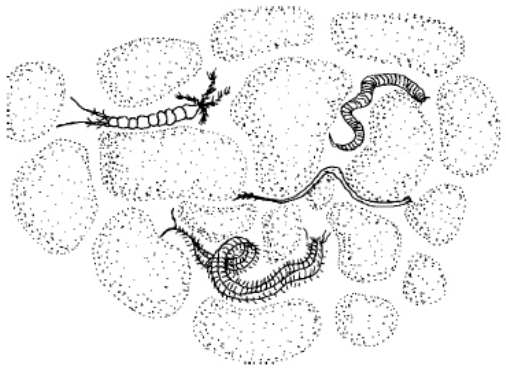
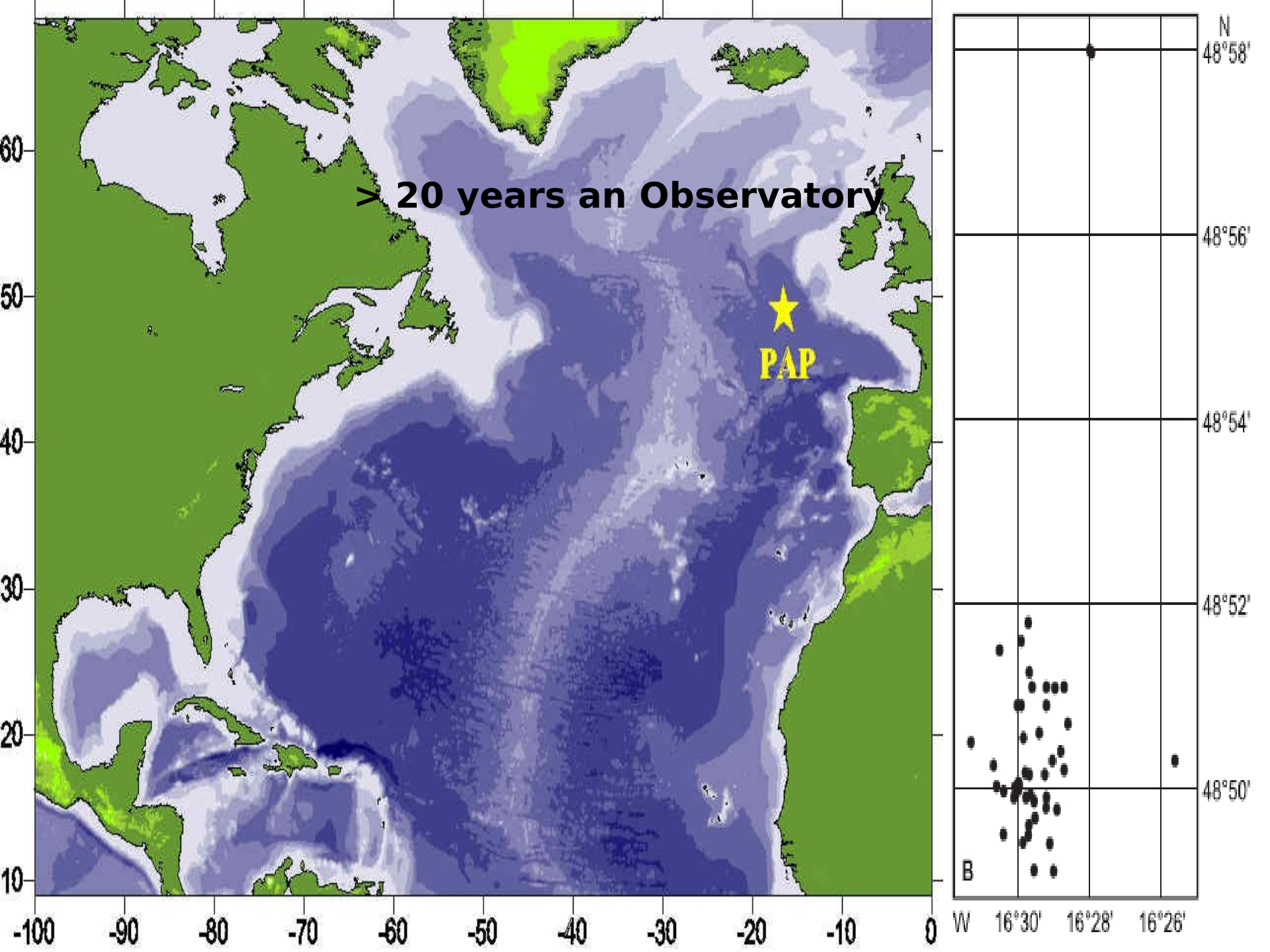
Temporal changes in community structure and diversity of deep sea Nematodes and Copepods at the Porcupine Abyssal Plain, NE Atlantic: a fifteen-year period study (1989-2004).

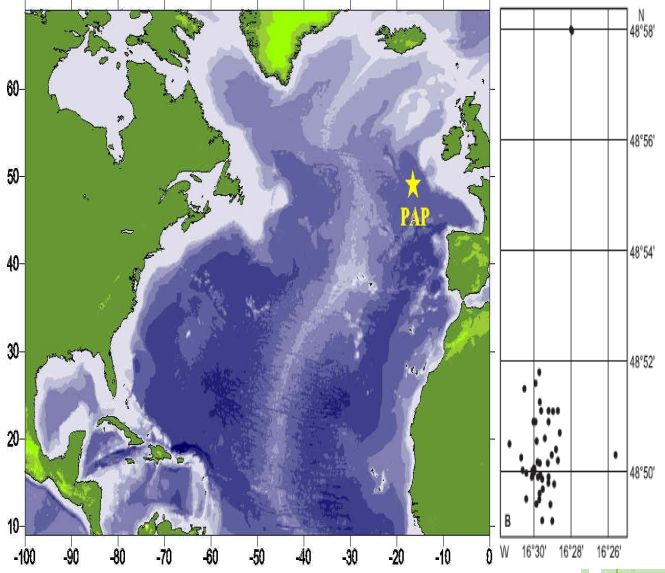
V. Kalogeropoulou, D.S.M. Billett, A. J. Gooday, N. Lampadariou,
P. Martinez Arbizu, A. Tselepides, A. Vanreusel




