Progress in the analysis of VMS data: Scientific insights from Italian experience

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GENERAL FISHERIES COMMISSION FOR THE MEDITERRANEAN
VMS Expert Meeting on a Technical Framework for Cooperation in the GFCM Area
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The context

- VMS data are routinary processed within the **Data Collection Framework** (http://ec.europa.eu/fisheries/cfp/fishing_rules/data_collection/index_en.htm) in order to assess and analyze the spatial extension of fishing effort
- This requires a complex flow since VMS data must be processed and coupled with other data sources (i.e. Logbooks)

The challenge

Some key steps are:

- Disaggregation of VMS dataset into single "tracks", that are fishing trips starting by and ending to a given harbor;
- Interpolation at an adequate standard frequency (e.g. 10 minutes) in order to realistically represent fishing activity;
- Recognize fishing activity with respect to targeted resources (i.e. Métiers classification)

Mètier classification in Mediterranean and Black Sea

Fishing activity is classified with respect to used gear and targeted resources within the DCF

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Activity	Gear classes	Gear groups	Gear type	Target assemblage	Mesh size and other selective devices	
Fishing activity	Dredges	Dredges	Boat dredge [DRB]	Molluscs		
	Trawls	Bottom trawls	Bottom otter trawl [OTB]	Demersal species	>=40	shelf slope mixed shelf and slope
				Deep water species*	>=40	
				Mixed demersal species and deep water species*	>=40	
			Multi-rig otter trawl [OTT]	Demersal species	>=40	
			Bottom pair trawl [PTB]	Demersal species	>=40	
			Beam trawl [TBB]	Demersal species	>=40	
		Pelagic trawls	Midwater otter trawl [OTM]	Mixed demersal and pelagic species	>=20	
			Midwater otter trawl [OTM]	Mixed demersal and pelagic species	13-20**	
			Pelagic pair trawl [PTM]	Small pelagic fish	>=20	
	Hooks and Lines	Rods and Lines	Hand and Pole lines [LHP] [LHM]	Finfish	(a)	
				Cephalopods	(a)	
			Trolling lines [LTL]	Large pelagic fish	(a)	
		Longlines	Drifting longlines [LLD]	Large pelagic fish	(a)	LLD_LPF_0_0_0 (BFT) LLD_LPF_0_0_0 (ALB) LLD_LPF_0_0_0 (SWO)
			Set longlines [LLS]	Demersal fish	(a)	shelf slope
	Traps	Traps	Pots and Traps [FPO]	Demersal species	(a)	
			Fyke nets [FYK]	Catadromous species	(a)	
				Demersal species	(a)	
			Stationary uncovered pound nets [FPN]	Large pelagic fish	(a)	
	Nets	Nets	Trammel net [GTR]	Demersal species	>=16	
			Set gillnet [GNS]	Small and large pelagic fish	>=16	
				Demersal species	360-400**	
				Demersal species	>=16	
			Driftnet [GND]	Small pelagic fish	(a)	
				Demersal fish	(a)	
	Seines	Surrounding nets	Purse seine [PS]	Small pelagic fish	>=14	
				Large pelagic fish	>=14	
			Lampara nets [LA]	Small and large pelagic fish	>=14	
		Seines	Fly shooting seine [SSC]	Demersal species	(a)	
			Anchored seine [SDN]	Demersal species	(a)	
			Pair seine [SPR]	Demersal species	(a)	
			Beach and boat seine [SB] [SV]	Demersal species	(a)	
	Other gear	Other gear	Glass eel fishing	Glass eel	(a)	
	Misc. (Specify)	Misc. (Specify)			(a)	
Other activity than fishing				Other activity than fishing		
Inactive				Inactive		

(a) Not spelled out in DCR but defined with reference to relevant EU Regulation(s)

(*) refering only to red shrimps *Aristaeomorpha foliacea* and *Aristeus antennatus*, species not included in the definition of deep sea species given by Council Regulation (EC) 2347/2002.

