QUESTIONNAIRE

Harmful Algal Bloom and Microbial Contamination Forecasting in Portugal

This short questionnaire aims to gather opinions from shellfish and fin-fish producers to help to tailor a PRIMROSE Harmful Algal Blooms forecast bulletin and possibly a microbial contamination early alert system to their needs.

A Harmful Algal Bloom forecast bulletin was created with a previous European project called ASIMUTH. It was maintained and ran by IPMA (Instituto Português do Mar e da Atmosfera; https://www.ipma.pt/pt/index.html) and MARETEC (Centro de Ciência e Tecnologia do Ambiente e do Mar; http://www.maretec.org/pt/about-us/) from the Instituto Superior Técnico (Universidade de Lisboa). However, the bulletin was discontinued when the project came to an end in 2013. We hope to revive and optimise a new HAB forecast bulletin, and possibly a microbial contamination early alert system during the PRIMROSE project.

An example of the old ASIMUTH bulletin is available at the end of this questionnaire to provide insight into what was offered, forming a baseline from which the PRIMROSE bulletin will be built.

The project builds on existing monitoring programmes carried out in the partners' regions to estimate harmful blooms, shellfish toxins and microbial contamination to comply with EU regulations. It will add value to these programmes by re-use of valuable data that is already being generated.

Project number: EAPA_182/2016

QUESTIONS ON THE PREVIOUS BULLETIN (2012 – 2013)

1. **Instituto Português do Mar e da Atmosfera (IPMA) and Instituto Superior Técnico (IST) used to provide a HAB forecast bulletin from 2012 to 2013. Were you aware that this bulletin existed?**

   ☐ Yes

   ☐ No

2. **Did you ever use the HAB forecast bulletin?**

   ☐ Yes

   ☐ No

   If **NO**, please give a reason why:

   ☐ Do not find it useful

   ☐ Other

   If **other**, please list reasons why:

3. **Did you use the information in the bulletin to make any of the following decisions?**

   ☐ Management decision (e.g. hiring of extra staff; stopping production)

   ☐ Mitigation decision (e.g. temporarily moving of stock to an unaffected site)

   ☐ Harvest decision (e.g. prematurely harvest your stock)

   ☐ Other

   If **OTHER**, please specify?

4. **In your opinion, does the old bulletin from 2012 and 2013 contained enough information to make it a useful tool? Please use the example at the end of this questionnaire as a reference.**

   ☐ Yes

   ☐ No

   ☐ Not applicable

5. **Is there any information in the bulletin which you do not find useful?**

   ☐ Yes

   ☐ No

   If **YES**, please provide details:

QUESTIONS FOR THE DEVELOPMENT OF A NEW BULLETIN

1. **Currently, if you receive an indication that a harmful event is imminent in the area where your stock animals are kept, do you have any strategies/protocols in place to mitigate stock damage/financial losses?**

   ☐ Yes

   ☐ No

   If **YES**, what strategies/protocols do you use, and are there any problems associated with them?

2. **Once a HAB event has arrived where your stock animals are kept, do you have any strategies/protocols in place to mitigate damage/losses?**

   ☐ Yes

   ☐ No

   If **YES**, what strategies/protocols do you use, and are there any problems associated with them?

3. **If a new HAB forecast bulletin was available now, how frequently do you think it should be updated?**

   ☐ Daily

   ☐ Weekly

☐ Fortnightly

4. **If a new forecast bulletin was available now, what is the minimum timeframe for a short-term forecast to be useful to you?**

   ☐ Forecast available 72 hours in advance

   ☐ Forecast available 1 week in advance

   ☐ Forecast available 2 weeks in advance

   ☐ Other; please specify _____

5. **With a longer forecast time (e.g. one month in advance), the accuracy of the forecast will decrease. Which of these scenarios would you prefer?**