> 20 years an Observatory
PAP
60
50
40
30
20
10
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
N
48°58'
48°56'
48°54'
48°52'
48°50'
B
W
16°30'
16°28'
16°26'

The Porcupine Abyssal Plain Observatory

§ 270 km SW of Ireland
§ 48°50’ N, 16°30’ W
§ 4850 m water depth
§ No topographic undulations
§ Strong seasonal POM fluxes (Lampitt et al., 2010)
§ Current speed ~ 3.5 cm/s (Vangriesheim et al., 2001)
§ Foraminiferal ooze (MD 8-8.6 µm) (Varnavas et al., 2001)
§ Sedimentation rate ~3.5 cm/ky (Rice et al., 1991)
§ O2 : ~266 µmol/l (SWI) ~25 µmol/l (6-10 cm depth) (Witbaard et al., 2000)
§ TOC: 0.35% (Rabouille et al., 2001; Lampitt et al., 2010)
§ C:N ratio 4.8 - 7.8 (Santos et al., 1994; Lampitt et al., 2010)



Objectives

Investigate the temporal changes and compare the behaviour and response of nematode and Harpacticoid copepod assemblages in terms of:

ü Species composition

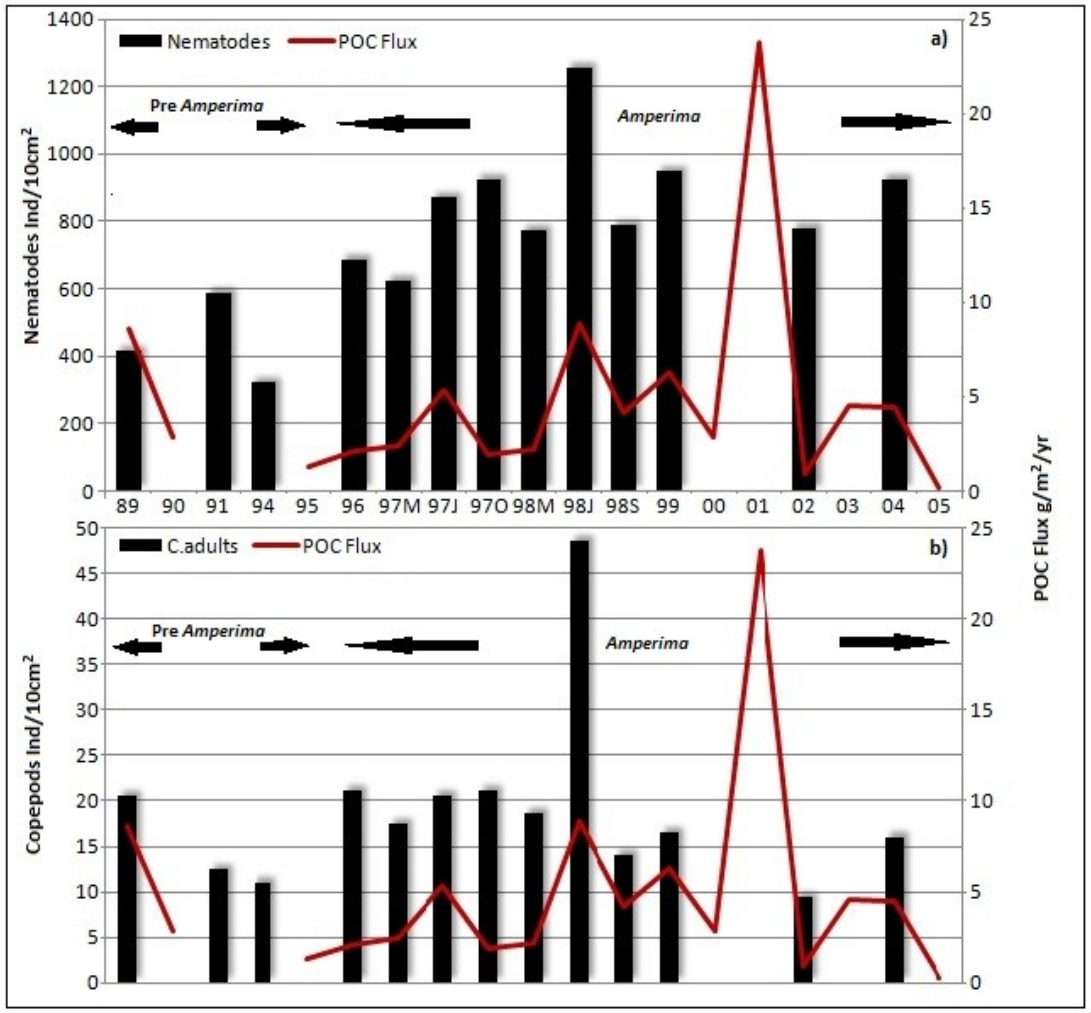
ü Sex ratio

ü Diversity patterns

Meiofaunal assemblages composition

Nematodes (70.6% - 94.7%) - (p≤0.001) years, cruises, periods
Harpacticoid copepods (3.6% – 22.9%) - (p≤0.001) years, cruises

Increasing trend, with interannual fluctuations
BIOENV (r: 0.531) - TPN Flux, % SiO2 and % CaCO3.



