



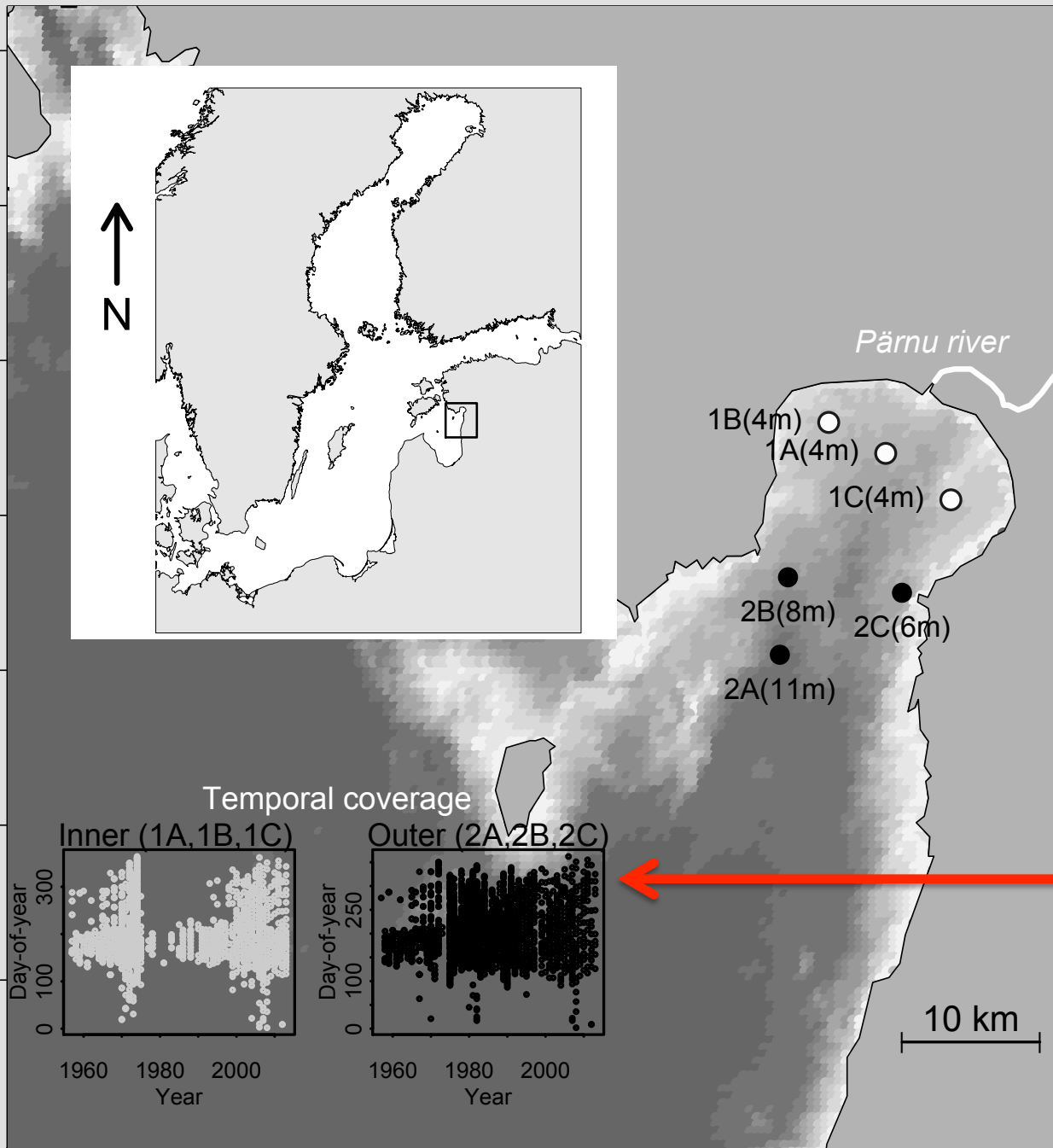
Climate effects on small copepods

Riina Klais, Saskia A. Otto, Marilyn Teder,
Mart Simm, Henn Ojaveer



Pärnu Bay (Baltic Sea)

