# Image Processing Applied to Temperature Pattern Identification

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NAUTILOS
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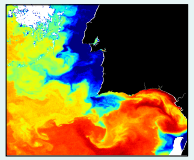
## Objective

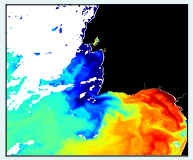
Detect and classify mesoscale patterns in an upwelling ecosystem by analysing Sea Surface Temperature (SST) maps coming from satellite data.

## Upwelling

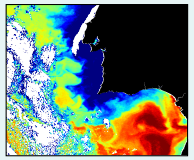
Upward vertical transport of cold and nutrient-rich waters by a combined effect of winds and the Earth rotation.



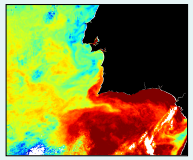
**E1** – cold water filament going westwards



**E2** – cold water filament going southwards



**E3** – cold current bypassing Cape St. Vincent

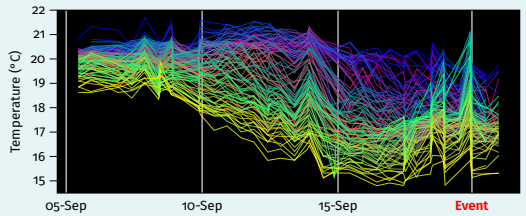


**E4** – warm counter-current bypassing Cape St. Vincent

## Dynamical analysis: spaghetti plot

Analysis of SST trend in a target area for 10–15 days before an event.

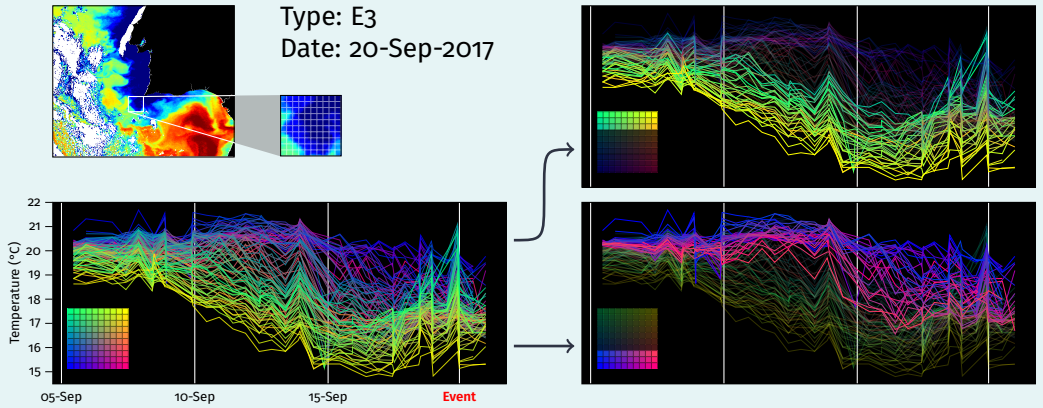
1. The area is divided in small squares.
2. For each square, its temperature is plotted against time.
3. All those plots are superimposed in a common reference system.

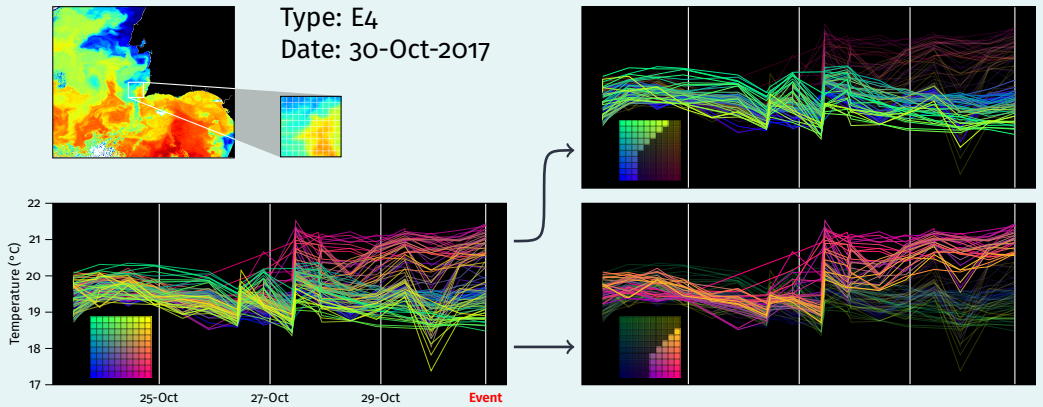



Colours are assigned to match each plot with the corresponding small square.

- Does the annual trend of SST influence the shape of the spaghetti plot? Little variation of the SST values, but the overall shape is mostly unchanged.
- What about the quality of the data coming from the satellites? Currently investigating the effects of "bad quality" data on our analysis.

## Identified patterns (examples)

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**Reference:** Marco Reggiannini, João Janeiro, Flávio Martins, Oscar Papini and Gabriele Pieri. "Mesoscale Patterns Identification through SST Image Processing". In: *Proceedings of the 2nd International Conference on Robotics, Computer Vision and Intelligent Systems*, 2021, pp. 165–172. DOI: 10.5220/0010714600003061