Spearman Correlation

Nematodes:
+ (p≤0.05) – PIC, Bsi

Harpacticoids:
+ (p≤0.001) - DW, PIC, BSi fluxes and %SiO2 and (p≤0.05) - POC flux and Opal: Calcite ratio

Copepodites and nauplii:
- (p≤0.05) PIC and BSi

Temporal changes in species composition

6,325 nematodes – 208 sp. – 92 genera – 28 families
772 adult copepods – 241 sp. – 82 genera – 23 families
group of comparatively more abundant species which densities presented interannual fluctuations and/or substitution between the two periods

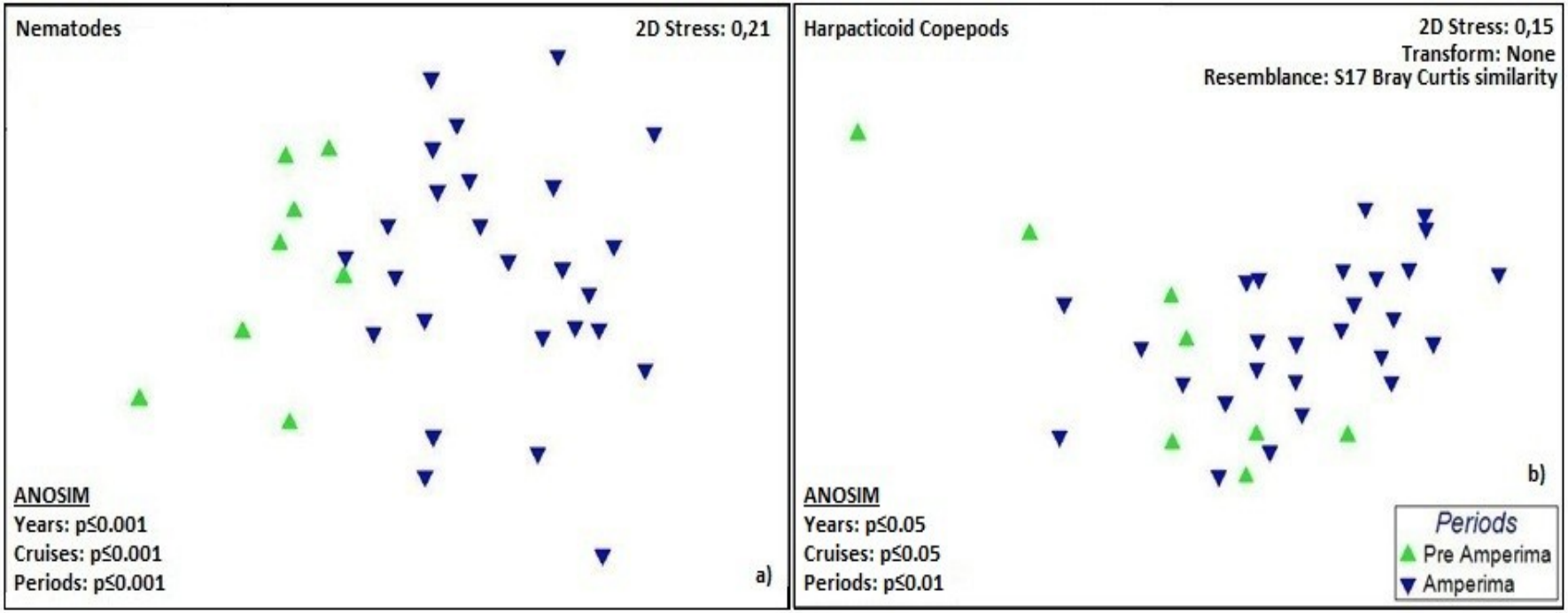
4 Acantholaimus species
Chromadorita sp. 2
Desmoscolex sp. 1
5 Halalaimus species
Linhystera sp.1
Manganonema sp. 1
Metadesmolaimus sp. 1
Neochromadora sp. 1
Oxystomina sp. 1
Pomponema sp. 1
Prochromadorella sp. 1
2 Quadricoma species
Syringolaimus sp. 1
3 Thalassomonhystera species

Argestigens glacialis
Boreolimella n. sp. 1
Bradya (Bradya) scotti , B. (B.) typica
Cylindronannopus primus, C. n. sp.
Ectinosoma carnivora
Halectinosoma sp. 1
Microsetella norvegica
Nematovorax gebklinae
Peresime n. sp. 1
Pseudobradya baroisi
Pseudomesochra n. sp. 5
Selenopsyllus sp. 1
Sigmatidium n. sp. 1
Tachidiella n. sp. 1

BIOENV showed weak correlations of nematode and copepod communities with
PIC flux, % SiO2 and C:N ratio (r: 0.404 and r: 0.323 respectively)

