A conceptual framework for developing the next generation of Marine OBservatories (MOBs) for science and society

In the field of ocean observing, the term of "observatory" is often used without a unique meaning. A clear and unified definition of observatory is needed in order to facilitate the communication in a multidisciplinary community, to capitalize on future technological innovations and to support the observatory design based on societal needs. In this paper, we present a general framework to define the next generation Marine OBservatory (MOB), its capabilities and functionalities in an operational context. The MOB consists of four interconnected components or "gears" (observation infrastructure, cyberinfrastructure, support capacity, and knowledge generation engine) that are constantly and adaptively interacting with each other. Therefore, a MOB is a complex infrastructure focused on a specific geographic area with the primary scope to generate knowledge via data synthesis and thereby addressing scientific, societal, or economic challenges. Long-term sustainability is a key MOB feature that should be guaranteed through an appropriate governance. MOBs should be open to innovations and good practices to reduce operational costs and to allow their development in quality and quantity. A deeper biological understanding of the marine ecosystem should be reached with the proliferation of MOBs, thus contributing to effective conservation of ecosystems and management of human activities in the oceans. We provide an actionable model for the upgrade and development of sustained marine observatories producing knowledge to support science-based economic and societal decisions.
Evolution of complex asexual reproductive strategies in jellyfish

Many living organisms in terrestrial and aquatic ecosystems rely on multiple reproductive strategies to reduce the risk of extinction in variable environments. Examples are provided by the polyp stage of several bloom-forming jellyfish species, which can reproduce asexually using different budding strategies. These strategies broadly fall into three categories: (1) fast localized reproduction, (2) dormant cysts, or (3) motile and dispersing buds. Similar functional strategies are also present in other groups of species. However, mechanisms leading to the evolution of this rich reproductive diversity are yet to be clarified. Here we model how risk of local population extinction and differential fitness of alternative modes of asexual reproduction could drive the evolution of multiple reproductive modes as seen in jellyfish polyps. Depending on environmental parameters, we find that evolution leads to a unique evolutionarily stable strategy, wherein multiple reproductive strategies generally coexist. As the extinction risk increases, this strategy shifts from a pure budding mode to a dual strategy and finally to one characterized by allocation into all three modes. We identify relative fitness-dependent thresholds in extinction risk where these transitions can occur and discuss our predictions in light of observations on polyp reproduction in laboratory and natural systems.
Monitoring and ming bio-physical parameters for hypoxia hazard in a coastal sand pit

Management of coastal areas requires monitoring and modeling of the anthropogenic drivers and the bio-physical processes affecting water quality. To assess the range of hydrographic conditions controlling oxygen distribution in the bottom layers of sand pits, a multi-year oceanographic survey has been conducted in a coastal area with several extraction pits. Hydrographic data including profiles of temperature, salinity and oxygen were collected and related to local wind conditions and circulation. Moreover, 1D and 3D high-resolution non-hydrostatic ocean models were used to describe turbulent mixing regimes and to obtain the range of wind speeds for which the critical anoxic conditions may occur. It is shown that wind speed appears to control the dynamics of oxygen concentrations, with oxygen depleted zones developing in a short time in low wind speed conditions. Moreover, the depth and the shape of the extraction pit contribute to decrease the mixing of the bottom layers and increase the water retention in the hole increasing the output and the persistence of oxygen depleted zones in the excavated area. The results of the numerical simulations show that the risk of hypoxia at the bottom of the sand pits is associated with higher temperatures and wind speed lower than 5 m/s, which is not infrequent during the summer season. However, the number of consecutive days of oxygen depletion can be considered lower than the danger threshold level assumed in the literature.

Keywords: dispersal, dormancy, evolutionarily stable state, evolutionary model, jellyfish polyps, life cycle

DOI: 10.1086/697538
Source: Scopus
Source-ID: 85046085126
Research output: Research - peer-review › Journal article – Annual report year: 2018

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Oceans and Arctic, Section for Coastal Ecology, Section for Ecosystem based Marine Management, University of Naples Parthenope, Marche Polytechnic University
Contributors: Mariani, P., Benassai, G., Grieco, L., Stenberg, C., Støttrup, J. G.
Publication date: 13 Mar 2018
A generic framework for individual-based modelling and physical-biological interaction

The increased availability of high-resolution ocean data globally has enabled more detailed analyses of physical-biological interactions and their consequences to the ecosystem. We present IBMlib, which is a versatile, portable and computationally effective framework for conducting Lagrangian simulations in the marine environment. The purpose of the framework is to handle complex individual-level biological models of organisms, combined with realistic 3D oceanographic model of physics and biogeochemistry describing the environment of the organisms without assumptions about spatial or temporal scales. The open-source framework features a minimal robust interface to facilitate the coupling between individual-level biological models and oceanographic models, and we provide application examples including forward/backward simulations, habitat connectivity calculations, assessing ocean conditions, comparison of physical circulation models, model ensemble runs and recently posterior Eulerian simulations using the IBMlib framework. We present the code design ideas behind the longevity of the code, our implementation experiences, as well as code performance benchmarking. The framework may contribute substantially to progresses in representing, understanding, predicting and eventually managing marine ecosystems.
Boom and burst: Life history, environmental noise, and the (un)predictability of jellyfish blooms

Jellyfish (pelagic Cnidarians and Ctenophores) form erratic and seemingly unpredictable blooms with often large, transient effects on ecosystem structure. To rapidly capitalize on favorable conditions, jellyfish can employ different life histories, which are either a life cycle with one annual sexual reproduction event and an overwintering benthic stage (metagenic life cycle), or continuous reproduction and a holoplanktonic life cycle. However, the links between life history, blooms, and environmental variability are unclear. Here, we examine how environmental variability can drive the bloom dynamics of typical jellyfish in coastal enclosed or semi-enclosed temperate ecosystems. With a simple community model, we reproduce typical seasonalities of the two strategies and trophic cascades triggered by abundant jellyfish, demonstrating how erratic blooms can be generated by irregular changes in the environment. Consistent with literature observations, we predict that metagenic jellyfish dominate early in the season, compared to holoplanktonic organisms, and are favored by increased seasonality. Our results reveal possible mechanisms driving coastal patterns of jellyfish blooms, and factors that are important for the outcome of competition between jellyfish with different life cycles. Such knowledge is important for our understanding of jellyfish blooms, which have large consequences for human activities and well-being, and may improve our ability to predict and manage local ecosystems.

Microplastic does not magnify the acute effect of PAH pyrene on predatory performance of a tropical fish (Lates calcarifer)

Microplastic (MP) leads to widespread pollution in the marine ecosystem. In addition to the physical hazard posed by ingestion of microplastic particles, concern is also on their potential as vector for transport of hydrophobic contaminants. We studied experimentally the single and interactive effects of microplastic and pyrene, a polycyclic aromatic hydrocarbon, on the swimming behaviour and predatory performance of juvenile barramundi (Lates calcarifer). Juveniles (18+ days post hatch) were exposed to MPs, or pyrene (100nM), or combination of both and feeding rate and foraging activity (swimming) were analyzed. Exposure to MPs alone did not significantly influence feeding performance of the juveniles, while a concentration-response series of pyrene showed strong effect on fish behaviour when concentrations were above 100 nM. In the test of combined MP and pyrene exposure we observed no effect on feeding while swimming speed showed a significant decrease. Thus, our
results confirm that short-time exposure to pyrene impacts performance of fish juveniles, while additional exposure to microplastic influenced their activity but not their feeding rate at the given conditions. Further studies on microplastics and other pollutants outlining their combined effects on behaviour and survival of tropical fish are encouraged

**General information**
State: Published
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Pages: 287-293
Publication date: 2018
Peer-reviewed: Yes

**Publication information**
Journal: Aquatic Toxicology
Volume: 198
ISSN (Print): 0166-445X
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 4.18 SJR 1.456 SNIP 1.233
Web of Science (2017): Impact factor 3.884
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 4.38 SJR 1.627 SNIP 1.382
Web of Science (2016): Impact factor 4.129
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 3.79 SJR 1.624 SNIP 1.179
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 3.75 SJR 1.594 SNIP 1.324
Web of Science (2014): Impact factor 3.451
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 4.06 SJR 1.891 SNIP 1.485
Web of Science (2013): Impact factor 3.513
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 3.83 SJR 1.89 SNIP 1.489
Web of Science (2012): Impact factor 3.73
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): CiteScore 3.99 SJR 2.019 SNIP 1.402
Web of Science (2011): Impact factor 3.761
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.798 SNIP 1.374
Web of Science (2010): Impact factor 3.333
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 2.014 SNIP 1.371
Modeling dispersal and spatial connectivity of macro-invertebrates in Danish waters: An agent-based approach

Marine organisms with planktonic life stages are subjected to extensive transport that results from the interactions between ocean currents and their behavioral responses to environmental changes in the course of their life. Questions remain on the identification of key drivers of dispersal and connectivity in marine populations as they can have multiple uses in the conservation and management of marine ecosystems. Here we investigate whether the open Kattegat, at the entrance to Baltic Sea, is the main source of recruitment to the benthos in associated estuaries and coastal sites through export of planktonic invertebrate larvae. We couple a 3D hydrodynamic ocean model (MIKE3FM) to an agent-based model and simulate the dispersal of macro-invertebrate populations in Danish waters. We use characteristic dispersal traits of the larval community (pelagic larval duration, spawning season, and settling behavior) and simulate dispersal processes within the muddy bottom habitats to derive recruitment rates and potential donor populations leading to population connectivity patterns on each site, one bay and two Danish fjords. We then use our recruitment results in the bay to compare them with field data on species diversity in the same area. A total of 48 different combinations of pelagic larval durations and spawning seasons of macro-invertebrates are simulated in two years 2004 and 2010. From these results, we conclude that the central and southern parts of the Danish waters are identified as important spawning grounds whereas the Kattegat does not seem to be the main provider of larvae into the selected sites. The model also predicts higher abundance and recruitment rates of macro-invertebrate larvae in 2010 compared to 2004. These results are supported by comparable species distribution data collected in the study area. Our results show the importance of an integrated modeling tool combining ocean circulation and biological traits to obtain a detailed description of dispersal and connectivity of macro-invertebrate community in the area, which can provide a more accurate baseline to manage marine biodiversity.

General information
State: Published
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Pages: 45-59
Publication date: 2018
Peer-reviewed: Yes

Publication information
Journal: Regional Studies in Marine Science
Volume: 20
ISSN (Print): 2352-4855
Ratings:
Scopus rating (2017): CiteScore 1.2 SJR 0.413 SNIP 0.693
Web of Science (2017): Impact factor 1.152
Sustainable use of marine resources through offshore wind and mussel farm co-location

Marine Spatial Planning (MSP) can offer significant benefits in terms of economic conservation strategies, optimizing spatial planning and minimizing the impact on the environment. In this paper, we focused on the application of multi-criteria evaluation (MCE) technique for co-locating offshore wind farms and open-water mussel cultivation. An index of co-location sustainability (SI) was developed based on the application of MCE technique constructed with physical and biological parameters on the basis of remote-sensing data. The relevant physical factors considered were wind velocity, depth range, concerning the site location for energy production, and sea surface temperature anomaly. The biological variables used were Chlorophyll-a (as a measurement of the productivity) and Particle Organic Carbon (POC) concentration, in order to assess their influence on the probable benefits and complete the requirements of this management framework. This SI can be easily implemented to do a first order selection of the most promising areas to be more specifically studied in a second order approach based on local field data.

