The authors have replied point-by-point to all comments given by the referees. Most of them addressed the issues properly. However, as the two referees mentioned, quite lots of effort are needed to improve the grammar and the quality of this manuscript. This does not mean the rest of the text apart from pointed comments listed by the referees are clear and precise enough for readers. There are still a lot of grammar mistakes and incorrect way of forming sentences for a scientific publication. I have listed some of them as the following comments. Thus, I suggest a close check through the text and a major revision of the current version.

Thank you very much for your comments. We have improved the English writing in the revised manuscript. I think that all spelling and grammatical errors in the manuscript have been addressed. These changes will not influence the content of the paper. Therefore here, we did not list the changes, but those revisions within the document are presented as "tracked changes".

Line 24: at -> in a

Done

Line 28: Also -> Futhermore

Done

Line 32: sedimentation -> sediment

Corrected

Line 37: with -> to

Done

Line 39: remove 'redistribute

Done

Line 40: I am wondering if there are any studies existed in this area focusing on sediment transport due to density gradient? Water circulation caused by density gradient usually plays an important role in transport of sediment and formation of turbidity maixima in estuaries.

The water circulation caused by density gradients is expected to be small and presumably not able to resuspend fine bottom sediment which is the topic of the article. There is many references addressing the gravitational circulation (e.g. Gyer, 2014 in Continental Shelf Research) is a good review), but we avoid to mention to not confuse the reader.

Line 41, 42: list references in a chronological order. (Please check through the manuscript)

Corrected through the manuscript.

Line 46: remove the second "("

Done

Line 54-55: Text duplicated, please remove.

Removed

Line 64-65: rewrite: "; the knowledge of these …" -> ", which may further benefit human activities management …"

modified

Line 77: add "m" behind 6.5

Done

Line 78: change "6.5m" to "6.5 m"

Changed.

Line 108: put (M-Sc) behind land station.

Done

Line 126: consisted -> consists

Corrected

Line 128: in (Cerralbo et al., 2015a) -> by Cerralbo et al. (2015a)

(Check through the manuscript for similar isssues)

Corrected through the manuscript.

Line 130: Rewrite this sentence. (e.g., The barotropic time step for ROMS is set to 30 s, and in SWAN the wave field is solved in a time interval of 3600 s.)

Rewrite in the new version of the manuscript.

Line 131: change -> exchange?

Corrected

Line 131: open boundary was forced -> boundary coan't be forced. -> water motion at the open boundaries was forced by …

Modified.

Line 134: flow -> discharge

Modified.

Line 135-136: This sentence is unclear, please rewrite.

Modified.

Line 137: What are the velocity near the bottom and wave near the bottom?

Near the bottom is the nearest computational node near the bottom. We include the reference where the computational method is explained to avoid extend unnecessarily the manuscript.

Line 139: move "bottom stress" behind current and wave bothd.

Done

Line 144: u and v are current spped in ? and ? direction? What is z_0 in your equation (1)? and the value is?

Both of them corrected. Z0 is computed by the model.

Line 153: (Kumar et al., 2012) -> Kumar et al. (2012)

Done.

Line 158: change "in" A2 to "at" A2. Use "at" for stations. Please close check you rest text and figure captions.

Done. Thanks.

Line 159: measured sea level height?

Surface elevation, we think that next sentence is explained.

Line 160: This sentence is still unclear, please rewrite it.

modified

Line 162: change to "Two typical wind conditions are considered …"

Modified.

Line 168: remove "," and include -> "includes"

Done

Line 169: The sentence is too wordy. Please remove "characteristic"

Modified and "Characteristic" removed.

Line 171: it is unclear the amplitude of what is maximum?

Clarified: "amplitude of sea level oscillation".

Line 173: it is unclear by analyzing what in the along-shore direction of Figure 3 reveals the peak of velocities are at the order of 0.5 m s-1. Note that the along-shore direction only refers to coordinate, itself can't reveal anything, please be precise in your description.

The along-shore is the axis direction of the Bay. See L171 in the new version of the Bay.

Line 176: … behavior ranging values from … -> … behavior with values ranging from …

Modified.

Line 176: I guess you mean Figure 2e.

Done.

Line 177: In this sence, three differentiated … -> Three differentiated …

Corrected.

Line 183: works -> work

Clarified.

Line 188: please explain what are the “points” mean ?

Clarified.

Line 189: First, please explain what are shown in this figure. I don’t see “points”, but two triangles that represent current data analised from station A1 and A2 , respectively, and one circle lying on the bottom of this figure reads “ADCP”. Without explanation, it is very hard to understand what can you read from this figure.

Clarified. The sentence has been expanded.

Line 193: add “the” before Alfacs Bay. Remove “The” before Figures 5. Moreover, it is better to describe two figures separately. First Figure 5, then Figure 6.

Done. In the manuscript the figures are explained sequentially.

Line 194: different snapshots of what? Please be precise on what you what to show.

Modified by results.

Line 194: both -> two.

Modified.

Line 194: wave and current-induced bottom … -> wave-induced and current-induced bottom… And also please be consists through the entire text.

Corrected through the manuscript

Line 195: corresponds -> correspond (Please rewrite this sentence in correct grammar.)

Corrected.

Line 196: removed “combined”. It is clear that the bottom stress contains several components that due to different hydrodynamics, in which one or more dominant over the others.

Done.

Line 197: “stresses” -> “stress”; “due to the current bottom stress” -> “caused by currents”

Corrected,

Line 202: remove “to”

Corrected,

Line 205: add “),” behind E1, remove “where”, “increase” -> “increases”

Done,

Line 206-208: Rewrite. This sentence is not an English written for scientific publication.

Modified: *"At A2, the combined bottom stress is equal to 0.03 Pa (presumably too small to induce resuspension)."*

Line 209: "This figure shows how…" -> "It reveals that …"

Modified.

Line 228: not the modelled stress itself suggest … but the analysis of modelled stress. This is a problem frequently occurs in the manuscript. Please look into your grammar closely and fix it.

Corrected and checked.

Line 231-232: In general, your sentences are wordy. Here is just one example. Moreover, it does not follow the structure formed in previous sentence. I suggest to rewrite as follows: "However, these studies did not explain the high spatial variability of the seiche-induced sediment resuspension, which are implied by the modelled current-induced bottom stress."

Modified.

Line 229-232: Please rewrite and improve your way of writing sentences.

Ok, done.

Line 238: "the current bottom intensity measured" -> "the measured bottom current speed"

Corrected.

Line 238: (Llebot et al., 2014) and (Cerralbo et al. 2015a) -> Llebot et al. (2014) and Cerralbo et al. (2015a)

Done.

Line 239: … a barotropic shape of what?

Added: "*water current profiles*"

Line 240: behavior -> Please be consists with your spelling, use either British English or American English. Don't use them both in one manuscript. I observed "analyzed", "modeled", which are AE, while "behaviour", "modelled" are BE.

Ok, checked through the manuscript.

Line 245: "This" -> "The"

Corrected

Line 246-248: Rewrite. Inconsistent structure.

Modified: "Episode E2 is attributed to at sea-breeze mechanism."

Line 249-251: wordy sentence.

Modified,

Line 256: similar to what in the second stage of E1.

modified

Line 256: are -> is

Modified.

Line 256: This sentence is unclear. Please rewrite.

Corrected,

Line 259: intensity -> speed

Corrected,

Line 261: have a relevant role in the resuspension mechanisms (wordy) -> relevant to the resuspension.

Modified.

Line 262: remove "the"

Line 266: "the relative importance" with respect to what? To each other or to the combined bottom stress?

Clarified

Line 267: quantify -> be quantified.

Modified,

Line 271-272: I don't see how model data is correlated with filed data. Model is, to some extent, to mimic features you observed in field data with giving open boundaries and initial conditions.

We have difficulties to understand this point, here we not compare model and observations. However, the sentence has been modified in the new version of the manuscript.

Line 275: mechanism itself does not have spatial and temporal variability, but the relative importance of each mechanism does. Mechanisms refer to, not physical variables, but processes as explanations of a phenomenon.

Thanks for this clarification. The manuscript has been modified.

Line 279: "an evident influence" -> what is that?

Modified by "*apparent*"

Line 284-286: Grammar incorrect, thus hard to understand.

Corrected and modified.

Line 292-293: don't use the same word through the entire text. Moreover, two "contribution" have different meaning. I suggest to replace the first one with "study"

Done.

Line 296: add "those considering" behind including.

Done

Line 297: "must take into account" -> "should include"

Replaced

Line 300: The bay geometry characteristics cannot suggest. Please rewrite this sentence.

Sentence modified: "favor" instead of "suggest".

Line 300: remove "effect"

Done.

Line 304: remove "the"

Done.

Line 305: "This may be consistent with …" Please rewrite this sentence.

Modified: "*This could explain…*"

Line 308: "should allow" -> "allows"

Replaced.

Line 320: "Others" -> "Other"

Corrected,

Line 321: add "with" before "freshwater"

Added

Figure 2 caption: "intensity" -> "speed"; "in"-> "at";

Done,

Line 509: "velocity" -> "speed". Note velocity refers to both speed and direction.

Corrected,

Line 510: "in" -> "by"

Corrected.

Figure 3 caption: (a)…; (b) as (a), but for the cross-shore direction.

Modified.

"showed" -> "shown"

Corrected

Figure 5 caption: current-induced bottom stress (\tau_c), wave-induced bottom stress (\tau_w) and combined wave-current bottom stress (\tau_c + \tau_w).

Corrected.