Temporal changes in species composition

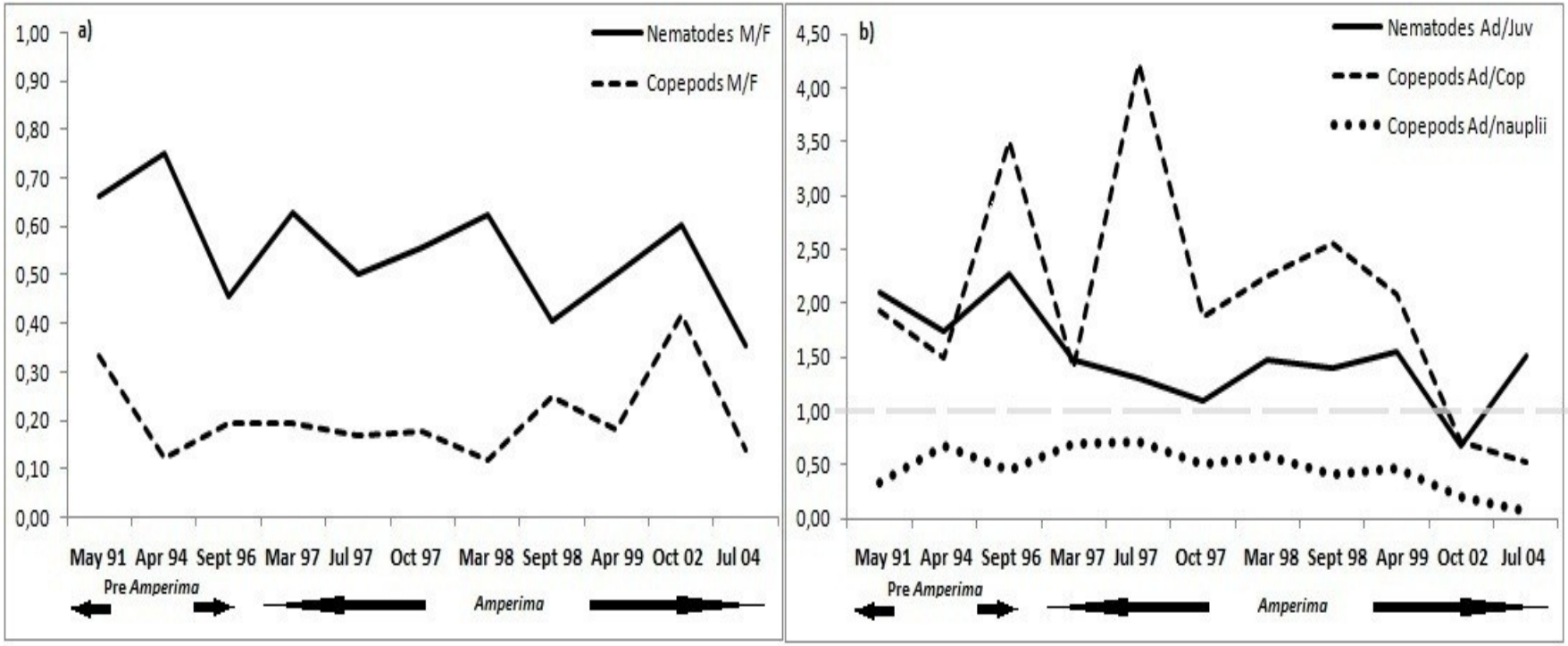
Nematodes:
SIMPER analyses showed 57% dissimilarity with low contribution - lack of dominance



H. copepods: SIMPER analyses showed 90% dissimilarity with a minimum contribution
Complete lack of dominance in the copepod assemblages

Temporal changes in sex ratio

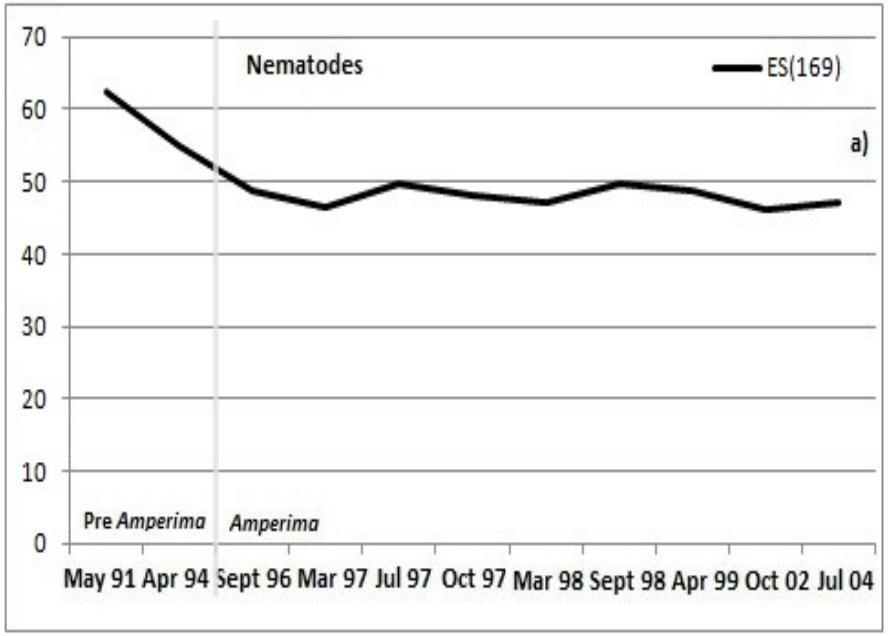
Nematodes: 61% adults / 39% juv.
M/F: interannual fluctuations and significant variation ($p \leq 0.05$)
between periods Adult/Juv.: significant decrease with time ($p \leq 0.01$)

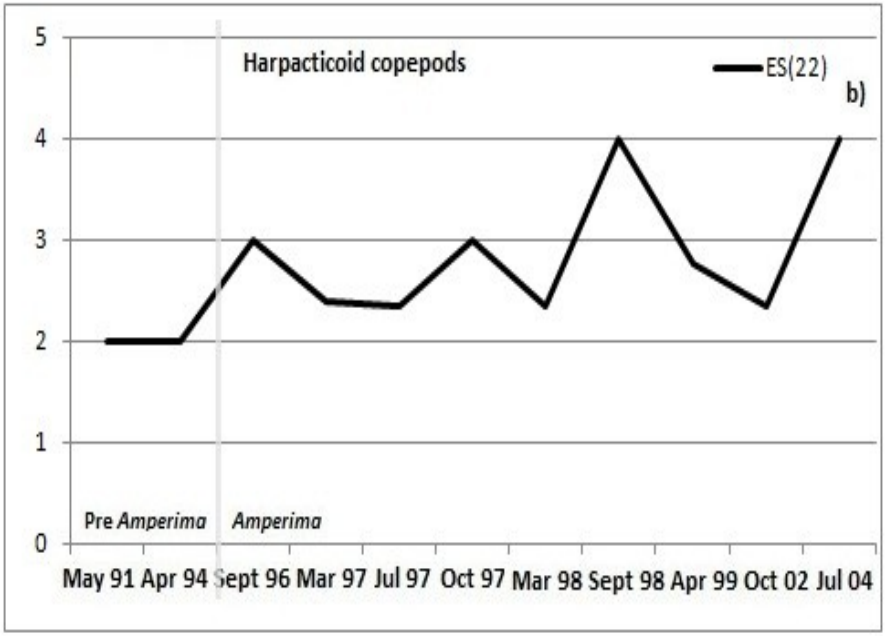


Copepods:26% adults / 14% copepodites / 60% nauplii
Adult/copepodite showed significant variation ($p \leq 0.05$)
Adult/nauplii showed significant ($p \leq 0.05$) increase during the *Amperima* period

