Section 1 - Personal data

Personal Data

Title	Dr
Name	Lionel
Surname	Renault
Email	lionel.renault@ird.fr
Position	Experienced researcher (professional researcher, lecturer or higher)
Your Scientific Background	Earth Sciences & Environment
Date of Birth	19/12/1980
Gender	MALE
Nationality	FRANCE
Have you already participated in the past to similar initiatives? or do you have already HPC experience?	Previous HPC-Europa projects
Participation in the past to similar initiatives (other)	

Section 2: Your Organisation

Your Organisation

University/Organisation	Institut de Recherche pour le Developement
Organisation Legal Status	Public Research Organisation
Department	Ocean
Organisation Address	LEGOS, 14 Avenue Edouard Belin
Town	Toulouse
Post code	31400
Country	FRANCE

Telephone	0033695365506

Your Research Group

Your Research Group	LEGOS
Name of your Group Leader	Alexandre Ganachaud
Email of your Group Leader	alexandre.ganachaud@ird.fr
URL of your research group www page	http://www.legos.obs-mip.fr

Section 3: Your Visit

When do you plan to come?

Preferred Start Date (dd/mm/yyyy)	01/04/2019
Expected Duration in weeks	13
HPC Access Centre	BSC
HPC Access Centre (secondary choice)	Not defined

Collaboration with host

nº	Host	Contacted This Host?
1.	ESP - Arsouze Thomas - Barcelona Supercomputing Center (BSC)	Yes

Add new host

nº	Host Name	Host Family Name	Host Institute	Host Department	Host Institute Country	Discipline	Host Researcher Telephone	Host Email	Host website	Contacted This Host?

Host collaboration description

This HPC-Europa3 project is expected to be a second step toward both a technical and scientific collaboration between the LEGOS/IRD and the BSC that will benefit to both parties. In the past, the applicant visited the BSC. With T. Arsouze (the host), they implemented the current feedback to the atmosphere in the BSC coupled model, analyzed the BSC simulations (with vs. without current feedback), and implemented and tested parameterizations of the current feedback in the ocean model used by the BSC (ie NEMO). Mesoscale air-sea interactions, by modifying the energy budget of the ocean, can strongly modulate the oceanic mean and mesoscale circulations, partly resolving long-lasting biases in oceanic numerical modeling. This project is geared to address a novel and important scientific challenge that arises from the emergence and the development of high resolution coupled models. So far, the wave interface between the atmosphere and ocean has not been explicitly included in climate models, assuming an equilibrated sea state which is transparent to momentum transfers between the two media -- momentum transfer to the wave field is immediately passed on to the ocean, and textit{vice versa}. This assumption is neglecting possible feedbacks to the atmosphere and the ocean associated with a non equilibrated sea state. We will range these effects under the term wave feedbacks within a coupled Wave-Atmosphere-Ocean (WAO) system. WAO may have an impact on the ocean energy and dynamics at both large scale and mesoscale through several processes (e.g., roughness, sace-time redistribution of interfacial momentum and energy fluxes, Stokes advection and drift, Langmuir turbulence).

This project mainly aims to implement the wave feedbacks to the atmosphere and to the ocean in the BSC coupled model and to test to what extent it can modulate the ocean and atmosphere dynamics, the other air-sea interactions and, thus, the climate predictability.

Section 4: Your Proposed Project

Project

Project Title	Bringing the Wave Feedbacks to Atmosphere and the Ocean into the BSC Earth System
1. Main Field	Earth Sciences & Environment
2. Specific Discipline	Earth - Marine science/Oceanography

More about the code:

Specify the code name	NEMO
Specify the web site of the code (if any)	https://www.nemo-ocean.eu/
Is there an existing serial code?	Yes

How big is it?	more than 10000 lines
What language is it written in?	Mixed C / Fortran
if other, please specify:	
How much of the code did you write yourself?	0 percent
Is there an existing parallel code?	Yes
What language is it written in?	Mixed C / Fortran
How was it parallelised?	MPI
if other, please specify:	
How big is it?	more than 10000 lines
How much of it did you write yourself?	0 percent
Libraries and Packages used:	MPI, BLAS, LAPACK, HDF4, HDF5, NETCDF, PARMETIS, SCALAPACK, P-NETCDF, UDUNITS, GRIB_API, CDFTOOLS v2, CDO, NCO, PERL, PYTHON, AUTOCONF and AUTOMAKE
Will you produce new data during your visit?	Yes
If yes, will the produced data be of interest for your scientific community?	Yes
Will the data be accompanied by metadata to describe them?	Yes
Will it be possible for you to make data related to your project available in open-access?	Yes

Your motivation for a visit - what do you intend to do?