Magenta is not very clear in the contour plots. I suggest to use a color with better contrast.

After a reviewer suggestion we include magenta because this color is not included in the color bar.

“Isobaths (in grey) are plotted each 3 m” -> Isobaths are plotted in grey solid lines in 3 m interval from ? m to ? m.

Modified.

“the plot scale is transformed in log10” -> “the bottom stresses are plotted in log10 scale”

Corrected

Characterization of bottom sediment resuspension events observed in a micro-tidal bay

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Abstract. In this ~~contribution~~ study we investigated the ~~origin of the~~ variability in near-bottom turbidity~~ observations~~ in the Alfacs Bay (NW Mediterranean Sea). The~~is~~ bay is characterized by a micro-tidal environment and a relevant seiching activity which may lead to flow velocities of more than 50 cm•s-1. A set of current meters and optical sensors were mounted near the sea bottom ~~were used~~ to acquire synchronous hydrodynamic and optical information of the water column. The time-series observations showed an evident relation between ~~the~~ seiche activity and sediment resuspension events. The observations of turbidity peaks are consistent with the node/anti-node location for the fundamental and first resonance periods of the bay. The implementation of a coupled wave-current numerical model shows a strong spatial variability of the potential resuspension locations. Strong wind events are also a mechanism responsible for~~of~~ the resuspension of fine sediment within the bay. This is confirmed by~~using retrieval of~~ suspended sediment concentration maps derived from Sentinel-2 satellite imagery~~data~~. We suggest that the sequence of resuspension events plays a relevant role in s~~S~~uspended s~~S~~ediment c~~C~~oncentration, in such a way that previous sediment resuspension events may influence the increase of suspended sediment in subsequent~~s~~ events. The suspended sediment events likely affect the ecological status of the bay and the sedimentary process in ~~theaat~~a long-term period.

1 Introduction

Suspended sediment in the water column and subsequent deposition plays a critical role in coastal ecosystems and for managing ~~in~~ coastal environment~~s and management~~. High levels of suspended sediment concentration in the water column have~~s~~ ~~relevant~~ substantial implications for~~in~~ aquatic ecosystems and natural habitats (Ellis et al., 2002) in particular during large exposure periods ~~(~~(Newcombe and Macdonald, 1991). ~~Also, Ssediment~~Furthermore, sediment supplied from rivers potentially transports ~~loads~~ significant amounts of organic matter, pollutants and heavy metals that may be deposited at the ~~in the vicinity~~ sea bottom or even transported offshore (Palanques et al., 2017). The sediment dynamics is relevant in coastal bays and estuaries due to the large amount of sediment delivered by the freshwater and the potential fine sediment trapping zones. In addition, sediment resuspension ~~can results in a large contributionlargely~~ contributes significantly to the total nutrient load (Sondergaard et al., 1992) and prevents ~~the~~ sunlight penetration (Mehta, 1989). ~~Besides,~~ T~~t~~he analysis and prevention of fine sediment~~ation~~ within basins and channels~~ access is object of investigation~~ also plays ~~also~~ a role for the purposes of~~in the~~ port ~~engineering context in~~engineering, in order to examine and monitor ~~the~~ siltation processes (e.g. ~~(~~Ghosh et al., 2001; van Maren et al., 2015)~~)~~. Finally, the growth of harmful species, such as dinoflagellate cysts, may be related to significant local resuspension through the mixing of the upper layers, resulting in~~to~~ more homogenous cyst profiles in the sediment (Giannakourou et al., 2005).

In coastal areas, ~~the transport~~ sediment transport is related to~~with~~ the hydrodynamic conditions. For~~In~~ ~~large~~ long time~~-~~scales, advection processes ~~redistribute and~~ determine the final depositional pattern as a function of the sediment and water current variables (~~Bever et al., 2009;~~ Ogston et al., 2000; Bever et al., 2009). Hydrodynamic~~s~~ processes driven by wind ~~-~~waves (Grifoll et al., 2013; Carlin et al., 2016~~; Grifoll et al., 2013~~), tides (Fan et al., 2004; Garel et al., 2009), winds (Sherwood et al., 1994; Hofmann et al., 2011~~1; Sherwood et al., 1994~~), surface seiches (Jordi et al., 2008) or internal-seiches (Shteinman et al., 1997) promote the resuspension, advection and settling of fine sediment, ~~and~~ conditioned by the continental sediment sources. Subsequent resuspension effects due to natural causes also contribute~~s~~ to~~at~~ the reworking and final deposition of the sediment load (Guillén et al., 2006; Grifoll et al., 2014a~~; Guillén et al., 2006~~). Moreover~~In this sense~~, anthropogenic activities such as~~,~~ ~~fishing~~ trawling, ship propellers and ~~in general~~ waves generated by vessels~~, may~~ bring additional energy in the water system influencing the resuspension, transport and final sediment deposition, in particular in shallow waters ~~(e.g.~~ (e.g., Garel et al., 2009; Hofmann et al., 2011).

This study focuses on Alfacs Bay (NW Mediterranean Sea; Southern part of the Ebro Delta) which is~~is~~ a micro-tidal estuary. The ~~entire~~ bay area is ~~and~~ intensively exploited by commercial activities, including ~~area with~~ tourism, fishing and aquaculture, ~~activities~~ and hence, the ~~being an~~ ecosystem has a ~~of~~ ~~highrelevant~~significant economic ~~importance~~ importance~~in the region~~. ~~It has been~~In the past, the bay has been extensively investigated ~~extensively in the past~~ in terms of its hydrodynamic~~s~~ response (Solé et al., 2009; Llebot et al., 2014; Cerralbo et al., 2015a, 2016, 2018~~; Llebot et al., 2014; Solé et al., 2009~~), tidal wave propagation (Cerralbo et al., 2014), biochemical processes (Llebot et al., 2010, 2011) and optical water properties (Ramírez-Pérez et al., 2017). The estuary receives freshwater discharge mainly from the rice fields of the Ebro river. ~~Thus, Alfacs Bay is an intensively exploited area with tourism, fishing and aquaculture activities being an ecosystem of relevant economic importance in the region.~~ Several episodes of algal blooms have been reported to be ~~and were (~~linked to ~~with the~~ increased ~~of~~ nutrient concentrations~~s~~, ~~-~~possibly~~and perhaps~~ triggered by resuspension mechanisms. Moreover, ~~) and~~the presence of harmful bacteria~~um~~ was found in bivalves with negative effects on aquaculture~~e have been reported~~ (Loureiro et al., 2009; Roque et al., 2009).

~~With the purpose to~~The goal of this study is to improve ~~the~~ knowledge in fine sediment dynamics in coastal bays and~~, the goal of this investigation is to~~ provide ~~a physical interpretation of~~ insights ~~of~~on the controlling factors of ~~the~~ sediment resuspension events observed within the Alfacs ~~a~~ micro-tidal bay ~~(Alfacs Bay; NW Mediterranean Sea)~~. ~~Using With~~Using sea-level heights, water currents and wind speed measurements we investigated the driving mechanisms for~~that~~ resuspension of~~d~~ fine bottom sediment within the bay. ~~Then~~Subsequently, the spatial and temporal interpretation of the resuspension mechanisms were linked with ~~the~~ hydrodynamic processes ~~s is~~ and analys~~z~~ed, through the implementation of a coupled wave-current ~~coupled~~ numerical model. The contribution aims ~~to provide explanation of~~to explain resuspension mechanisms ~~; the knowledge of these mechanism~~which may have ~~an~~ a positive~~evident~~ benefit for ~~human~~management activities ~~activities management mentioned previously~~ (e.g. harmful species resuspension or algal blooms with negative effects on aquaculture activities).

The water circulation in Alfacs Bay has been ~~widely~~extensively analys~~z~~ed in previous ~~contributions~~ studies, using observational data~~-~~sets and numerical ~~results~~ models (Camp and Delgado, 1987; Cerralbo et al., 2014, 2015a; Llebot et al., 2014). However, fine sediment dynamics and ~~its~~ their resuspension mechanisms have~~s~~ not been examined yet. Synchronous optical measurements, jointly with velocity and sea-level measurements, have ~~entailed~~ facilitated an opportunity to~~a good chance to~~ investigate the resuspension mechanisms in Alfacs Bay. Considering the area is a micro-tidal estuary, wind or wind-waves are candidate mechanisms for dispersal of fine sediment. ~~This area is an example of micro-tidal estuary, thus being the wind or wind-waves candidates mechanisms of fine sediment dispersal.~~

2 Methods

2.1 Study Area

Alfacs Bay, located in the~~at~~ south of the Ebro delta, is formed by the prograding southern spit. The semi-enclosed bay is ~~about~~ approximately 16 km long and 4 km wide~~th~~. The average depth is 4 m and the maximum depth is about 6.5 m in the middle of the bay (Figure 1). A central channel of 2.5 km in length~~, and~~ 6.5 m ~~depth~~deep, connects the ~~is connecting~~ bay ~~to~~with the~~The connection with the~~ open ~~sea~~ocean.~~ is 2.5 km, with a central channel of 6.5m and~~ S~~s~~hallow edges of around 1-2 m ~~can~~are ~~be~~ found on both sides. To the north, t~~T~~he bay is surrounded by rice fields.~~ to the north, which~~ From April to December, these fields spill around 10 $m^3 \cdot s^{-1}$ of freshwater loaded with nutrients into the bay.~~during 9-10 months per year (April-December)~~ These nutrient rich waters are distributed among several~~in several~~ channels, to the eastern side of the delta, ~~and a~~close ~~by~~to a ~~-~~sandy beach ~~closing it on the east side~~. The seabed in the central part of the bay is composed of~~by~~ very fine sediments (typically 65-65% silt, 30-35% clay and ~~a~~approximately~~, round~~ 5% sand) with increasing ~~the~~ sandy content towards the edges of the bay (Guillén and Palanques, 1997; Satta et al., 2013). The bottom ~~sediment~~ of Alfacs Bay is composed of mud, with a significant content of clay ~~,~~and sand (Palacín et al., 1991). It was discovered~~They found~~ that the muddy sediment extended to~~by~~ the central part of the bay, whereas~~and~~ the sand content ~~of sand~~ increased near the~~to~~ spit which ~~that~~ separates the bay from the open ~~sea~~ocean. The same was found ~~and also in~~along~~for~~ the southern shallow edge.

