

# To what extent is fishing effort affecting the trophic level of the demersal communities at small scale? Preliminary results of a new food web indicator

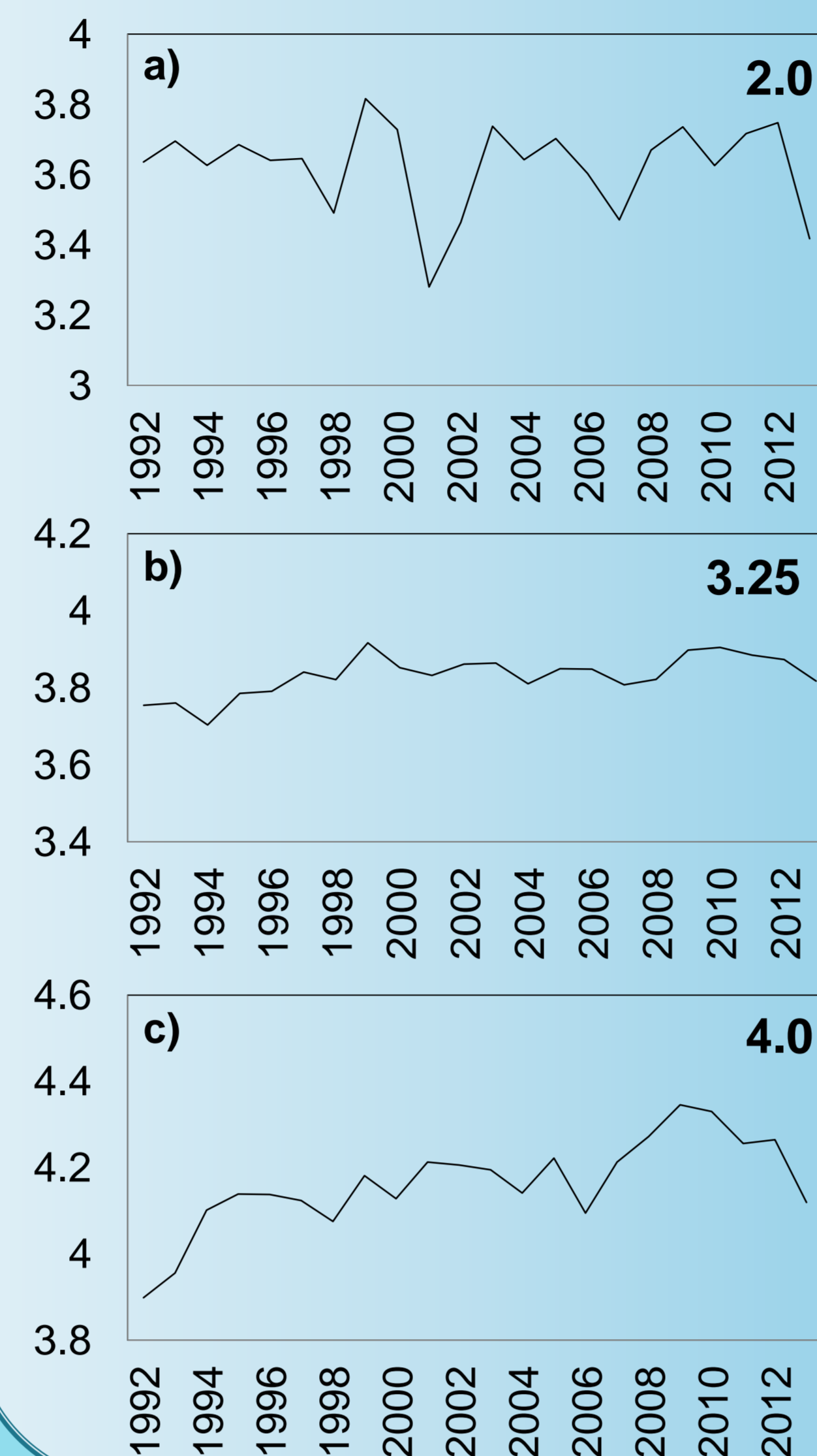
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## INTRODUCTION

Pauly & Watson (2003) suggested that the health and sustainability of fisheries can be assessed by monitoring the trends in average trophic levels (TLs). When TL values begin to drop, it indicates that fisheries are relying on ever smaller fish and that stocks of the larger predatory fish are beginning to collapse.