   ☐ Short forecast (<3 days) with accuracy of >80%

   ☐ Medium forecast (<7 days) with accuracy of >60%

   ☐ Long forecast (>1 month) with accuracy of <50%

6. **If a new forecast bulletin was available now, what information would you like it to provide?**

   ☐ Current conditions

   ☐ Water circulation patterns

   ☐ Phytoplankton biomass and composition

   ☐ Biological and/or ecological information on toxic species

   ☐ Prediction of temperature, salinity and density

   ☐ Satellite-derived sea surface temperature

   ☐ Satellite-derived chlorophyll images

   ☐ Historical trends

☐ Other; please specify

7. How often would you consult the forecast bulletin?

☐ Daily

☐ Weekly

☐ Fortnightly

☐ Monthly

☐ Other; please specify _____

8. Overall, how important would a HAB forecasting system be to you?

☐ Crucial ☐ Very important ☐ Slightly important

☐ Not important ☐ Unimportant

9. What would encourage you to consult a potential HAB forecast bulletin more often? Please tick any that are applicable:

☐ Simplification of website bulletin

☐ Availability of a mobile app

☐ Automated alert system e.g. alert message sent directly to your mobile phone

☐ Other; please specify _____

10. PRIMROSE will also develop a proto-type for a microbial contamination early alert system for Portugal. Would a microbial contamination early alert system for be useful to you?

☐ Yes

☐ No

11. Overall, how important would a microbial contamination early alert system be to you?

☐ Crucial ☐ Very important ☐ Slightly important

☐ Not important ☐ Unimportant

12. For both the HAB forecast bulletin and the microbial contamination early alert systems, what species would you be interested in?

☐ *Dinophysis* sp (DSP)

☐ *Gymnodinium catenatum (PSP)*

☐ *Azadinium* spp. (AZA)

☐ *Alexandrium* spp. (PSP)

☐ *Pseudo-nitzschia* spp. (ASP)

☐ *Karenia* spp. (fish-killing species)

☐ *E. coli*

☐ Other; please specify _____

YOUR INFORMATION

1. **What is your main business activity? Please tick all applicable:**

- ☐ Fin-fish producer (seabass)
- ☐ Fin-fish producer (seabream)
- ☐ Fin-fish producer (trout)
- ☐ Fin-fish producer (salmon)
- ☐ Fin-fish producer (other; please specify_____)
- ☐ Shellfish producer (abalone)
- ☐ Shellfish producer (mussels)
- ☐ Shellfish producer (oyster)
- ☐ Shellfish producer (scallops)
- ☐ Shellfish producer (hatchery)
- ☐ Shellfish producer (other; please specify_____)
- ☐ Seaweed producer
- ☐ Fin-fish processors
- ☐ Shellfish processors
- ☐ Aquaculture and seafood agency
- ☐ Seafood exporter
- ☐ Private research institute
- ☐ Public research institute
- ☐ University
- ☐ Other; please specify_____

2. Please provide the location of where most of your business activity takes place (i.e. main production/harvesting area):

Coastal

☐ Viana do castelo

☐ Matosinhos - VN de Gaia

☐ Aveiro

☐ Litoral Figueira da Foz - Nazaré

☐ Cabo raso- Costa da Caparica

☐ Peniche-Cabo Raso

☐ Setubal-Sines

☐ Aljezur - S. Vicente

☐ Sagres

☐ S. Vicente - Portimão

☐ Faro-Tavira

☐ Tavira- Vila Real de Santo

☐ António

Coastal Lagoons

☐ Albufeira lagoon

☐ Óbidos lagoon

Estuaries and rias

☐ Lima estuary

☐ Minho estuary

☐ Mondego estuary

☐ Aveiro Ria

☐ Mira estuary

☐ Sado estuary

☐ Tagus estuary

☐ Guadiana estuary

☐ Ria Formosa- Faro

☐ Ria Formosa - Olhão

☐ Ria Formosa - Fuzeta

☐ Ria Formosa - Tavira

☐ Ria Formosa - Cacela

☐ Alvor Ria (Lagos, Portimão)

