dedicated to hydrology. These methods will be transposed to SAR data (in WP2) and validated with respect to what has been obtained with LRM data and climatological time series such as Hydroweb (service providing a water level database on major rivers, lakes and wetlandswater developed by the LEGOS – Laboratoire d'Etudes en Géophysique et Océanographie Spatiale - in Toulouse, http://www.legos.obs-mip.fr/en/soa/hydrologie/hydroweb/) or PISTACH (CNES project on hydrology with altimetry) data base.
- The project will also draw on the ESA rivers and lake consortium for integrating with multiple satellite data (ENVISAT, ERS, AltiKa, Jason1+2) providing around 1287 river and targets throughout the world for validation and long term data provision as well as the reference data compiled in WP4.

Such a service provision would be of great interest to the Energy sector to monitor reservoirs water content. This market will be one of the envisioned target markets of this service.

Task 6.2 Monitoring snow depth (Starlab)
This task will focus on the definition of a downstream service for monitoring of snow water equivalents (SWE). Likewise described in the statement of work the SWE is proportional to the combination of the snow depth and snow density, thus this task envisions to:
- Derive snow depth from the SRAL instrument and combine it with,
- Snow density acquired from full polarimetric SAR data (e.g. RADARSAT-2).

The derivation of snow density from SAR data is a very innovative technique and some progress has been undertaken at Starlab for the last few years. If these results do not achieve accurate results sufficient to satisfy the clients needs this task will constrain the service provision to snow depth from altimetry data.

Task 6.3 Monitoring of Soil moisture (Starlab)
The Soil Moisture will be analyzed with different techniques in order to cross-calibrate the output algorithm of WP2.
By the integration and the correct interpolation of different sources of data it will be possible to define a downstream service providing Soil moisture information with the highest coverage and accuracy possible. The sources of data that will be considered include
• SRAL L2 Product for Soil moisture
• SAR L2 Product for Soil moisture
SAR algorithms for the derivation of soil moisture have already been developed at Starlab and calibrated for the east-coast of Spain. Therefore, experiments shall constrain to this area for a proper cross-calibration.

Task 6.4: Hydrological modelling and data assimilation (DTU, DHI and Starlab)
Hydrological models are key decision support systems for water resources management. Ingestion and assimilation of new data from Sentinel-3 can significantly improve hydrological model performance and predictive capability. A catchment-scale water balance modelling approach will be developed which will be able to ingest snow depths data, soil moisture data and river and lake levels. The task will include:
• Development of a coupled hydrological-hydrodynamic catchment-scale modelling approach based on existing simulation packages such as the DHI model suite.
• Development of assimilation approaches for snow depths, soil moisture and river and lake levels in the hydrological modelling system
• Case study applications in selected basins. Earth Observation data assimilation into hydrological models is particularly beneficial in remote areas where no or only few in-situ observations are available. Basins in Africa, Asia and Latin America are good examples of this.
Assessment of the hydrological modelling and data assimilation approach in view of global-scale application based on the findings in the case study basins. A list of specifications and requirements for a global inland water system will be developed.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	DTU	6.00
2	Starlab	9.50
4	CLS	4.00
5	DHI	10.00
6	UNEW	3.00
	Total	32.50

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D6.1	Lake and river level monitoring service	2	8.00	R	PU	30
D6.2	Snow depths monitoring service	2	3.00	R	PU	33
D6.3	Multi sensor Soil Moisture product	2	2.50	R	PU	33
D6.4	Prototype modelling and data assimilation system	5	11.00	O	PU	33

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D6.5	Demonstration of water resources management services for selected basins	5	8.00	O	PU	36
		Total	32.50			

Description of deliverables

D6.1) Lake and river level monitoring service: [month 30]

D6.2) Snow depths monitoring service: [month 33]

D6.3) Multi sensor Soil Moisture product: [month 33]

D6.4) Prototype modelling and data assimilation system: [month 33]

D6.5) Demonstration of water resources management services for selected basins: [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS11	Lake, Snow depths and Multi sensor Soil Moisture product established	6	33	Report submitted
MS12	Demonstration of water resources management services for selected basins	5	36	Report submitted

WT3:
Work package description

Project Number [1]	313238	Project Acronym [2]	LOTUS

One form per Work Package

Work package number [53]	WP7	Type of activity [54]	OTHER
Work package title	Dissemination and exploitation		
Start month	1		
End month	36		
Lead beneficiary number [55]	1		

Objectives

This workpackage will disseminate the results obtained in the LOTUS project on the use of Sentinel-3 SRAL SAR mode data as well as derived new products for GMES land and marine services. This includes the setting-up a web site for visualization and dissemination of project data and results. Effective dissemination actions are directed towards European SMEs to facilitate the exploitation of the new products in value adding applications for both ocean and land.
Furthermore, this workpackage will disseminate the results of the LOTUS project to European services and projects contributing to the Climate and Climate Change monitoring.
Finally, this workpackage will disseminate the results of the LOTUS project to GMES services for security and emergency management.