The present work compares the trends in the mean trophic level of the benthic and demersal communities dwelling the continental shelf of the southern Bay of Biscay, at large and small scale. Using a spatio-temporal approach, the main objective of the present work was to compare temporal trends in mean TLs at global (large scale) and community (small scale) level. We will assess, in a second step, to what extent these trends are related to fishing effort, in order to establish a new indicator based on the results combining both databases.

Fig. 1. Evolution of mean trophic level of benthic and demersal communities using different cut-offs: a) TL>2.0, b) TL>3.25 and c) TL>4.0

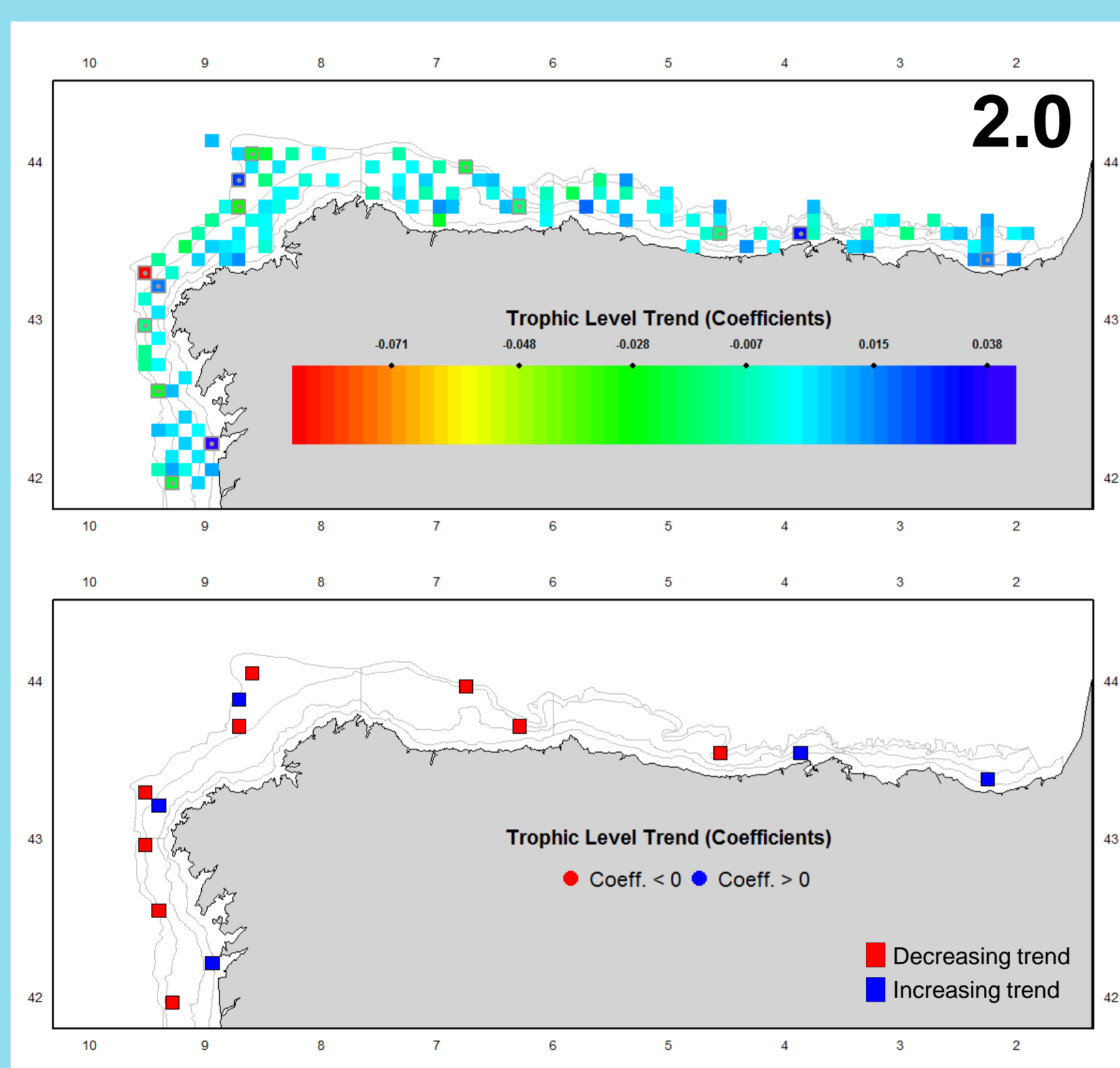


## MATERIAL AND METHODS

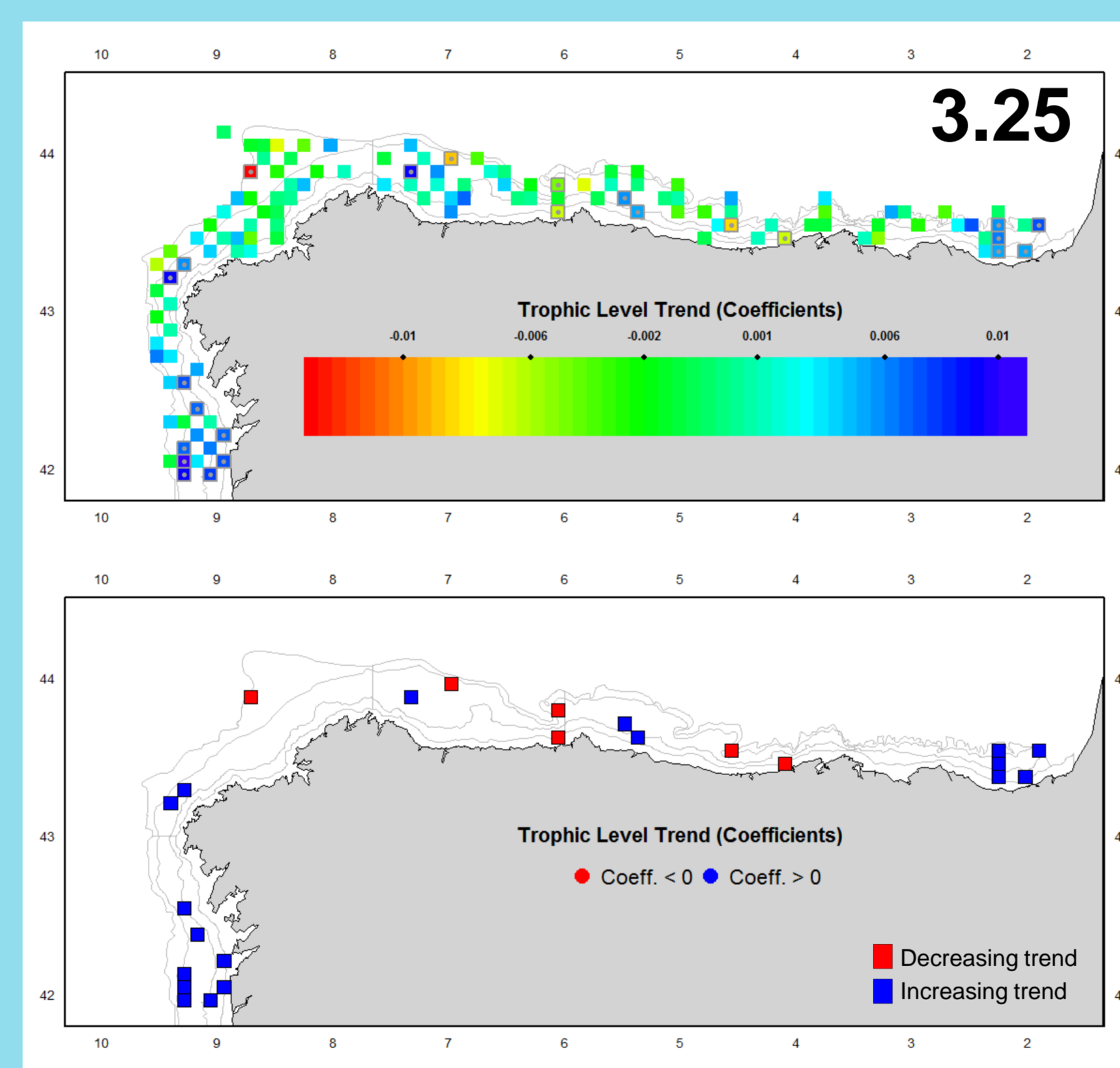
Data come from IBTS bottom trawl surveys carried out every autumn in the southern Bay of Biscay (1992-2015). To calculate the metric, biomass and trophic level of each species were used. Trophic level (TL) of each species were calculated using stomach contents sampled for demersal fish species, combined with data from Fishbase and local references for those species which lacked empirical data (for more information see Safi et al., this poster session). The indicator has been calculated using two approaches: 1) Global mean trophic level (MTL, large scale), and 2) Trends in MTL, by gridded MTL (small scale, 5 x 5 miles grid resolution), called **gridded MTL**. In both cases, the indicator was estimated using three different cut-offs (2.0, 3.25 and 4.0). A GLM was applied in each sampling rectangle to test significant differences in MTL trends along the historical series.

