Contract: WP4-SYSMS-1101

Climate change and copepod size spectra:

Comparison of two coastal long-term series in the western Mediterranean Sea

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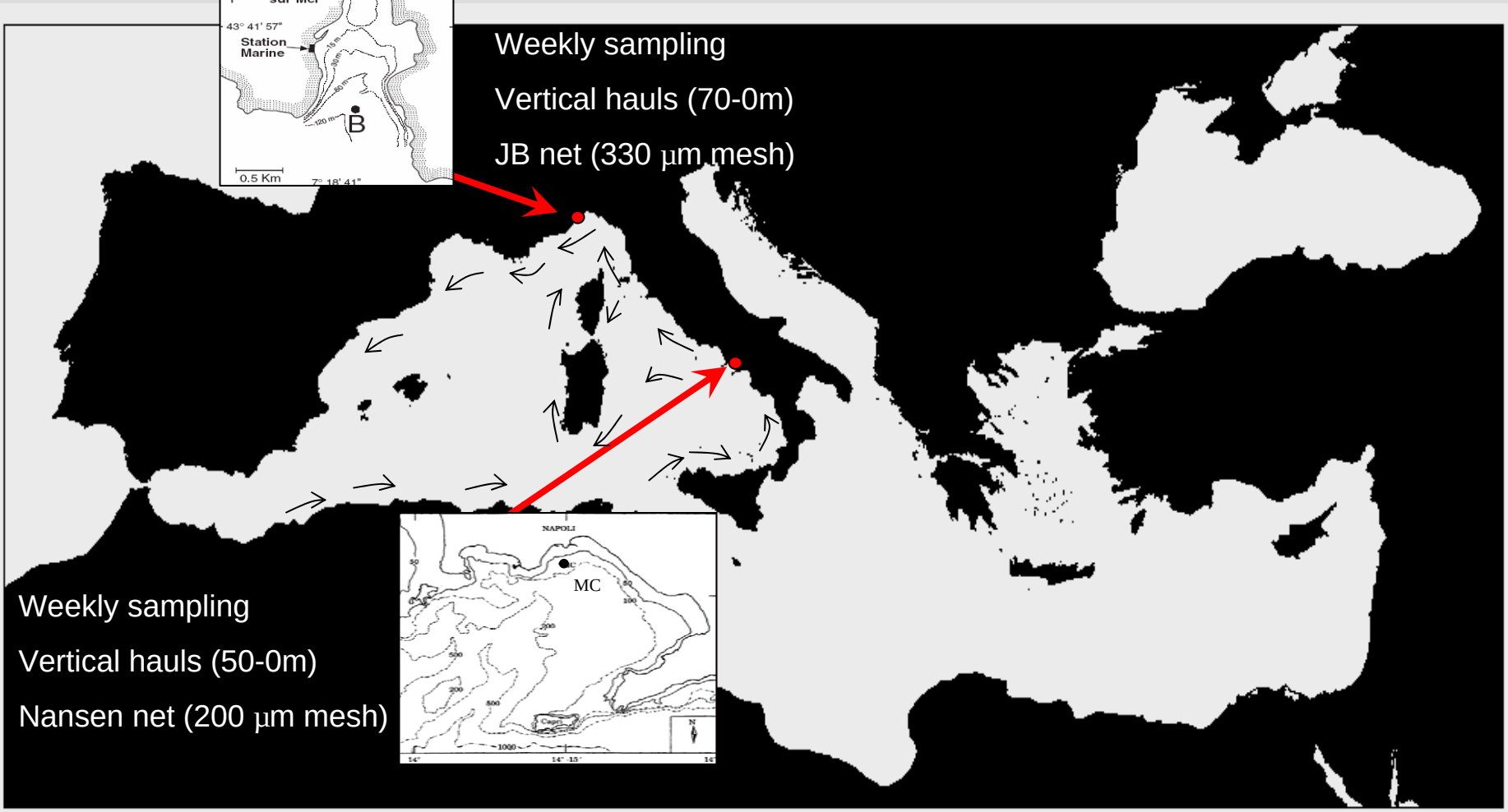
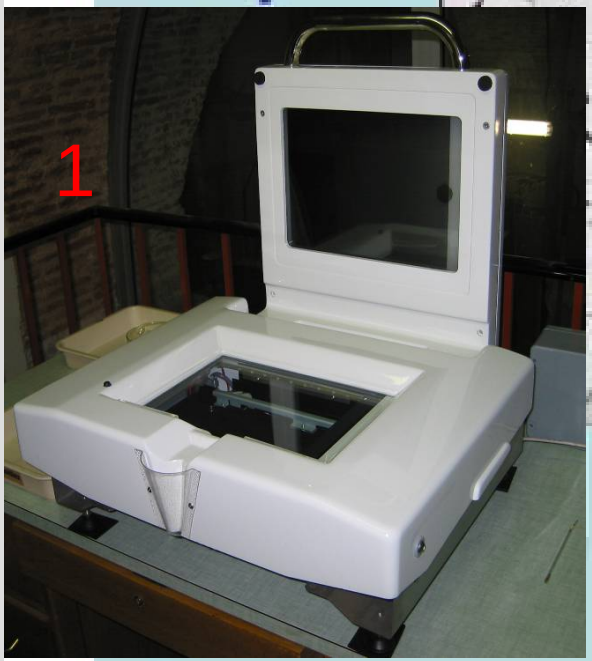
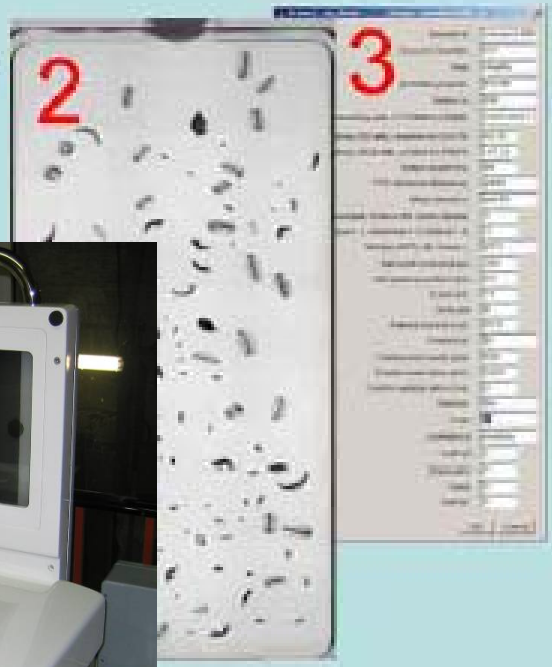
Sampling Sites