The bay is categoris~~z~~ed~~ has been defined~~ as a salt-wedge estuary (Camp and Delgado, 1987) with almost stable stratification all year. T~~he highest t~~idal ranges during spring tides reach~~is~~ around 0.2 m, and the hydrodynamic fluctuations are controlled by the wind modulated by the seiche activity during~~in a~~ short periods (Cerralbo et al., 2015a). Both winds and salinity gradients due to freshwater discharge dominate t~~T~~he water circulation in the low-frequency band.~~ is dominated by both winds and salinity gradients due to freshwater discharge~~ (Solé et al., 2009; Cerralbo et al., 2018). ~~The most i~~Intense regional winds coming from ~~in the area are from the~~ north and ~~and~~ northwestern directions together with the orographic effects ~~, establishing~~ ~~a~~result in wind jets in the Ebro River valley ~~due to the orographic effects in the Ebro River valley~~ (Grifoll et al., 2015, 2016). This offshore wind is characterized by noticeable spatial variability due to the surrounding topography (Cerralbo et al., 2015b). The water column within the bay used to be stratified due to the freshwater discharge, but well-mixed conditions are common during winter as a consequence of the hydrodynamic response to strong wind forcing (Llebot et al., 2014) and occasionally to seiches (Cerralbo et al., 2015a). During the summer, the contribution of the temperature at the stratification may ~~be~~ also be substantial (Cerralbo et al., 2015a).

2.2 Measurement~~s~~ campaigns

The bulk of the observational data ~~correspond at~~was collected during ~~two months~~ a 2-month field campaign from July to mid-September 2013. ~~The data set consisted of w~~Water currents ~~from~~ were measured with two 2MHz Acoustic Doppler Current meter Profilers (ADCPs) moored in the mouth (Fig. 1 - A1) and inner bay (Fig. 1 - A2) ~~(Fig.1)~~ and configured to record 10 min averaged data from 10 registers per minute and with 25 cm vertical cells. Both devices were equipped with an Optical Backscatter Sensor (Campbell Scientific OBS-3), a bottom pressure meter and a temperature sensor. The instruments ~~, and they~~ were mounted at ~~on~~ the sea bottom in~~at~~ 6.5 m depth, while the sensors were 0.25 m above the sea bed. The signals from the OBS instruments ~~signal is~~were transformed to the Nephelometric Turbidity Units (NTU) with~~using~~ device calibration ~~repport~~report. In the past a ~~Besides, the study area used to present a~~ linear relation between optical signal and suspended sediment concentration has been observed in the study area (Guillén et al., 2000). ~~The distance of the ADCPs and OBS sensor were 0.25 m above the sea bed.~~ The ADCP has a 20 cm ~~of~~ blanking zone. Additional sea level data were obtained through a sea level gauge mounted in Sant Carles de la Ràpita harbor (Fig.1) and bottom pressure systems from the ADCPs. Atmospheric data (wind, atmospheric pressure, solar radiation and humidity) were obtained from a land station (M-Sc) located in Sant Carles de la Ràpita, ~~(M-Sc)~~ mounted 10 m above the ground.

2.3 Current and wave model implementation

We use the coupled version of SWAN-ROMS models included in the COAWST system in order to simulate the hydrodynamics within the bay. The COAWST system (Warner et al., 2010) consists of several state-of-the-art numerical models that include ROMS (Regional Ocean Modeling System) for ocean and coastal circulation and SWAN (Simulating Waves Nearshore) for surface wind-wave simulation. SWAN is a third-generation numerical wave model that computes random, short-crested waves in coastal regions with shallow water and ambient currents (Booij et al., 1999). It is based on the wave action balance with sources and sinks and incorporates ~~the~~ state-of-the-art formulations of the processes of wave generation, dissipation and wave-wave interactions. ROMS is a three-dimensional circulation model which solves the primitive variables on a sigma-level in the vertical and horizontal regular grid. Numerical aspects of ROMS are described in detail in (Shchepetkin and McWilliams, 2005). In COAWST system, the wave model provides hydrodynamic parameters (i.e., significant wave height, average wave periods, wave propagation direction, near-bottom orbital velocity and wave energy dissipation rate) to the water circulation model. The ocean model provides water depth, sea surface elevation, and current velocity to the wave model. The variables exchange is made "on-line" during the simulation processes, via Model Coupling Toolkit (Jacob et al., 2005), where a multi-processes MPI protocol is used to distribute the computations among several nodes. The COAWST also include different formulations to parametrize the wave-current bottom boundary layer and the wave effect on currents (Warner et al., 2008; Kumar et al., 2012).

The implementation of the COAWST system in Alfacs Bay consists~~ed~~ of a regular grid of 186 x 101 points with a spatial resolution of 100 m (in both x and y) and 12 sigma levels in the vertical direction. Details of the implementation and the skill assessment of the ROMS model in Alfacs Bay is provided by ~~in (~~Cerralbo et al. ~~, (~~(2015a). The same regular grid is used by the SWAN model. A two-year water circulation simulation (2012-2013) was performed in order to obtain realistic three-dimensional temperature and salinity fields. The barotropic time step for ROMS is set to~~was~~ 30 s, and in ~~for ROMS and~~ SWAN the wave field is solved in a time interval of ~~the wave field each~~ 3600 s. The interval time between exchange of variables of ROMS and SWAN was established in 3600 s. For both simulations, water motion at the open boundary was forced by~~with~~ depth-averaged velocities and sea level measurements~~d~~ at A1 (interval data of 600 sec). The freshwater inputs are distributed on 8 points simulating the main rice channels with a total discharge~~flow~~ of 10m^{3}s^{-1} ~~(see~~ (Cerralbo et al., 2015a)~~)~~.

The bottom boundary layer was parameteri~~z~~sed using the combined wave-current (Styles and Glenn, 2000) adopted in ROMS and SWAN coupling ~~in~~ (Warner et al., 2008). The input parameters for the model are the velocity components ~~near the bottom~~ and wave characteristics near the bottom (wave period, wave direction and the wave orbital direction). For each computational step, an initial assessment of bed roughness length is estimated as a function of the grain size, ripples and sediment transport. ~~Then~~Consequnetly, the pure current bottom stress (τ_c) and pure wave bottom stress (τ_w) ~~bottom stress~~ are computed as:

$$\tau_c = \frac{(u^2+v^2)\kappa^2}{\ln^2(z/z_0)} \tag{1}$$

$$\tau_w = 0.5 f_w u_b^2 \tag{2}$$

where z is the vertical coordinate, z_0 total bottom roughness length, u and v are the water currents components~~speed~~, u_b is the orbital velocity,~~-~~ κ is the von Karman's constant, and f_w is the Madsen wave-friction factor. ~~Then, t~~The maximum bottom stress under wave-current conditions is computed as (Soulsby, 1997):

$$\tau_{wc} = \tau_c \left(1 + 1.2 \left(\frac{\tau_w}{\tau_w + \tau_c}\right)^{1.5}\right) \quad (3)$$

The wave effects ~~on~~ from currents are considered using vortex-force formalism, which is included in COAWST. This approach ~~allows to~~ considers the effect ~~of~~ from~~the~~ gravity waves on the mean flow, and was tested in different experimental and real configurations by ~~(~~Kumar et al.~~,~~ (2012).

3 Results

3.1 Observations

In order to investigate the suspended sediment~~s~~ events within Alfacs Bay we used a sub-set of the total observations recorded at~~in~~ A2: from 2nd August to 8th August 2013. This is because the sub-set data selected include the main hydrodynamic conditions susceptible to increase the near-bottom turbidity. Figure 2 shows the time-series recorded at~~in~~ A2 in terms of NTU from the OBS, measured sea level height ~~measured~~ (additionally sea-level height measured at~~in~~ A1 is also shown), bottom current speed in m•s-1 at~~in~~ A1 and wind speed and direction measured at~~in~~ M-Sc (see Figure 1). The sea level height reference was obtained by subtracting the mean value of the pressure meter time-series provided by the ADCP.

~~The wind characterization~~Two typical wind conditions are considered (Figure 2.a and 2.b)~~ include two of the most typical situations in the region~~: sea breeze and the NW winds (Cerralbo et al., 2015a). The sea breeze is associated to an increase of wind speed during the central hours of the day (approximately from 11:00 hr to 18:00 hr with a wind direction within the range of approximately 30º to 180º~~ approximately~~). From a daily point of view, this seems evident during the 1st to 6th of August. A different pattern is observed during the wind speed peak ~~of~~ (7th-8th of August) where 330º wind directions were measured. This corresponds to an offshore wind typical ~~from~~ for the region (NW winds called “Mestral”).