Description of work and role of partners

The dissemination work is subdivided into sub-tasks as shown below. For each area of dissemination targeted material will be developed and disseminated based on inter-action with the user. All material will be published on the project website too.

Task 7.1 Project web site (DTU)
Establishing and maintaining the public website of the Project to provide general and targeted dissemination as well as data for exploitation.
This includes design, implement and operate a suitable web-portal (or else) for disseminating the data products of the projects. This website will provide the front window for the project external communication.
The web pages will contain description of the general purpose and aims of the project; news and events; description of main technical aspects; partners; sponsoring, GMES context, press materials.
All public deliverables will be made available on the public web.
Demonstration data and validation report based on D3.1 and D 3.2 as well as guides on “how to” use new data and products will be prepared and made available.

Task 7.2 GMES land and ocean (Starlab and UNEW)
Information describing results obtained in the LOTUS project on the use of Sentinel-3 SRAL SAR mode data as well as derived new products for GMES land and marine services. Existing involvement in the MyOcean2 project along with the participation will be used to bridge the corporation between GMES data providers and product. Dissemination based on D3.1 and D3.2 targeted towards the MyOcean Sea Level TAC will be made at the RV2 meeting at month 18 toward the ocean community and at the RV3 towards the GMES land community at month 27 to ensure exploitation of the LOTUS results.
Information material will be made available as printed material as well as through the project web pages.
Dedicated dissemination of the mature project results towards the ocean and land community will also take place at the RV3 meeting at month 27.
In general, this contribution is seen to increase the competitiveness of European value adding GMES marine and land services.

Task 7.3 SME exploitation (DHI)
The exploitation of the new LOTUS services will be demonstrated via involvement and agreements with at least three users/SME. Possible SME will be researched in the first part of the project and dedicated promotional

material based on D3.1 and D3.2 and progress on WP4,5 and 6 will be disseminated to the ocean and land SME at the RV2 and RV3 meeting at month 18 and 27, respectively.
The service level agreements include full detail about the service delivered and how it adds value to the end-users. The exploitation methodology is further disseminated to SME's outside the project via presentation at international conferences.
Based on the interaction with the SME, dissemination material directed towards European SMEs will be developed and reported to facilitate the exploitation of the new products in value adding applications for both ocean and land and this way to increase the uptake of the LOTUS results among SME.

Task 7.4 Climate Change monitoring (DTU)
Dissemination activities targeted towards European services and projects contributing to the Climate and Climate Change monitoring will be carried out. A targeted approach is taken in here, in which the exploitation for climate change monitoring of the new Sentinel 3 serviced will be presentation at international conferences (both EGU and more specialist conferences) to also promote the project outside the EU and to create interest in LOTUS on a global scale.
The project will provide direct reference to and new Sentinel-3 "core" ocean products for assessment bodies such as the WMO/UNEP Intergovernmental Panel for Climate Change, International Polar Year bodies, or any policy-maker body dealing with global environmental issues.

Task 7.5 Security and emergency management (CLS)
Initially will we research and indentify the existing projects linked to the GMES services for security and emergency and to contact them directly. A preliminary list of these projects is the following one: Cleanseanet, (EMSA) for oil spill contingency, SIDARUS which is a sea ice downstream service for Arctic and Antarctic users. Identified users will be consulted and targeted information describing the results of the LOTUS project to GMES services for security and emergency management will be prepared and disseminated to these to maximize the uptake of the LOTUS results. The report will contain useful information about the potential of the new and/or improved products developed in the frame of the LOTUS project for applications such as Iceberg detection and Search & Rescue.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	DTU	8.00
2	Starlab	6.75
4	CLS	4.00
5	DHI	7.00
6	UNEW	3.00
	Total	28.75

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D7.1	Report describing web site	1	2.00	R	PU	6
D7.2	Report describing Sentinel-3 SRAL SAR mode data and new products for GMES land and marine services	2	7.75	R	PU	24

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D7.3	New LOTUS products and their potential use in value adding applications described in report	5	7.00	R	PU	30
D7.4	Report describing the results to European services and projects contributing to Climate monitoring	1	6.00	R	PU	36
D7.5	LOTUS results to GMES services for security and emergency management described in report	4	6.00	R	PU	36
		Total	28.75			