VMS data were calculated as the number of fishing days by sampling rectangle (only otter trawl is shown in this poster).

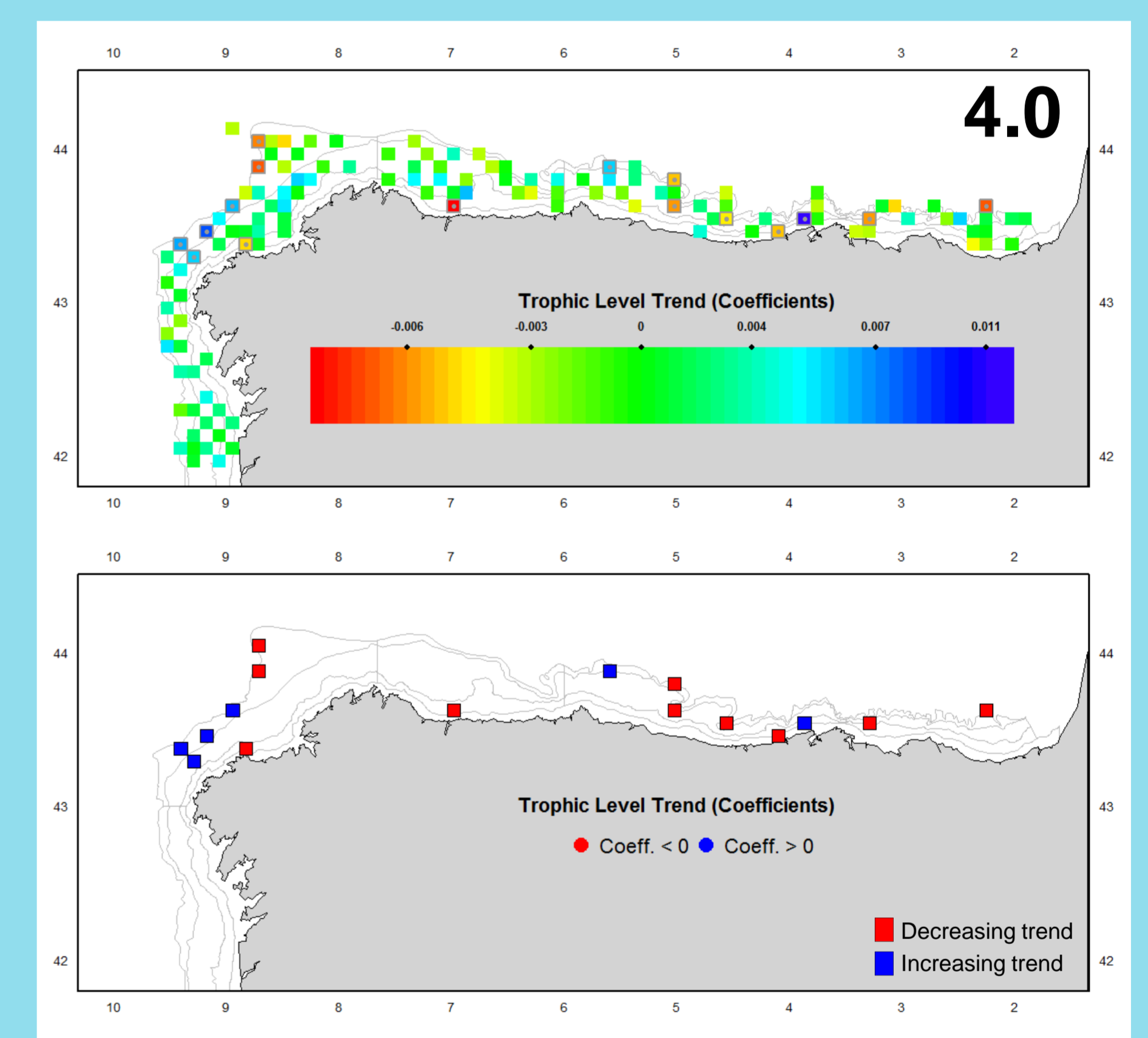
## RESULTS ON GRIDDED MTL AT SMALL SCALE



At large scale, no significant trend was found taking into account the whole community (Fig. 1a, TL > 2.0). However, when we analyse the gridded MTL, decreasing trends were found in almost 10 % of the sampling rectangles.