Benchmarking:	Not interested	Code development:	Secondary motivation

Collaborative project:	Main motivation	Consultancy:	Main motivation
Data Analysis:	Main motivation	Establishing Academic Link:	Secondary motivation
Optimisation:	If time permits	Parallelisation:	Not interested
Porting code:	Not interested	Production runs:	Main motivation
Training:	If time permits	Visualisation:	Not interested
Other:			

Tell us about your programming experience

	Level	**Years experience**
Unix	Expert	More than 5 years
Fortran	Advanced	More than 5 years
C	Intermediate (low)	More than 5 years
C++	No experience	Not applicable
MPI	Intermediate (high)	More than 5 years
Open MP	Intermediate (high)	More than 5 years
CUDA	No experience	Not applicable
OpenACC	No experience	Not applicable
OpenCl	No experience	Not applicable
OmpSS	No experience	Not applicable

Please characterise your typical production runs

Tell us about your present computing resources	
Machine architecture (please specify)	TGCC IREBNE: BULL Sequana X1000

	supercomputer 1 656 Intel Skylake 8168 bi-processors nodes - 2,7 GHz, 24 cores/proc- 79 488 compute cores for 6,86 Pflop/s peak power, 192 GB of DDR4 memory / node, InfiniBand EDR interconnect.
Processor speed (please specify)	2.7Ghz
Processor type (please specify)	Intel Skylake 8168 bi-processors nodes
Number of nodes	> 1.000
Typical execution time per run	more than 24 hours
Please estimate the computing resources that you would expect to use during your visit	
Total CPU requirements (CPU hours)	60.000-100.000
Please specify the value = (elapsed time of a single run)*(number of CPU used in a single run) * (total number of runs)	run of 4 months (allowing testing the implementation) 5 x 5000 x 4 = 100,000 hours. Note the host is also planning to use his own hours to perform 5 years of simulation
Number of nodes	> 1.000
Total Memory requirements	9.001-90.000 Gb
Temporary disk space requirements for a single run	6To
Library requirements	netcdf,hdf,mpi

Compatible architectures (Select one or more, as applicable)	IntelX86 (e.g. Sandy Bridge, Ivy Bridge, Haswell, Broadwell, Skylake) AMD
Compatible architectures (other)	
Please justify your choice of resources (e.g. CPU requirements, no. of processors, compatible architectures)	During the 3 months stay at BSC,I intend to implement to wave feedback in the atmospheric and oceanic models of the BSC. Four months of simulation will allow to test the implementation. Note we are also planning to tun a 5-years simulation using CPU hours from the host.

Project Proposal

Background information	Interactions between the ocean and the atmosphere largely influence the Earth's cli- mate and ecosystems at the level of ocean basins. The main modes of climate vari- ability (e.g., Madden-Julian Oscillation, El Niño, North-Atlantic Oscillation) are ocean- atmosphere coupled modes. Ecosystems have a strong response to these variations through the physical influence of winds, light and temperature on the nutrient reservoir and there- fore on the primary production and the trophic chain. While climate models (GCMs) generally agree globally in term of main mode of vari- ability and are relatively realistic in term of, e.g., global mean sea surface temperature, there is a large regional dispersion or common biases. Eastern Boundary Upwelling Sys- tem (EBUS) and Western Boundary Currents (WBCs) are among the strongest bias areas (e.g., Richter (2015)). Part of those biases arise because of a poor representation of the mesoscale oceanic, atmospheric and biogeochemical dynamics. Those limitations have thus created a new line of research based on a regional approach to the interactions be- tween the ocean and the atmosphere and aiming to understand and predict variability in key areas of the ocean. Mesoscale thermal (feedback of the sea surface temperature) and mechanical (feed- back of the sea surface current) air-sea interactions, by modifying the energy budget of the ocean, can strongly modulate the oceanic mean and mesoscale currents, partly resolv- ing long-lasting biases in oceanic numerical modeling (e.g., Ma et al. 2016; Seo et al. 2015; Seo 2017; Renault et al. 2016b,a, 2017, 2018). However,