General information
State: Published
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Pages: 34-41
Publication date: 2018
Peer-reviewed: Yes

Publication information
Journal: Ecological Modelling
Volume: 367
ISSN (Print): 0304-3800
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 2.69 SJR 1.084 SNIP 1.088
Web of Science (2017): Impact factor 2.507
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.43 SJR 0.967 SNIP 1.09
Web of Science (2016): Impact factor 2.363
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 2.43 SJR 1.082 SNIP 1.097
Web of Science (2015): Impact factor 2.275
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 2.7 SJR 1.132 SNIP 1.341
Web of Science (2014): Impact factor 2.321
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 2.53 SJR 1.148 SNIP 1.318
Web of Science (2013): Impact factor 2.326
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 2.28 SJR 1.045 SNIP 1.249
Dynamics of phytoplankton blooms in turbulent vortex cells

Turbulence and coherent circulation structures, such as submesoscale and mesoscale eddies, convective plumes and Langmuir cells, play a critical role in shaping phytoplankton spatial distribution and population dynamics. We use a framework of advection-reaction-diffusion equations to investigate the effects of turbulent transport on the phytoplankton population growth and its spatial structure in a vertical two-dimensional vortex flow field. In particular, we focus on how turbulent flow velocities and sinking influence phytoplankton growth and biomass aggregation. Our results indicate that conditions in mixing and growth of phytoplankton can drive different vertical spatial structures in the mixed layer, with the depth of the mixed layer being a critical factor to allow coexistence of populations with different sinking speed. With increasing mixed layer depth, positive growth for sinking phytoplankton can be maintained with increasing turbulent flow velocities, allowing the apparently counter-intuitive persistence of fast sinking phytoplankton populations in highly turbulent and deep mixed layers. These dynamics demonstrate the role of considering advective transport within a turbulent vortex and can help to explain observed phytoplankton biomass during winter in the North Atlantic, where the overturn of deep convection has been suggested to play a critical role in phytoplankton survival.

General information

State: Published
Organisations: Section for Marine Ecology and Oceanography, National Institute of Aquatic Resources, Section for Oceans and Arctic, Centre for Ocean Life, University of Bergen
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Publication date: 2017
Peer-reviewed: Yes
Effects of high-frequency strobed laser light on Atlantic cod (Gadus morhua) physiology and behavior

General information
State: Published
Modelling Jellyfish in marine ecosystems

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Centre for Ocean Life
Contributors: Schnedler-Meyer, N. A., Kiørboe, T., Mariani, P.
Publication date: 2017
Peer-reviewed: No
Event: Abstract from Dansk Havforskermøde, Helsingør, Denmark.
Research output: Research › Conference abstract for conference – Annual report year: 2017

On the missing link in ecology: improving communication between modellers and experimentalists
Collaboration between modellers and experimentalists is essential in ecological research, however, different obstacles linking both camps often hinder scientific progress. In this commentary, we discuss several issues of the current state of affairs in this research loop. Backed by an online survey amongst fellow ecologists, modellers and experimentalists alike, we identify two major areas that need to be mended. Firstly, differences in language and jargon lead to a lack of exchange of ideas and to unrealistic mutual expectations. And secondly, constraint data sharing, accessibility and quality limit the usage of empirical data and thereby the impact of ecological studies. We discuss ways to advance collaboration; how to improve communication and the design of experiments; and the sharing of data. We hope to start a much-needed conversation between modellers and experimentalists, to further future research collaboration and to increase the impact of single ecological studies alike.

General information
State: Published
Organisations: Centre for Ocean Life, National Institute of Aquatic Resources, Lund University, University of Bergen
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Pages: 1071-1077
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: Oikos
Volume: 126
Issue number: 8
ISSN (Print): 0030-1299
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 3.67 SJR 2.172 SNIP 1.322
Web of Science (2017): Impact factor 3.709
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.68 SJR 2.382 SNIP 1.335
Web of Science (2016): Impact factor 4.03
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 3.59 SJR 2.404 SNIP 1.343
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 3.69 SJR 2.507 SNIP 1.476
Passive vs Active Knowledge Transfer: boosting grant proposal impact

Research funders are increasingly concerned with measurable socio-economic impact of investment in research, and on increasingly shorter timescales. Innovation, and “open innovation” are the policy priorities of the moment and optimising the flow of ideas along the lab-2-market spectrum is essential for re-use of results, fuelling open innovation, and boosting socio-economic impact or public funded research.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Research Secretariat, Section for Oceans and Arctic, Section for Marine Ecology and Oceanography, AquaTT
Contributors: Grigorov, I., Bayliss-Brown, G., Murphy, D., Thøgersen, T. L., Mariani, P.
Number of pages: 1
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: Geophysical Research Abstracts
Volume: 19
Article number: 18355-2
Seasonal succession in zooplankton feeding traits reveals trophic trait coupling

The seasonal forcing of pelagic communities invokes a succession of the dominant phytoplankton and zooplankton species. Here, we characterize the seasonal succession of the plankton traits and their interactions using observations and model simulations of the plankton community in the western English Channel. We focus on activity traits that characterize the defensive and feeding abilities of zooplankton and distinguish between low risk, low return ambush feeders and high risk, high return feeding-current feeders. While the phytoplankton succession depends on traits related to nutrient acquisition and photosynthesis, it also depends on grazing which couples feeding and motility traits across trophic guilds. Despite interannual variations in the species dominating the protist plankton community, the seasonal trait distribution reveals robust and repeatable seasonal patterns, changing between non-motile cells flourishing in spring and motile community dominating during summer. The zooplankton community is dominated by active feeding-current feeders with peak biomass in the late spring declining during summer. The model reveals how zooplankton grazing reinforces protist plankton seasonal succession and shows how the physical environment controls the vertical structure of plankton communities, where ambush feeders exhibit a preference for greater depths during summer. We characterize the seasonal succession as trophic trait coupling and conjecture that this coupling leads to a trophic trait cascade where successive trophic levels alternate in their expression of activity traits further up in the food chain.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Centre for Ocean Life, Section for Marine Ecology and Oceanography
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Pages: 1184-1197
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: Limnology and Oceanography
Volume: 62
Issue number: 3
ISSN (Print): 0024-3590
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 3.81 SJR 1.871 SNIP 1.329
Web of Science (2017): Impact factor 3.595
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.5 SJR 1.806 SNIP 1.253
Web of Science (2016): Impact factor 3.383
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 3.93 SJR 2.423 SNIP 1.408
Seasonal succession in zooplankton feeding traits reveals trophic trait coupling

Trophic impact of Atlantic bluefin tuna migrations in the North Sea

Large highly migratory predators can have major impacts on local marine ecosystems by reducing prey populations and leading to trophic cascades that affect the entire fish community. These trophic interactions are typically non-linear and can alter both the migratory behaviour of the predator and the stability of the fish community. The impact of a migrating top-predator is investigated here for Atlantic bluefin tuna in the North Sea. Bluefin tuna has been absent from the region for half-century, but recent years have seen recovery of migrations and a return of bluefin tuna in the area. We use a size spectrum model to analyse the trophic impact of the returning tuna on the entire fish community, under scenarios with varying levels of tuna consumption and fishing mortality on the prey. We show that with high level of prey fishing mortality in the North Sea, the effect of a tuna re-colonization results in only limited trophic cascades. However, high tuna consumption or changes in fishing mortality may result in a sudden recruitment failure of small-pelagic fish due to cascading effects on the fish community. In present-day conditions, the level of tuna consumption that triggers recruitment failure is lower at increasing fishing mortalities on their prey, providing indications for the future sustainable management of both small-pelagics and bluefin tuna in the area.
The global susceptibility of coastal forage fish to competition by large jellyfish

Competition between large jellyfish and forage fish for zooplankton prey is both a possible cause of jellyfish increases and a concern for the management of marine ecosystems and fisheries. Identifying principal factors affecting this competition is therefore important for marine management, but the lack of both good quality data and a robust theoretical framework have prevented general global analyses. Here, we present a general mechanistic food web model that considers fundamental differences in feeding modes and predation pressure between fish and jellyfish. The model predicts forage fish dominance at low primary production, and a shift towards jellyfish with increasing productivity, turbidity and fishing. We present an index of global ecosystem susceptibility to shifts in fish–jellyfish dominance that compares well with data on jellyfish distributions and trends. The results are a step towards better understanding the processes that govern jellyfish occurrences globally and highlight the advantage of considering feeding traits in ecosystem models.
The migration game in habitat network: the case of tuna

Long-distance migration is a widespread process evolved independently in several animal groups in terrestrial and marine ecosystems. Many factors contribute to the migration process and of primary importance are intra-specific competition and seasonality in the resource distribution. Adaptive migration in direction of increasing fitness should lead to the ideal free distribution (IFD) which is the evolutionary stable strategy of the habitat selection game. We introduce a migration game which focuses on migrating dynamics leading to the IFD for age-structured populations and in time varying habitats, where dispersal is costly. The model predicts migration dynamics between these habitats and the corresponding population distribution.

When applied to Atlantic bluefin tunas, it predicts their biomass is located in the spawning areas which have also the largest diversity in the age-structure. Distant feeding areas are occupied on a seasonal base and often by larger individuals,

in agreement with empirical observations. Moreover, we show that only a selected number of migratory routes emerge as
those effectively used by tunas

**General information**

**State:** Published  
**Organisations:** National Institute of Aquatic Resources, Centre for Ocean Life, Section for Marine Ecology and Oceanography, Biology Centre CAS, IRD, Unité de Recherche Ecosystèmes Marins Exploités  
**Contributors:** Mariani, P., Krivan , V., MacKenzie, B., Mulon, C.  
**Pages:** 219-232  
**Publication date:** 2016  
**Peer-reviewed:** Yes

**Publication information**

**Journal:** Theoretical Ecology  
**Volume:** 9  
**Issue number:** 2  
**ISSN (Print):** 1874-1738  
**Ratings:**  
- BFI (2018): BFI-level 1  
- Web of Science (2018): Indexed yes  
- Scopus rating (2017): CiteScore 1.48 SJR 0.873 SNIP 0.727  
- Web of Science (2017): Impact factor 1.453  
- Web of Science (2017): Indexed yes  
- BFI (2016): BFI-level 1  
- Scopus rating (2016): CiteScore 1.81 SJR 1.149 SNIP 0.861  
- Web of Science (2016): Impact factor 1.221  
- Web of Science (2016): Indexed yes  
- BFI (2015): BFI-level 1  
- Scopus rating (2015): CiteScore 1.71 SJR 1.29 SNIP 0.762  
- Web of Science (2015): Impact factor 2.085  
- BFI (2014): BFI-level 1  
- Scopus rating (2014): CiteScore 1.86 SJR 1.42 SNIP 0.976  
- Web of Science (2014): Impact factor 1.553  
- Web of Science (2014): Indexed yes  
- BFI (2013): BFI-level 1  
- Scopus rating (2013): CiteScore 2.2 SJR 1.472 SNIP 0.913  
- Web of Science (2013): Impact factor 1.732  
- ISI indexed (2013): ISI indexed yes  
- Web of Science (2013): Indexed yes  
- BFI (2012): BFI-level 1  
- Scopus rating (2012): CiteScore 2.4 SJR 1.661 SNIP 1.041  
- Web of Science (2012): Impact factor 2.052  
- ISI indexed (2012): ISI indexed yes  
- BFI (2011): BFI-level 1  
- Scopus rating (2011): CiteScore 1.74 SJR 1.346 SNIP 0.692  
- Web of Science (2011): Impact factor 1.545  
- ISI indexed (2011): ISI indexed no  
- Scopus rating (2010): SJR 1.176 SNIP 0.923  
- Web of Science (2010): Impact factor 1.364  
- Web of Science (2010): Indexed yes  
- Scopus rating (2009): SJR 0.996 SNIP 0.68  
**Original language:** English  
**Keywords:** Structured population, Ideal free distribution, Game theory, Habitat selection, Bluefin tuna  
**DOIs:**  
10.1007/s12080-015-0290-8