Description of deliverables

D7.1) Report describing web site: [month 6]

D7.2) Report describing Sentinel-3 SRAL SAR mode data and new products for GMES land and marine services: [month 24]

D7.3) New LOTUS products and their potential use in value adding applications described in report: [month 30]

D7.4) Report describing the results to European services and projects contributing to Climate monitoring: [month 36]

D7.5) LOTUS results to GMES services for security and emergency management described in report: [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS13	Web site has been established	1	6	Website is public
MS14	Dissemination of first results to GMES marine community and user consultation completed	2	13	Report submitted
MS15	Dissemination of first results to GMES land community and user consultation completed	5	20	Report submitted
MS16	Dissemination of near final results to GMES marine and land community performed	1	31	Report submitted
MS17	Description of LOTUS products and use in GMES completed	4	36	Report submitted

WT3:
Work package description

Project Number [1]	313238	Project Acronym [2]	LOTUS

One form per Work Package

Work package number [53]	WP8	Type of activity [54]	MGT
Work package title	Management		
Start month	1		
End month	36		
Lead beneficiary number [55]	1		

Objectives

The goal of this WP is to implement appropriate management and organizational activities to monitor the short and long term development and deployment of LOTUS. It includes:
- maintenance of the consortium agreement,
- chairing of the steering committee and the advisory board, and
- the overall legal, ethical, financial and administrative management including, for each of the beneficiaries, the obtaining of the certificates on the financial statements and on the methodology and costs relating to financial audits and technical reviews.

Description of work and role of partners

The management will be performed on a day-to-day basis and through regular meetings of the steering group via phone conferences and face-to-face meetings (~every 9 months) to address issues of relevance to the LOTUS progress. The coordinator will:
1) administer the financial contribution of the Union regarding its allocation between beneficiaries and activities, in accordance with this grant agreement and the decisions taken by the consortium. The coordinator shall ensure that all the appropriate payments are made to the other beneficiaries without unjustified delay;
2) keep the records and financial accounts making it possible to determine at any time what portion of the financial contribution of the Union has been paid to each beneficiary for the purposes of the project;
3) inform the REA of the distribution of the financial contribution of the Union and the date of transfers to the beneficiaries, when required by this grant agreement or by the REA;
4) preparation, execution and post-processing of major project meetings such as Steering Committee meetings, General Assemblies and meetings with the advisory board (tasks: agendas, invitations, location of meeting places, organization of rooms and equipment, preparation distribution and archiving of materials, minutes and action lists);2) implement and maintain a project-specific database for reporting and controlling, including the adaptation of the structure after changes in the workplan and the consortium;
5) maintain efficient management procedures to meet milestones and reporting/deliverables deadlines,
6) review the reports to verify consistency with the project tasks before transmitting them to the REA;
7) monitor the compliance by beneficiaries with their obligations under this grant agreement.
8) handling of legal issues, IPR issues and maintenance of the consortium agreement,
9) handling of the project correspondence and the day-to-day requests from partners and external bodies.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	DTU	5.00
	Total	5.00

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D8.1	Project Management Plan	1	1.00	R	PU	4
D8.2	Minutes of Kick-off meeting	1	0.20	R	PU	1
D8.3	Minutes of project RV1	1	0.20	R	PU	10
D8.4	Minutes of project RV2	1	0.20	R	PU	19
D8.5	Minutes of project RV3	1	0.20	R	PU	28
D8.6	Minutes of project RV4	1	0.20	R	PU	36
		Total	2.00			

Description of deliverables

D8.1) Project Management Plan: [month 4]

D8.2) Minutes of Kick-off meeting: Minutes from combined project review meeeting and steering committee meeting. [month 1]

D8.3) Minutes of project RV1: Minutes from combined project review meeeting and steering committee meeting. [month 10]

D8.4) Minutes of project RV2: Minutes from combined project review meeeting and steering committee meeting. [month 19]

D8.5) Minutes of project RV3: Minutes from combined project review meeeting and steering committee meeting. Minutes also include outcome of advisory board meeting. [month 28]

D8.6) Minutes of project RV4: Minutes from combined project review meeeting and steering committee meeting. [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS18	Kick-off meeting has been held	1	1	
MS19	Periodic reporting accomplished, Period 1	1	18	Report submitted
MS20	Periodic reporting accomplished, Period 2	1	36	Report submitted
MS21	Final reporting accomplished	1	36	Report submitted