- **St.MC (Gulf of Naples, Tyrrhenian Sea) *from 1984 onwards***
- **Point B (Villefranche Bay, Ligurian Sea) *from 1966 onwards***



The Zooscan

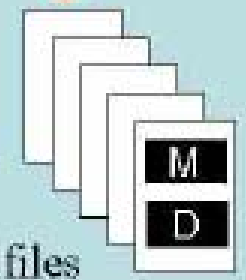




Supervised-Learning

(Random Forest Algorithm)

Training set vs Test set



n pid files

7

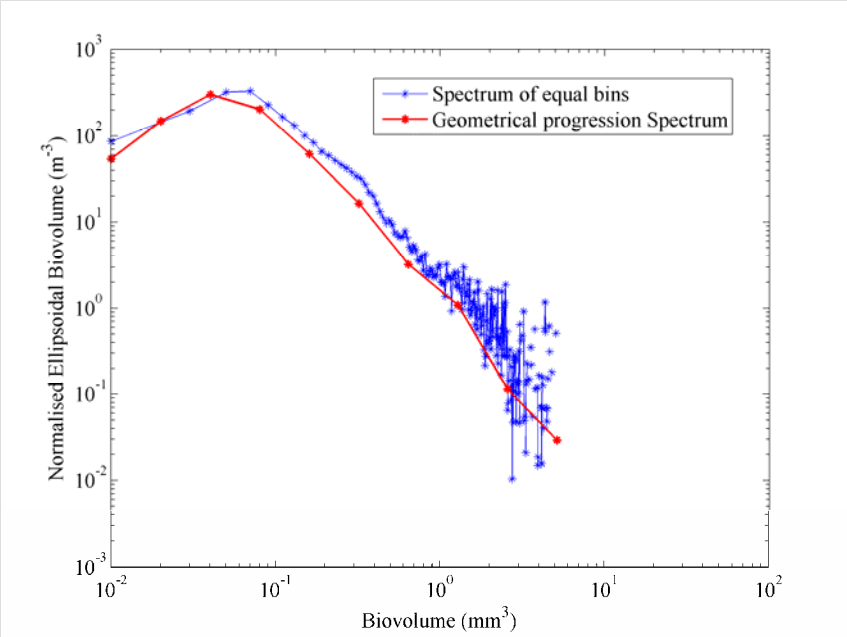
Structured variable with *n* record