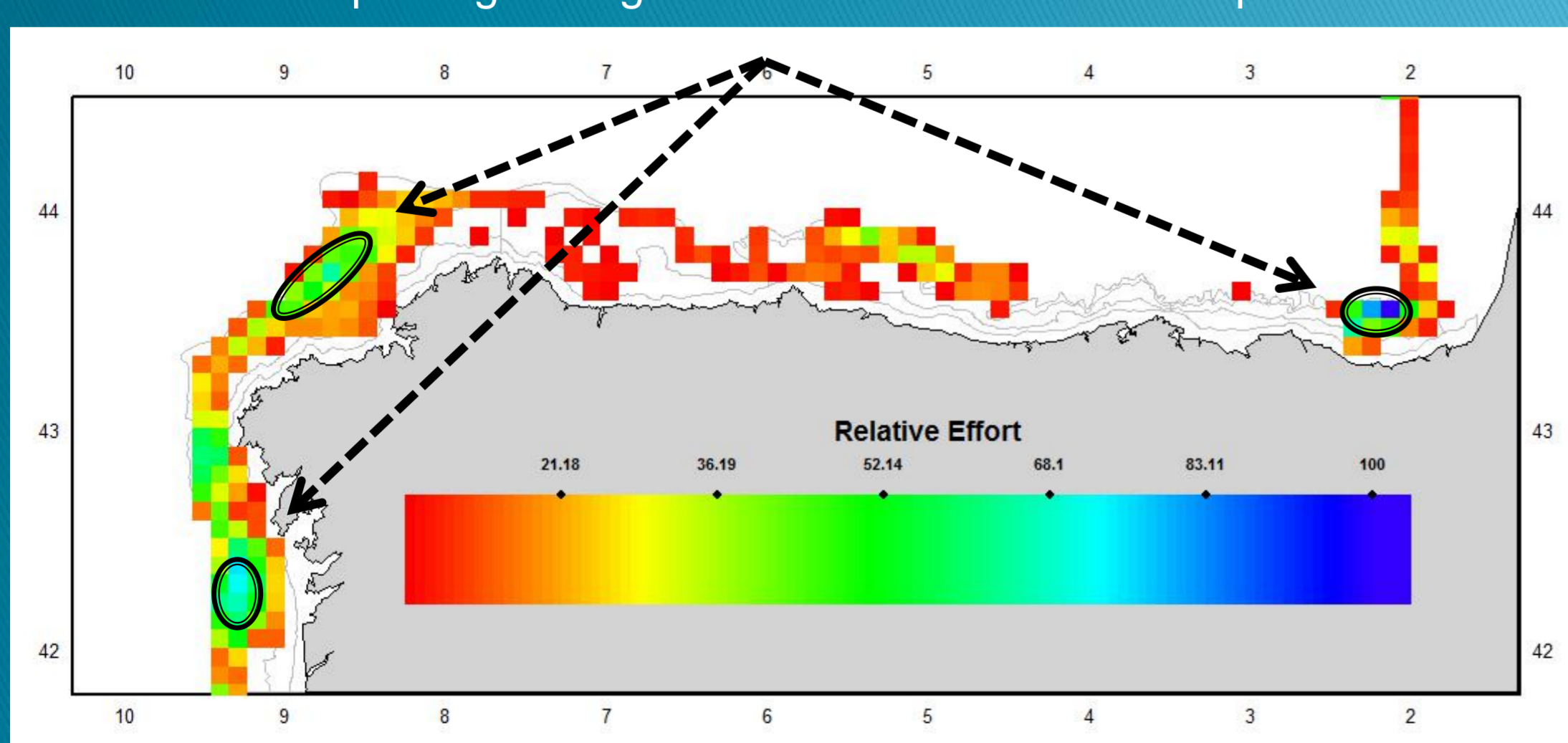
An increasing trend was observed at large scale when using the cut-off of 3.25 (Fig. 1b). The results of the gridded MTL showed also significant increasing trends in 15 % of the sampling rectangles. This pattern is observed across the study area.