so far, the wave interface between the atmosphere and ocean has not been explicitly included, assuming an equilibrated sea state which is transparent to momentum transfers between the ocean and the atmosphere – momentum transfer to the wave field is immediately passed on to the ocean, and vice versa. This assumption is neglecting possible feedbacks to the atmosphere and ocean as- sociated with a non equilibrated sea state. We will range these effects under the term wave feedback within a coupled Wave-Atmosphere-Ocean (WAO) system. WAO inter- actions has received a growing interest from the scientific community resulting in a num- ber of new projects and model development. Several studies have shown the relevance of Wave-Atmosphere (WA) or Ocean-Wave (OW) or full WAO coupling, e.g., in storm- surge modeling (Mastenbroek et al., 1993), weather and wave prediction (Janssen et al., 2002, 2004; Renault et al., 2012) and ocean circulation and variability (Burgers et al., 1995; Breivik et al., 2015; Chune and Aouf, 2018). These studies show that explicitly including wave effects in a model can provide more realistic interfacial momentum fluxes. Janssen et al. (2002) demonstrate that modifying the Charnock relation to account for wave age dependence in a coupled WA model improves both the atmospheric circulation and wave field. However, there is no general understanding on the effect of full WAO coupling on the energy budget of the ocean.

In a pioneer work based on a coarse-resolution global coupled WAO model (at 1◦), Breivik et al. (2015), show that ocean-wave coupling may significantly affect SST, essen- tially from the parameterization of sea state effect on surface turbulent kinetic energy. The effect is quite large over WBCs, where OW coupling leads to SST differences of up to 2◦C. However, this forerunner study use a coarse ocean model that cannot fully resolve AC dynamics, including its mesoscale activity. In addition, the study is biased towards mixed layer parameterization and likely suffers from missing terms that were not judged important at coarse resolution (Suzuki and Fox-Kemper, 2016). More recently, Chune and Aouf (2018), using global eddy permitting coupled WAO models show the WAO can modulate the surface stress intensity up to 10% and the SST up to 1◦over the WBCs. A fully consistent wave-averaged model (e.g., Marchesiello et al. 2015) is required to properly account for wave effects, and the role of WAO coupling in the energy budget and dynamics of the global ocean and the atmosphere is still an open question.

The Barcelona Supercomputing Center (BSC) is involved in the PRIMAVERA Euro- pean project (Horizon2020, 2015-2019). This project aims to develop a new generation of advanced and well-evaluated high-resolution global climate models, capable of simulat- ing and predicting global and regional climate. In this framework, the BSC has developed a coupled version of the EC-Earth 3.2 climate model at a groundbreaking horizontal res- olution of about 15km in each climate system component (EC-Earth3_IFS-T1279_NEMO-ORCA12). This Glob15km simulation proposes to follow the entire HighResMIP coordi- nated exercise, within the set of simulations of

	the Sixth Phase of the Coupled Model In- tercomparison Project (CMIP6). This protocol will offer a framework for building a large multi-model ensemble of high resolution simulations with a low resolution counterpart following a common experimental protocol, and allow identifying the robust benefits of increased model resolution. The set of 50 years of Glob15km simulation already existing at BSC is thus an unprece- dented tool to evaluate the benefits of high resolution on a long time frame and at global scale. In particular, this resolution should allow to explicitly resolve dynamical features missing at coarser resolution (such as eastern and western boundary currents), but also provide an adequate basis for testing the effects of the WAO. Adding the wave feedbacks to the BSC coupled system, i.e., a missing air-sea interaction, may improve the BSC skills in predicting the climate on seasonal and longer time-scale. The goals of the work proposed here are: • The first goal of this collaboration is to implement in the BSC coupled model the coupling between the wave model WAM, the atmospheric model IFS, and the ocean model NEMO. The implementation of the wave coupling has already been done in NEMO and WRF using the coupler OASIS/MCT. It has to be tested with the WAM and IFS model within the BSC framework. This implementation of the WAO with the same 3 components is already functional at the ECMWF center. However, some work has to be done to make this running on long time periods in the frame- work of the EC-Earth developments (i.e., communications between components us- ing OASIS-MCT coupler, implementation in a workflow manager). This work will be done in close collaboration with colleagues from ECMWF and LOCEAN (Paris) who already implemented a WAO with NEMO ocean model, WRF atmospheric model, and WW3 wave model (Objective 1 of the workplan). • The second goal is to test such a coupling over a short term period to assess the quality of the implementation. (Objective 2 of the workplan). • The third goal is to test such a coupling is to run a 5 years global coupled simulation to assess the impact of the wave coupling on the ocean and atmosphere dynamics (e.g., Gulf Stream separation, energetic budget of the ocean, atmospheric response, etc) (Objective 2 and 3 of the workplan). The applicant will bring his expertise to the analysis of the global coupled configuration Glob 15km carried by T. Arsouze that currently includes the thermal feedback and the current feedback (integrated in a previous HPC visit by the applicant and the host) with a focus on the Western Boundary Currents dynamic and its links with the air-sea interactions. (Objective 3 of the workplan) • The last goal is to prepare a future long-term simulation (Objective 4 of the work- plan). I conducted my thesis (2005-2008) at the Laboratory of Geophysical and Oceanographic Space Studies (LEGOS, Toulouse) in the ECOLA team (Echanges Cote- LArge), under the direction of B. Dewitte (IRD / LEGOS) and Y. duPenhoat (IRD / LEGOS). My research aimed to