☐ Arade estuary

EXAMPLE OF THE PREVIOUS BULLETIN AVAILABLE IN PORTUGAL

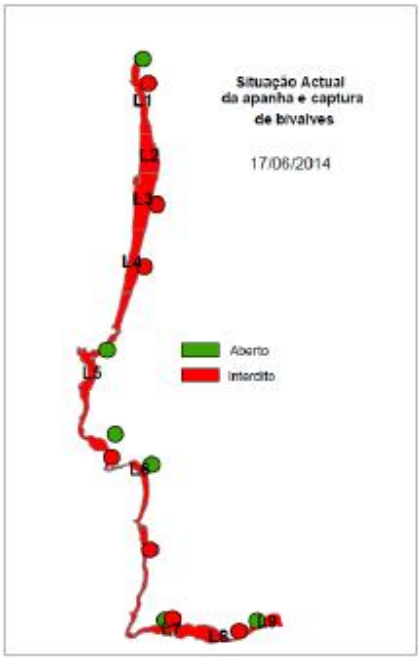
Below are screenshots from old ASIMUTH bulletin. It covered the entire Portuguese coastline. The bulletin was five pages long.

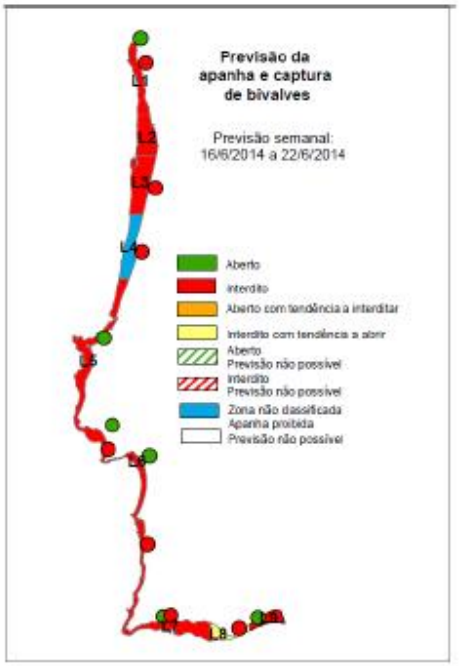
Boletim de previsão da apanha e captura de bivalves

ASIMUTH
www.asimuth.eu

Semana 25, 16 a 22 de junho de 2014

Condições atuais e previsões





Ponto da situação

Devido à presença de fitoplâncton produtor de toxinas marinhas ou de níveis de toxinas acima dos valores regulamentares estão interditas temporariamente a apanha e captura, com vista à comercialização e consumo, de espécies de bivalves provenientes das seguintes zonas de produção: L1, L2, L3, Ria de Aveiro, L5, Lagoa de Albufeira, L6, L7a, L8 e L9.

Está proibida a apanha e captura de bivalves, devido à ausência de amostras de algumas espécies, no Estuário do Mondego, Ria Formosa – Olhão.

Está proibida, indeterminadamente, a apanha e captura de bivalves na zona L4 por esta corresponder a zona litoral não classificada.

Previsões

Devido à ausência de espécies de fitoplâncton tóxico, prevê-se a tendência da abertura à apanha e captura de bivalves no L8. As zonas de produção da Ria do alvôr e Ria Formosa-Tavira encontram-se abertas à apanha e captura de bivalves.