(**) for black sea

The challenge

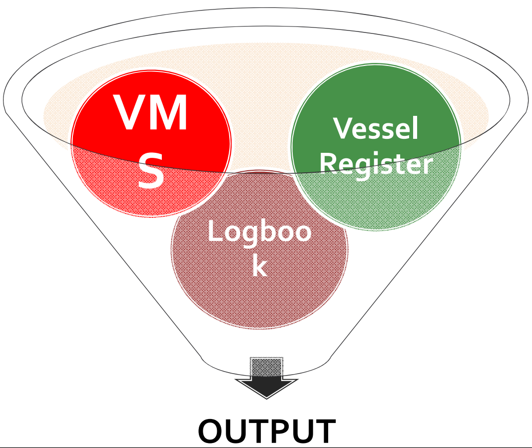
Other steps:

- Distinguish between fishing and steaming points within each classified track;
- Aggregate fishing points per area, per activity and per time, on a spatial grid;
- Analyze the obtained pattern in order to:

1. Compute pressure indicators (extension of exploited area)
2. Identify and monitoring fishing grounds through time

The data used

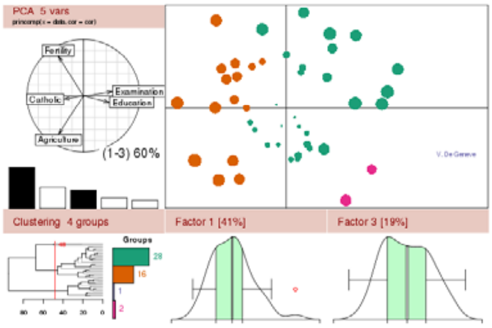
The main sources of data for these analyses are represented by:



The way

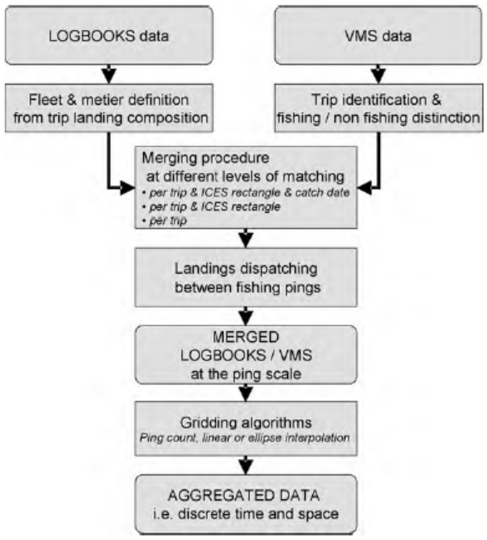
- We developed a series of libraries and routines in R codein order to facilitate validation, sharing and enhancement of methological skills

The R Project for Statistical Computing



Matching with Logbooks

One of the main step of the analysis is represented by matching of VMS and Logbooks informations. This is performed using an approach developed by Bastardie et al., 2010