	study the impact of mesoscale atmospheric structures on the ocean variability. My approach combined the use of observed data (satellites and in situ) and oceanic and atmospheric modeling based on the Regional Ocean Modeling System (ROMS, Shchep- etkin and McWilliams (2005)) and the Weather Research and Forecast model (WRF, Ska- marock et al. (2008)). During my thesis I developed a collaboration with the University of Chile (Department of Meteorology, Team of René Garreaud) where I spent nine months which allowed me to deepen my culture on the Eastern Boundary Upwelling System (EBUS) off Peru-Chile, and then joined the IRD collaborative network in Peru by partici- pating in the IMARPE training program, especially by training a Peruvian student on the atmospheric model WRF (Miguel Saavedra). I then did a post-doc in Spain, at SOCIB / IMEDEA, where I took the responsibility of the Modeling Department. This experience allowed me to deepen and extend my competences in coupled modeling by addressing air-sea coupling and physical-biogeochemical coupling, and transpose my modeling plat- form to another region, i.e., the Mediterranean Sea, while maintaining collaborations with Chile (CEAZA). I also maintained a sustained training activity by supervising a master, a PhD, and a post-doc (see related publications). My expertise and the problems I have tackled have naturally led me to extend my network of international collaborations (Rut- gers University, USGS, CEAZA), and to France (MIO and LEGI). Finally, from June 2013, after 4 years in Spain, I moved to the United States to take a position as a Researcher at the University of California, Los Angeles (UCLA) within J.C. McWilliams' team. I managed a small Research team financed by a NSF 3M $ (PI) that I obtained in 2014 on the impact of climate change on the ecosystem of the 4 main EBUS (i.e., California, Benguela, Canary Islands, Chile). I was also Co-PI of a project on the acidification and deoxygenation of the Upwelling of California (PI, J.C. McWilliams), which allowed me to deepen my knowledge and skills in biogeochemistry and to develop new collaborations with the University of Washington (C. Deutsch). I was also interested in the average circulation of large basins and its major currents (Gulf Stream and Agul- has), and their regional impacts. In a precursor work, using coupled ocean-atmosphere simulations. I have recently shown the need to resolve small scales interactions between the ocean and the atmosphere to represent realistically the mean and mesoscale oceanic currents, and the primary production in the EBUS, challenging simple upwelling indices based on wind along the coast as well as the classic paradigm how to force an oceanic model on which I will discuss in the following chapters. My projects allowed me to su- pervise researchers (1), and post-doctoral (3) and to collaborate with students (2) and to develop my network of international collaborations (UCLA, University of Washing- ton, University of Oregon, Universidad de Concepcion (Chile), University of Cape Town (South Africa), Nanjing University) and national

