Copernicus **E**volution and **A**pplications with **S**entinel **E**nhancements and **L**and **E**ffluents for **S**hores and **S**eas

Date: December 2018

Deliverable Number: 7.4.b
Due date for deliverable: October 2018
Actual submission date: December 2018
Leader: UPC

Document Dissemination Level: PU

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)

Co-ordinator: Universitat Politècnica de Catalunya (UPC)
Project Contract No: H2020-EO-2016-730030- CEASELESS
Project website: https://ceaseless.barcelonatech-upc.eu

DOCUMENT INFORMATION

Title	Updated project forms with yearly summary and calendar page
Lead Author	
Contributors	
Distribution	
Document Reference	

DOCUMENT HISTORY

Date	Revision	Prepared by	Organisation	Aproved by	Notes
December 2018		Manuel Espino Agustín S.-Arcilla Pablo Cerralbo Marc Mestres	LIM/UPC		

ACKNOWLEDGEMENT

This project has received funding from the European Union’s H2020 Programme for Research, Technological Development and Demonstration under Grant Agreement No: H2020-EO-2016-730030- CEASELESS.

e-CALENDAR

CEASELESS

2019

Horizon 2020
European Union Funding
for Research & Innovation

January						
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31*			

* D1.2 / D1.3 / D2.2 / D3.2 / D4.3

February						
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28			

March						
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

April						
1	2	3	4	5	6	7
8	9	10	11	12	EGU	
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30*					

* D1.4 / D2.3 / D4.4 / D5.1

May						
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

June						
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

July						
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31*				

* D3.3 / D5.2 / D5.3

August						
			1	2	3	4
5	6	7	8	9	10	11
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19	20	21	22	23	24	25
26	27	28	29	30	31	

September						
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2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

October						
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31*			

* D2.4 / D6.3 / D7.6 / D7.8 / D7.9 / D7.10
Project Meeting (Barcelona)

November						
End of 3rd year				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

December						
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

SECOND YEAR SUMMARY

HORIZON 2020

CEASELESS

At a glance:

Title:
Copernicus Evolution and Applications with Sentinel Enhancements and Land Effluents for Shores and Seas

Instrument:
H2020

Total Cost:
1.999.332'50 €

Duration:
36 months

Start Date:
2016 – 11 – 01

Consortium:
9 partners from 5 countries

Project Coordinator:
Prof. Agustín Snchez-Arcilla

Project Web Site:
ceaseless.barcelonatech-upc.eu

Key Words:
Satellite data, Sentinel, Assimilation, High resolution modelling, Coupling

Work performed during the 2nd year

CEASELESS has improved the recovery of Sentinel 3A SRAL data using the ALES algorithm and verifying the measurements against standard products. The work has also tackled mitigation options for Sentinel-1 level 2 radial velocity products in the coastal zone. This has been followed by an inter-comparison of altimeter data from CryoSat-2, Jason-2, Jason-3 and Sentinel-3 addressing the differences in wind speed (limited) and significant wave height (up to 15% in coastal regions). It has also shown the offset between wind speeds retrieved from Envisat and Sentinel-1A/B. The conclusion is the improvement of data quality from recent Sentinel-3A data when compared to older S-3A products.

Regarding modelling CEASELESS has considered the effects of grid resolution and unstructured meshes in wave data assimilation and depending on a) energetic level of the event, b) covariance length scales and c) methods to update the spectrum. The differences between assimilative and non-assimilative runs converge after about 6h with a short-lived assimilation benefit for coastal domains. For coupled models CEASELESS has analyzed the advances with respect to stand-alone models showing the dependence on the selected parameterizations. The effects of coupling wind-wave models during energetic events leads to an enhanced surface roughness, therefore to reduced wind speed and associated wind fields. The work has also considered the 1 versus 2 way model coupling for several grid resolutions. The conclusion is that the main differences between occur under strong gradients and energetic enough conditions. The CEASELESS improvements have allowed capturing sharp gradients and fronts common in coastal domains, with tools that are been shared for testing among CMEMS MFC partners.

The applications to water quality and aquaculture/fisheries have been based on simulated water renovation and temperature, then compared to in-situ and satellite data. This has included the fresh water discharges from land, analyzing the effect of artificially modifying (dredging) the connection of the selected coastal bays with the outer sea. This has been the result of an application to the Spanish Mediterranean coast where the importance of 2-way coupling and accurate nesting and interpolation using CMEMS boundary conditions from MyOcean-Med and MyOcean-IBIT has been demonstrated. Here the CMEMS products have been downscaled to about 20m resolution inside the Bay providing an accurate representation of small-scale processes such as required by local users. The associated need for error and uncertainty have been supported by an analysis of neighborhood verification methods. The importance of having a consistent framework for evaluating model performance across offshore and coastal zones has also been determined using conventional statistics (means square error) and the cumulative ranked probability score.

The performed work can contribute to an optimal use of the growing number of observations in coastal areas, providing knowledge about the errors from different data sources. This can be applied to the preparation of contingency plans by coastal or harbour authorities where the criteria should come from the users. For instance, for harbour cases the characterization of meteo-oceanographic scenarios, the initial and boundary conditions and from the perspective of the users, a harbour domains unification in terms of velocities, residence times and hazards levels. enhanced. This suggest working towards more automated modelling workflows.

Summary and advances

The work done during this second CEASELESS year corresponds to all project work packages, going from data provision to assimilation and modelling. It also encompasses applications, derived products and the needs for data storage and recovery. The advances can be summarized by:

1. Analyzing altimeter retrieved wind/wave data, assessing uncertainties and variability.
2. Modelling capacity to tackle intense met-ocean events near the coast.
3. Standardized data protocols for exchanges, using predominantly the net CDF format.
4. Capacity for selectively subsampling specific variables in user defined subdomains.
5. Coupling through free-surface and bed boundary conditions, with updated bathymetry.
6. Assimilation for specific coastal applications incorporating end users criteria, with implications for CMEMS downscaling.

More information

For more information please contact:
Prof. Agustín Sánchez-Arcilla
Email: agustin.arcilla@upc.edu
https://ceaseless.barcelonatech-upc.eu

Project Partners	
Universitat Politecnica de Catalunya - UPC	ES
Technical University of Denmark - DTU	DK
Helmholtz-Zentrum Geesthacht - HZG	DE
Danish Hydraulic Institute – DHI	DK
Geographic Resources Analysis & Science – GRAS	DK
National Research Council – CNR	IT
Natural Environment Research Council – NERC	UK
Met Office – MO	UK
The European Centre for Medium-Range Weather Forecasts - ECMWF	UK