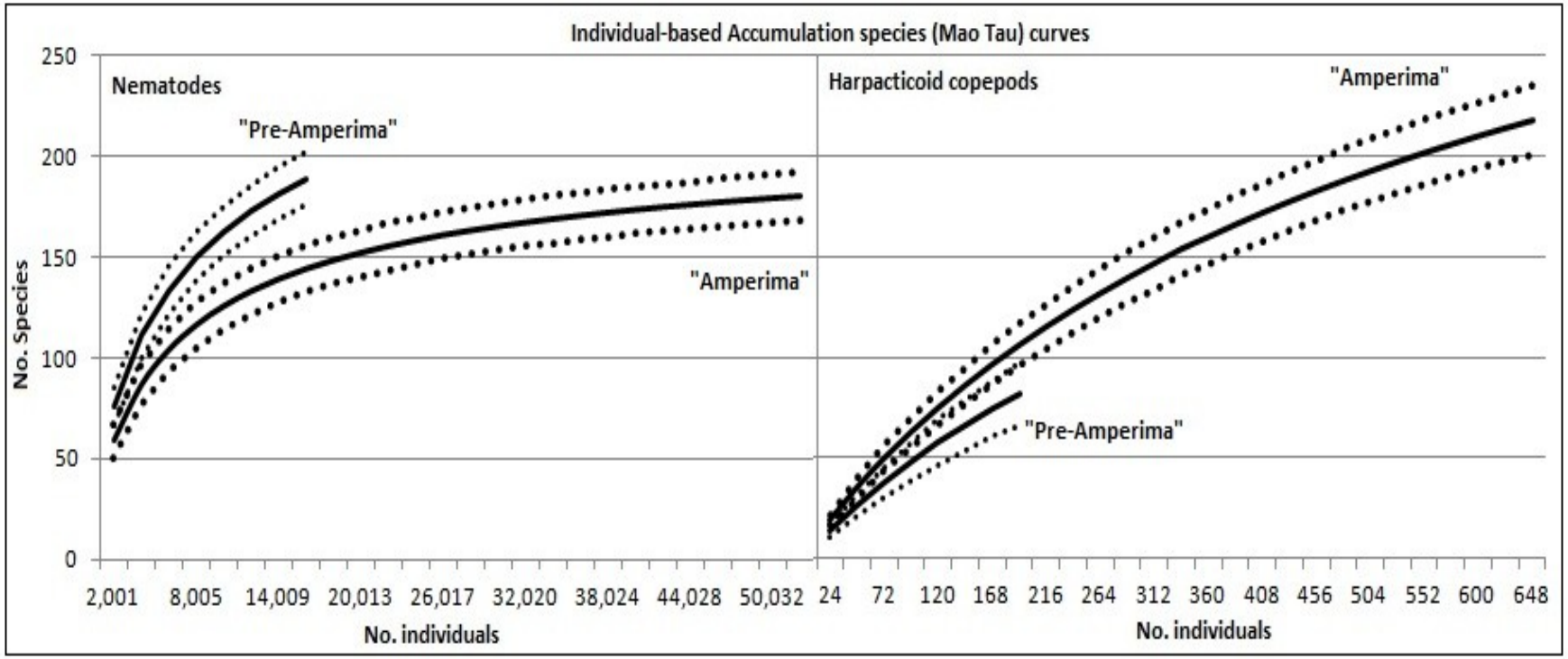
Temporal changes in Diversity

Es(n)