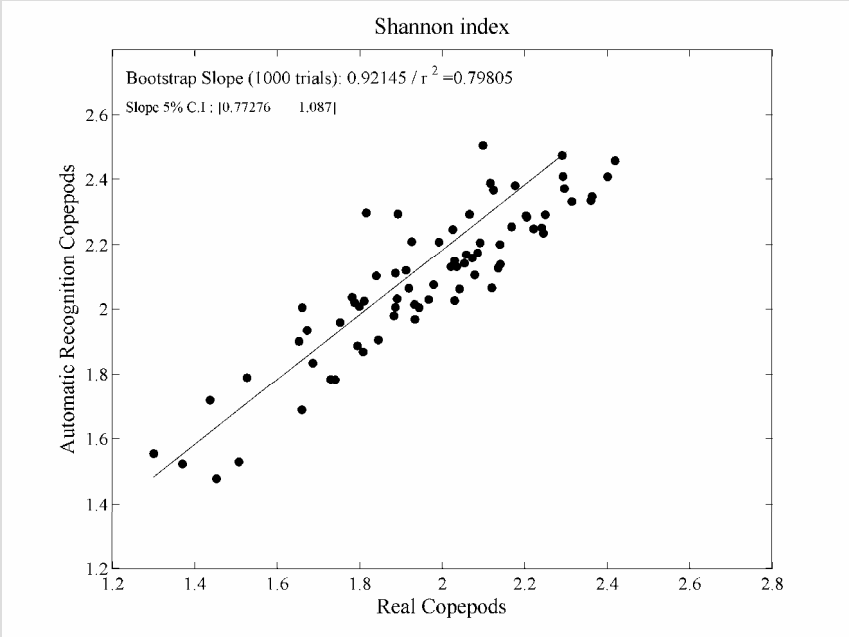
Datasets

Copepod Shannon index

Copepods: 96% recognition / 18% contamination

Abundance and size ⟶ NB-Size spectra ⟶ Sh.Index.on the bins from the mode





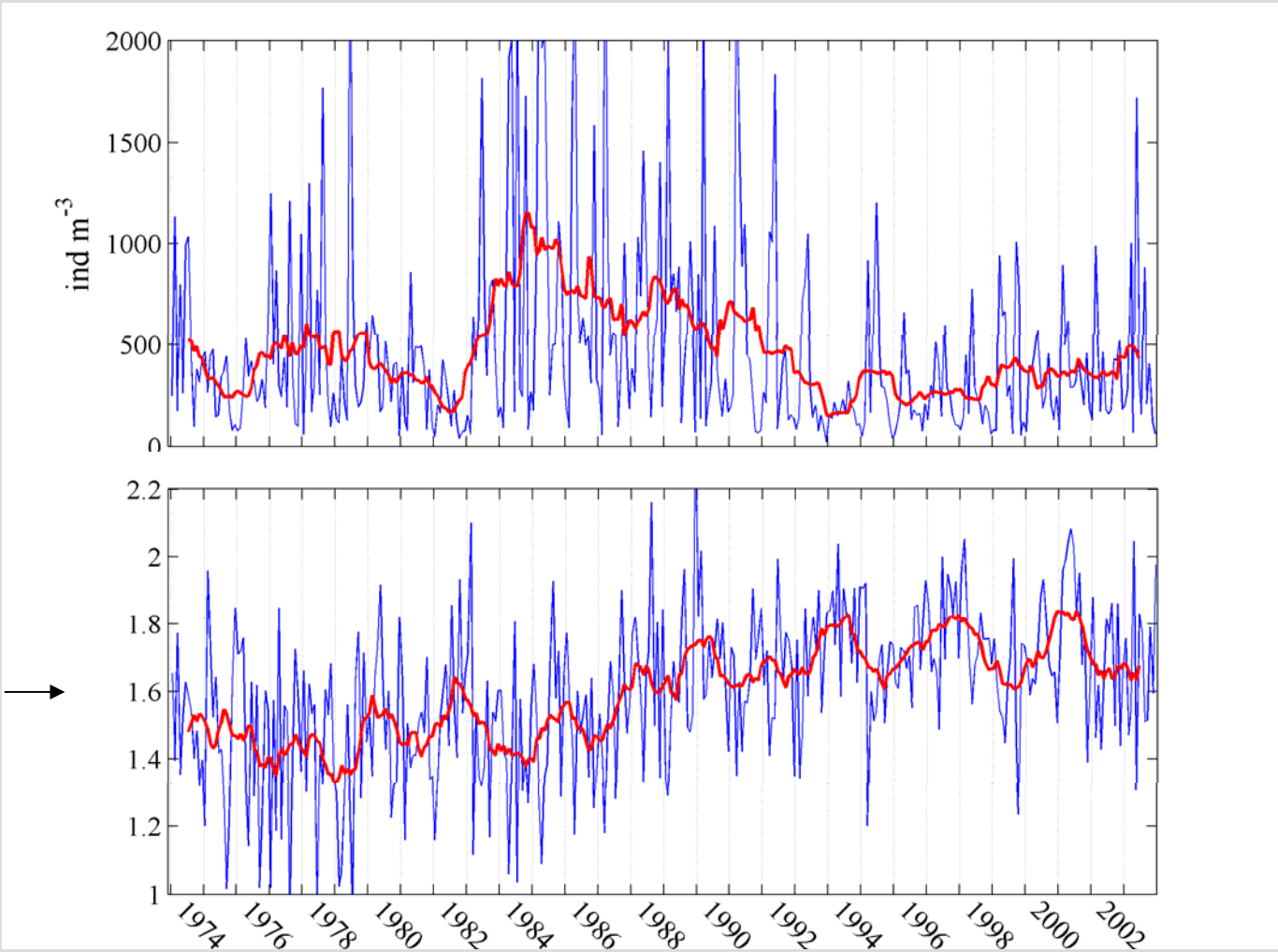
We can follow the copepod size distribution in a community by the Shannon index of the NB-s spectra of copepods automatically recognised

