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PERSEUS
POLICY-ORIENTED MARINE ENVIRONMENTAL RESEARCH IN THE SOUTHERN EUROPEAN SEAS

Vessel Monitoring System (VMS): new ways to use its data

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New methodology for better estimations of fishing intensity

What is a Vessel Monitoring System (VMS)?

A Vessel Monitoring System (VMS) is a satellite-based monitoring system which provides data on the location, course and speed of vessels to the fisheries authorities at regular intervals. According to the European Commission (EC) Regulation No2244/2003, fishing vessels with total length greater than 15 meters are obligated to be equipped with a VMS. Similarly, all coastal European Union (EU) countries should set up systems that are compatible with each other, so that countries can share data and the EC can easily monitor that rules are respected.

Fig. 1. VMS system

Why is it important?

- **Management purposes** - The analysis of VMS data can provide spatial and temporal grids about fishing effort, which is a necessary information for management purposes.
- **Scientific purposes** - "Good quality" estimates of fishing effort are required in order to design management plans for the operation of different fishing gears and for modelling purposes
- **Maritime Spatial Planning Directive -** The VMS is a key part of the Monitoring Control and Surveillance (MCS) programmes at national, European and international levels and can be used to improve the management and sustainability of the marine environment.
- **Modelling purposes** - The analysis of VMS data can be a significant input for several modelling approaches combining VMS data with bathymetry, environmental and oceanographic data, fisheries data (catches, landings, discards), sea bottom types and habitats.

VMS within PERSEUS

In the framework of PERSEUS research project, different approaches were introduced to analyse VMS data. In particular, VMS data were analysed for the western (Spain), central (Italy) and eastern (Greece) Mediterranean Sea basins.

Modules for the analysis of VMS data

During the implementation period, two modules were proposed to analyze VMS data.

VMS within PERSEUS

The first module presents common methodological steps to analyze the VMS dataset, which allow to estimate fishing effort indicators and define common spatial references for visualization. The common methodological steps are:

1. **Quality control of data** - elimination of errors in the raw VMS data;
2. **Data enhancing** - by integration of legislation bathymetry etc., the crossing of the VMS data with Logbooks;
3. **Classification of fishing activity** by a speed rule for the estimation of fishing effort indicators;
4. **Estimation of fishing effort indicators** - through calculations, such as Days at sea, Days*GT, Days*KW, fishing hours;
5. **Visualization** - by producing high detailed maps of fishing effort with respect to spatial and temporal grids

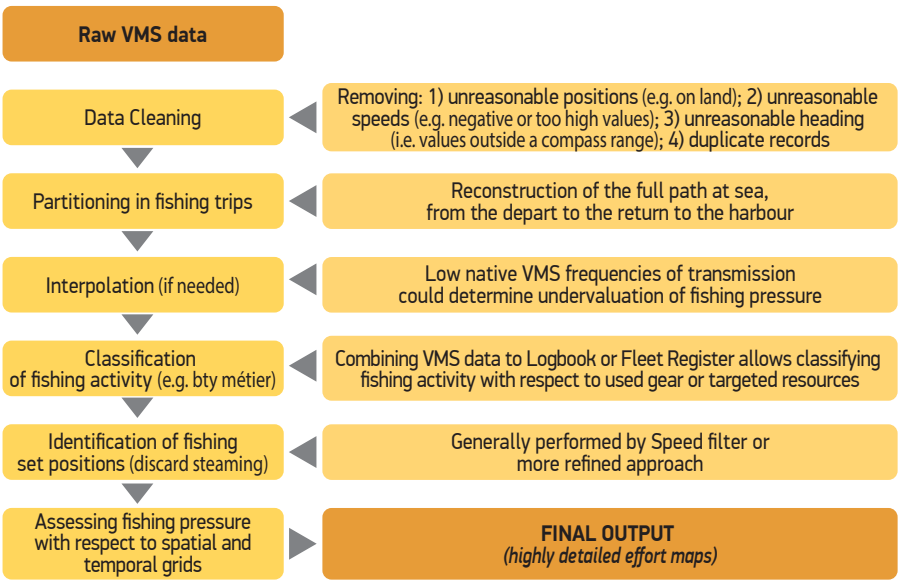

Fig. 2 A common methodological workflow was defined and applied to the different national VMS datasets

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In addition, in the framework of this subtask, a Geoportal was developed, which can be accessed through the PERSEUS website. The VMS PERSEUS Geoportal delivers geographic information that depicts the fishing effort of certain fishing gears (trawlers, purse seiners). The layers that are visualized in the geoportal were derived by the common methodological procedures that were described in the first module. The geoportal consists of a user-friendly web application which meets the open-source application standards.