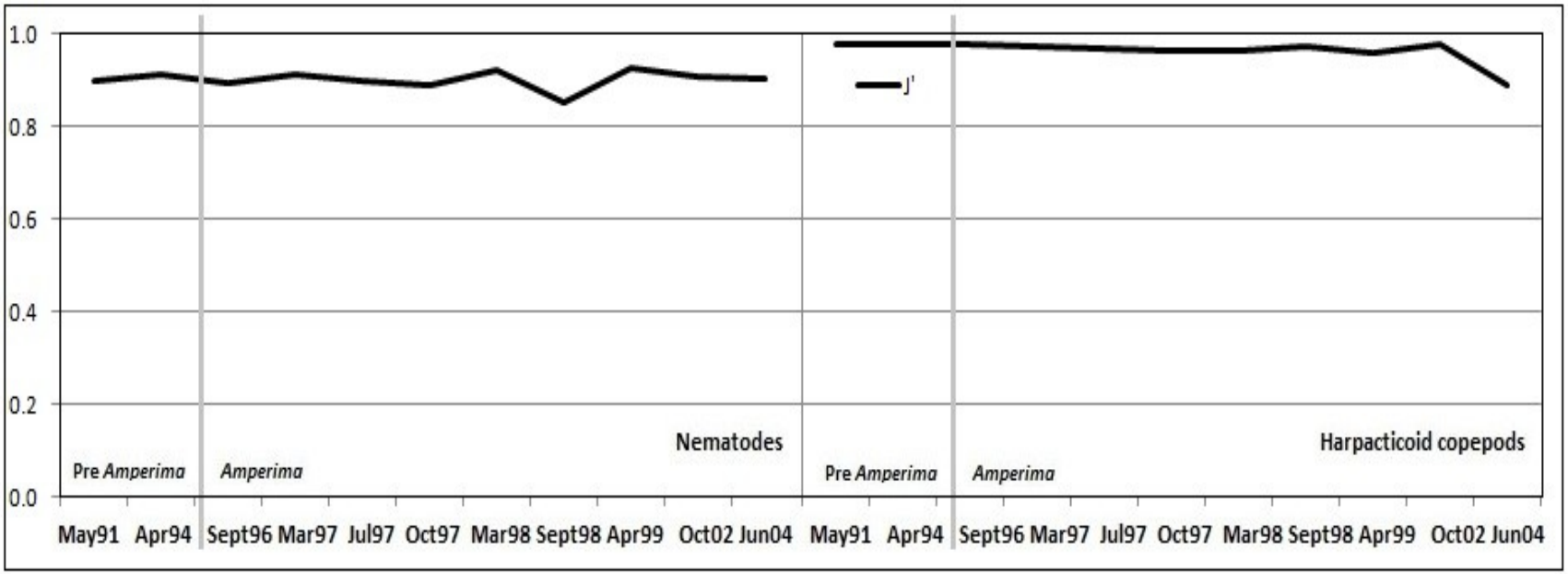




Species richness

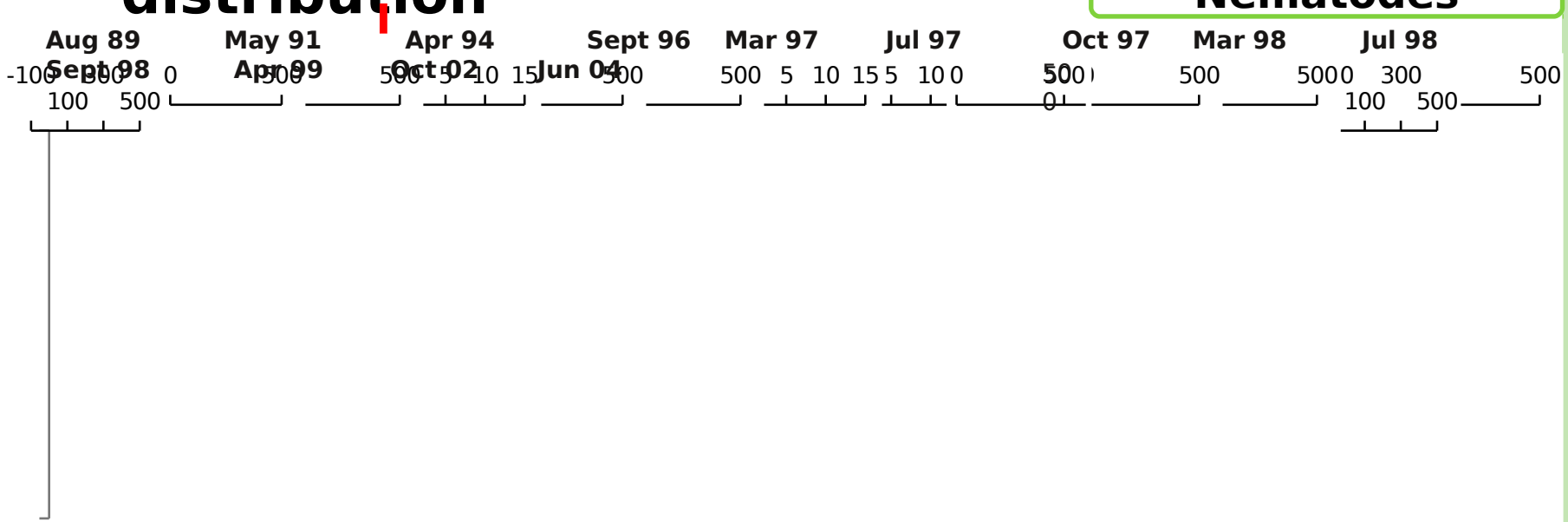


Evenness J’