Higher Sh.index ~ expected higher proportion of large copepods

1 Size class ~ 1 Species

$$H' = -\sum p_i \log_2 p_i$$

Point B time series

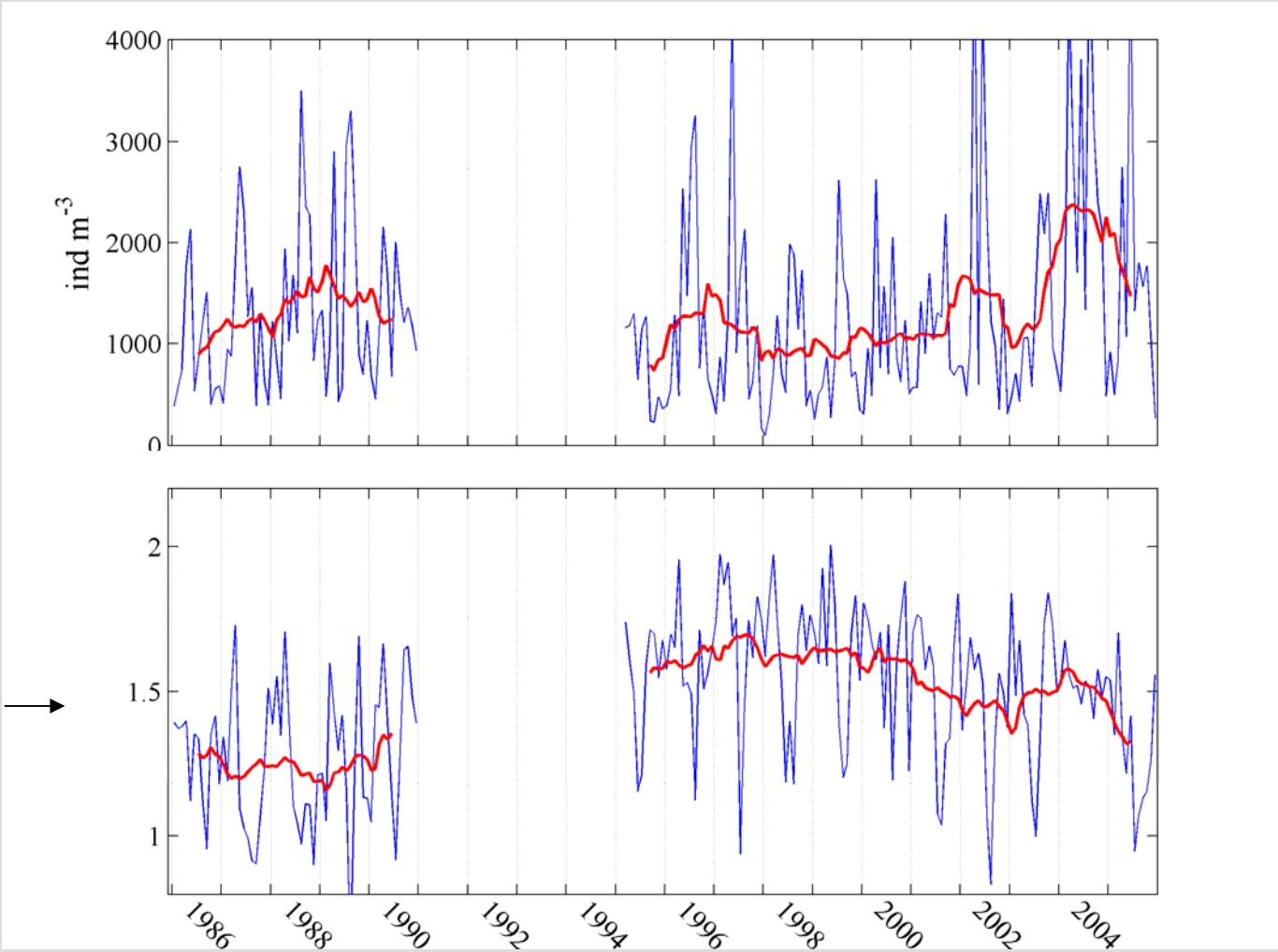


Size Diversity →

Increase of size diversity (~mean body size) in mid-80s and stabilisation in the ‘90s