Research output: Research - peer-review ▶ Journal article – Annual report year: 2015
Adfærd hos torsk på et kunstigt stenrev i et baglokale på den Blå Planet

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Living Resources, Section for Ecosystem based Marine Management, Centre for Ocean Life, Den Blå Planet, Aarhus University, DHI Denmark
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Publication date: 2015
Peer-reviewed: No
Event: Abstract from 18. Danske Havforskermøde, Copenhagen, Denmark.
Research output: Research › Conference abstract for conference – Annual report year: 2015

A new compact, cost-efficient concept for underwater range-gated imaging: the UTOFIA project

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Centre for Ocean Life, AZTI-Tecnalia
Contributors: Quincoces, I., Galparsoro, I., Bald, J., Gabina, G., Visser, A., Mariani, P., Jonasdottir, S.
Number of pages: 1
Publication date: 2015
Peer-reviewed: No
Event: Poster session presented at ICES Annual Science Conference 2015, Copenhagen, Denmark.
Electronic versions: Publishers_version

Bibliographical note
ICES CM 2015/C:15
Research output: Research › Poster – Annual report year: 2015

Network analysis of food risks and crises in the global seafood market

General information
State: Published
Organisations: National Institute of Aquatic Resources, Centre for Ocean Life, University of California at Santa Barbara, University of Padova
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Number of pages: 1
Publication date: 2015

Host publication information
Title of host publication: Book of Abstracts. DTU's Sustain Conference 2015
Place of publication: Lyngby
Publisher: Technical University of Denmark (DTU)
Article number: F-9
Electronic versions: F9_DTU_Sustain_2015.pdf
Research output: Research › peer-review › Conference abstract in proceedings – Annual report year: 2015

Optimal bæredygtig udnyttelse af tilgængelige torskbevarelse for dansk fiskeri

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Section for Marine Ecology and Oceanography, Centre for Ocean Life
Contributors: Eero, M., Hansen, J. H., Hüsey, K., Huwer, B., Berg, C. W., Mariani, P., Mosegaard, H., Nielsen, A., Eg Nielsen, E., Rindorf, A., Ulrich, C., Vinther, M., Worsøe Clausen, L.
Number of pages: 52
Publication date: 2015

Publication information
Place of publication: Charlottenlund
Publisher: DTU Aqua. Institut for Akvatiske Ressourcer
Original language: Danish
The role of deep convection on the dynamics of the North Atlantic phytoplankton community

In recent years observations of a significant winter phytoplankton stock and blooms in the absence of stratification have challenged the classical picture of phytoplankton dynamics in the North Atlantic. To explain phytoplankton winter survival, it has been suggested that deep convection can sustain low primary production by frequently returning plankton cells to the euphotic zone. For this mechanism to work the convective vertical velocities have to superimpose the sinking rate of phytoplankton cells and cell photosynthesis has to compensate for respiratory and other losses. In this thesis different modeling approaches are used to investigate several aspects of the bio-physical interplay between deep convection and phytoplankton growth. Simple water column models for phytoplankton have suggested that phytoplankton cannot grow in highly turbulent deep mixed layers, conditions typical for deep convective regimes. To investigate this discrepancy between observations and model studies, a modeling approach commonly used in population models was applied to a spatial grid, where the advective flow was explicit represented.

The result shows that indeed phytoplankton can persists in highly turbulent deep waters and suggests that it is the convective overturning within the mixed layer, that enables cell to thrive under these conditions.

To investigate the role of acclimation during winter and during the onset of the spring bloom, an adaptive Individual-Based-Model (IBM) was developed, allowing to test the phyto-convection hypothesis in relation to individual physiological rates. The model in-cooperates an adaptive parameterization for respiration and a mechanistic sinking model, both of which have been suggested as important contributors to phytoplankton losses during the winter. While cell sinking was found to be only of lesser importance, respiration had a large impact on phytoplankton survival during during winter and especially during the onset of stratification. In difference to the non-hydrostatic model coupled to the IBM, ecosystem models are hydrostatic and are therefore not able to capture convective motion as such. Due to the coupling of deep convection and phytoplankton winter survival in the north Atlantic this can lead to an underestimation of winter phytoplankton biomass. As a first step to improve the winter phytoplankton representation, a simple parameterization assuming average mixed layer light levels throughout the whole mixed layer, was implemented into an ecosystem model and validated with a on-hydrostatic convection model. The new parameterization improved the model fit to observational data substantially. The increased standing stock during winter led to higher carbon export, in particular during the onset of thermal stratification in spring. The finding of this thesis have important implication for our understanding of carbon sequestration during winter and for the role of the North Atlantic as a carbon sink, in particular in a scenario of climate change.
Analysis of self-overlap reveals trade-offs in plankton swimming trajectories

Movement is a fundamental behaviour of organisms that not only brings about beneficial encounters with resources and mates, but also at the same time exposes the organism to dangerous encounters with predators. The movement patterns adopted by organisms should reflect a balance between these contrasting processes. This trade-off can be hypothesized as being evident in the behaviour of plankton, which inhabit a dilute three-dimensional environment with few refuges or orienting landmarks. We present an analysis of the swimming path geometries based on a volumetric Monte Carlo sampling approach, which is particularly adept at revealing such trade-offs by measuring the self-overlap of the trajectories. Application of this method to experimentally measured trajectories reveals that swimming patterns in copepods are shaped to efficiently explore volumes at small scales, while achieving a large overlap at larger scales. Regularities in the observed trajectories make the transition between these two regimes always sharper than in randomized trajectories or as predicted by randomwalk theory. Thus, real trajectories present a stronger separation between exploration for food and exposure to predators. The specific scale and features of this transition depend on species, gender and local environmental conditions, pointing at adaptation to state and stage-dependent evolutionary trade-offs. © 2014 The Author(s) Published by the Royal Society. All rights reserved.
A Sustainability Index of potential co-location of offshore wind farms and open water aquaculture

This paper presents the definition of a Sustainability Index for the co-location in marine areas of offshore wind farms and aquaculture plans. The development of the index is focused on the application of MCE technique based on physical constraints and biological parameters that are directly linked to the primary production. The relevant physical factors considered are wind velocity and depth range (which directly governs the choice of the site for energy production and for offshore technology), the relevant biological parameters are SST, SST anomaly and CHL-a concentration (as a measurement of the productivity). The further development of the technique, already used in open water aquaculture localization, consists in converting raw data into sustainability scores, which have been combined using additive models, in order to define the overall sustainability. The study area used to implement the computation of the Sustainability Index (SI) was identified in the Danish portion of the Baltic Sea and in the western part of the Danish North Sea. Results on the spatial distribution of the SI underline different responses as a function of the physical and biological main influencing parameters

General information
State: Published
Organisations: National Institute of Aquatic Resources, Centre for Ocean Life, Section for Ecosystem based Marine Management, University of Naples Parthenope
Contributors: Bennassai, G., Mariani, P., Stenberg, C., Christoffersen, M.
Pages: 213-218
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Ocean & Coastal Management
Volume: 95
ISSN (Print): 0964-5691
Ratings:
BFI (2018): BFI-level 1
Comparative ecology of widely distributed pelagic fish species in the North Atlantic: Implications for modelling climate and fisheries impacts

This paper reviews the current knowledge on the ecology of widely distributed pelagic fish stocks in the North Atlantic basin with emphasis on their role in the food web and the factors determining their relationship with the environment. We
consider herring (Clupea harengus), mackerel (Scomber scombrus), capelin (Mallotus villosus), blue whiting (Micromesistius poutassou), and horse mackerel (Trachurus trachurus), which have distributions extending beyond the continental shelf and predominantly occur on both sides of the North Atlantic. We also include albacore (Thunnus alalunga), bluefin tuna (Thunnus thynnus), swordfish (Xiphias gladius), and blue marlin (Makaira nigricans), which, by contrast, show large-scale migrations at the basin scale. We focus on the links between life history processes and the environment, horizontal and vertical distribution, spatial structure and trophic role. Many of these species carry out extensive migrations from spawning grounds to nursery and feeding areas. Large oceanographic features such as the North Atlantic subpolar gyre play an important role in determining spatial distributions and driving variations in stock size. Given the large biomasses of especially the smaller species considered here, these stocks can exert significant top-down pressures on the food web and are important in supporting higher trophic levels. The review reveals commonalities and differences between the ecology of widely distributed pelagic fish in the NE and NW Atlantic basins, identifies knowledge gaps and modelling needs that the EURO-BASIN project attempts to address. © 2014 Elsevier Ltd. All rights reserved.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Section for Marine Living Resources, Centre for Ocean Life, IFREMER, Institute of Marine Research, AZTI-Tecnalia, Fisheries and Oceans Canada, CLS Satellite Oceanography Division, University of Massachusetts, Marine Research Institute Reykjavik, National Oceanographic and Atmospheric Administration, University of Strathclyde, Faroe Marine Research Institute
Pages: 219–243
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Progress in Oceanography
Volume: 129
Issue number: Part B
ISSN (Print): 0079-6611
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 4.07 SJR 2.192 SNIP 1.547
Web of Science (2017): Impact factor 4.27
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.4 SJR 1.944 SNIP 1.287
Web of Science (2016): Impact factor 3.391
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 3.34 SJR 1.705 SNIP 1.367
Web of Science (2015): Impact factor 3.512
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 3.65 SJR 1.888 SNIP 1.445
Web of Science (2014): Impact factor 3.025
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 3.87 SJR 2.37 SNIP 1.594
Web of Science (2013): Impact factor 3.986
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 4.17 SJR 2.752 SNIP 1.775
Web of Science (2012): Impact factor 3.708
ISI indexed (2012): ISI indexed yes
Fishing out collective memory of migratory schools