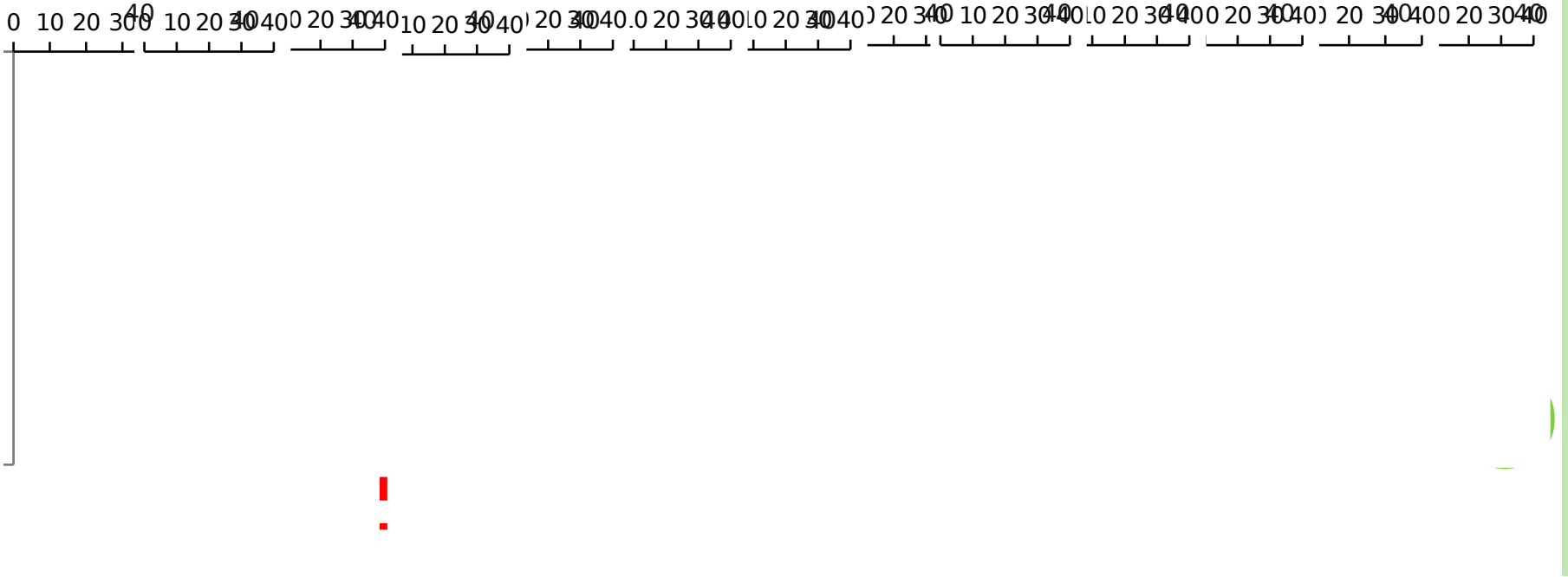

1.0
0.8
0.6
0.4
0.2
0.0
J'
Nematodes
Harpacticoid copepods
Pre Amperima
Amperima
Pre Amperima
Amperima
May91 Apr94 Sept96 Mar97 Jul97 Oct97 Mar98 Sept98 Apr99 Oct02 Jun04
May91 Apr94 Sept96 Mar97 Jul97 Oct97 Mar98 Sept98 Apr99 Oct02 Jun04