Higher frequency of appearance of large copepods (>0.32 mm3) from the early ‘80s and strong decrease of small copepods’ abundance in the ‘90s

St. MC time series

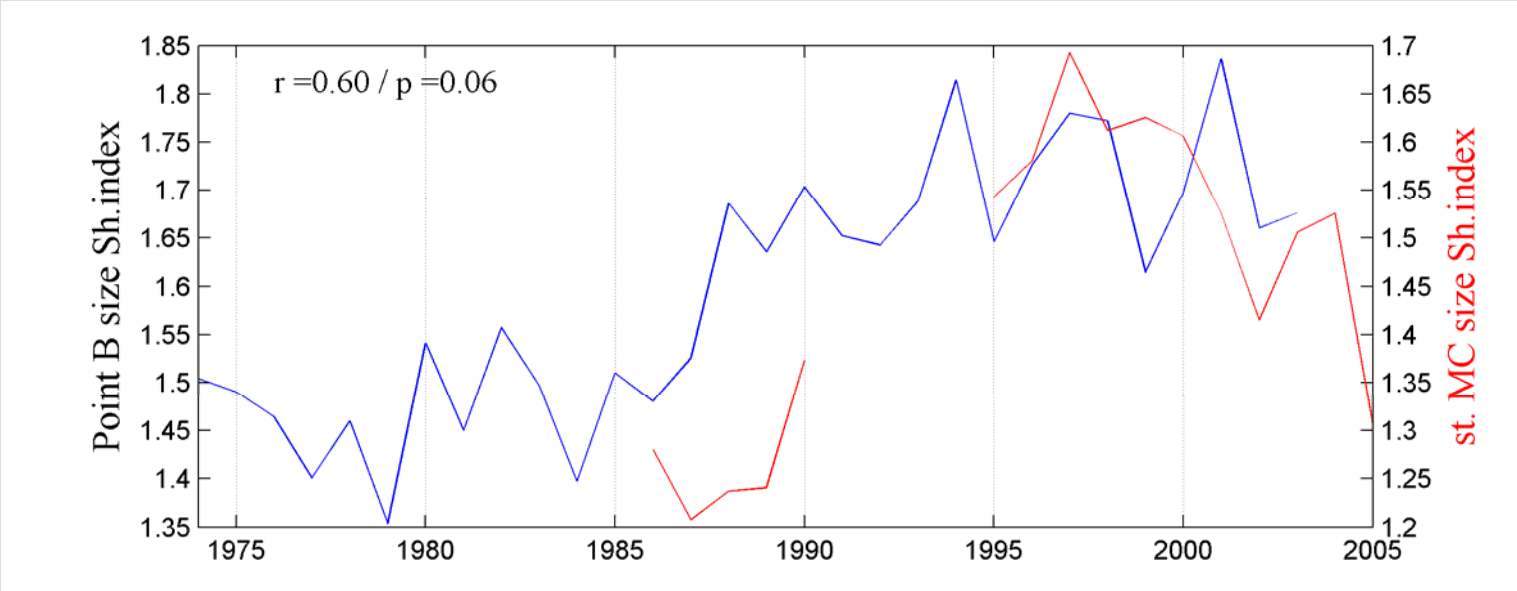


Size Diversity →

Higher size diversity after the 90s' major sampling interruption

Abundance and size-diversity trends are opposite (smaller organisms are more abundant)