	(INRIA, LOCEAN, LOPS, LEGOS). I recently integrated the IRD as a "Chargé de Recherche". My research project nat- urally follows my research line I developed throughout my carrier and aims to better understand the Ocean-Land-Wave-Atmosphere interactions, their impact on the biogeo- chemical variability and mean state, and how to parameterized them in a forced ocean model. Last year, thanks to HPC3, I visited the BSC and contribute to implement and to test the current feedback to the atmosphere in the BSC coupled system (two papers will be submitted soon).
Case for HPC-EUROPA funding	My research would benefit from HPC-Europa funding by the rich interaction with the local scientific host that it will allow. In particular the HPC-Europa framework is crucial to achieve the goals of this project as it will allow the applicant to have an access to the HPC supercomputer and, thus, to implement in collaboration with T. Arsouze the wave coupling to the atmosphere and the ocean in the BSC Earth System coupled model. The resulting coupled simulations designed within this project will lay ground for performing a long-term global fully coupled simulation that will allow to fully test and assess the impact of the wave feedback on both the atmosphere and the ocean. It will therefore not only strongly benefit the modeling community but also, in particular, the BSC center and its capability to run high-quality coupled climate simulations and to better predict the seasonal variability of the climate. This collaboration will also allow to bring the applicant's knowledge on Western Boundary Currents and mesoscale air-sea interactions to the BSC by participating to the analysis of existing and on-going simulations. It will allow a transfer of knowledge from both a technical (management of a high-complexity configuration) and scientific (analysis of a global simulation, with global large scale interactions, at a regional scale resolution) perspective. Finally, this project is geared to re-enforce and complement the applicant's knowledge of Earth System interactions by expanding his area of research from mostly regional modeling to global modeling. Overall, it will allow him to assess the wave feedbacks to the atmosphere and the ocean, which are, so far, largely ignored by the modeling community. The experience he will gain by collaborating with BSC and the PRIMAVERA project will provide new competencies in state-of-the-art methodologies for the analysis of complex coupled systems. LEGOS/IRD and UCLA (his former job) has been in the forefront of the research in ocean-atmosphere coupled modeling, in particular through the implementation of the OASIS_MCT coupler into the ROMS_Agrif model and recent studies on the importance of air-sea coupling in determining the mean ocean dynamic. The applicant will therefore have the opportunity to bring

	and share his knowledge on air-sea coupling, ocean mesoscale variability, and Western Boundary Currents dynamics with the BSC. Through the project the applicant will also further improve his experience with the processing and analysis of large numerical model data. Finally it will also allow him to enlarge his professional network.

Project Workplan
Project Workplan

The objectives for this 13 weeks visit at BSC are :

1) Implement and test the wave feedbacks to the ocean and to the atmosphere in the BSC coupled model. Time needed: 6 weeks.

2)Father and develop tools to analyze the new simulations by comparing them to the set of previous coupled simulations from the BSC (that did not include the wave feedbacks, but include the thermal feedback and both thermal and current feedbacks) in term of ocean-atmosphere energy exchange, and mean and eddy kinetic energy. Time needed : 8 weeks. Note this task will be based on previous development made by the applicant and by using tools developed by the BSC.

2) In parallel of task (2), run a 5 years coupled simulation and analyze it in term of momentum stress, significant wave height, 10-wind, eddy kinetic energy, transfer of energy between the ocean and the atmosphere, mean oceanic and atmospheric circulations. Time needed: 4 weeks.

4) Prepare future simulation. Time needed: 1 weeks.

The requested time visit of 13 weeks is longer than the average visit length of 7 weeks. However, this is necessary because of the various tasks needed to reach the objectives.

Section 5: Attachments

Curriculum vitae
Curriculum vitae LIONEL RENAULT

Researcher

Born: 19th December 1980 in Marseille (France)

Nationality: French
Languages: French (native language), English (fluent), Spanish (fluent), Catalan (good level), German (notions)

lionel.renault@ird.fr
lrenault@atmos.ucla.edu

PROFESSIONAL PREPARATION

Centrale Marseille, Marseille, France
2001¬2004. Specialization in marine engineering, coastal engineering section.

Université Paul Sabatier, Toulouse, France
2004–2005. M.Sc.II, Science of the Universe, Ocean, Atmosphere and Continental Surfaces.
Laboratoire d'Etudes en Géophysique et Océanographie Spatiales, Toulouse, France
2005–2008. Ph.D. in Physical Oceanography.

APPOINTMENTS

Institut de Recherche pour le Développement (IRD), LEGOS, Toulouse, FRANCE
Researcher (2017-present). Conducted research on Ocean-Atmosphere coupling, Physical-biogeochemical interactions, regional modeling of mesoscale and submesoscale. Expert on Eastern and Western Boundary Upwelling System, Mediterranean Sea, numerical modeling, and Ocean-Atmosphere coupling.

University of California–Los Angeles
Assistant Researcher, Department of Atmospheric and Oceanic Sciences, Team of Prof. J.C. McWilliams, June 2013–2017.
Conducted research on Ocean-Atmosphere coupling, Physical-biogeochemical interactions, regional modeling of mesoscale and submesoscale. Expert on Eastern Boundary Upwelling System (EBUS), Mediterranean Sea, numerical modeling, and Ocean-Atmosphere coupling.