During~~The~~ the analysis period~~d of analysis~~, ~~also include~~ a seiche event was also captured ~~during the 3rd of~~on the 3rd of August. This seiche event was previously ~~characterized~~ described hydro-dynamically in Cerralbo et al.~~,~~ (2015a) revealing an ~~characteristic~~ oscillation of 1 hour periods in sea-level and currents. This oscillation is characterized by a node (approximately located at A2) where the velocities are maximum, and an anti-node (approximately located at~~in~~ A1) where the amplitude of sea level oscillation is maximum (see sea-level height at~~in~~ A1 in comparison to A2 in Figure 2.c). The homogeneous vertical profile in velocities measured at~~in~~ A2 is shown in Figure 3, ~~where the along-shore direction reveal~~ with velocit~~i~~yes peaks ~~of~~ in the order of 0.5 m•s-1 in the water column, at the along-shore direction (i.e. following the axis of the bay). The near-bottom water current speed at~~in~~ A2 (Figure 2.d) show fluctuations with peaks over 0.1 m•s-1, except for~~ing~~ the mentioned seiche event where peaks arising 0.4 m•s-1.

The near-bottom turbidity shows a fluctuating behaviour with values -ranging~~ values~~ from almost zero to ~~higher~~ over~~than~~ 10 NTU (Figure 2.e~~d~~). ~~In this sense, T~~Tthree differentiated events with high turbidity are observed. These events are E1 (covering from 08:00 of 3rd of August to 10:00 of 5th of August), E2 (03:00 to 12:00 6th of August) and E3 (between 08:00 7th August and 15:00 8th of August). The maximum turbidity is measured during the E1 (maximum turbidity 41.1 NTU). This event lasts for a longer time in comparison to E2 (with a maximum turbidity 4.6 NTU) and E3 (maximum turbidity 12.1 NTU).

3.2 Skill assessment near the sea bottom

The performance of the water circulation model used in this ~~contribution~~ study was examined in terms of sea-level, water currents and temperature/salinity evolution in previous ~~works~~research (Cerralbo et al., 2014). However, in this work we pay attention to the near-bottom velocities ~~because~~ due to its relevant role in the sediment resuspension and transport dynamics. Thus, the skill assessment of the near-bottom velocities at~~in~~ A1 and A2 is analys~~z~~ed using a Taylor diagram (Taylor, 2001). This diagram characterizes the similarity between numerical model and observations using their correlation, the R~~r~~oot-M~~m~~ean-S~~s~~quare D~~d~~ifference (RMSD) and the amplitude of their variations (represented by their standard deviations). The skill of the model ~~skill~~ improves as the ~~points~~ triangles ~~get~~ are closer to the observation reference point in the diagram which means the full agreement between the model and the observations (Figure 4). In general, the model results showed a good agreement with the observations in the prevalent along-shelf direction, with correlations larger than 0.5 and RMSD below 1. In addition, the water current fluctuations are well represented in the model because the normalized standard deviation is close~~r~~ to 1 in both measuring points.

3.3 Modelled bottom stress

The bottom stress is obtained from the coupled numerical model implemented in the Alfacs Bay. ~~The~~ Figures 5 and 6 show different snapshots of the modelling results ~~in order~~ to examine the bottom stress pattern for two~~both~~ components (i.e. wave-induced and current-induced bottom stress~~es~~). These ~~snapshots~~ results correspond~~s~~ to different episodes identified from the previous observational analysis. The plot scale of the bottom stress is transformed in log10 for clarity. During the case E1 (3rd of August 2013; 10:00 hr) the ~~combined~~ bottom stress~~es~~ ~~are~~ is mainly ~~due to the current bottom stress~~caused by currents (Figure 5.left). Maximum values of 0.15 Pa for the combined bottom stress are obtained at~~in~~ the center of the bay, and the mouth. This episode corresponds to a seiche event and the spatial variability of the bottom stress is consistent with the spatial pattern of the node/antinode position. It means that the maximum combined bottom stress (associated ~~at~~with maximum water currents) corresponds to the node position (minimum sea-level amplitude). In ~~opposite~~contrast, the minimum bottom stress corresponds to the antinode position (maximum sea-level amplitude). The position A2 is located near ~~to~~ the node, where the water currents are maximum during the seiche event (0.08 Pa for combined bottom stress). It is worth to mention the node/antinode pattern of the current-induced bottom stress, which presumably would indicate a large spatial variability ~~on~~ of the resuspension process within the bay.

After the seiche activity (second stage of E1), ~~where~~ the wind speed increases due to the sea-breeze~~)~~ and~~,~~ the current-induced bottom stress (5th of August 2013; 08:00) decreases significantly in particular in the center of the bay (Figure 5.right). The bottom stress distribution shows how the maximum values are obtained near the shoreline (2.2 Pa) due to the contribution of the wave-induced bottom stress. At~~In~~ A2, the combined bottom stress is equal to 0.03 Pa (~~value~~ presumably ~~far~~ too small~~little~~ to induce resuspension). For this event, the wave field during the sea-breeze is shown in Figure 7. ~~This figure shows how~~It reveals that the maximum significant wave height (equal to 0.3 m) occurs near the northern and southern shallow edge consistent with the maximum wave-induced bottom stress.

The bottom-stress pattern during ~~the~~ episode E2 (Figure 6.left) is similar to the second stage of ~~the~~ episode E1. Both wave and current bottom stress (08:00 7^{th} of August) tends to be small ~~in~~ at A2 in comparison to the seiche event. Only substantial bottom stress ~~are~~ is observed in the shallow edges of the bay due to the wave action originated by the sea-breeze.

During ~~the~~ episode E3 (NW wind, Figure 6.right), the combined bottom stress (23:00 8^{th} of August) is dominated by both wave and current action. The southern part of the bay shows that the maximum wave induced bottom stress is consistent with the wave climate (Figure 7). Also, the current induced bottom stress presents ~~non negligible~~non-negligible values within the bay. Focusing ~~in~~ on A2, both mechanisms contribute in a similar manner (wave and current bottom stress is 0.09 and 0.06 Pa respectively) in the combined bottom stress.

4 Discussion

The synchronous time-series of the meteo-oceanographic variables and turbidity shown in Figure 2, joint~~ly~~ with the bottom stress model~~led~~ provides a good opportunity to characterize the turbidity peaks measured at~~in~~ A2. During the first stage of ~~the~~ episode E1, the bottom current speed responds ~~at~~ to the node-antinode pattern with velocities that ~~raise~~ increase 0.4 m•s-1 at~~in~~ A2. ~~Apparently, T~~This increase of the bottom velocity caused bottom sediment resuspension and a turbidity peak (Figure 2). Even ~~that~~ if an increase of wind speed occurs (peaks that raise 8 m•s-1), the oscillating pattern of the current (see Figure 3), ~~strongly~~ polaris~~z~~ed strongly, following the along-shore direction with 1-hr periods. This~~,~~ suggest an increase of turbidity due to the seiche instead of wind driven current. The analysis of modelled bottom stress ~~modeled~~ during E1 (Figure 5) also suggested that the seiche is the main mechanism for turbidity increase at~~in~~ A2, during the first stage of event E1. Resuspension mechanisms in the water environment~~s~~ caused by seiches ~~are~~ is mentioned~~suggested~~ in observational investigations (Niedda and Greppi, 2007; Chung et al., 2009; Jordi et al., 2011~~; Niedda and Greppi, 2007~~).

However, these studies did not explain the high spatial variability of the importance of the seiche-induced ~~sediment~~ resuspension mechanism, which are implied by the modelled current-induced bottom stress. ~~However, the numerical results of the current-induced bottom stress shown in Figure 5(left) suggest a high spatial variability of the seiche-induced resuspension not examined in the mentioned contributions.~~ It means observational results about turbidity variability may differ significantly in function of the location of the node/anti-node and its consequent maximum and minimum velocities.

The turbidity still shows large values after the seiche was already dissipated and the bottom current decreased during the second stage of the E1 event. Typical sea-breeze wind conditions were observed (gentle variation of wind direction from 30º to 180º) with a noticeable increase of the wind speed during 4^{th} of August, unrelated ~~with~~ to the measured bottom current ~~bottom intensity~~ speed. Llebot et al. (2014) and ~~(~~Cerralbo et al.~~,~~ (2015a) stated that water current profiles due to winds observed in Alfacs Bay does not imply a barotropic shape in the water ~~column~~velocity~~ies~~ profiles, suggesting ~~near the bottom~~ a different ~~behaviour~~behaviour near the bottom, compared to the~~than~~ surface, related to wind set-up phenomena. In consequence, the local resuspension due to wind-breeze seems unlikely at this location of the bay. It seems more feasible that high turbidity measured at~~in~~ A2 during E1 (second stage) ~~are~~ is associated to advection of fine sediment resuspended previously by seiche or by sea-breeze activity in the shallow edges of the bay, with a subsequent transport towards the middle of the bay. This last mechanism would also explain ~~also~~ the turbidity peak measured during the 5th of August at 00:00; after the fine sediment settling occurred within the bay. The sediment advection within the bay is difficult to confirm according to our data~~ set~~, but Alfacs bathymetry shows a characteristic shallow edge near the coastline (water depths below 2 m; see Figure 1). In these shallow edges the bottom stress ~~arises~~ increases by 0.8 Pa, suggesting a potential sediment resuspension. Th~~is~~e shallow edge may be a source of fine sediment under energetic wind conditions in case of fine sediment availability. In consequence, the advection of resuspended sediment ~~highlight~~highlights the relevance of the water current patterns within the bay for turbidity measurements.