Animals form groups for many reasons but there are costs and benefit associated with group formation. One of the benefits is collective memory. In groups on the move, social interactions play a crucial role in the cohesion and the ability to make consensus decisions. When migrating from spawning to feeding areas fish schools need to retain a collective memory of the destination site over thousand of kilometers and changes in group formation or individual preference can produce sudden changes in migration pathways. We propose a modelling framework, based on stochastic adaptive networks, that can reproduce this collective behaviour. We assume that three factors control group formation and school migration behaviour: the intensity of social interaction, the relative number of informed individuals and the preference that each individual has for the particular migration area. We treat these factors independently and relate the individuals’ preferences to the experience and memory for certain migration sites. We demonstrate that removal of knowledgable individuals or alteration of individual preference can produce rapid changes in group formation and collective behavior. For example, intensive fishing targeting the migratory species and also their preferred prey can reduce both terms to a point at which migration to the destination sites is suddenly stopped. The conceptual approaches represented by our modelling framework may therefore be able to explain large-scale changes in fish migration and spatial distribution.
General information
State: Published
Organisations: National Institute of Aquatic Resources, Centre for Ocean Life, Section for Marine Ecology and Oceanography
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Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of the Royal Society. Interface
Volume: 11
Issue number: 95
ISSN (Print): 1742-5689
Ratings:
  BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
  BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 3.89
  Web of Science (2017): Impact factor 3.355
Web of Science (2017): Indexed yes
  BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.04
  Web of Science (2016): Impact factor 3.579
Web of Science (2016): Indexed yes
  BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 3.5
  Web of Science (2015): Impact factor 3.818
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 3.59
  Web of Science (2014): Impact factor 3.917
Web of Science (2014): Indexed yes
  BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 4.88
  Web of Science (2013): Impact factor 3.856
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
  BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 5.06
  Web of Science (2012): Impact factor 4.907
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
  BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 4.53
  Web of Science (2011): Impact factor 4.402
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
  BFI (2010): BFI-level 1
Web of Science (2010): Impact factor 4.259
  Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
BFI (2008): BFI-level 1
Original language: English
Electronic versions:
Publishers version - Open Access
DOIs:
10.1098/rsif.2014.0043
Route optimisation and solving Zermelo's navigation problem during long distance migration in cross flows
The optimum path to follow when subjected to cross flows was first considered over 80 years ago by the German mathematician Ernst Zermelo, in the context of a boat being displaced by ocean currents, and has become known as the 'Zermelo navigation problem'. However, the ability of migrating animals to solve this problem has received limited consideration, even though wind and ocean currents cause the lateral displacement of flyers and swimmers, respectively, particularly during long-distance journeys of 1000s of kilometres. Here, we examine this problem by combining long-distance, open-ocean marine turtle movements (obtained via long-term GPS tracking of sea turtles moving 1000s of km), with a high resolution basin-wide physical ocean model to estimate ocean currents. We provide a robust mathematical framework to demonstrate that, while turtles eventually arrive at their target site, they do not follow the optimum (Zermelo's) route. Even though adult marine turtles regularly complete incredible long-distance migrations, these vertebrates primarily rely on course corrections when entering neritic waters during the final stages of migration. Our work introduces a new perspective in the analysis of wildlife tracking datasets, with different animal groups potentially exhibiting different levels of complexity in goal attainment during migration.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Living Resources, Centre for Ocean Life, Deakin University, Laboratoire de Physique Theorique de la Matiere Condensee, Swansea University
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Pages: 137-143
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Ecology Letters
Volume: 17
Issue number: 2
ISSN (Print): 1461-023X
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 9.78 SJR 6.825 SNIP 3.305
Web of Science (2017): Impact factor 9.137
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 10.76 SJR 7.822 SNIP 3.301
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 10.86 SJR 8.573 SNIP 3.419
Web of Science (2015): Impact factor 10.772
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 11.19 SJR 8.572 SNIP 3.682
Web of Science (2014): Impact factor 10.689
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 11.4 SJR 8.037 SNIP 3.476
Web of Science (2013): Impact factor 13.042
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 11.25 SJR 9.245 SNIP 3.603
Web of Science (2012): Impact factor 17.949
ISI indexed (2012): ISI indexed yes
The first “lost year” of Mediterranean sea turtles: dispersal patterns indicate subregional management units for conservation

Identifying highly frequented areas is a priority for sea turtle conservation, and the distribution of young individuals in open waters represents a major knowledge gap due to methodological biases. The drift of hatchlings from 38 loggerhead and 10 green turtle nesting sites in the Mediterranean were simulated for the first six months of life, with the simulations being repeated for five different years (2001 – 2005). The results indicate that hatchlings from the Levantine and south-central Mediterranean sites are mainly retained in the same areas of origin, while those from the Ionian area mainly disperse to the Ionian, Adriatic and south-central Mediterranean areas. Combining hatchling dispersal with existing empirical information on juveniles and adults, a general distribution model among nesting sites, oceanic and neritic foraging grounds for Mediterranean sea turtles is proposed. The Levantine zone may be particularly key for the conservation of the Mediterranean populations of both species, since it may host the highest concentration of individuals. Subregional management units identified by dispersal patterns may facilitate turtle conservation through a relatively small-scale international approach. In-water studies in specific zones are identified as a research priority for improving the current knowledge and inform conservation plans.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Centre for Ocean Life
Contributors: Casale, P., Mariani, P.
Pages: 263-274
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Marine Ecology Progress Series
Volume: 498
ISSN (Print): 0171-8630
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Control of plankton seasonal succession by adaptive grazing

The ecological succession of phytoplankton communities in temperate seas is characterized by the dominance of nonmotile diatoms during spring and motile flagellates during summer, a pattern often linked to the seasonal variation in
the physical environment and nutrient availability. We focus on the effects of adaptive zooplankton grazing behavior on the seasonal succession of temperate plankton communities in an idealized community model consisting of a zooplankton grazer and two phytoplankton species, one motile and the other nonmotile. The grazer can switch between ambush feeding on motile cells or feeding-current feeding on nonmotile cells. The feeding-current behavior imposes an additional mortality risk on the grazer, whereas ambush feeding benefits from small-scale fluid turbulence. Grazer–phytoplankton feeding interactions are forced by light and turbulence and the grazer adopts the feeding behavior that optimizes its fitness. The adaptive grazing model predicts essential features of the seasonal plankton succession reported from temperate seas, including the vertical distribution and seasonal variation in the relative abundance of motile and nonmotile phytoplankton and the seasonal variation in grazer abundance. Adaptive grazing behavior, in addition to nutrient and mixing regimes, can promote characteristic changes in the seasonal structure of phytoplankton community observed in nature.

**General information**

State: Published
Organisations: National Institute of Aquatic Resources, Section for Ocean Ecology and Climate, Section for Population Ecology and Genetics
Contributors: Mariani, P., Andersen, K. H., Visser, A., Barton, A., Kiørboe, T.
Pages: 173-184
Publication date: 2013
Peer-reviewed: Yes

**Publication information**

Journal: Limnology and Oceanography
Volume: 58
Issue number: 1
ISSN (Print): 0024-3590
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 3.81 SJR 1.871 SNIP 1.329
Web of Science (2017): Impact factor 3.595
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.5 SJR 1.806 SNIP 1.253
Web of Science (2016): Impact factor 3.383
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 3.93 SJR 2.423 SNIP 1.408
Web of Science (2015): Impact factor 3.66
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 3.73 SJR 2.118 SNIP 1.581
Web of Science (2014): Impact factor 3.794
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 3.98 SJR 2.244 SNIP 1.564
Web of Science (2013): Impact factor 3.615
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 3.81 SJR 2.474 SNIP 1.499
Web of Science (2012): Impact factor 3.405
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): CiteScore 3.59 SJR 2.398 SNIP 1.439
Web of Science (2011): Impact factor 3.416
ISI indexed (2011): ISI indexed yes
Adaptive behaviour, tri-trophic food-web stability and damping of chaos

We examine the effect of adaptive foraging behaviour within a tri-trophic food web with intra-guild predation. The intra-guild prey is allowed to adjust its foraging effort so as to achieve an optimal per capita growth rate in the face of realized feeding, predation risk and foraging cost. Adaptive fitness-seeking behaviour of the intra-guild prey has a stabilizing effect on the tri-trophic food-web dynamics provided that (i) a finite optimal foraging effort exists and (ii) the trophic transfer efficiency from resource to predator via the intra-guild prey is greater than that from the resource directly. The latter condition is a general criterion for the feasibility of intra-guild predation as a trophic mode. Under these conditions, we demonstrate rigorously that adaptive behaviour will always promote stability of community dynamics in the sense that the region of parameter space in which stability is achieved is larger than for the non-adaptive counterpart of the system.
General information
State: Published
Organisations: National Institute of Aquatic Resources, Research Secretariat, Centre for Ocean Life, Station Biologique, Roscoff
Number of pages: 21
Publication date: 2012
Optimization of fisheries resource exploitation in the Skagerrak (Oskar)

General information
State: Published
Organisations: Section for Population Ecology and Genetics, National Institute of Aquatic Resources, Section for Monitoring, Section for Management Systems, Department of Informatics and Mathematical Modeling, DTU Data Analysis, Section for Ocean Ecology and Climate
Publication date: 2012

Spawning of bluefin tuna in the black sea: historical evidence, environmental constraints and population plasticity

The lucrative and highly migratory Atlantic bluefin tuna, Thunnus thynnus (Linnaeus 1758; Scombridae), used to be distributed widely throughout the north Atlantic Ocean, Mediterranean Sea and Black Sea. Its migrations have supported sustainable fisheries and impacted local cultures since antiquity, but its biogeographic range has contracted since the 1950s. Most recently, the species disappeared from the Black Sea in the late 1980s and has not yet recovered. Reasons for the Black Sea disappearance, and the species-wide range contraction, are unclear. However bluefin tuna formerly foraged and possibly spawned in the Black Sea. Loss of a locally-reproducing population would represent a decline in population richness, and an increase in species vulnerability to perturbations such as exploitation and environmental change. Here we identify the main genetic and phenotypic adaptations that the population must have (had) in order to reproduce successfully in the specific hydrographic (estuarine) conditions of the Black Sea. By comparing hydrographic conditions in spawning areas of the three species of bluefin tunas, and applying a mechanistic model of egg buoyancy and sinking rate, we show that reproduction in the Black Sea must have required specific adaptations of egg buoyancy, fertilisation and development for reproductive success. Such adaptations by local populations of marine fish species spawning in estuarine areas are common as is evident from a meta-analysis of egg buoyancy data from 16 species of fish. We conclude that these adaptations would have been necessary for successful local reproduction by bluefin tuna in the Black Sea, and that a locally-adapted reproducing population may have disappeared. Recovery of bluefin tuna in the Black Sea, either for spawning or foraging, will occur fastest if any remaining locally adapted individuals are allowed to survive, and by conservation and recovery of depleted Mediterranean populations which could through time re-establish local Black Sea spawning and foraging.
Torsk og klima: Hvordan påvirker klimaændringerne torsken i Nordsøen?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Population Ecology and Genetics, Section for Ocean Ecology and Climate, Section for Public Sector Consultancy
Contributors: Rindorf, A., Brøgger Pedersen, J., Christensen, A., Grønkjær, P., Höffle, H., Jonasdottir, S., Mariani, P., Munk, P., Møller, E. F., Maar, M., She, J., Tirsgaard, B., Vinther, M., Gislason, H.
Number of pages: 22
Publication date: 2012

Publication information
Place of publication: Charlottenlund
Publisher: Institut for Akvatiske Ressourcer, Danmarks Tekniske Universitet
Year: 2012
Original language: English
Electronic versions:
Torskogklima_web.pdf
URLs:
Research output: Education › Other contribution – Annual report year: 2012

A sustainability index for offshore wind farms and open water aquaculture

General information
State: Published
Organisations: Section for Coastal Ecology, National Institute of Aquatic Resources, Section for Ocean Ecology and Climate
Contributors: Benassai, G., Stenberg, C., Christoffersen, M. O., Mariani, P.
Number of pages: 368
Pages: 3-14
Publication date: 2011

Host publication information
Title of host publication: Coastal Processes
Volume: II
Editors: Benassai, G., Rodriguez, G.
DOI: 10.2495/CP110011
Source: orbit
Source-ID: 276721
Research output: Research › Article in proceedings – Annual report year: 2011

Larval growth in the dominant polychaete Polydora ciliata is food-limited in a eutrophic Danish estuary (Isefjord)

General information
State: Published
Organisations: Section for Ocean Ecology and Climate, National Institute of Aquatic Resources
Pages: 99-110
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Marine Ecology - Progress Series
Volume: 407
ISSN (Print): 0171-8630
Ratings:
BFI (2018): BFI-level 2
Modelling retention and dispersion mechanisms of bluefin tuna eggs and larvae in the Northwest Mediterranean Sea

Knowledge of early life history of most fish species in the Mediterranean Sea is sparse and processes affecting their recruitment are poorly understood. This is particularly true for bluefin tuna, Thunnus thynnus, even though this species is one of the world’s most valued fish species. Here we develop, apply and validate an individually based coupled biological-physical oceanographic model of fish early life history in the Mediterranean Sea. We first validate the general structure of the coupled model with a 12-day Lagrangian drift study of anchovy (Engraulis encrasicolus) larvae in the Catalan Sea. The model reproduced the drift and growth of anchovy larvae as they drifted along the Catalan coast and yielded similar patterns as those observed in the field. We then applied the model to investigate transport and retention processes affecting the spatial distribution of bluefin tuna eggs and larvae during 1999-2003, and we compared modelled distributions with available field data collected in 2001 and 2003. Modelled and field distributions generally coincided and were patchy at mesoscales (10s-100s km); larvae were most abundant in eddies and along frontal zones. We also identified probable locations of spawning bluefin tuna using hydrographic backtracking procedures; these locations were situated in a major salinity frontal zone and coincided with distributions of an electronically tagged bluefin tuna and commercial bluefin tuna fishing vessels. Moreover, we hypothesized that mesoscale processes are responsible for the aggregation and dispersion mechanisms in the area and showed that these processes were significantly correlated to atmospheric forcing processes over the NW Mediterranean Sea. Interannual variations in average summer air temperature can reduce the intensity of ocean mesoscale processes in the Balearic area and thus potentially affect bluefin tuna larvae. These modelling approaches can increase understanding of bluefin tuna recruitment processes and eventually contribute to management of bluefin tuna fisheries.