Interpolation


Fisheries Research

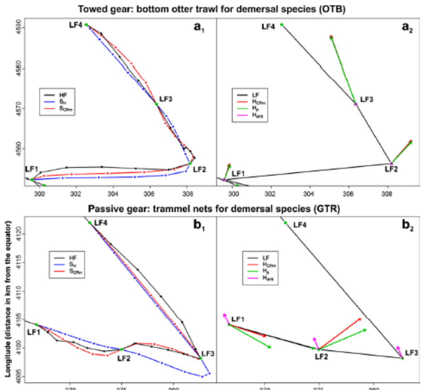
Fisheries Research

New insights in interpolating fishing tracks from VMS data for different métiers

Tommaso Russo, Antonio Parisi, Stefano Cataudella

ARTICLE INFO

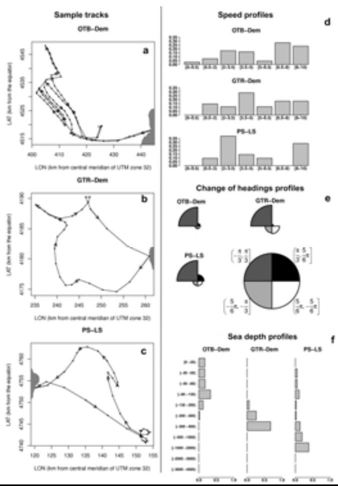
ABSTRACT

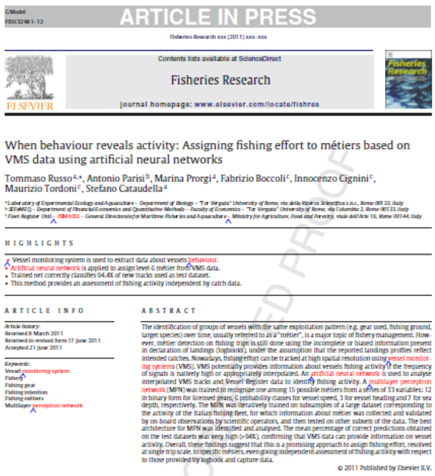


We developed some specific tools for the interpolation of VMS data to obtain high frequency tracks from VMS signals natively characterized by low frequency (e.g. 2 hours, that is the default for Italian fleet)

Recognize fishing activity

We also developed a method, based on Artificial Neural Network, to classify the fishin activity associated to each VMS track

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Fisheries Research

When behaviour reveals activity: Assigning fishing effort to métiers based on VMS data using artificial neural networks

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HIGHLIGHTS

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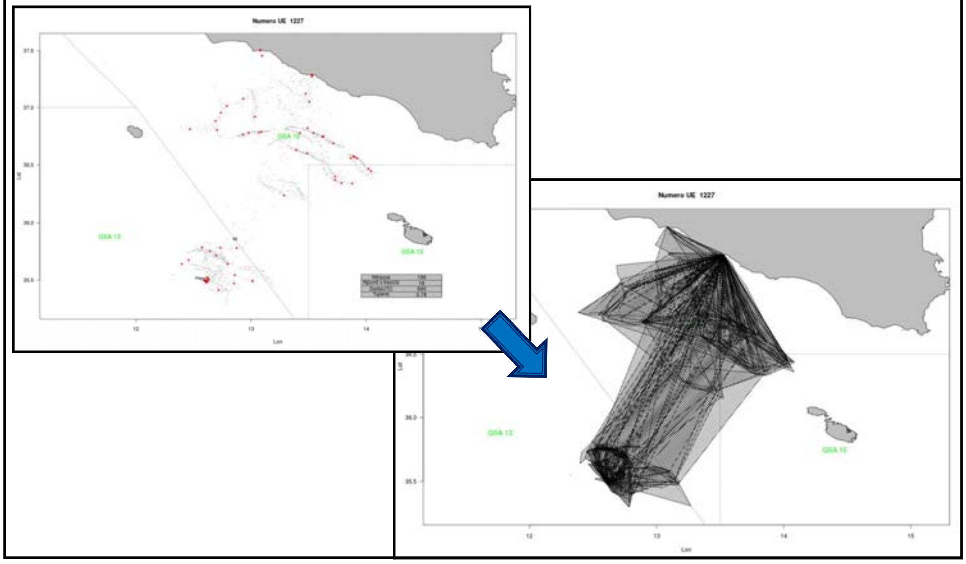
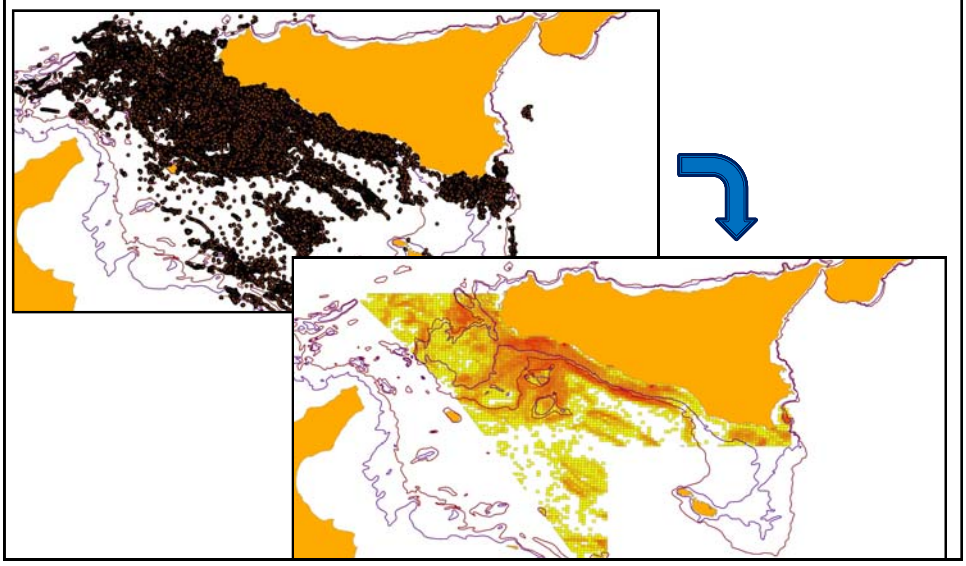
ABSTRACT