Comparison of copepod size

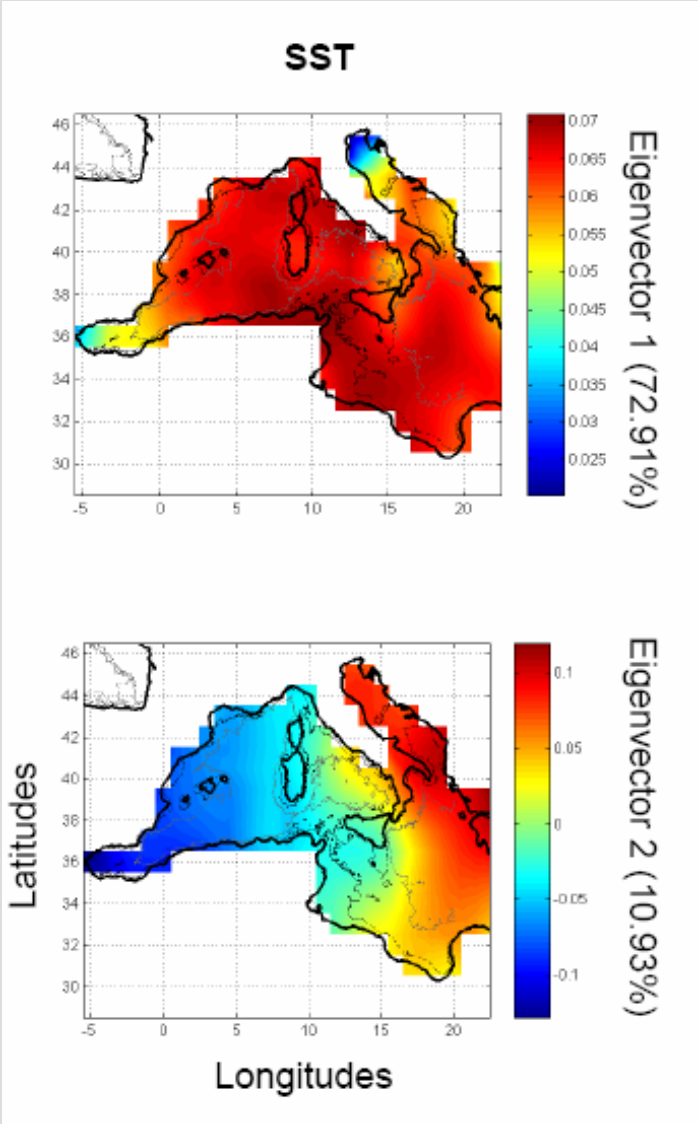


Common larger mean body size in the 90s

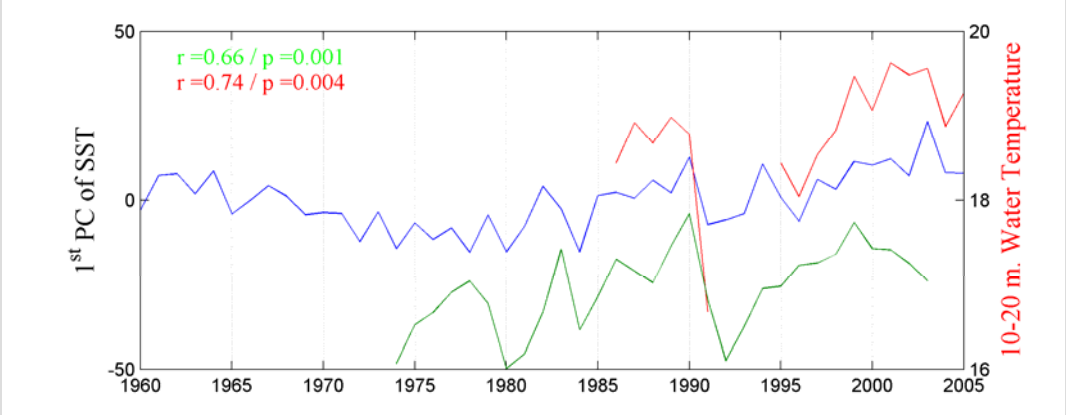
NBs-spectra shannon index positively correlated

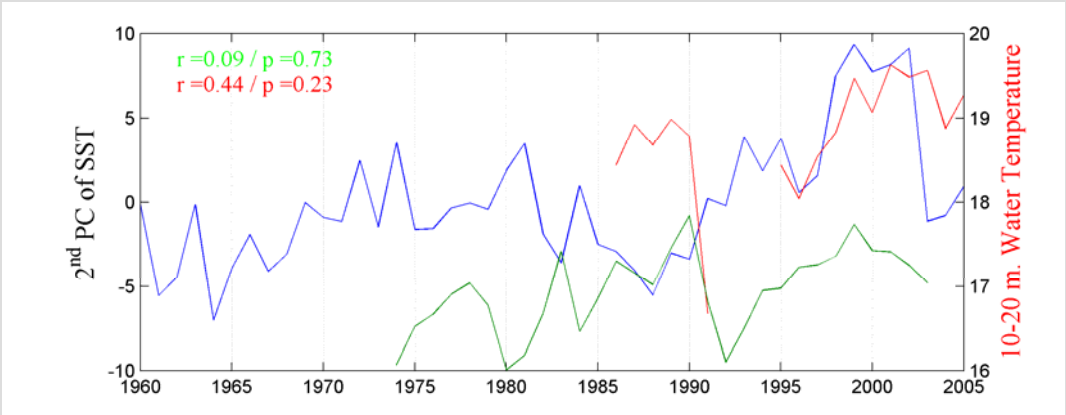
Is there a common environmental forcing at basin level for both time series?