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Contributors: Mariani, P., MacKenzie, B., Iudicone, D., Bozec, A.
Pages: 45-58
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Progress in Oceanography
Volume: 86
Issue number: 1-2
ISSN (Print): 0079-6611
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 4.07 SJR 2.192 SNIP 1.547
Web of Science (2017): Impact factor 4.27
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.4 SJR 1.944 SNIP 1.287
Web of Science (2016): Impact factor 3.91
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 3.34 SJR 1.705 SNIP 1.367
Web of Science (2015): Impact factor 3.512
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 3.65 SJR 1.888 SNIP 1.445
Web of Science (2014): Impact factor 3.025
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 3.87 SJR 2.37 SNIP 1.594
Web of Science (2013): Impact factor 3.986
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Offshore wind farms and their potential for shellfish aquaculture and restocking

General information
State: Published
Organisations: Section for Coastal Ecology, National Institute of Aquatic Resources, Section for Ocean Ecology and Climate
Contributors: Stenberg, C., Christoffersen, M. O., Krog, C., Mariani, P., Dolmer, P.
Publication date: 2010
Peer-reviewed: No

URLs:

Original language: English
DOIs:
10.1016/j.pocean.2010.04.027
Source: orbit
Source-ID: 252786
Research output: Research › peer-review › Journal article – Annual report year: 2010

Ontogenetic development of migration: Lagrangian drift trajectories suggest a new paradigm for sea turtles

Long distance migration occurs in a wide variety of taxa including birds, insects, fishes, mammals and reptiles. Here, we provide evidence for a new paradigm for the determinants of migration destination. As adults, sea turtles show fidelity to
their natal nesting areas and then at the end of the breeding season may migrate to distant foraging sites. For a major rookery in the Mediterranean, we simulated hatchling drift by releasing 288,000 numerical particles in an area close to the nesting beaches. We show that the pattern of adult dispersion from the breeding area reflects the extent of passive dispersion that would be experienced by hatchlings. Hence, the prevailing oceanography around nesting areas may be crucial to the selection of foraging sites used by adult sea turtles. This environmental forcing may allow the rapid evolution of new migration destinations if ocean currents alter with climate change.
Optimization and emergence in marine ecosystem models

Ingestion rates and mortality rates of zooplankton are dynamic parameters reflecting a behavioural trade-off between encounters with food and predators. An evolutionarily consistent behaviour is that which optimizes the trade-off in terms of the fitness conferred to an individual. We argue that interaction rates used in models, rather than being prescribed, should be dynamic emerging properties that reflect this optimization. A simple example illustrates how predator and prey abundance, and prey community structure, can instigate prey switching with cascading trophic effects. (C) 2009 Elsevier Ltd. All rights reserved.
Optimal behaviour and dynamical impact in a plankton predator-prey system

Swimming in turbulence: zooplankton fitness in terms of foraging efficiency and predation risk

Turbulence impacts zooplankton fitness in opposing manners, by increasing contacts with prey but at the same time increasing contacts with predators. We investigate the fitness of individual zooplankton in terms of a trade-off between energetic gains and costs, and risk of predation. Through idealized descriptions of foraging and predation in a turbulent water column, we determine how fast a zooplankter should swim, if at all, and where should it position itself in the vertical to maximize its fitness given certain environmental conditions. Suspension feeding has an advantage over ambush feeding at high turbulence levels, whereas cruise feeding becomes optimal at low turbulence levels. In general, behaviours...
that seek out low levels of turbulence increase an individual's fitness, a prediction that runs counter to turbulent encounter rate arguments, and exposes the fallacy of examining only the foraging aspects of the fitness trade-off.

**General information**
State: Published
Organisations: Section for Ocean Ecology and Climate, National Institute of Aquatic Resources, Section for Population- and Ecosystem Dynamics
Contributors: Visser, A., Mariani, P., Pigolotti, S.
Pages: 121-133
Publication date: 2009
Peer-reviewed: Yes

**Publication information**
Journal: Journal of Plankton Research
Volume: 31
Issue number: 2
ISSN (Print): 0142-7873
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 2.22 SJR 1.163 SNIP 0.979
Web of Science (2017): Impact factor 1.897
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.92 SJR 1.123 SNIP 0.856
Web of Science (2016): Impact factor 1.983
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 1.77 SJR 1.029 SNIP 0.802
Web of Science (2015): Impact factor 2.15
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 2.24 SJR 1.098 SNIP 1.234
Web of Science (2014): Impact factor 2.407
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 2.39 SJR 1.292 SNIP 1.101
Web of Science (2013): Impact factor 2.263
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 2.43 SJR 1.594 SNIP 1.109
Web of Science (2012): Impact factor 2.435
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 1.99 SJR 1.171 SNIP 1.049
Web of Science (2011): Impact factor 2.079
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.205 SNIP 0.983
Web of Science (2010): Impact factor 1.749
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.935 SNIP 1.04
Hindcasting the temperature and growth history of surviving larvae of bluefin tuna (Thunnus thynnus) in the Northwest Mediterranean Sea

General information
State: Published
Organisations: Section for Ocean Ecology and Climate, National Institute of Aquatic Resources
Contributors: Mariani, P., Garcia, A., MacKenzie, B., Alemany, F., Cortés, D., Velez-Belchí, P.
Publication date: 2008

Host publication information
Title of host publication: Book of Abstracts
Source: orbit
Source-ID: 277775
Research output: Research › Conference abstract in proceedings – Annual report year: 2008

A numerical investigation of the impact of turbulence on the feeding rates of Oithona davisae

General information
State: Published
Organisations: Section for Ocean Ecology and Climate, National Institute of Aquatic Resources
Contributors: Mariani, P., Botte, V., Ribera d'Alcalà, M.
Pages: 273-286
Publication date: 2007
Peer-reviewed: Yes

Publication information
Journal: Journal of Marine Systems
Volume: 70
ISSN (Print): 0924-7963
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 2.63 SJR 1.276 SNIP 1.162
Web of Science (2017): Impact factor 2.506
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.61 SJR 1.403 SNIP 1.276
Web of Science (2016): Impact factor 2.439
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 2.19 SJR 1.082 SNIP 1.038
Web of Science (2015): Impact factor 2.174
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 2.69 SJR 1.231 SNIP 1.484
Web of Science (2014): Impact factor 2.508
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 2.99 SJR 1.593 SNIP 1.46
Web of Science (2013): Impact factor 2.476
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 2.51 SJR 1.543 SNIP 1.256
Web of Science (2012): Impact factor 2.655
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 2.43 SJR 1.51 SNIP 1.281
Web of Science (2011): Impact factor 2.126
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.434 SNIP 1.116
Web of Science (2010): Impact factor 2.005
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.413 SNIP 1.096
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.327 SNIP 1.269
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.176 SNIP 1.229
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.049 SNIP 1.28
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.368 SNIP 1.224
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.409 SNIP 1.27
Scopus rating (2003): SJR 1.258 SNIP 1.26
Scopus rating (2002): SJR 0.844 SNIP 1.268
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 1.121 SNIP 0.938
Scopus rating (2000): SJR 0.832 SNIP 0.823
Scopus rating (1999): SJR 0.908 SNIP 0.927
Original language: English
Individual based model of cod larvae feeding behavior: Interaction with turbulence and search shape

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources, Section for Ocean Ecology and Climate
Contributors: MacKenzie, B., Mariani, P., Visser, A.
Publication date: 2007
Peer-reviewed: No

Bibliographical note
Oral presentation and abstract
Source: orbit
Source-ID: 242019
Research output: Research › Conference abstract for conference – Annual report year: 2007

Individual-based simulations of larval fish feeding in turbulent environments

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources, Section for Ocean Ecology and Climate
Contributors: Mariani, P., MacKenzie, B., Visser, A., Botte, V.
Pages: 155-169
Publication date: 2007
Peer-reviewed: Yes

Publication information
Journal: Marine Ecology - Progress Series
Volume: 347
ISSN (Print): 0171-8630
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 2.53
Web of Science (2017): Impact factor 2.276
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.4
Web of Science (2016): Impact factor 2.292
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 2.56
Web of Science (2015): Impact factor 2.361
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 2.75
Web of Science (2014): Impact factor 2.619
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 2.79
Web of Science (2013): Impact factor 2.64
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 2.9
Web of Science (2012): Impact factor 2.546
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): CiteScore 2.85
Web of Science (2011): Impact factor 2.711
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Web of Science (2010): Impact factor 2.483
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Web of Science (2008): Indexed yes
Web of Science (2007): Indexed yes
Web of Science (2006): Indexed yes
Web of Science (2005): Indexed yes
Web of Science (2004): Indexed yes
Web of Science (2003): Indexed yes
Web of Science (2002): Indexed yes
Web of Science (2001): Indexed yes
Web of Science (2000): Indexed yes
Original language: English
DOIs:
10.3354/meps07092

Bibliographical note
Open Access Article
Source: orbit
Source-ID: 226601
Research output: Research - peer-review › Journal article – Annual report year: 2007

Klimaændringer og Dogger banke

General information
State: Published
Organisations: Section for Ocean Ecology and Climate, National Institute of Aquatic Resources, Section for Population-and Ecosystem Dynamics
Contributors: Maar, M., Visser, A., Bolding, K., Burchard, H., Mariani, P.
Number of pages: 1
Publication date: 2007

Host publication information
Title of host publication: 14. danske havforskermøde, Syddansk Universitet, 23-25 januar 2007

Bibliographical note
Abstract
Source: orbit
Source-ID: 226499
Research output: Research › Conference abstract in proceedings – Annual report year: 2007
Modelling dispersion mechanisms of bluefin tuna larvae in the Balearic area

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Contributors: Mariani, P.
Publication date: 2007

Publication information
Year: 2007
Original language: English
URLs:
Source: orbit
Source-ID: 242011
Research output: Research › Other contribution – Annual report year: 2007

Modelling retention dispersion mechanisms of bluefin tuna eggs and larvae in the Balearic area

General information
State: Published
Organisations: Section for Ocean Ecology and Climate, National Institute of Aquatic Resources
Contributors: Mariani, P., MacKenzie, B., Ribera, M., Bozec, A.
Publication date: 2007
Peer-reviewed: No
Event: Abstract from CLIOTOP Symposium Conference, La Paz, Mexico, .
Source: orbit
Source-ID: 277777
Research output: Research › Conference abstract for conference – Annual report year: 2007

pPOM: A nested, scalable, parallel and Fortran 90 implementation of the Princeton Ocean Model

General information
State: Published
Organisations: University of Naples Parthenope
Contributors: Giunta, G., Mariani, P., Montella, R., Riccio, A.
Pages: 117-122
Publication date: 2007
Peer-reviewed: Yes

Publication information
Journal: Environmental Modelling & Software
Volume: 22
Issue number: 1
ISSN (Print): 1364-8152
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 4.77 SJR 1.963 SNIP 1.957
Web of Science (2017): Impact factor 4.177
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 4.8 SJR 1.986 SNIP 2.105
Web of Science (2016): Impact factor 4.404
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 4.67 SJR 2.078 SNIP 2.144
Web of Science (2015): Impact factor 4.207
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
A grid computing based virtual laboratory for environmental simulations

The grid computing technology permits the coordinate, efficient and effective use of (geographically spread) computational and storage resources with the aim to achieve high performance throughputs for intensive CPU load applications. In this paper we describe the development of a virtual laboratory for environmental applications. The software infrastructure, and the related interface, are developed for the straightforward use of shared and distributed observations, software, computing and storage resources. The user can design and execute his experiments building up and assembling data acquisition procedures, numerical models, and applications for the rendering of output data, with limited knowledge of grid computing, thereby focusing his attention to the application. Our solution aims at the goal of developing black-box grid applications for earth observation, marine and environmental sciences. © Springer-Verlag Berlin Heidelberg 2006.