~~The e~~Episode E2 is ~~associated~~attributed to at sea-breeze mechanism. This event is qualitatively less important in terms of turbidity measured at~~in~~ A2. The comparison of the sea-breeze event during 4th of August and 6th of August (both have similar wind and bottom current speed but different turbidity values) seem~~s~~ to indicate the relevance of the previous events and the subsequent advection of fine sediment, following the mechanism ~~way~~ explained previously. Similar to the second stage of E1, the bottom stress is low (below 0.02 Pa) in the central basin of the bay~~, the bottom stress is~~~~are small (below 0.02 Pa)~~; ~~so~~ indicating that~~the~~ local resuspension is unlikely. In consequence, the turbidity measured at~~in~~ A2 is probably due to advection processes of suspended sediment from the shallowest areas (combined bottom stress more than 0.8 Pa) in~~to~~ the central basin.

Finally, episode E3 corresponds to a strong NW wind event with wind speeds~~speeds~~~~intensities~~ in excess of ~~that raise~~ 12 m•s-1. The bottom current speed does not show significantly higher values during this episode, in comparison to calm periods. However, in ~~opposite~~ contrast to the sea breeze, the sea waves generated by the NW wind conditions ~~may have a relevant role in the~~ are relevant to the resuspension mechanisms due to an increase of the wave induced bottom stress (Figure 6(right)). ~~Unhopefully~~Unfortunately, the set-up of the ADCP did not allow~~ed~~ us to record the oscillatory pattern derived from the orbital velocities generated by waves and the relative importance of each resuspension mechanism (i.e. wind or waves) is difficult to ~~be~~ quantify~~ied~~~~fy~~.

E2 and E3 are examples of two mechanisms that may ~~produce local peaks in~~increase the turbidity: wind-driven current and wind-waves. In Alfacs Bay, the role of these mechanisms in sediment resuspension is less clear in comparison to seiches because they are ~~in~~ a function of wind speed without a ~~clear c~~orrelation between wind module and the turbidity observed. The resuspension of fine sediment due to wind and wind-waves in shallow environments have been reported in ~~the~~ literature (Luettich et al., 1990; Ogston et al., 2000; Guillén et al., 2006; Bever et al., 2011; Grifoll et al., 2014b;~~ Guillén et al., 2006;~~ Hawley et al., 2014~~; López et al., 2017~~; ~~Luettich et al., 1990;~~ Martyanov and Ryabchenko, 2016; López et al., 2017~~; Ogston et al., 2000~~). Some of ~~these~~ this works highlight the complexity of the sediment processes due to the temporal and spatial variability of the importance of resuspension mechanisms and the presence of available material to be resuspended. Apparently, this is the case of our observations, because similar wind conditions ~~does~~do not imply the same turbidity measurements. A good example is the sea-breeze wind events during 4th, 5th and 6th of August in which different turbidity values ~~are~~ were observed. As ~~we~~ mentioned in the previous section, advective fluxes and the sequence of events may have a relevant role in the observed water turbidity. ~~In this sense, m~~Many authors have reported an apparent~~evident~~ influence on advective fluxes correlated with suspended sediment concentration after an initial deposition of fine sediment (-Sherwood et al., 1994; Ogston et al., 2000; Guillén et al., 2006; Harris et al., 2008; Bever et al., 2009; Grifoll et al., 2014b~~; Guillén et al., 2006; Harris et al., 2008; Ogston et al., 2000; Sherwood et al., 1994~~). This means that on longer time~~-~~scales, advection of sediment by currents may redistribute sediment and determine final deposition patterns (Wright and Nittrouer, 1995). This may be the mechanism responsible of high turbidity observed under relatively low hydrodynamic conditions. For instance, ~~the fact that during~~ the sea-breeze event of 2nd August does not ~~appears~~ cause high turbidity, ~~in opposite~~ in contrast to the event on~~to~~ 5th of August (second stage of E1 event), which may ~~response~~ indicate that~~at this mechanism where~~ an energetic event (i.e. seiche) ~~may~~ could mobili~~z~~se sediment, which is ~~that after is~~ resuspended easily in subsequent events. The lack of proportionality of the resuspension related to hydrodynamics is also found in extended data time-series where divergences are associated mainly ~~at~~ to sediment availability in the bottom, among other factors (e.g. in Wiberg et al. (1994) or ~~(~~López et al.~~,~~ (2017) ~~; Wiberg et al., 1994)~~). In the case of Alfacs Bay, more extended observations may clarify the relation between wind intensity, wind-waves, seiches and the amount of suspended sediment and fluxes taking into account the sequence of energetic events.

The sediment distribution in Alfacs Bay (high percentage of silt and clay in the central basin and sand prevalence in the southern, eastern and western shore) is consistent with the modeling results shown in this study~~contribution~~, where larger bottom stress~~es~~ were obtained in the lateral shallow edges due to the contribution of the wave induced bottom stress in shallow areas. However, the deposition mechanism ~~may be~~is a complex process, composed from ~~including~~ an initial settling and a subsequent dispersal, ~~in a similar pattern to~~ as described in (Wright and Nittrouer, 1995). Further sediment transport simulations, including those considering sediment classes and erosion and settling effects, would help to investigate the sediment settling dynamics and its final deposition. These processes ~~must take into account~~should include the cohesive nature of the fine sediment or other~~s~~ ~~phenomena~~phenomena's, such as ~~armoring~~armouring or bioturbation, that may modify the physical properties of the sediment layers (van Ledden et al., 2004; Amoudry and Souza, 2011~~; van Ledden et al., 2004~~).

The characteristics of the bay, such as ~~geometry characteristics (for instance~~ the relative narrow and shallow entrance,~~)~~ favour~~suggest~~ the trapping ~~effect~~ of fine sediments, fed either ~~delivered~~ by the freshwater outflow or the exchange~~link~~ between the open sea and the inner bay. The trapping effect of the bay may entail~~ed~~ the presence of a thin surface bottom layer of fine sediment easily ~~involved~~ subject to~~in~~ resuspension. This behaviour is typical from shallow and sheltered environments such as lagoons or lakes. According to ~~(~~Luettich et al. (~~,~~1990) and ~~(~~Hofmann et al.~~,~~ (~~-~~2011), the regular resuspension events in sheltered and shallow water bodies ~~prevent the sediment~~prevents sediment consolidation and ~~the~~ formation of a cohesive sediment layer. This ~~may~~ could explain ~~be consistent with~~ the high turbidity values observed in the Alfacs Bay under relatively weak conditions, such as sea-breeze events, ~~as~~ which would likely not occur~~opposite to be expected~~ if the sediment was cohesive.

~~The image with unprecedent resolution obtained by the~~ The Sentinel-2 satellites provide imagery ~~whichshould allow~~which allow for further identification of~~ to identify~~ scenarios with resuspension linked to hydrodynamic forcing. Figure 8 shows the Total Suspended Matter (TSM in mgr•l-1) for the Alfacs Bay in two differentiate scenarios: NW wind and Calm conditions. Without access to local calibration data, a generalized approach for TSM retrieval has been applied. Through SNAP (v. 6.0.0) the Level 1C Sentinel-2 MSI data was converted to geophysical values (suspended sediment concentration) using the most recent version of the water quality processor 'C2RCC' (v. 1.0). The C2RCC processor was run using default values. Following processing in SNAP the data was post-processed (tiles merged, and data noise corrected) and the TSM maps created. NW wind conditions increase the TSM substantially ~~the TSM~~ in the southeastern shallow edges. This would be a source of a subsequent advection of fine sediment towards the central bay as it was stated in the previous paragraphs. In ~~opposite~~contrast, the values of TSM decrease significantly during calm conditions.

Also, the proximity of the Ebro river mouth (15 km at north) may increase the suspended sediment within the bay under ~~particular~~ specific circumstances. River discharge is the main driver of the Ebro River plume, followed by wind and regional oceanic circulation that tend~~s~~ to be southward (Fernández-Nóvoa et al., 2015; Mestres et al., 2003). Analysis of the turbid plume by remote sensing products indicate that more than 70% of the plume extension was located south of the river mouth, influenced by the regional oceanic circulation (Fernández-Nóvoa et al., 2015). Other~~s~~ external sediment sources may be associated with freshwater discharge from channels, overwash in the bar, flash flood from small creeks or aeolian transport. The complete study of the suspended sediment dynamics will provide objective information to address the problem of degrading water quality within the bay and how to make use of natural mechanisms to limit undesired concentrations of nutrients or pollutants. This applies in particular to harmful algae blooms prone to occur in the area under present and future conditions.

5 Conclusions

The observational set and the wave-current numerical results obtained for Alfacs Bay have ~~permitted~~ allowed for a thorough investigation of~~to investigate~~ the resuspension mechanisms of fine sediment. The results indicate evidence of a clear mechanism of resuspension induced by eventual seiche events, which according to the bottom stress patterns may have a relevant spatial variability within the bay. The wind and wind-wave mechanisms ~~also~~ are also responsible ~~of~~ for fine sediment resuspension during energetic wind events, especially in shallow~~er~~ areas of the bay. The relevance of the sequence of events in turbidity is highlighted, taking into account the effect of advective sediment fluxes within the bay (from the lateral shallow edges to the middle of the bay). The trapping effect of the bay may entail the presence of a thin surface layer of fine sediment, easily involved in resuspension neglecting the expected cohesive effects. However, these points deserve further analysis with extended data sets and sediment transport modeling. The exchange of fine sediment within the bay and the open sea is also evident~~seems also evident~~ according to remote sensing images. However, these points deserve further analysis with extended data sets and sediment transport modeling. As a region ~~of~~ with high-anthropogenic pressure, this research may contribute to develop ~~better~~ integrated development plans considering~~integrated plans in the context of~~ sustainable aquaculture activities and ~~the~~ climate change mitigation ~~of the effects of climate change~~ in the Ebro Delta.