IMEDEA and SOCIB, Palma de Mallorca, Spain
Postdoctoral Scholar and Researcher, 2009–2013. Lead modeler at the SOCIB modeling facility. Conducted research on ocean–atmosphere interactions, coupled simulations, and mesoscale and interannual variability.

Laboratoire d'Etudes en Géophysique et Océanographie Spatiales (LEGOS, France) and Universidad de Chile (Chile). PhD student. Conducted research on mesoscale atmospheric forcing on the Humboldt Current System using both regional models and observations.

SKILLS
Development: Fortran77/90, C/C++, MPI
Scientific calculus: Matlab, Python, IDL. Numerical simulations: ROMS/CROCO, NEMO, WRF, SWAN, COASWST, OASIS, MCT.
OS: Linux, Mac, Windows.
In situ measurments (CTDs, XBTs, drifters).
Languages: French: Native; English: Fluent; Spanish: Fluent; Catalan : Good

MENTORING
In Spain, Dr. Renault advised two postdoctoral scholars (M. Juza, L. Arancha), one Ph.D. student (R. Escudier), and one M.Sc. student (F. Desbiolles). At UCLA, he also advised three postdoc (A. Jousse, F. Kessouri, and R. Chen) and one researcher (S. Masson).

REVISIONS OF PEER REVIEWED ARTICLE AND OUTREACH
JGR Ocean and Atmosphere, Ocean modelling, JPO, GRL, Natural Hazard, Progress in Oceanography, Journal of Physical Oceanography, Nature Geoscience, Nature Communication, USGC internal reviews Evaluation of French national project (IRD, 1 project) and National Science Foundation (3 projects).

Press releases following the publications of Renault et al., 2011 and Renault et al., 2016. Press releases following the NSF grant in 2014.
Member of the PhD comity of Romain Escudier.

FIELD EXPERIENCE
2012: TOSCA cruise, Ibiza Strait, 26-30 October 2012; R/V García del Cid (Spain). PI: Alejandro Orfila (IMEDEA, Spain); 2 days; ADCP, CTD, XBT, drifters, ...

FUNDING RECEIVED SO FAR
2018: HPC3 (13 weeks visit)
2014: NOAH grant (1.2M€)
2014: NSF grant (2.96M€)
2014: Bureau of Ocean Energy Management (0.36M€);
2007: Comité National de Géodesie Française, Grant to attend the IUGG conference, Perugia, Italia.
2007: University of Paul Sabatier (Toulouse, France), grant for internship in Chile ATUPS (1756 €)
2006: University of Paul Sabatier (Toulouse, France), grant for internship in Chile ATUPS (1756 €)
2005: University of Paul Sabatier (Toulouse, France) merit scholarship (3200€)

MAIN COLLABORATORS
James C. McWilliams (UCLA), Curtis Deutsch (UW), M. Jeroen Molemaker (UCLA), Alexander Shchepetkin (UCLA), Alex Hall (UCLA), Hartmut Frenzel (UW), Sebastien Masson (UCLA/LOCEAN), Francois Colas (LOCEAN), Florian Lemarié (INRIA France), Dudley Chelton (Oregon University), Patrick Marchesiello (IRD/LEGOS, France), Jonathan Gula (Université de Brest), Pierrick Penven (IRD/LPO, France), Dehayes Julie (LOCEAN), Pous Stephane (LOCEAN), Fayçal Kessouri (UCLA), Bianchi Daniele (UCLA), Julien Jouanno (LEGOS)

Curriculum vitae (attachment)