General information
State: Published
An object-oriented model for the prediction of turbulence effects on plankton

General information
State: Published
Organisations: Laboratory of Biological Oceanography
Contributors: Mariani, P., Botte, V., d'Alcala, M.
Pages: 1287-1307
Publication date: 2005
Peer-reviewed: Yes

Publication information
Volume: 52
Issue number: 9-10
ISSN (Print): 0967-0645
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 2.65 SJR 1.352 SNIP 0.975
Web of Science (2017): Impact factor 2.451
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.35 SJR 1.389 SNIP 0.999
Web of Science (2016): Impact factor 1.713
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 2.5 SJR 1.394 SNIP 1.128
Web of Science (2015): Impact factor 2.137
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 2.68 SJR 1.755 SNIP 1.113
Web of Science (2014): Impact factor 2.19
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 3.06 SJR 2.226 SNIP 1.345
Web of Science (2013): Impact factor 2.763
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 2.59 SJR 1.936 SNIP 1.185
Web of Science (2012): Impact factor 2.243
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 2.6 SJR 1.901 SNIP 1.125
Effects of small scale motion on plankton

General information
State: Published
Organisations: Unknown
Contributors: Mariani, P.
Number of pages: 176
Publication date: 2005

Publication information
Place of publication: Napoli
Publisher: Universita' degli studi di Napoli "Federico II"
Original language: English
Source: orbit
Source-ID: 259820
Research output: Research - peer-review › Journal article – Annual report year: 2005

Modeling and computational issues for air/water quality problems: A grid computing approach
In this paper we report some results on the design of a grid computing application in the field of environmental sciences. The case study concerns the integration of several independent computational models (weather, air and water quality and sea wave and currents) over a grid computing infrastructure. The aim of the project is the development of an efficient, high-performance and general-purpose distributed laboratory for environmental modeling. Expected end users may be either researchers in computational environmental sciences, whom a standard interface to access existing and distributed resources (database, models, visualization tools, parallel computers and virtual organization's collaborative community facilities) is provided, or ordinary citizens who can access the results of operational runs of the integrated system for obtaining short-scale forecasts using a web-based interface. Presently, the application continuously supplies real-time forecasts and scenario analysis for both weather and air quality and it is interactively serviceable via a dedicated web portal.
Projects:

**Arctic Research Icebreaker Consortium (ARICE) (39506)**

ARICE’s overall aim is to provide Europe with better capacities for marine-based research in the ice-covered Arctic Ocean. ARICE aims at reaching this goal with the existing polar fleet by: 1. Networking: ARICE will develop strategies to ensure the optimal use of the existing polar research vessels at a European and international level. The aim is to establish an International Arctic Research Icebreaker Consortium which shares and jointly funds ship time for scientists on the available research icebreakers. 2. Transnational access: ARICE will provide transnational access to four European and two international research icebreakers. Access is granted based on scientific excellence of the research proposals, which researchers need to submit during the application process. The participating icebreakers are: PRV Polarstern (Germany), IB Oden (Sweden), RV Kronprins Haakon (Norway), RRS Sir David Attenborough (United Kingdom), CCGS Amundsen (Canada) and RV Sikuliaq (USA). 3. Joint research activities: ARICE will improve the research icebreakers’ services by working closely together with maritime industry on a so called “ships and platforms of opportunity” programme. Through this programme, commercial vessels operating in the Arctic Ocean will collect oceanic and atmospheric data on their cruises. At the same time, science and industry will work together to explore new technologies, which can improve ship-based and autonomous measurements in the Arctic Ocean. ARICE will also implement virtual and remote access of data via an innovative 3D Virtual Icebreaker, which will provide anyone with real-time information from the Arctic. The project is coordinated by the Alfred Wegener Institute, Germany and funded by the EU Horizon 2020 programme.

Edelvang, K., Project Manager, National Institute of Aquatic Resources, Section for Oceans and Arctic Stedmon, C., Project Participant, National Institute of Aquatic Resources
**Assessing the role of micro-plastics on marine ecosystem functioning**
Krekoukiotis, D., PhD Student, National Institute of Aquatic Resources
St. John, M., Main Supervisor, National Institute of Aquatic Resources
Christensen, A., Supervisor, National Institute of Aquatic Resources
Mariani, P., Supervisor, National Institute of Aquatic Resources
Anden EU-finansiering
01/07/2018 → 30/06/2021
Award relations: Assessing the role of micro-plastics on marine ecosystem functioning
Project: PhD

**Vertical migration and the structure and function of pelagic ecosystems**
Pinti, J. P. A., PhD Student, National Institute of Aquatic Resources
Visser, A., Main Supervisor, National Institute of Aquatic Resources
Kiørboe, T., Supervisor, National Institute of Aquatic Resources
Mariani, P., Supervisor, National Institute of Aquatic Resources
Samfinansieret - Andet
01/10/2017 → 30/09/2020
Award relations: Vertical migration and the structure and function of pelagic ecosystems
Project: PhD

**REMORA: Reconfigurable Modular Robotic System for Aquatic Environment**
Galeazzi, R., Project Manager, Department of Electrical Engineering, Automation and Control
Christensen, D. J., Project Participant, Department of Electrical Engineering, Automation and Control, Centre for Playware
Mariani, P., Project Participant, National Institute of Aquatic Resources, Section for Oceans and Arctic
Visser, A., Project Participant, National Institute of Aquatic Resources, Section for Oceans and Arctic
Özkil, A. G., Project Participant, Department of Mechanical Engineering, Engineering Design and Product Development
Nielsen, U. D., Project Participant, Department of Mechanical Engineering, Fluid Mechanics, Coastal and Maritime Engineering
01/02/2016 → 31/01/2018
Project: Research

**The importance of the copepod species Metridia spp. in the Godthåbsfjord at present and future climate conditions**
Kjellerup, S., PhD Student, National Institute of Aquatic Resources
Nielsen, T. G., Main Supervisor, National Institute of Aquatic Resources
Kiørboe, T., Supervisor, National Institute of Aquatic Resources
Mariani, P., Examiner, National Institute of Aquatic Resources
Head, E., Examiner
Varpe, Ø., Examiner
Forskningsrådsfinansiering
01/02/2010 → 27/08/2014
Award relations: The importance of the copepod species Metridia spp. in the Godthåbsfjord at present and future climate conditions
Project: PhD

**Collaborative modular underwater robotic system for long-term autonomous operations (REMORA) (39341)**
In this project we aim to bootstrap new high-impact underwater robotics activities at DTU. We propose to develop a novel robotic platform, the REMORA1 system, for research, education and innovation. The objectives of the project are to develop the necessary infrastructure, i.e., underwater robotic system, test facilities, educational framework and external collaboration, to perform world-class research and innovation in the area of offshore underwater robotic technology. With this project we aim to eventually strengthen the Danish maritime sector in dealing with the high cost and technical challenges of inspections and maintenance in increasing amount of offshore installations. The project is a collaboration between DTU Electrical Engineering, DTU Mechanical Engineering and DTU Aqua who have complementary expertise...
Optimal sustainable use of cod stocks accessible for Danish fisheries (DEL-TORSK) (39147)

Optimal sustainable utilization of cod stocks that contain several biological sub-populations requires taking population structure into account in stock assessment and management. The aim of this project was to develop scientific basis for cod management decisions in the North Sea and the Baltic that takes biological units of cod and their dynamics into account. Methodological challenges concerning advising on stocks that contain sub-populations with differences in dynamics and biological parameters are common for North Sea and the Baltic. Therefore, the project considered both seas, in terms of developing methodological basis for addressing population structure in management advice. The results were presented at ICES benchmarks for North Sea and Baltic Sea cod in 2015, and used to developing further the management basis for optimal use of cod stocks. The project included mapping of distribution of sub-populations using genetic analyses and modelling of transport of early life stages. These results were combined with existing knowledge on cod population structure both in the Baltic and North Sea, to identify distribution areas of sub populations. This information was then incorporated in area-specific stock assessment analyses. This project was coordinated by DTU Aqua. The project was funded by the Danish Ministry of Food, Agriculture and Fisheries and the European Fisheries Fund (EFF).

Eero, M., Project Coordinator, National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Hansen, J. H., Project Participant, National Institute of Aquatic Resources
Mariani, P., Project Participant, National Institute of Aquatic Resources
Berg, C. W., Project Participant, National Institute of Aquatic Resources
Hüssy, K., Project Participant, National Institute of Aquatic Resources
Huwer, B., Project Participant, National Institute of Aquatic Resources
Nielsen, A., Project Participant, National Institute of Aquatic Resources

Coastal mussel banks: The importance for the fish fauna and possibilities for habitat restoration (MusFisk) (39133)

Coastal mussel banks are commonly assumed to be good areas for recreational fishing, but few quantitative studies have investigated how fish abundance and diversity co-vary with mussel coverage. In many Danish coastal waters, mussel coverage is reduced compared to historic records, but the impact of the reduction on coastal fisheries remains largely unknown. This project investigates fish abundance and diversity in various coastal habitats to predict possible effects of mussel bank restoration projects. Because it is increasingly recognized that restoration of coastal habitats support both pelagic and bentthic fisheries, this study hypothesized that mussel banks may provide important shelter and foraging habitats for various trophic levels of fish. Covering different habitats, catch per unit effort (CPUE) was quantified using fyke nets, and fish abundance and behaviours were measured using stationary underwater video cameras. These studies revealed that blue mussel (Mytilus edulis) banks support fish abundance and diversity comparable to areas covered by eel grass (Zostera marina), indicating that mussel bank restoration projects could benefit fisheries in a fashion similar to eel grass habitats. Moreover, fish abundance, but not diversity, differed between mussel banks exposed to different current velocity regimes, suggesting that mussel banks exposed to higher current velocities support higher fish abundances.

These findings indicate that mussel bank restoration carried out in high current velocity regimes may provide the most favorable habitats for fish. Surprisingly, fish behaviours were similar in different current velocity regimes, suggesting comparable ecological function of the habitats. Planned data collection in 2016 includes experimental manipulations of mussel coverage in laboratory studies where habitat preferences and stress levels (cortisol) will be examined in a number of fish species. These findings will be useful to test findings from the field studies and help predicting the effects of mussel bank restoration in coastal areas. This project is coordinated by DTU Aqua. The project is funded by the Danish Rod and Net Fishing License Funds.