Basin scale climate



stMC and Point B water T vs. 1st and 2nd modes of the basin SST

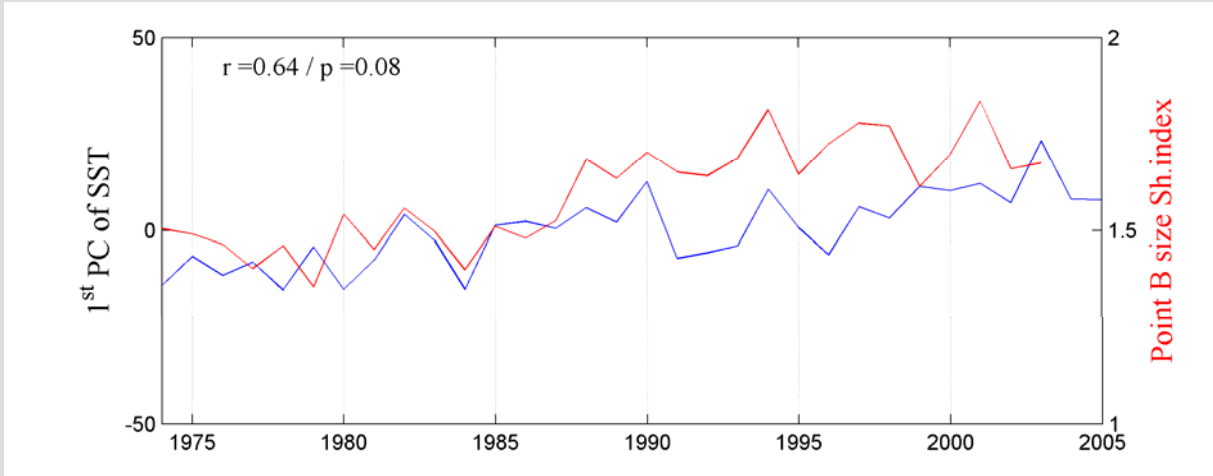




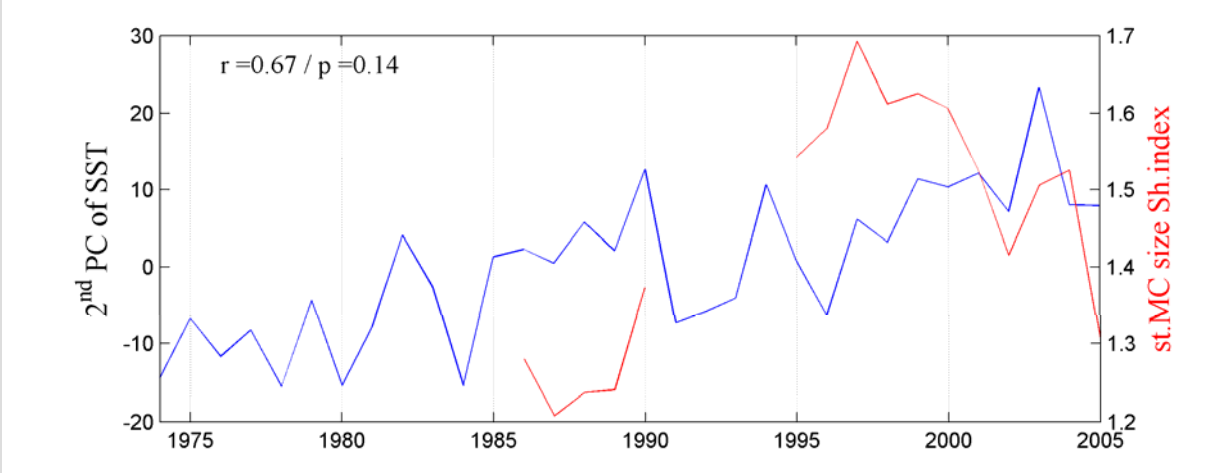
Different temporal pattern in the western and eastern basins expresed by the second mode (an event occured in the Eastern basin and not in the Western) Naples is in the boundary of the effect of this event