- CV_Lionel_Renault_English_2019.pdf

List of publications

(40) Renault, L. et al. 2019. Remarkable Control of Western Boundary Currents by Eddy Killing, a Mechanical Air-Sea Coupling Process, under second review, GRL
(39) Renault, L. et al. 2019. Disentangling the Mesoscale Ocean-Atmosphere Interactions, JGR, accepted.
(38) Meroni, A. N. et al. (2018). Role of the oceanic vertical thermal structure in the modulation of heavy precipitations over the Ligurian Sea. Pure and Applied Geophysics, 175(11), 4111-4130..
(37) Renault, L. et al. (2018). Dampening of Submesoscale Currents by Air-Sea Stress Coupling in the Californian Upwelling System. Scientific reports, 8(1), 13388.
(36) González-Wangüemert, et al. (2018). Gene pool and connectivity patterns of Pinna nobilis in the Balearic Islands (Spain, Western Mediterranean Sea): Implications for its conservation through restocking. Aquatic Conservation: Marine and Freshwater Ecosystems.
(35) Desbiolles, F. et al. (2018). Upscaling impact of wind/sea surface temperature mesoscale interactions on southern Africa austral summer climate. International Journal of Climatology, 38(12), 4651-4660.
(34) Wesselmann M. et al., Genetic and oceanographic tools reveal high population connectivity and diversity in the endangered pen shell Pinna nobilis. Scientific reports 8.1 (2018): 4770.
(33) Renault, L. et al. 2017. Satellite Observations of Imprint of Oceanic Current on Wind Stress by Air-Sea Coupling. Scientific reports 7.1 (2017): 17747.
(32) Barkan, R. et al. 2017. Submesoscale Dynamics in the Northern Gulf of Mexico. Part I: Regional and Seasonal Characterization, and the Role of River Outflow. Journal of Physical Oceanography, (2017).
(31) Srinivasan, K. et al. 2017. Topographic and Mixed Layer Submesoscale Currents in the Near-Surface Southwestern Tropical Pacific. Journal of Physical Oceanography, 47(6), pp.1221-1242.
(30) Renault, L. et al. 2017. Modulation of the Agulhas Current Retroflection and Leakage by Oceanic Current Interaction with the Atmosphere in Coupled Simulations. Journal of Physical Oceanography, 47(8), pp.2077-2100.
(29) Renault, L .et al. 2016. Control and Stabilization of the Gulf Stream by Oceanic Current Interaction with the Atmosphere. Journal of Physical Oceanography, 46(11), pp.3439-3453.
(28) Y. Sun et al. "Seasonal and Interannual Variability in the Wind-Driven Upwelling Along the Southern East China Sea Coast," in IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing , vol.PP, no.99, pp.1-8. doi: 10.1109/JSTARS.2016.2544438
(27) Renault L. et al. 2016. Modulation of Wind-Work by Oceanic Current Interaction with the Atmosphere. Journal of Physical Oceanography, (2016), http://dx.doi.org/10.1175/JPO-D-15-0232.1 (R2016b)
(26) Escudier R. et al: Characterization of the Western Mediterranean mesoscale variability using high-resolution model and observations, J. of Geophys. Research, DOI: 10.1002/2015JC011371 (2016).
(25) Renault, L., et al. F., 2016. Partial decoupling of primary productivity from upwelling in the California Current System. Nature Geoscience, accepted
(24) Juza M. et al. Operational SOCIB forecasting system and multi-platform validation in the Western Mediterranean Sea, Jounal of Operational Oceanography, in press, 10.1080/1755876X.2015.1117764 (2016)
(23) Renault, L.,et al. : Orographic shaping of US West Coast wind profiles during the upwelling season, Climate Dynamics (2016): 1-17.
(22) McWilliams, J. C. et al., Filament Frontogenesis by Boundary Layer Turbulence. Journal of Physical Oceanography, (2015).

(21) Sayol J.M. et al., A Lagrangian model for tracking surface spills and SaR operations in the ocean, Environmental Modelling & Software, Volume 52, February 2014, Pages 74-82, ISSN 1364-8152, http://dx.doi.org/10.1016/j.envsoft.2013.10.013
(20) Macías D. et al. (2014): Fishing anchovy in the Alboran Sea: A socioeconomic activity under threats by future environmental scenarios, accepted, Journal of Marine Systems.
(19) Sayol, J.-M. et al. (2013), Sea surface transport in the Western Mediterranean Sea: A Lagrangian perspective, J. Geophys. Res. Oceans, 118, doi:10.1002/2013JC009243..
(18) Juza, M. et al. 2013, Origin and pathways of Winter Intermediate Water in the Northwestern Mediterranean Sea using observations and numerical simulation, J. Geophys. Res. Oceans, 118, doi:10.1002/2013JC009231..
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Section 6: Marketing HPC-Europa3

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Where did you hear about HPC-Europa3?	Colleague
If possible, please provide us with more details. For example, if you heard about us from a direct boss or colleague, how did they hear about us? If you found us from a link on another web site, tell us the URL of that site. If you selected "Other", please let us know where!	

Any further suggestions for a more effective marketing of the HPC-Europa3 Programme