Data de atualização: 16 de junho 2014

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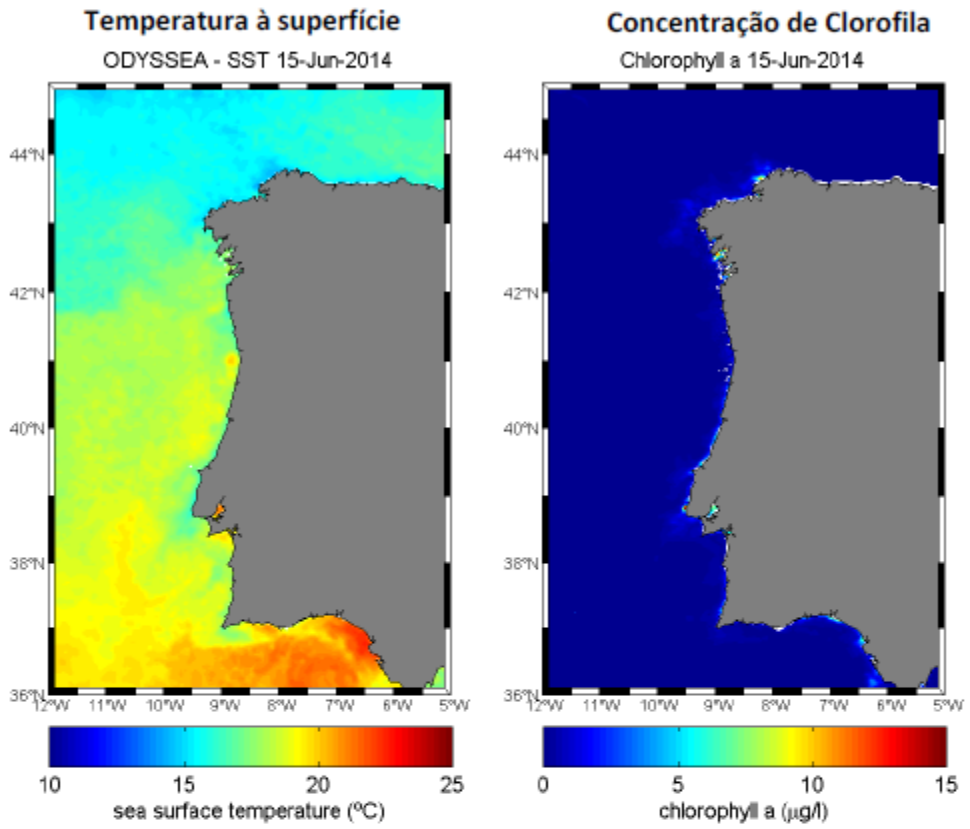
Condições atuais: imagens de satélite



Temperatura à superfície

A imagem de satélite da temperatura da água à superficie evidencia temperaturas mais baixas na costa oeste de Portugal e norte de Espanha.

Concentração de clorofila

Observam-se valores ligeiramente mais elevados de pigmentos de clorofila ao longo da costa oeste e da costa sul.

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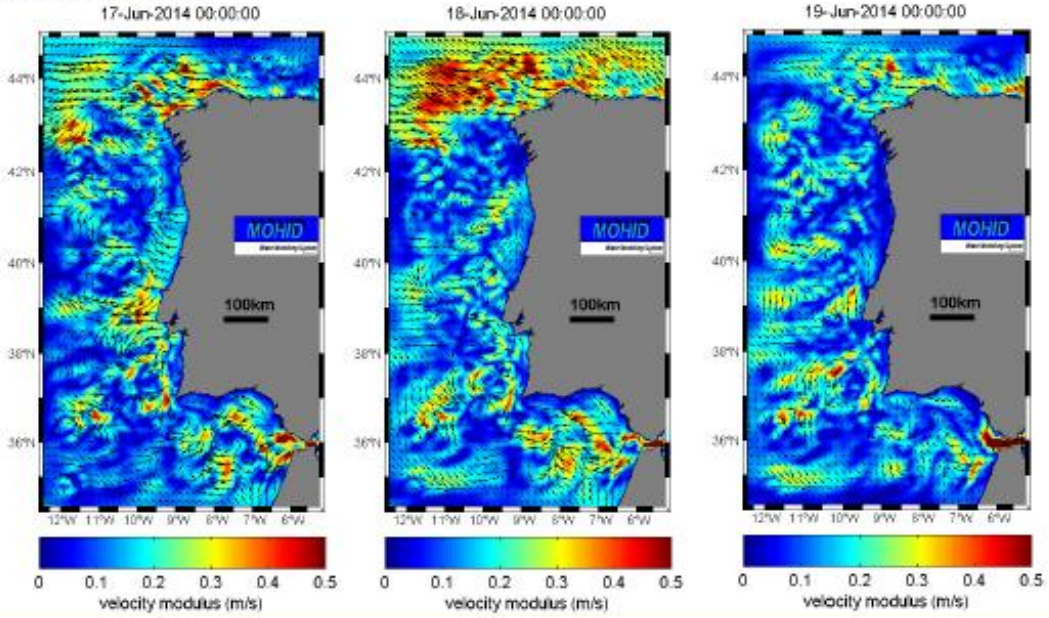
Previsões do modelo PCOMS