Copepod size and basin scale climate

Point B



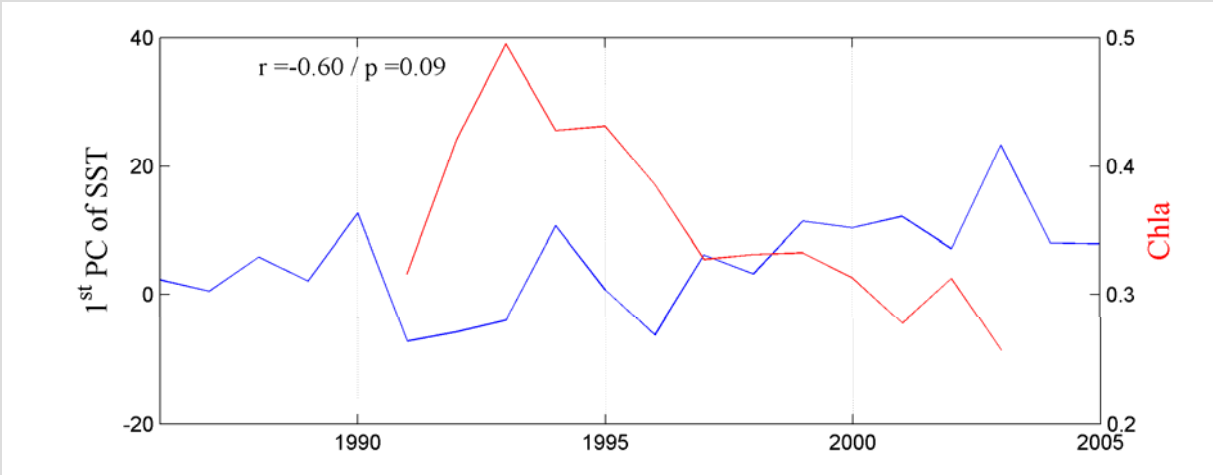
St MC



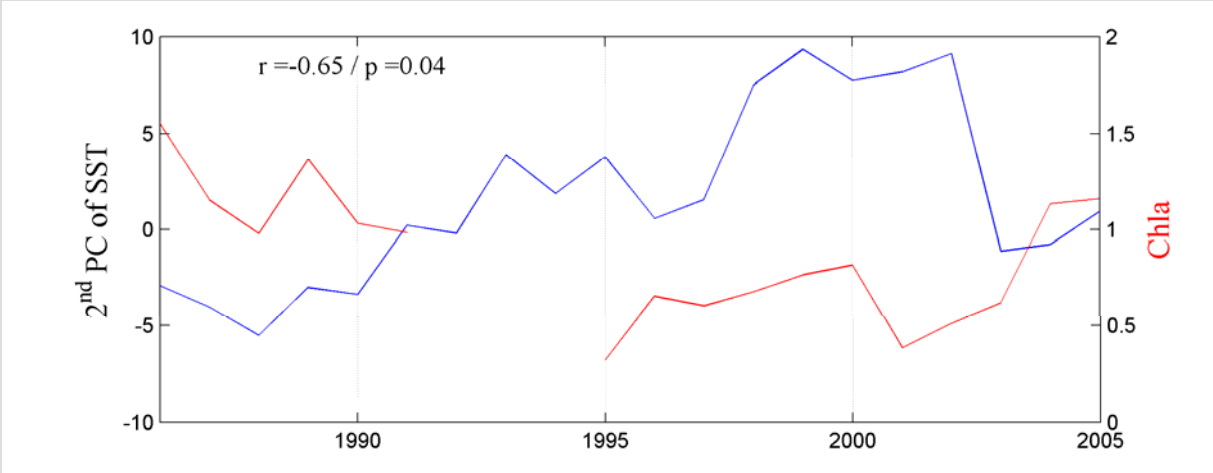
Size diversity in Villefranche is correlated with the 1st PC whereas the one in Naples is correlated to the 2nd PC which would indicate a local event in the Eastern basin

Primary production and basin scale climate

Point B



St MC



Higher water temperature: Lower primary production

Same pattern as for copepod size. St MC phytoplankton is influenced by the 2nd PC whereas Point B by the basin general trend

•Copepod size spectra in both time series have shifted to a higher proportion of large organisms

•It seems that the mechanisms forcing these changes are different in both locations

•Primary production has decreased in both locations due to higher water temperatures

•The gulf of Naples is in a climatological boundary: it seems copepod community has been influenced by an event occured in the eastern part of the basin

•Could the pattern represented by the SST’s 2nd PC be related to the EMT event?

Any questions?

Thank you for your attention!

Thank you also to Eur-oceans

And

Thank you to both teams:

G.Gorsky's team in Villefranche

and

M.Ribera d'Alcalá in Naples