In summary: from points to tracks



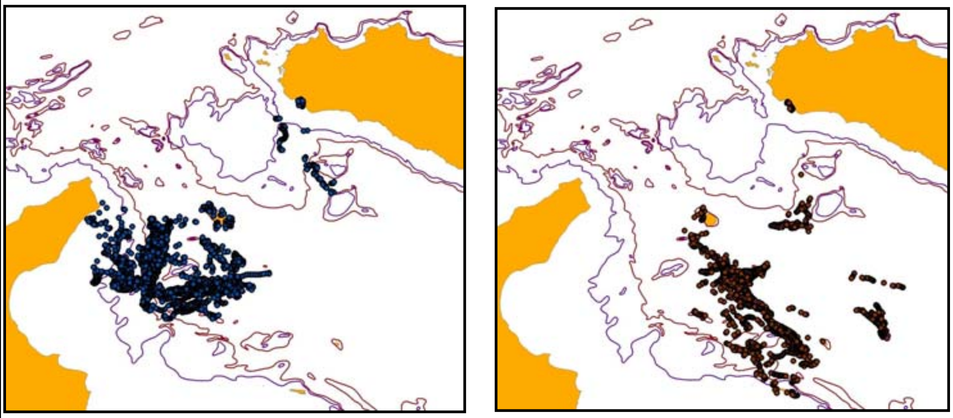
From points to pattern



Possible analysis: seasonal patterns

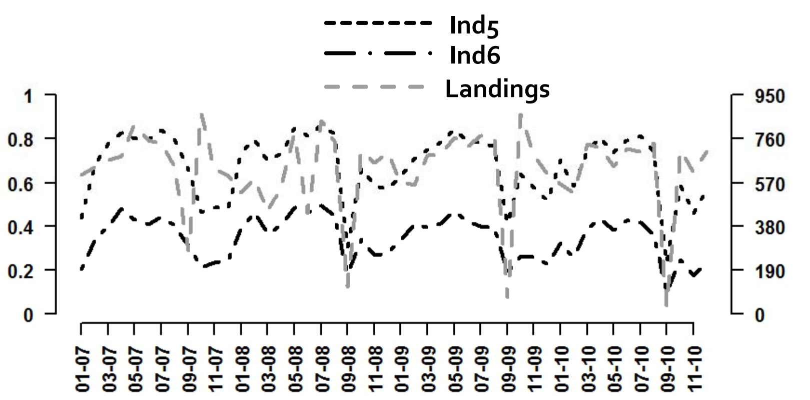
Winter

Spring



Pressure indicators: temporal trends

Long-term monitoring of fishing activity (exploited area)

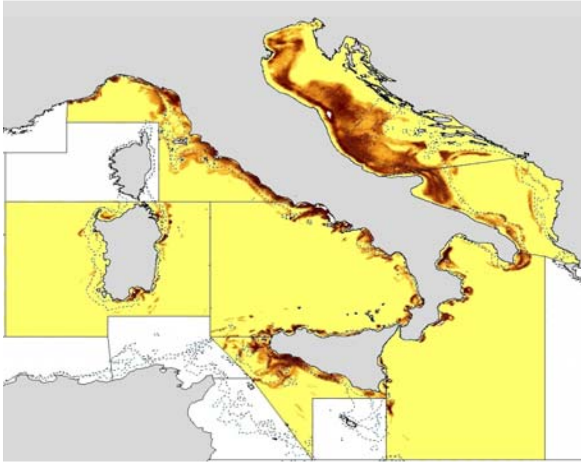


Fishing grounds

Use of VMS data to track spatio-temporal changes of fishing grounds.

We developed a statistical method to identify fishing grounds and to track temporal changes.

"Static" map of the fishing grounds



Thank you for the attention

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