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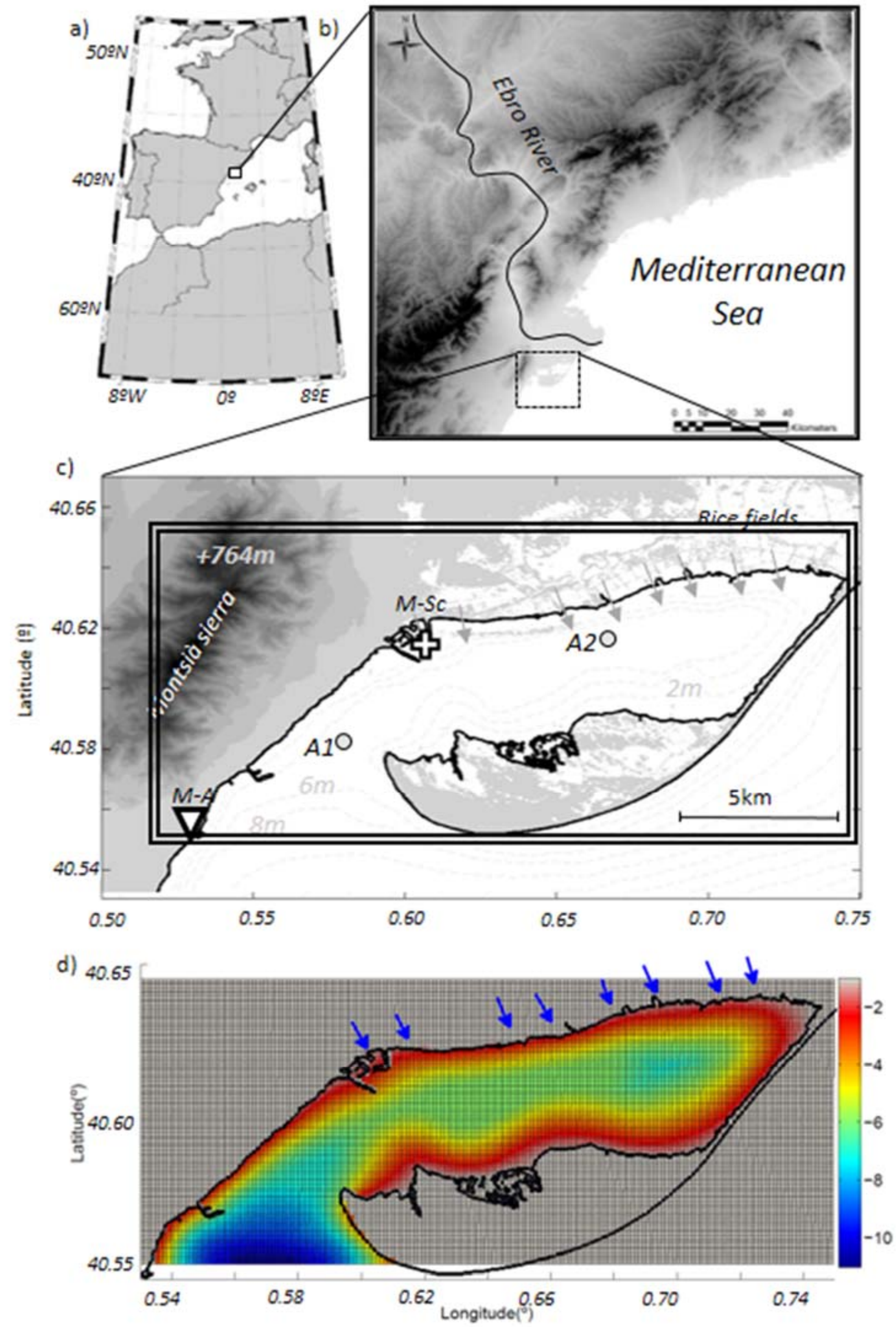
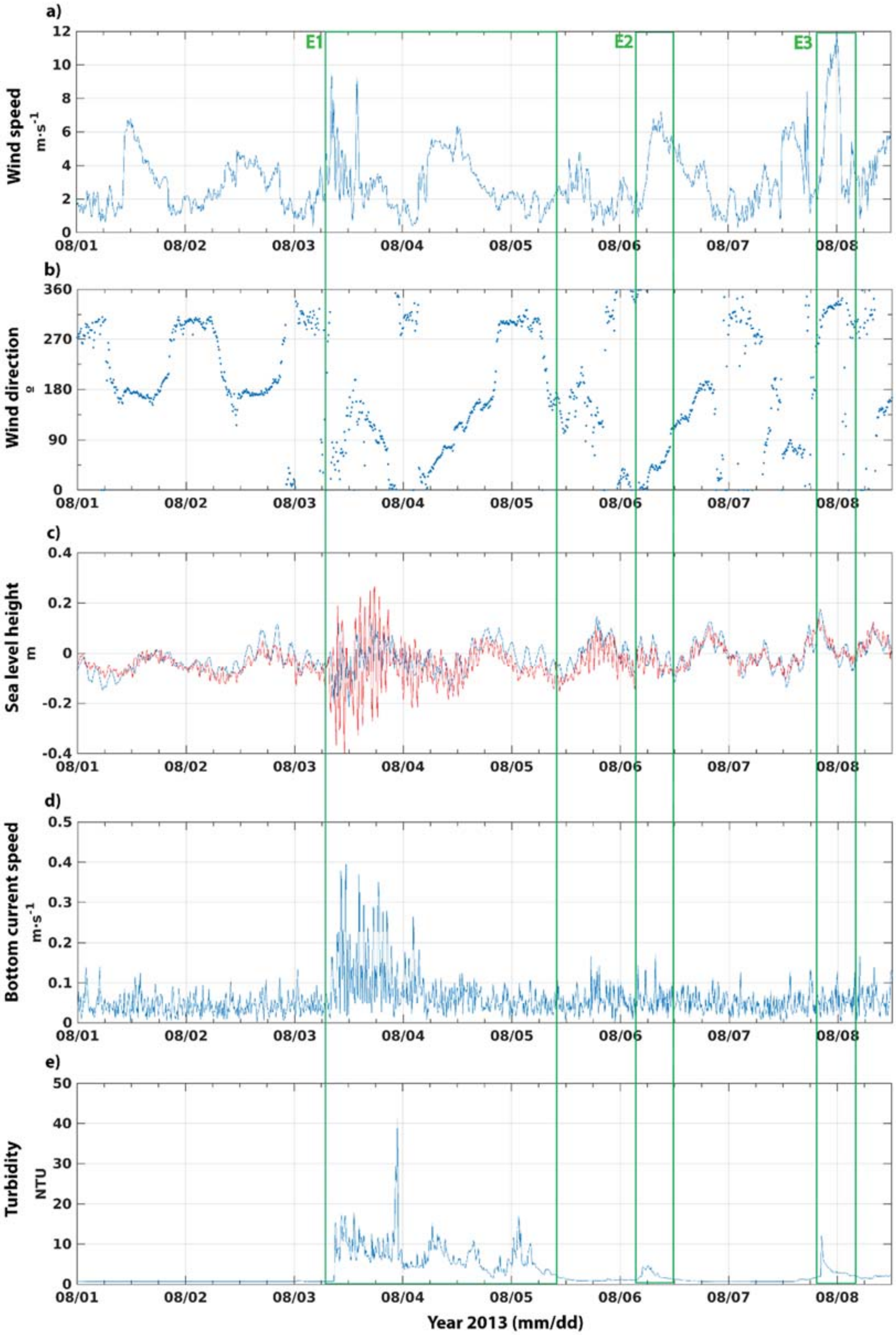


Figure 1: **a: ~~Regional l~~Location of the Ebro River Delta in a regional context; b: Location of the Alfacs Bay in the Ebro River Delta;~~.~~ c: Overview map of the Alfacs Bay. The location of ~~Triangle shows t~~the meteorological station is marked with a triangle (M-A~~Sc~~) and a~~.~~ w~~W~~hite cross marks the location of the~~for~~ Sant Carles de la Ràpita tide gauge (M-Sc). The Gre~~a~~y circles show~~s~~ the ADCP and OBS mooring locations ~~(~~A1 and A2, respectively~~)~~. The g~~G~~ray arrows at~~on~~ the northern coast depict~~shows~~ the**

freshwater drainage points considered in the simulation; d:~~.~~ ~~Double line square indicate the domain for the hydrodynamic numerical model, which is shown in detail in image~~ d ~~(colorbar indicates depth in meters).~~ The figure shows the modelling domain with the background grid correspondings~~s~~ to the numerical mesh used in the numerical model~~ling~~. The b~~B~~lue arrows on the northern coast shows the freshwater drainage points considered in the simulation. The colourbar indicates depth in meters.



a)
Wind speed
m·s-1
E1
E2
E3
b)
Wind direction
º
c)
Sea level height
m
d)
Bottom current speed
m·s-1
e)
Turbidity
NTU
08/01
08/02
08/03
08/04
08/05
08/06
08/07
08/08
Year 2013 (mm/dd)

Figure 2: Time-series of the variables measured during the field campaign. (a) wind ~~intensity~~ speed measured at~~in~~ M-Sc. (b) wind direction measured at~~in~~ M-Sc. (c) Sea-level height measured at~~in~~ A2 (blue) and A1 (red). (d) near-bottom current speed~~velocity~~ measured at~~in~~ A1. (e) NTU measured by~~in~~ OBS mounted at the A2 station. Vertical bars show the episodes considered in the analysis.