WT4:
List of Milestones

Project Number [1]	313238	Project Acronym [2]	LOTUS

List and Schedule of Milestones

Milestone number [59]	Milestone name	WP number [53]	Lead beneficiary number	Delivery date from Annex I [60]	Comments
MS1	Scientific requirements for ocean applications consolidated	WP1	4	4	Report submiited
MS2	SAR mode algorithms for ocean defined	WP1	2	12	Report submitted
MS3	Scientific requirements for land applications consolidated	WP2	5	4	Report submitted
MS4	SAR mode algorithms for land defined	WP2	6	12	Report submitted
MS5	Data products Definition development, (DPDD) delivered	WP3	4	12	Report submitted
MS6	ATBD delivered	WP3	4	19	Report submitted
MS7	Prototype data sets for ocean and land applications prepared	WP4	4	21	Data delivered
MS8	Assessment of the prototype data sets completed and the results described	WP4	2	24	Report submitted
MS9	Service methodologies for end-to-end demonstration of improved wave and wind data established	WP5	5	24	Report submitted
MS10	Service methodology established for surface current, eddy and front detection climate change service	WP5	5	33	Report submitted
MS11	Lake, Snow depths and Multi sensor Soil Moisture product established	WP6	6	33	Report submitted

WT4:
List of Milestones

Milestone number [59]	Milestone name	WP number [53]	Lead beneficiary number	Delivery date from Annex I [60]	Comments
MS12	Demonstration of water resources management services for selected basins	WP6	5	36	Report submitted
MS13	Web site has been established	WP7	1	6	Website is public
MS14	Dissemination of first results to GMES marine community and user consultation completed	WP7	2	13	Report submitted
MS15	Dissemination of first results to GMES land community and user consultation completed	WP7	5	20	Report submitted
MS16	Dissemination of near final results to GMES marine and land community performed	WP7	1	31	Report submitted
MS17	Description of LOTUS products and use in GMES completed	WP7	4	36	Report submitted
MS18	Kick-off meeting has been held	WP8	1	1	
MS19	Periodic reporting accomplished, Period 1	WP8	1	18	Report submitted
MS20	Periodic reporting accomplished, Period 2	WP8	1	36	Report submitted
MS21	Final reporting accomplished	WP8	1	36	Report submitted

WT5:
Tentative schedule of Project Reviews

Project Number [1]	313238	Project Acronym [2]	LOTUS

Tentative schedule of Project Reviews

Review number [65]	Tentative timing	Planned venue of review	Comments, if any
RV 1	9	REA, Brussels, B	All partners review progress and work plan. Advisory Board members will be invited to participate.
RV 2	18	CLS, Toulouse, F	All partners review progress and work plan. MyOcean Sea-Level TAC members will participate.
RV 3	27	DHI, Hørsholm, DK	All partners review progress and work plan. MyOcean Sea-Level TAC members will participate. Advisory Board members will be invited to participate.
RV 4	36	Starlab, Barcelona, E	All partners review progress and results.

WT6:
Project Effort by Beneficiary and Work Package

Project Number [1]	313238	Project Acronym [2]	LOTUS

Indicative efforts (man-months) per Beneficiary per Work Package

Beneficiary number and short-name	WP 1	WP 2	WP 3	WP 4	WP 5	WP 6	WP 7	WP 8	Total per Beneficiary
1 - DTU	13.00	5.00	6.00	11.00	6.00	6.00	8.00	5.00	60.00
2 - Starlab	15.00	11.00	9.32	9.75	4.00	9.50	6.75	0.00	65.32
4 - CLS	8.00	4.00	19.43	6.00	6.00	4.00	4.00	0.00	51.43
5 - DHI	0.00	3.00	3.00	5.00	12.00	10.00	7.00	0.00	40.00
6 - UNEW	1.00	7.00	3.00	8.00	0.00	3.00	3.00	0.00	25.00
Total	37.00	30.00	40.75	39.75	28.00	32.50	28.75	5.00	241.75

WT7:
Project Effort by Activity type per Beneficiary

Project Number [1]	313238	Project Acronym [2]	LOTUS

Indicative efforts per Activity Type per Beneficiary

Activity type	Part. 1 DTU	Part. 2 Starlab	Part. 4 CLS	Part. 5 DHI	Part. 6 UNEW	Total
1. RTD/Innovation activities						
WP 1	13.00	15.00	8.00	0.00	1.00	37.00
WP 2	5.00	11.00	4.00	3.00	7.00	30.00
WP 3	6.00	9.32	19.43	3.00	3.00	40.75
WP 5	6.00	4.00	6.00	12.00	0.00	28.00
WP 6	6.00	9.50	4.00	10.00	3.00	32.50
Total Research	36.00	48.82	41.43	28.00	14.00	168.25
2. Demonstration activities						
WP 4	11.00	9.75	6.00	5.00	8.00	39.75
Total Demo	11.00	9.75	6.00	5.00	8.00	39.75
3. Consortium Management activities						
WP 8	5.00	0.00	0.00	0.00	0.00	5.00
Total Management	5.00	0.00	0.00	0.00	0.00	5.00
4. Other activities						
WP 7	8.00	6.75	4.00	7.00	3.00	28.75
Total other	8.00	6.75	4.00	7.00	3.00	28.75
Total	60.00	65.32	51.43	40.00	25.00	241.75