The evolution of mean trophic level of top predators (Fig. 1c, TL > 4.0), showed a significant increase since the beginning of the series. However, almost 10 % of the sampling rectangles showed a decreasing trend.

## PRELIMINARY RESULTS ON GRIDDED VMS

The result of plotting fishing effort showed three most impacted areas.



### Main conclusions

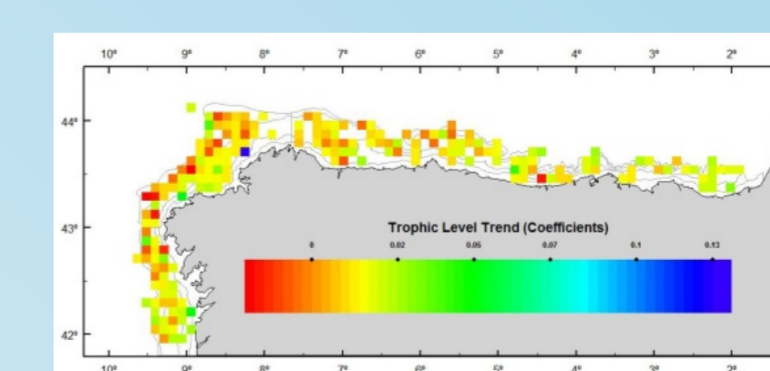
1. The analyses of the indicator at different scales showed different results, which gave us the opportunity to analyse in more detail what is happening in the mean trophic level of the community, from a food web perspective.
2. VMS data showed areas where fishing gear (otter trawl) are impacting in the soft bottoms of the continental shelf.

### Next step

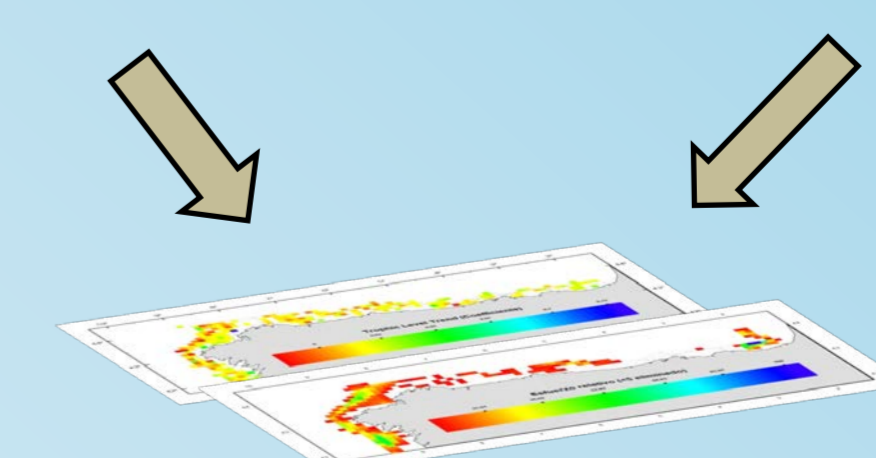
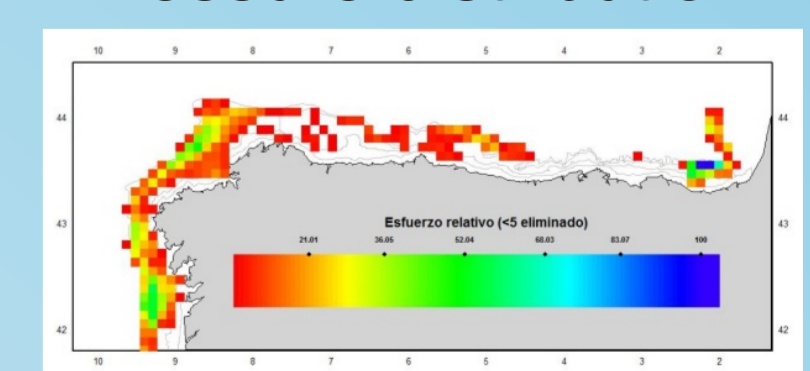
Combining and overlapping different layers we will be able to establish "impacted scales" according to the trends in the mean TL at a community scale: very low, low, medium low, medium, high medium, high, very high.

## NEXT STEP

### MTL trends



### Pressure distribution



### Impacted areas