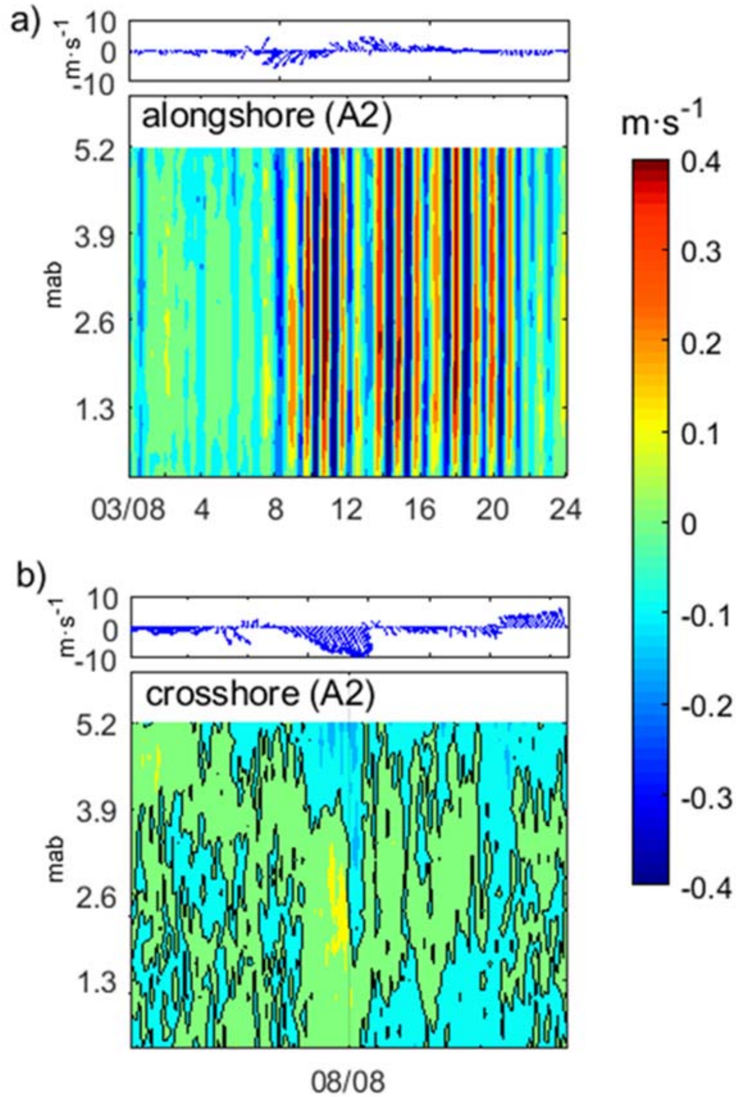


Figure 3: Each panel shows on the top the wind speed measured at M-Sc ~~(~~in m·s^{-1}~~)~~., ~~and~~ At~~on~~ the bottom the vertical profiles show the ~~velocities~~ speed measured at A2 (in m·s^{-1}; mab stands for~~mean~~ meters above the bottom). Black lines show 0 ~~velocity~~speed isolines. In each panel, different events are shown~~ed~~: a) 2013/8/3 for the along-shore ~~velocities (panel a)~~direction and b) as (a) but for the cross-shore direction on 2013/8/8~~ for crosshore (panel b)~~. ~~Black lines show 0 velocity isolines.~~

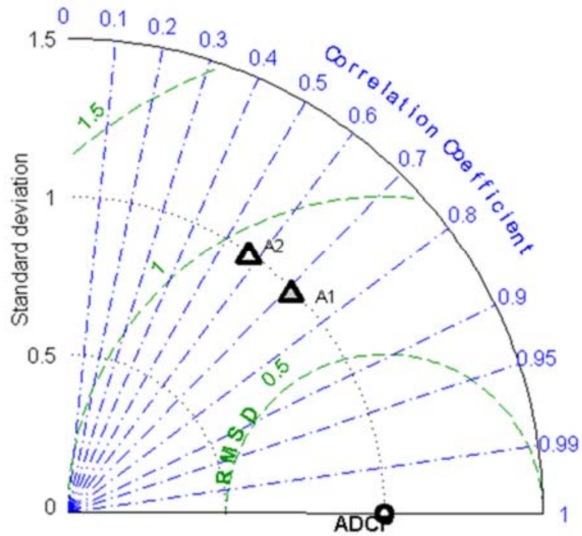


Figure 4: Taylor diagram comparing the error metrics between the observations and model results for the near-bottom currents. A1 and A2 corresponds to the ADCP locations shown in Figure 1.

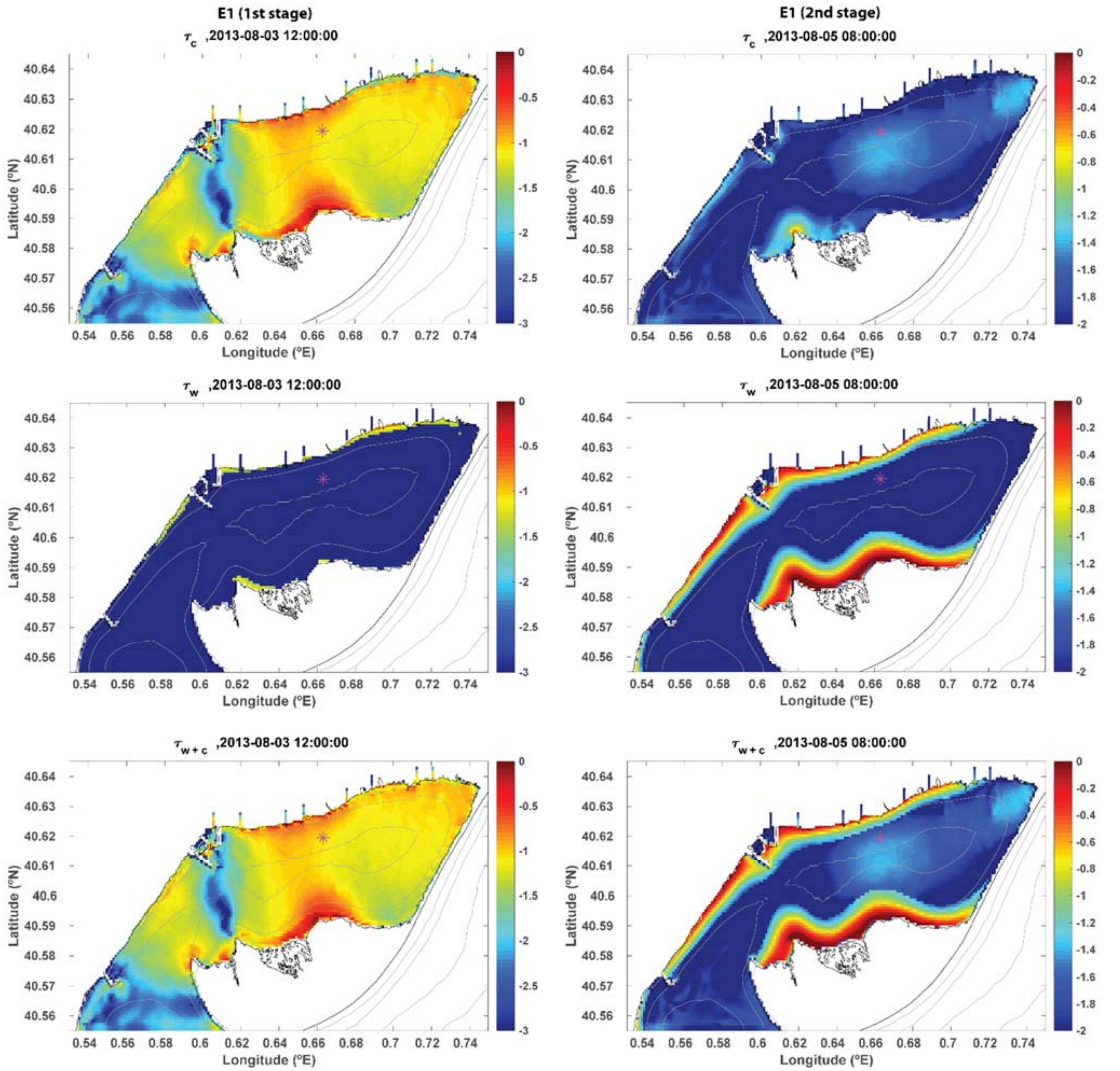


Figure 5: Current-induced bottom stress (τ_c~~\tau_c~~), wave-induced bottom stress (τ_w~~\tau_w~~) and combined wave-current bottom stress (~~\tau_c + \tau_w~~τ_{wc}).~~Distribution of the current, wave and combined wave-current bottom stresses log10(Pa) in~~ in the Alfacs Bay during the first stage of the episode E1 (i.e. seiche; left panels) and the second stage of the episode E1 (i.e. sea breeze; right panels). ~~Magenta symbol show the~~ The A2 station is shown in magenta. Isobaths ~~(in grey)~~ are plotted in grey solid lines in ~~each~~ 3 m intervals from 3~~xx~~ m to 12~~xx~~ m. Note that for clarity, the ~~plot scale is transformed in~~bottom stresses are plotted in log10 scale and the vertical range differs between both bottom stress distributions.