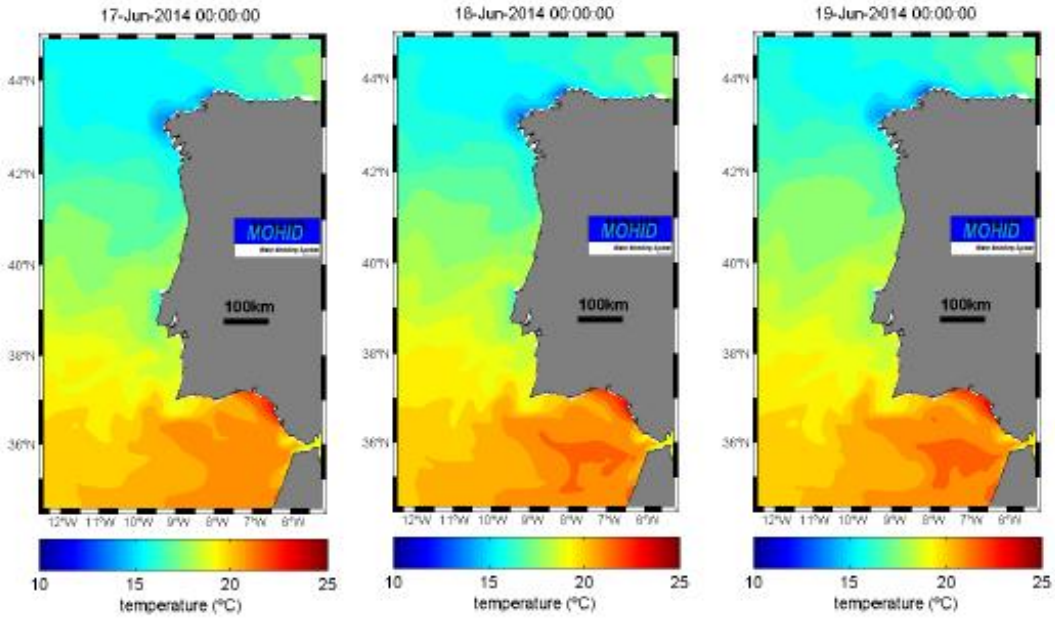
Fim da previsão: 19 de junho 2014, 00h00m

Os resultados do modelo mostram uma circulação para W-NE junto à costa oeste e para S-SW junto à costa sul. A intensidade da corrente varia ao longo do período simulado. A temperatura da água à superfície mantem-se relativamente constante ao longo do período simulado, verificando-se temperaturas mais baixas junta à costa oeste norte.