The first module allows obtaining the fishing effort output, which can be used for different and advanced implementations as described in the second module.

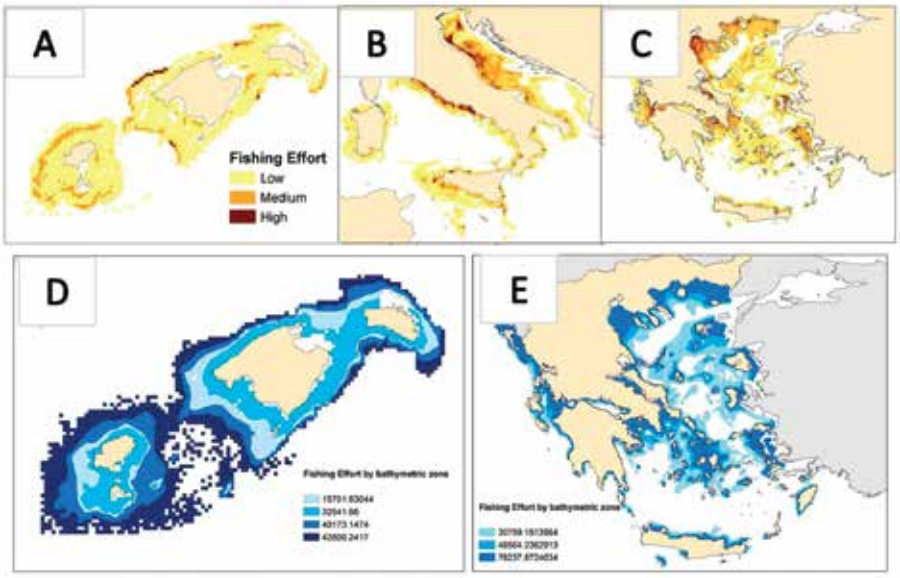

Fig. 3 Fishing effort from bottom trawlers in A) Balearic Islands, B) Italy, C) Greece and fishing effort by bathymetric zone, D) Balearic Islands and E) Greece.

MODULE 2: Fishing effort implementations

The second module aims at combining the fishing effort estimates with environmental, oceanographic and data from surveys, in order to identify important fishing areas and target species. These implementations are in line with the requirements of national and European legislation and introduce the following innovative methodologies:

1. **Identification of fishing grounds** for the target species of bottom trawl fishery;
2. **Identification and mapping migration spatiotemporal patterns** of the investigated fishing fleet;
3. **Estimation of small-scale fishing pressure index**, using Multi-Criteria Decision Analysis and VMS data; and
4. **Evaluation of fisheries statistics data** using VMS fishing effort estimates.

PERSEUS achievements

Through the PERSEUS project, common methodologies have been established for the first time in Europe with an observing system that uses VMS and which has direct relevance to MSFD implementation, Marine Spatial Planning, fishing fleet migration strategies, fishing grounds, etc. The proposed methodology supports MSFD Descriptor 3 "Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock".
In particular, the two modules proposed to analyze VMS data:

- Satisfy scientific and management purposes by giving the basic information needed for further analysis and modeling;
- Satisfy some basic requirements of Common Fisheries Policy (CFP) in the way data is collected and analyzed.
- Give concrete and reliable results about the behavior of the fishing fleet controlled by the Vessel Monitoring Systems.
- Use data analysis methods and modeling with other biotic and abiotic parameters that could also be used as an implementation guide for other European areas.

This fact sheet is based on the PERSEUS deliverable: "Common methodological procedures for analysis of VMS data, including web-based GIS applications related to the spatial extent and intensity of fishing effort" (D3.4) ISBN no: 978-960-9798-14-3

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