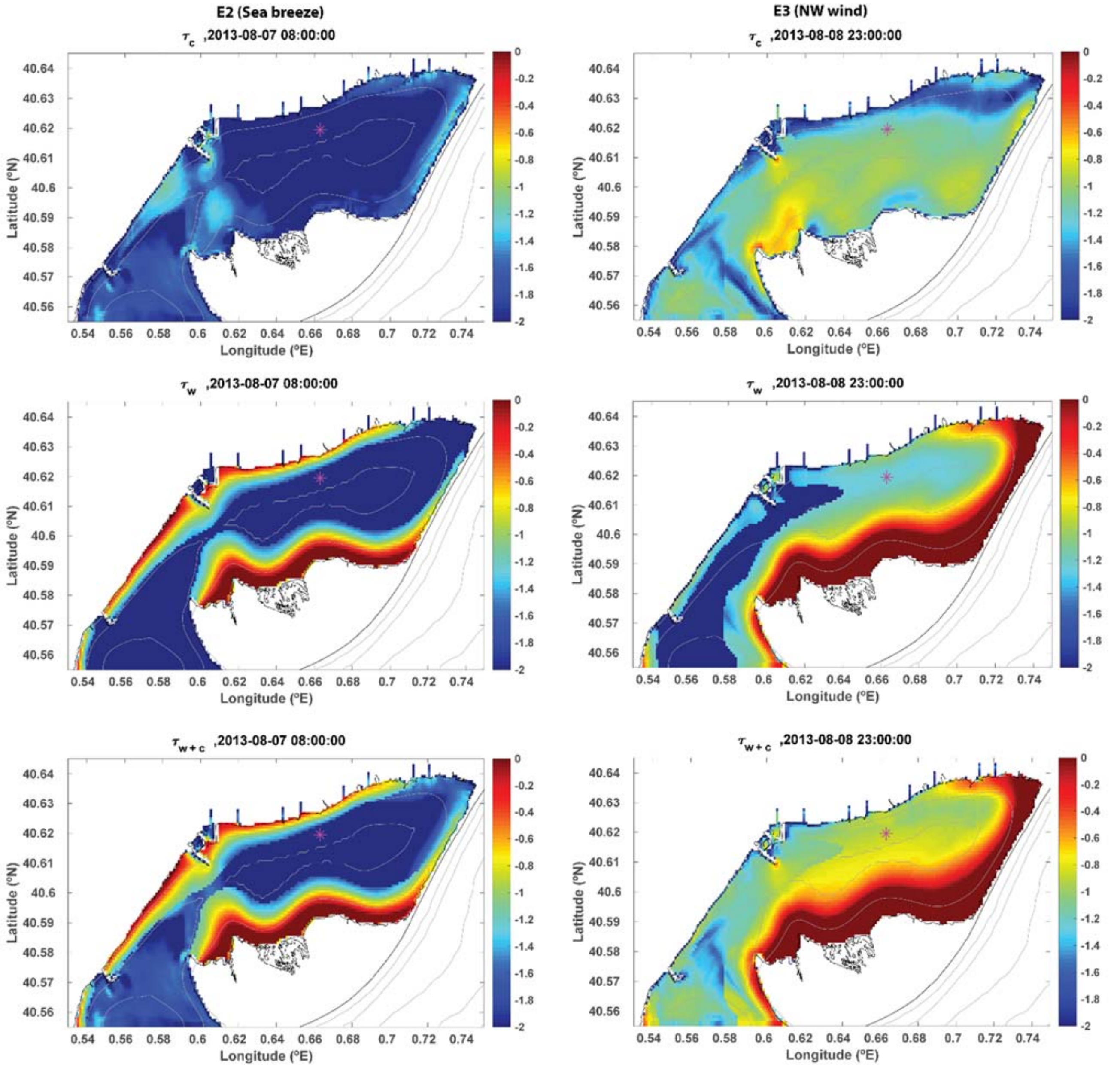


Figure 6: Current-induced bottom stress (τ_c), wave-induced bottom stress (τ_w) and combined wave-current bottom stress (τ_{wc}).in the Alfacs Bay ~~Current-induced bottom stress (\tau_c), wave-induced bottom stress (\tau_w) and combined wave-current bottom stress (\tau_c + \tau_w).Distribution of the current, wave and combined wave-current bottom stresses log10(Pa) in the Alfacs Bay~~ during the first stage of the episodes E2 (left) and E3 (right). The A2 station is shown in magenta. Isobaths (in grey) are plotted in grey solid lines in each 3 m intervals from ~~xx~~3 m to ~~xx~~12 m. Note that for clarity, the plot scale is transformed in ~~bottom stresses are plotted in~~ log10 scale and the vertical range differs between both bottom stress distributions.~~Magenta symbol show the A2 station. Isobaths (in grey) are plotted each 3 m. Note that for clarity, the plot scale is transformed in log10 and the vertical range differs between both bottom stress distributions.~~

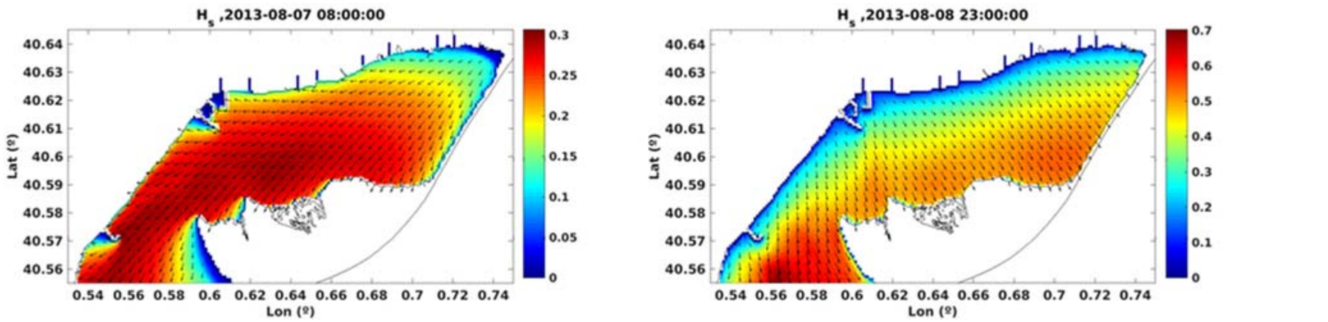


Figure 7: ~~Snapshot of the w~~Wave field for the episode E2 (sea-breeze; left) and E3 (NW wind; right). ~~Color map~~The colours represent~~s~~ ~~the~~ significant wave heights in meters ~~-~~and black arrows the direction of propagation. Note that the value ranges of ~~the significant wave height are~~colourbars are different.

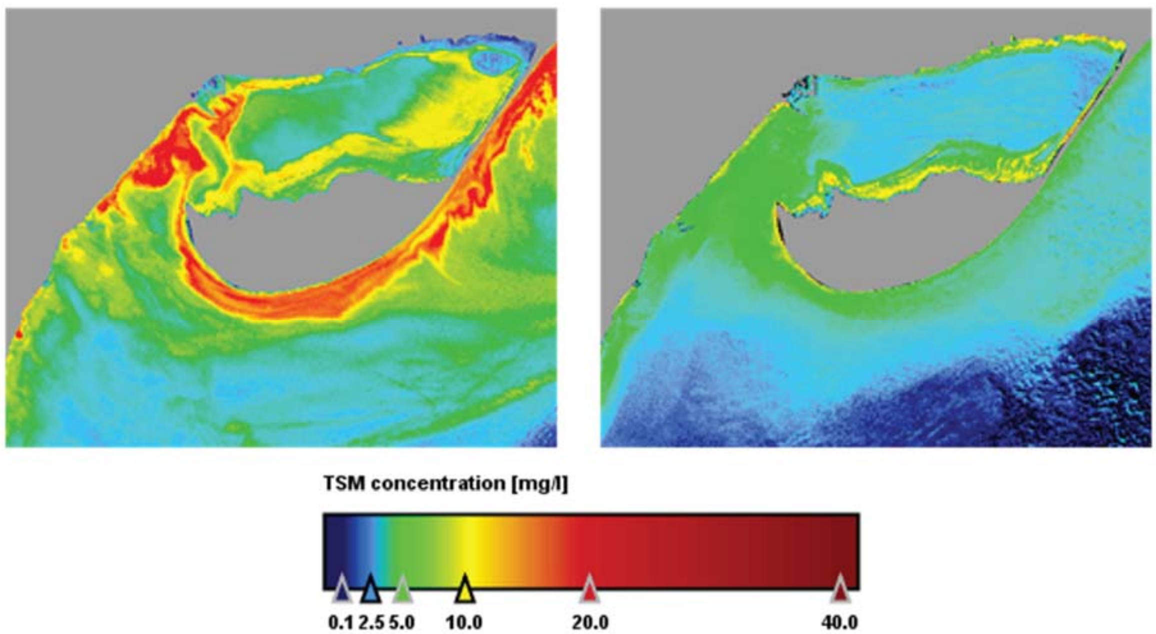


Figure 8: Total Suspended Matter (TSM in mg~~•l~~ per liter) obtained from Sentinel-2 imagery for the Alfacs Bay ~~in~~ for two ~~differentiate~~ different conditions~~scenarios~~: NW winds (left; 27th of December 2017) and calm conditions (right; 15th of February of 2018).