Circulação à superfície



Temperatura à superfície



Boletim de previsão da apanha e captura de bivalves

Semana 25, 16 a 22 de junho de 2014

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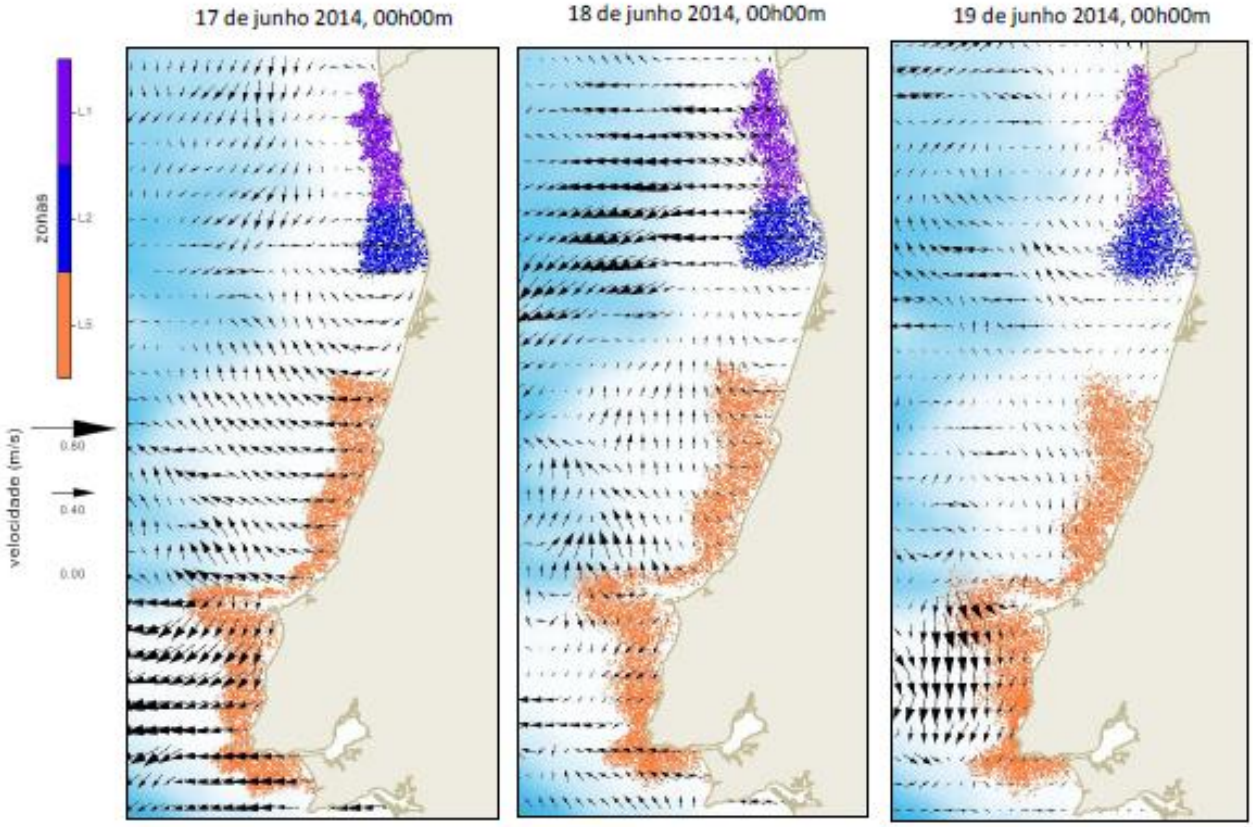
Previsões do modelo de transporte de partículas - Previsão de 3 dias

Fim da previsão: 19 de junho 2014, 00h00m

As simulações mostram que os blooms localizados na zona L1, L2 e L5 serão transportadas para o largo.

Localização inicial do bloom: Zonas L1 L2 e L5



Boletim de previsão da apanha e captura de bivalves

Semana 25, 16 a 22 de junho de 2014

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Previsões do modelo de transporte de partículas - Previsão de 3 dias

Fim da previsão: 19 de junho 2014, 00h00m

As simulações mostram que os blooms localizados na zona L6 e L7 costa oeste serão transportados para sul junto à costa. Os blooms localizados na zona L7 costa sul, L8 e L9 serão transportados ligeiramente para este.

Localização inicial do bloom: Zona L6, L7, L8 e L9