Svendsen, J. C., Project Coordinator, National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Støttrup, J. G., Project Participant, National Institute of Aquatic Resources
Mariani, P., Project Participant, National Institute of Aquatic Resources
Stenberg, C., Project Coordinator, National Institute of Aquatic Resources

Keywords: Research areas: Coastal Ecology & Oceanography
EUROMARINE Consortium (39185)

EuroMarine is a European, marine science network launched in 2014. It represents the scientific communities of three former European Networks of Excellence: EUR-OCEANS, Marine Genomics Europe, and MarBEF. It was designed by the EuroMarine FP7 preparatory project (2011-13) as a bottom-up organization and meant to be a voice for the European marine scientific community. It is intended as a durable structure and was established as a consortium for an initial duration of 10 years. A legal entity will be established in 2016 as a support structure under the control of the consortium. As of 2016 EuroMarine counts 72 member organisations (MOs), 57 of which are ‘full voting’ members contributing to the budget. Two primary goals of EuroMarine are: - to support the identification and initial development of important emerging scientific topics and methodologies in marine sciences - to foster new services relevant to the marine scientific community. EuroMarine will achieve these goals through internal competitive calls for proposals, within the available budget. It is expected that support for these activities and their outcomes will help to leverage larger projects under European, national or joint research funding programmes. EuroMarine also intends to advocate for marine science and to contribute to improving the science-governance interface, providing expertise and transferring knowledge. This project is coordinated by French Research Institute for Exploitation of the Sea & The National Center for Scientific Research, France. The project is self-funded.

Mariani, P., Project Participant, National Institute of Aquatic Resources, Centre for Ocean Life
01/01/2014 → 31/12/2017
Keywords: Research area: Oceanography
Collaborators: National Center for Scientific Research, IFREMER
Project: Research

COLUMBUS (39239)

COLUMBUS overarching objective is to ensure that applicable knowledge generated through EC-funded science and technology research can be transferred effectively to advance the governance of the marine and maritime sectors while improving competitiveness of European companies and unlocking the potential of the oceans to create future jobs and economic growth in Europe (Blue Growth). This project is coordinated by AquaTT UETP Ltd. The project is funded by EU, Horizon2020.

Mariani, P., Project Participant, National Institute of Aquatic Resources
Thøgersen, T. L., Project Participant, National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography
Larsen, E., Project Participant, National Institute of Aquatic Resources
01/03/2015 → 28/02/2018
Keywords: Research areas: Oceanography & Observation Technology
Project: Research

Process integration into multispecies and ecosystem models: Resulting ecological, economic and social trade offs (PRIME TRADE OFFS) (39324)

Extensive multispecies and ecosystem research has been done in the Baltic, North Sea, Barents Sea/Norwegian Sea, Bay of Biscay and the Black Sea in the past about 30 years. There has been invested substantially in the research on multispecies interactions, and ecosystem functioning. In parallel, significant knowledge on the environmental impacts on recruitment processes, movements or migrations, and species interactions has been accumulated, but not yet consequently integrated in multispecies and ecosystem models and management concepts. The major questions raised in PRIME TRADE OFFS are hence, (i) how the integration of environmentally-driven variability in population and ecosystem dynamics affects short- and long-term predictions of economically important fish species, and (ii) how the inclusion of environmental variability changes our perceptions of tradeoffs between utilization of different resources, including for example fuel cost due to changed resource distributions in space and effects on targeted species, as well as socio-economic efficiency. There have been several initiatives to improve multispecies and ecosystem modelling in order to make it operational for both tactical and strategic assessment and ecosystem-based fisheries management. PRIME TRADEOFFS is the logical continuation of these initiatives and will make the concepts of multi-species maximum sustainable yield and environmental impact on biological key process such as distribution, growth and recruitment operational for ecosystem-based management of marine resources, as demanded in the Marine Strategy Framework Directive and the reformed Common Fisheries Policy. This project is coordinated by DTU Aqua and is funded by the EU, COFASP, ERA-NET.
Modelling the role of competition between fish and jellyfish in marine pelagic ecosystems
Schnedler-Meyer, N. A., PhD Student, National Institute of Aquatic Resources
Mariani, P., Main Supervisor, National Institute of Aquatic Resources
Kjærboe, T., Supervisor, National Institute of Aquatic Resources
Christensen, A., Examiner, National Institute of Aquatic Resources
Huse, G., Examiner
Tiselius, P., Examiner
Samfinansieret - Andet
01/08/2014 → 05/12/2017
Award relations: Modelling the role of competition between fish and jellyfish in marine pelagic ecosystems
Project: PhD

PhD Scholarship in Physical Oceanography
Rullyanto, A., PhD Student, National Institute of Aquatic Resources
Visser, A., Main Supervisor, National Institute of Aquatic Resources
Svenstrup Petersen, O., Supervisor
Sørensen, J. V. T., Supervisor
Mariani, P., Examiner, National Institute of Aquatic Resources
Burchard, H., Examiner
Sharple, J., Examiner
1/3 FUU, 1/3 inst 1/3 Andet
15/03/2012 → 30/09/2015
Award relations: PhD Scholarship in Physical Oceanography
Project: PhD

The role of deep convection on the dynamics of the North Atlantic phytoplankton community
Lindemann, C., PhD Student, National Institute of Aquatic Resources
St. John, M., Main Supervisor, National Institute of Aquatic Resources
Mariani, P., Supervisor, National Institute of Aquatic Resources
MacKenzie, B., Examiner, National Institute of Aquatic Resources
Bruggeman, J., Examiner
Martin, A. P., Examiner
Institut, samfinansiering
01/01/2012 → 01/07/2015
Award relations: The role of deep convection on the dynamics of the North Atlantic phytoplankton community
Project: PhD

Modelling the competition between two closely-related copepod species in Arctic under climate change
Sainmont, J., PhD Student, National Institute of Aquatic Resources
Visser, A., Main Supervisor, National Institute of Aquatic Resources
Andersen, K. H., Supervisor, National Institute of Aquatic Resources
Mariani, P., Examiner, National Institute of Aquatic Resources
Aksnes, D. L., Examiner
Banas, N. S., Examiner
Institut, samfinansiering
01/12/2010 → 07/05/2014
Award relations: Modelling the competition between two closely-related copepod species in Arctic under climate change
Project: PhD

Underwater time of flight image acquisition system (UTOFIA) (39240)
This project offers a compact and cost-effective underwater imaging system for turbid environments and will fill the current gap between short-range, high-resolution conventional video and long-range low-resolution sonar systems. The camera system utilizes high frequency laser pulses synchronized with rapid shutter operations on nano second time scales to radically reduce the interference of back scatter on visual images. Using this range-gated imaging technology, the system
will extend the imaging range by factor 2 to 3 over conventional video systems. At the same time, the system will provide video-rate 3D information. UTOFIA offers a new modus operandi for the main targeted domains of application: marine life monitoring, harbour and ocean litter detection, fisheries stock assessment and aquaculture, seabed mapping, offshore industry and civil security. The project is a collaborative effort between engineering companies producing the laser components, the camera systems, the software control and processing systems as well as the deployment platforms. The project also involves companies charged with integrating the system and its commercialization into the market place. The role of DTU Aqua is twofold; it is responsible for a series of field and laboratory trials to demonstrate the proof-of-concept and to feed back into the engineering design process, and it is responsible for the exploitation and dissemination dimension of the project, particularly with respect to marine science, fisheries and aquaculture applications. The consortium is coordinated by SINTEF, Norway. The project is funded by EU, Horizon2020.

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01/02/2015 → 30/04/2018

Keywords: Research areas: Oceanography & Fish Biology & Observation Technology

Collaborators: Odos Imaging, SINTEF, Subsea Tech, AZTI-Tecnalia, Fraunhofer-Gesellschaft, Bright Solutions Srl

Project: Research

Boulder reefs as spawning and nursery areas for fish (RevFisk) (39144)

The project aimed to build knowledge about marine boulder reefs and their biological function for fish as spawning and nursery areas. The field work was conducted on a stone reef, Hatter Barn at two depths 6-12 m and 13-17 m. These two depths were chosen to provide information on fauna and flora in the upper photic zone and a deeper zone. The dominant fish were labrids, which also spawned in the area and juvenile cod. Acoustic tagged cod provided information on their presence around the reef. Many exhibited a diurnal rhythm, concentrating on the reef during nighttime, although some cod were stationary on the reef the whole time. The deeper reef was more frequently visited (fourfold) by cod than the shallower reef. Experimental work conducted at the Blue Planet aquarium revealed that corksling wrasse are highly territorial and able to prevent juvenile cod from occupying their crevices. Goldsinny wrasse showed little interaction with cod and generally utilized very small crevices. Both labrids and cod utilized shelter from current flows provided by the structures and cod were often seen in high concentrations near the bottom where the current flows were laminar. The results are useful for further developing models that quantify boulder reefs impact on fish (larvae, juvenile, adult) as a function of the reefs condition, size and depth location. The results are useful in helping plan and design the restoration of destroyed boulder reefs but also to manage existing boulder reefs. The project was coordinated by DTU Aqua. The project was funded by the Danish Ministry of Food, Agriculture and Fisheries and the European Fisheries Fund (EFF).

Stenberg, C., Project Coordinator, National Institute of Aquatic Resources

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01/12/2013 → 01/02/2015

Keywords: Research areas: Coastal Ecology & Marine Living Resources & Oceanography

Collaborators: Aarhus University, DHI Denmark

Project: Research

North Atlantic - Arctic coupling in a changing climate: impacts on ocean circulation, carbon cycling and sea-ice (NAACOS) (38888)

Climate change is most pronounced at high latitudes, with rapid and dramatic changes observed in sea-ice coverage, circulation and the ecosystem. These changes have profound effects both at the regional scale as well as globally. The North Atlantic and Arctic Ocean are the headwaters of the thermohaline circulation (THC), the global heat engine responsible, amongst other things, for the relatively mild climate we experience in Denmark. Subtle change in sea-ice formation, deep water formation, and freshwater supply on a relatively local scale will have repercussions around the world. More subtle still are the feedback controls these processes have on climate change. Sea-ice coverage and the earth’s albedo is one feedback, but there is also the draw down and sequestering of atmospheric CO2 in deep waters by physical and biological processes. The whole is an intricate weave of interrelated mechanisms: the scientific challenge to draw together expertise across disciplines to address these issues was accomplished; the strategic outcome was a suite of knowledge-based tools designed to reduce the uncertainty and contribute to climate policies. The NAACOS team comprised a number of well-recognized scientists with profound experience and a significant international collaboration.

NAACOS developed and refined oceanographic models using remote sensing and observations to evaluate the impact of high latitude climate change on circulation, deep water formation, sea-ice and carbon flux, and their implications at regional scales. The project was coordinated by DTU Aqua. The project was funded by the Danish Council for Strategic
Research and a DHI student stipend.

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01/01/2011 → 31/12/2014

Keywords: Research areas: Oceanography & Marine Populations and Ecosystem Dynamics & Marine Living Resources
Collaborators: Aarhus University, Danish Meteorological Institute, DHI Denmark, University of Copenhagen, Faroe
Research Institute

Project: Research

**Modelling the impact of hydrography and lower trophic production on fish recruitment (MODREC) (38114)**

The recruitment of fish stocks is strongly influenced by fluctuations in climate and physical environment leading to strong and seemingly unpredictable year-to-year variations in year class strength. The aim of this project is to develop a model framework for conducting detailed recruitment studies on fish stocks. The framework will be applied for two commercially important fish stocks: sprat and sandeel, in order to improve the understanding of climate effects via bottom-up control and explain the observed high variability in reproductive success in these stocks. The framework will be built on existing hydrographic models by adding descriptions of primary and zooplankton production. The project is coordinated by DTU Aqua.