Vertical distribution

Nematodes



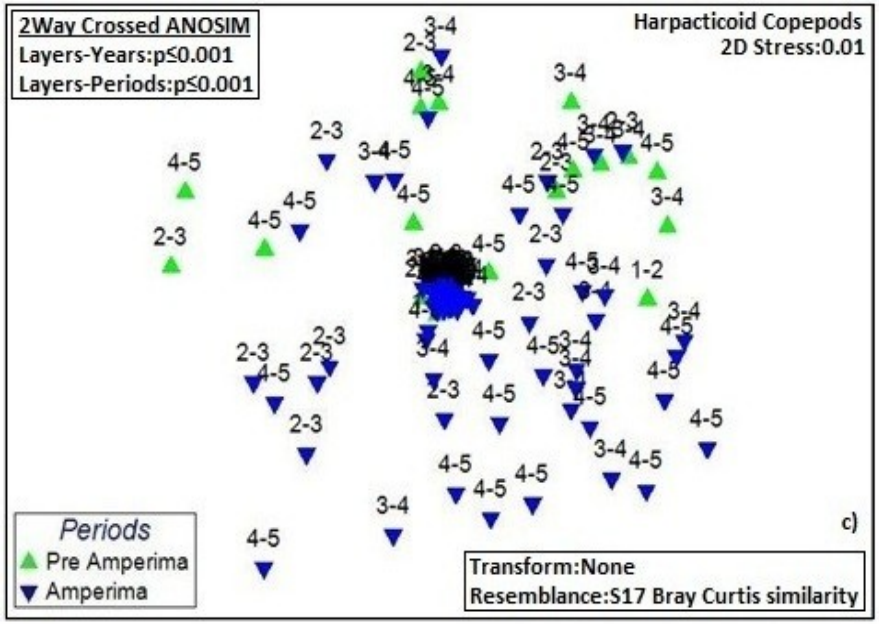
Copepods

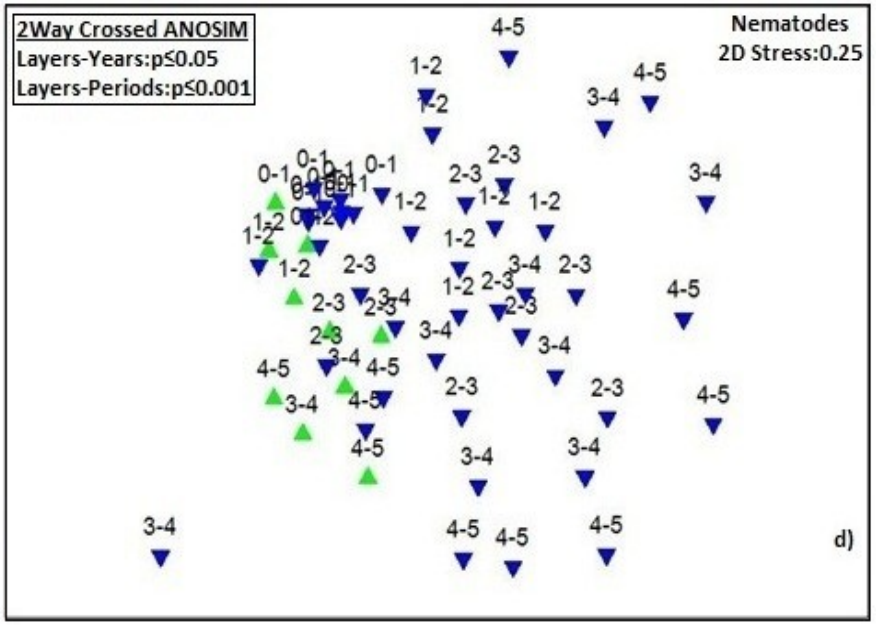


Vertical distribution

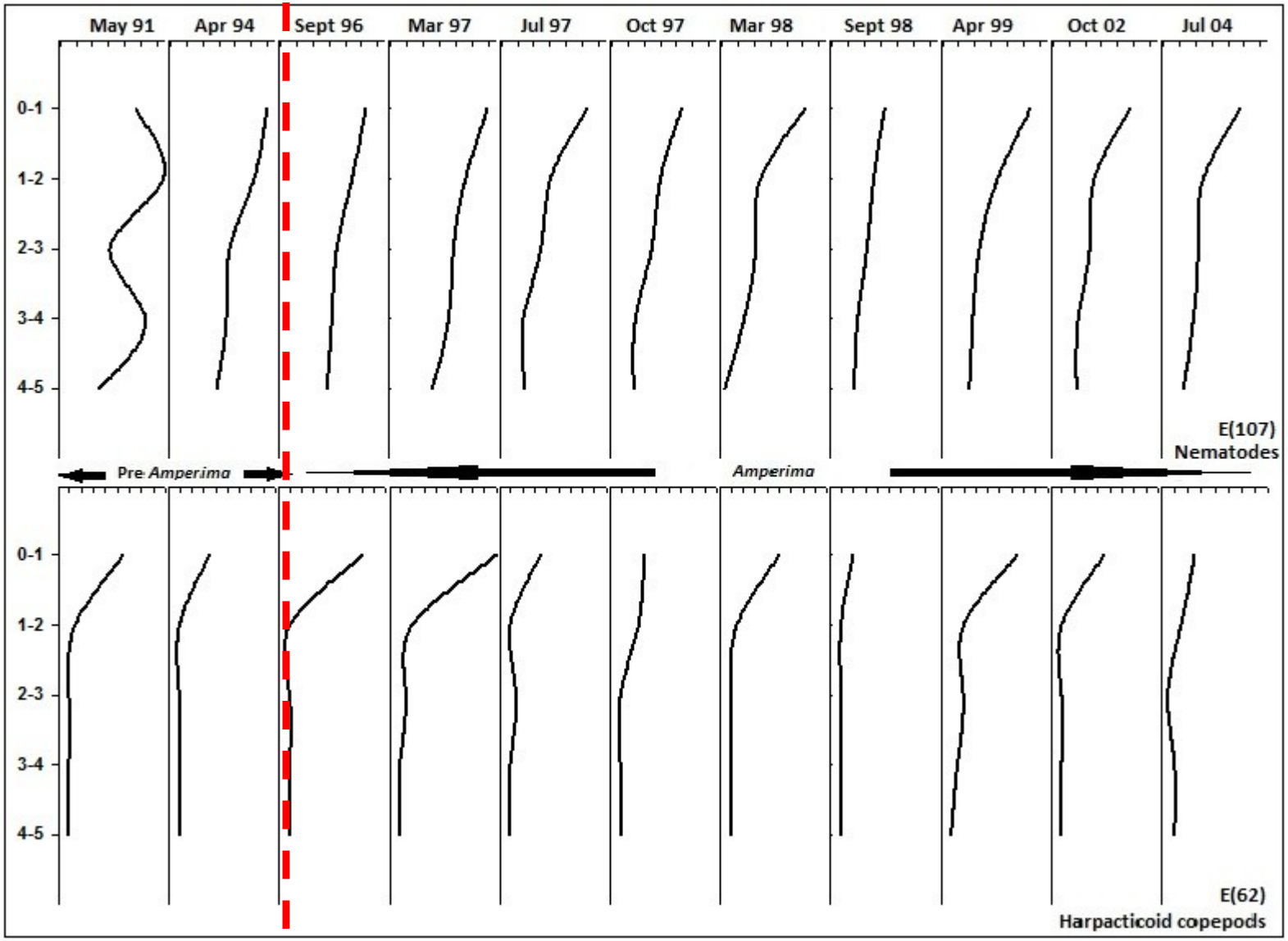
Nematodes are more evenly distributed vertically into the sediment.

Copepods are aggregated in the 0-1 cm, showing variation of the assemblage in the deeper layers.





Vertical distribution: Diversity patterns



Conclusions

- **Nematode densities increased by three-fold since 1996 influenced by the variability of organic fluxes (Lampitt et al., 2010) whereas copepods do not show any temporal variations.**

- **Correlations however with fluxes were found to be rather weak, while their peaks do not seem to coincide indicating time lag responses.**

- **Females dominate the populations throughout the time series**

- **Nematode juveniles and all developmental copepod stages showed significant increase with time indicating a continuous and intense reproductive activity. Thus, reproduction must have played an important role in abundance regulation.**

Conclusions

- **Both assemblages are not characterised by dominance. More abundant species vary in abundance revealing a community shift (substitution of rare species) between the two periods but however species seem to be evenly distributed through time.**

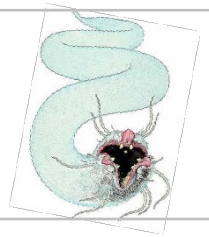
  - **Nematodes: significant increase of the most abundant after 1996 and substitution of rare species between the two periods although species richness decreases after the Amperima event,**

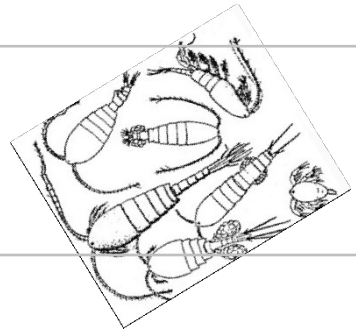
  - **Copepods: low abundances with no temporal variation Species richness increases during 1996-2004 as more than 50% of singletons appear only then.**

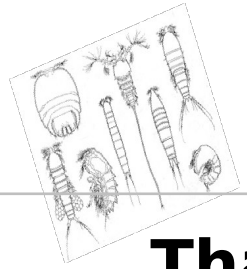
- **Meiofaunal assemblages DO vary through time but NOT as strongly as expected.**

- **Nematodes and Copepods DO respond differently**

- **Metazoan Meiofaunal communities seem relatively STABLE over time.**







Thank you for your attention!