WT8:
Project Effort and costs

Project Number [1]	313238	Project Acronym [2]	LOTUS

Project efforts and costs

Beneficiary number	Beneficiary short name	Estimated eligible costs (whole duration of the project)						Requested EU contribution (€)
		Effort (PM)	Personnel costs (€)	Subcontracting (€)	Other Direct costs (€)	Indirect costs OR lump sum, flat-rate or scale-of-unit (€)	Total costs	
1	DTU	60.00	324,187.72	1,500.00	25,150.00	366,332.09	717,169.81	557,201.98
2	Starlab	65.32	326,600.00	0.00	12,650.00	163,300.00	502,550.00	371,700.00
4	CLS	51.43	447,121.20	1,500.00	13,200.00	369,947.70	831,768.90	416,634.40
5	DHI	40.00	293,819.40	1,500.00	10,725.00	282,066.66	588,111.06	449,282.00
6	UNEW	25.00	161,113.00	0.00	9,625.00	102,442.80	273,180.80	199,343.60
Total		241.75	1,552,841.32	4,500.00	71,350.00	1,284,089.25	2,912,780.57	1,994,161.98

1. Project number

The project number has been assigned by the Commission as the unique identifier for your project. It cannot be changed. The project number **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

2. Project acronym

Use the project acronym as given in the submitted proposal. It cannot be changed unless agreed so during the negotiations. The same acronym **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

53. Work Package number

Work package number: WP1, WP2, WP3, ..., WPn

54. Type of activity

For all FP7 projects each work package must relate to one (and only one) of the following possible types of activity (only if applicable for the chosen funding scheme – must correspond to the GPF Form Ax.v):

• **RTD/INNO =** Research and technological development including scientific coordination - applicable for Collaborative Projects and Networks of Excellence

• **DEM =** Demonstration - applicable for collaborative projects and Research for the Benefit of Specific Groups

• **MGT =** Management of the consortium - applicable for all funding schemes

• **OTHER =** Other specific activities, applicable for all funding schemes

• **COORD =** Coordination activities – applicable only for CAs

• **SUPP =** Support activities – applicable only for SAs

55. Lead beneficiary number

Number of the beneficiary leading the work in this work package.

56. Person-months per work package

The total number of person-months allocated to each work package.

57. Start month

Relative start date for the work in the specific work packages, month 1 marking the start date of the project, and all other start dates being relative to this start date.

58. End month

Relative end date, month 1 marking the start date of the project, and all end dates being relative to this start date.

59. Milestone number

Milestone number:MS1, MS2, …, MSn

60. Delivery date for Milestone

Month in which the milestone will be achieved. Month 1 marking the start date of the project, and all delivery dates being relative to this start date.

61. Deliverable number

Deliverable numbers in order of delivery dates: D1 – Dn

62. Nature

Please indicate the nature of the deliverable using one of the following codes

R = Report, **P** = Prototype, **D** = Demonstrator, **O** = Other

63. Dissemination level

Please indicate the dissemination level using one of the following codes:

• **PU =** Public

• **PP =** Restricted to other programme participants (including the Commission Services)

• **RE =** Restricted to a group specified by the consortium (including the Commission Services)

• **CO =** Confidential, only for members of the consortium (including the Commission Services)

• **Restreint UE =** Classified with the classification level "Restreint UE" according to Commission Decision 2001/844 and amendments

• **Confidentiel UE =** Classified with the mention of the classification level "Confidentiel UE" according to Commission Decision 2001/844 and amendments

• **Secret UE =** Classified with the mention of the classification level "Secret UE" according to Commission Decision 2001/844 and amendments

64. Delivery date for Deliverable

Month in which the deliverables will be available. Month 1 marking the start date of the project, and all delivery dates being relative to this start date

65. Review number

Review number: RV1, RV2, ..., RVn

66. Tentative timing of reviews

Month after which the review will take place. Month 1 marking the start date of the project, and all delivery dates being relative to this start date.

67. Person-months per Deliverable

The total number of person-month allocated to each deliverable.