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01/01/2007 → 31/12/2009

Keywords: Research area: Marine Populations and Ecosystem Dynamics
Collaborators: Aarhus University, Danish Meteorological Institute

Project: Research

**Center for Ocean Life (COOL) - a Villum-Kahn Rasmussen Centre of excellence for the study of life in a changing ocean (38960)**

Our goal is to develop a fundamental understanding and predictive capability of marine ecosystems through the use of novel trait-based approaches and models. The Centre is organized around three main research activities: - Identification and mechanistic description of the traits and trade-offs required to characterize the main Darwinian missions (feed, survive, reproduce) of the various life forms in the ocean through experimental and theoretical work, as well as analysis of literature data. - Models: scaling of individual behavior to population and ecosystem dynamics through the development of trait-based models. - Testing model prediction by comparing to observed trait patterns in the ocean. The Centre involves biologists, physicists, chemists, and mathematicians and has a very strong training component through the supervision of master students, and about 30 PhD and postdoctoral fellows as well as by offering PhD summer schools and organizing international workshops. The Centre in addition host many visiting students and scientists. The Centre is lead by DTU Aqua. The project is funded by the Villum Kahn-Rasmussen Foundation (Velfax Foundations) as well as through various national and European fellowship programs (Research Council, H.C. Ørsted Fellowship programme, Marie Curie, Carlsberg Foundation, etc).

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01/01/2012 → 31/12/2017

Keywords: Research areas: Oceanography & Marine Populations and Ecosystem Dynamics & Marine Living Resources & Ecosystem based Marine Management
Collaborators: Michigan State University, University of Bergen, Kiel University, University of Copenhagen, Massachusetts Institute of Technology, University of Oxford, Roskilde University

Project: Research

**A coast to coast network of protected areas: From the shore to the deep sea (CoCoNet) (38863)**

The project targeted design and implementation of marine protected areas, as well as advancement of the scientific basis for optimal design and implementation. The project focused on two pilot studies in the Mediterranean and Black Sea for
establishing a network of MPAs. DTU Aqua participated in developing the scientific basis for optimal design of MPA networks by developing spatial size-based models to describe biodiversity as appropriate scales, as well as habitat connectivity from trait-based modelling, and procedures for analyzing habitat connectivity. DTU Aqua also contributed to governance issues relating to establishment of MPA networks. The project had 39 partners from the EU and Eastern Europe and Near Asia. The project was coordinated by Universita del Salento, Italy. The project was funded by EU, Framework Programme 7.

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01/01/2012 → 31/01/2016
Keywords: Research areas: Marine Living Resources & Oceanography & Ecosystem based Marine Management
Project: Research

MyOcean 2 (38862)
The project advanced and coordinated European scientific and technical infrastructure in the European operational oceanography community, for collecting and distributing ocean observations and ocean forecasts, being a continuation of MyOcean. DTU Aqua was reference intermediate user (RIU) in WP3 aimed at integrating MyOcean products into national systems and services and foster downstream exploitation of MyOcean information especially at a regional level. The project had 61 partners from the EU and was coordinated by Mercator Ocean, France. The project was funded by EU, Framework Programme 7.

Christensen, A., Project Manager, National Institute of Aquatic Resources, Section for Marine Living Resources
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01/01/2012 → 30/09/2014
Keywords: Research areas: Marine Living Resources & Oceanography
Project: Research

MyOcean (38134)
The project advanced and coordinated European scientific and technical infrastructure in the European operational oceanography community, for collecting and distributing ocean observations and ocean forecasts. DTU Aqua contributed by developing an integrated system for forecasting of sandeel fisheries in WP3 and in WP18 as reference intermediate user (RIU), for integrating operational oceanography products in marine resource management. The project was coordinated by Mercator Ocean, France and had 52 partners from the EU. The project was funded by EU, Framework Programme 7.

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01/01/2008 → 15/05/2012
Keywords: Research areas: Marine Living Resources & Oceanography
Project: Research

Integration of European marine research networks of excellence (EUROMARINE) (38903)
EuroMarine seeks to integrate three major European marine FP6 networks of excellence (EUR-OCEANS, MarBEF and Marine Genomics Europe) into one organization, "The EuroMarine Consortium" with a road map for joint programming, creating synergies between different scientific fields, towards a common research strategy and a shared vision for the oceans of tomorrow. EuroMarine will bring together leading European marine scientists to create a major internationally competitive network. The goal is to exploit the knowledge created within the consortium to address questions related to the functioning of marine ecosystems and the needs of society. This project also wishes to engage the European marine data management and scientific communities in shaping the long-term integration of data, historical, present and future. Moreover, EuroMarine aims to create a 21st century marine scientist, with deep knowledge in one discipline and basic "fluency" in several others, as well as a natural ability and desire to work as part of a team. The project is coordinated by University of Gothenburg, Sweden.

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01/01/2011 → 31/01/2013
Keywords: Research area: Oceanography
Collaborators: Environmental & Marine Project Management Agency, Centre National de la Recherche Scientifique, Centre of Marine and Environmental Research, University of Groningen, Stazione Zoologica Anton Dohrn, Ministero dell'Istruzione dell'Università e della Ricerca, Netherlands Institute of Ecology, Centro de Ciências do Mar do Algarve, IFREMER, Marine Biological Association of the United Kingdom, Station Biologique de Roscoff, Max Planck Institute, University of Gothenburg, University of Bremen, Centre de Recherche Halieutique Méditerranéenne et Tropicale, Institut de recherche pour le développement, Royal Netherlands Institute for Sea Research - NIOZ, Flanders Marine Institute, Ghent University
Project: Research
Geographical distribution of fish resources and optimizing of fishery practice in the north-eastern North Sea (RESOURCE) (38878)
RESOURCE is a collaborative fishermen-scientist project in direct continuation of the REX projects in the north-eastern
North Sea conducting small-scale scientific surveys, but only with one commercial trawler, encompassing also
geospatial distributional aspects as in OSKAR. The REX project showed that changes in the biomass densities of cod
differ between bottom types (and may depend on stock size) and the proportion of the cod population found on smooth
bottoms is not constant. However, due to scaling problems and too short a time series the achieved results have so far
had no impact on the assessment procedure or any (measurable) effect on the TAC's (but the RAC discussions may have
affected decisions by the European Commission). Continuation of the field work with the trawler in 2010-12 in the
RESOURCE project should produce a sufficient time series for supplementing the abundance indices for the older ages in
the assessment, which at present are based only on the catch rates in the international scientific surveys (IBTS). This total
REX-RESOURCE time series will be used in the state space assessment of North Sea cod (SAM) and various other
approaches applied to document how commercial CPUE may be used in the tuning procedure. Particular attention will be
given to evaluate the size of the spawning stock of cod. Mechanistic knowledge on vital rates together with REX,
RESOURCE, OSKAR and IBTS (and possibly also UK) survey data will be used as input to the geostatistical tool GeoPop
to estimate the temporal and spatial dynamics of the size distribution of the cod stock. This part of the project will
represent a direct continuation of OSKAR principles including considerations to how to design an operational fishery-
forecasts system for North Sea cod. The project is coordinated by DTU Aqua.

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Mosegaard, H., Project Participant, National Institute of Aquatic Resources
Christensen, A., Project Participant, National Institute of Aquatic Resources
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01/01/2011 → 30/09/2012
Keywords: Research area: Marine Populations and Ecosystem Dynamics
Collaborators: Danish Fishermen's Association
Project: Research

Building scenarios for marine ecosystems under anthropogenic and natural forcings (EurOceans Consortium) (38779)
The aim of the EUR-OCEANS Consortium was to favor joint initiatives between key Research Performing Organizations
(RPOs) and Research Funding Organizations (RFOs) across Europe, to help the community make significant jumps in
marine sciences during the next decades. This was implemented by organizing and sponsoring activities with a clear focus
on relevant marine science “hot topics” leading to wider European (FP8, JPI) projects. These activities included Gordon-
like conferences, flagship programs, foresight workshops and public outreach. The focus of the Consortium was on the impact of climate/global change on marine ecosystems, and the construction of scenarios relevant to the emerging International Platform on Biodiversity and Ecosystem Services (ipBES). A number of activities were funded in EUROCEANS with major impacts in term of new scientific publications, international training networks and other EU and Nationally funded projects. The EUROCEANS Consortium merged with similar initiatives in other marine research fields (i.e., MARBEF+ and Marine Genomics) to establish first a Consortium for a Collective Support Action under the FP7 program (called EUROMARINE) and then the integrated European Marine Network : EUROMARINE covering research topics from genes to ecosystems under changing oceans. The Consortium had over 25 European universities and research institutions covering all of Europe and a broad spectrum of marine ecology disciplines. The project was coordinated by Institut de Recherche pour le Développement, France. The project was self-funded.

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01/01/2009 → 31/12/2012
Keywords: Research area: Oceanography
Project: Research

Activities:

EGU2017-18355 Passive vs Active Knowledge Transfer: boosting grant proposal impact
Period: 24 Apr 2017
Ivo Grigorov (Speaker)
Georgia Bayliss-Brown (Other)
David Murphy (Other)
Thomas Lindberg Thøgersen (Other)
Patrizio Mariani (Other)
National Institute of Aquatic Resources
Research Secretariat
Centre for Ocean Life
Section for Marine Ecology and Oceanography

Description
Research funders are increasingly concerned with measurable socio-economic impact of investment in research, and on increasingly shorter timescales. Innovation, and “open innovation” are the policy priorities of the moment and optimising the flow of ideas along the lab-2-market spectrum is essential for re-use of results, fuelling open innovation, and boosting socio-economic impact or public funded research.

The presentation showcases two complimentary strategies that Project Managers can employ pre- and/or post-award in order to optimise the exploitation and impact of research project: passive and active knowledge transfer. Passive Knowledge Transfer relies on maximum disclosure of research output (other than commercially exploitable research via patents and other IPR) in the interest of optimal reproducibility, independent validation and re-use by both academic and non-academic users, without necessarily targeting specific users. Tools of the trade include standard public & academic dissemination means (research articles, online media publications, newsletters, generic policy briefs). Additional transparency of the research workflow can be achieved by integrating “open science” (open notebooks, open data, open research software and open access to research publications) as well as Virtual Research Environments (VREs) in the methodology of the proposed work. Ensuring that the proposal partners are suitably trained in best practices of open science, makes proposal grant more competitive at evaluation and the resulting maximum access to research outputs does contribute to better return on investment for funders (Beagrie 2016) and economic growth objectives of public s e.g. Blue Growth (Houghton & Swan 2011, Marine Knowledge 2020 Roadmap). Active Knowledge Transfer, or the pro-active translation of research into policy or commercial context, is the more classical and better known approach (also referred to as extension services, or researchers providing advice e.g. to fisheries and aquaculture governance bodies and private sector). Horizon2020 COLUMBUS Consortium proposes and tests a methodology for categorizing the diverse output of research into verifiable “knowledge outputs”, and documenting the execution of an transfer plan to very specific and identified potential users, in order to transfer knowledge along the lab-2-market spectrum. The presentation will demonstrate how Open Science and detailed knowledge transfer plans complement each other, enhance grant proposal evaluation pre- and post-award, and can address Blue Growth policy objectives. Concepts presented are developed by FP7/H2020 FOSTER (www.fosteropenscience.eu), H2020 COLUMBUS (www.columbusproject.eu).

Degree of recognition: International
Documents:
EGU2017-18355-2
Links:
https://www.fosteropenscience.eu/event/ipr-open-science-and-technology-transfer

Related event

EGU General Assembly 2017: European GEosciences Union 2017
24/04/2017 → 28/04/2017
Vienna, Austria
Activity: Talks and presentations › Conference presentations