>4000 zooplankton samples, biweekly to weekly

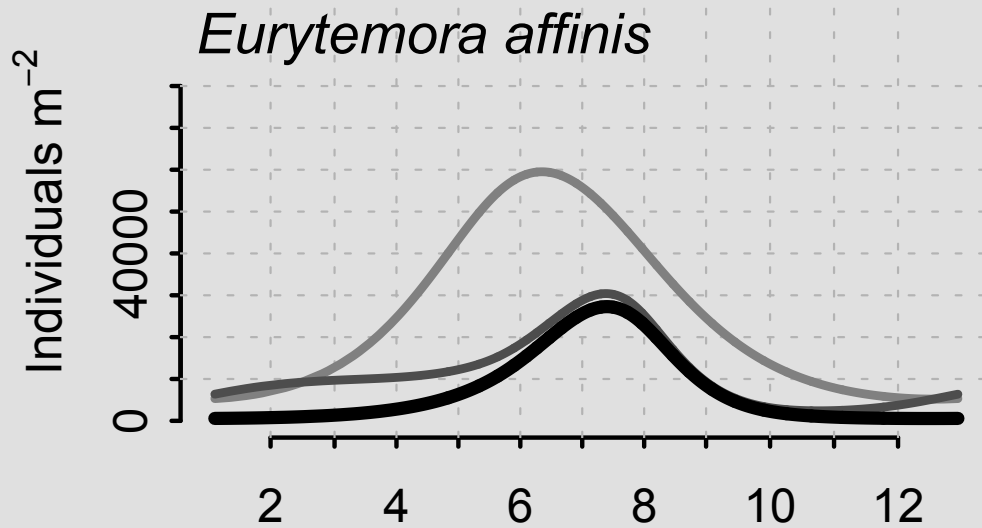


Sampling times

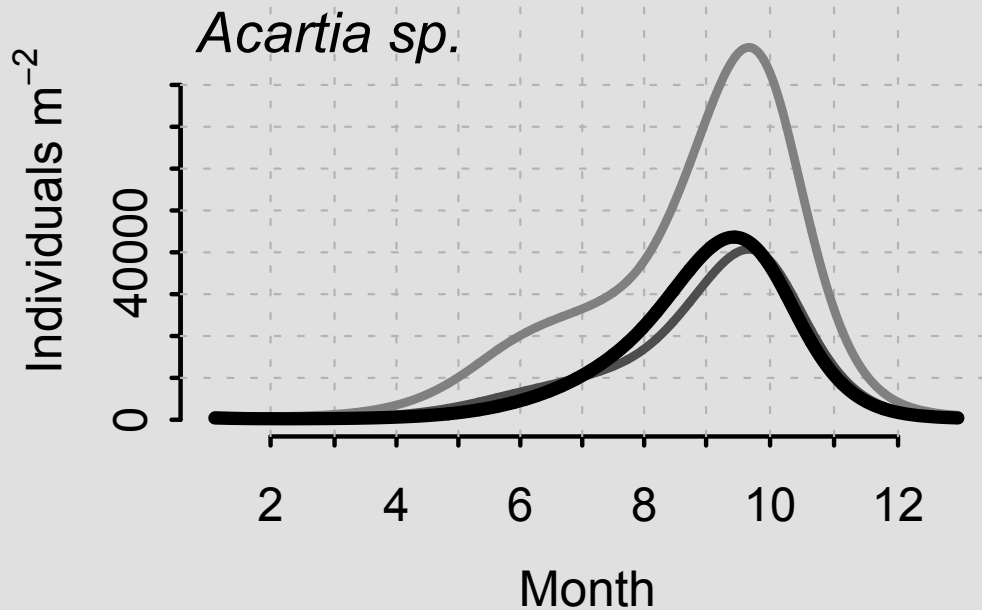
Zooplankton: small copepods



Photos: Tarja Katajisto

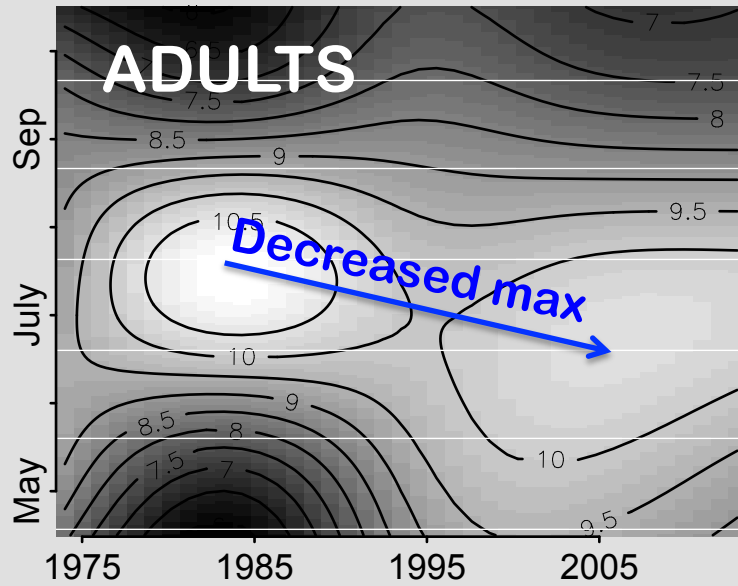
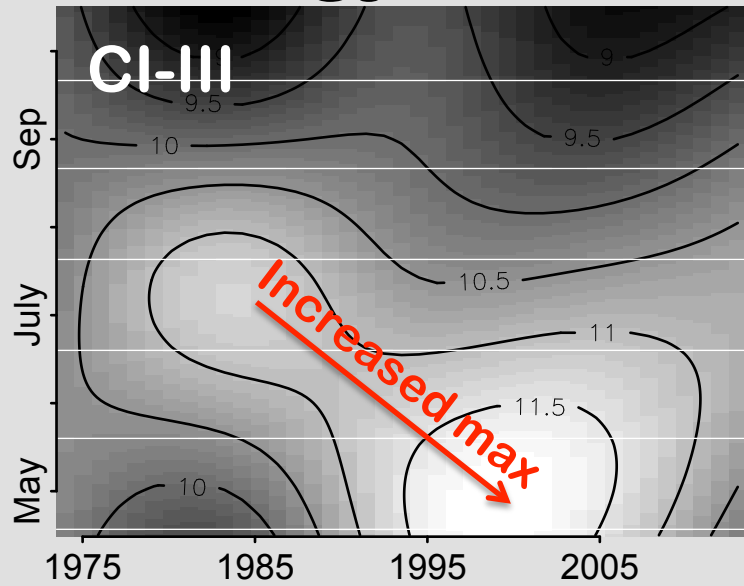


***Eurytemora* peaks
in July, *Acartia* in
September**

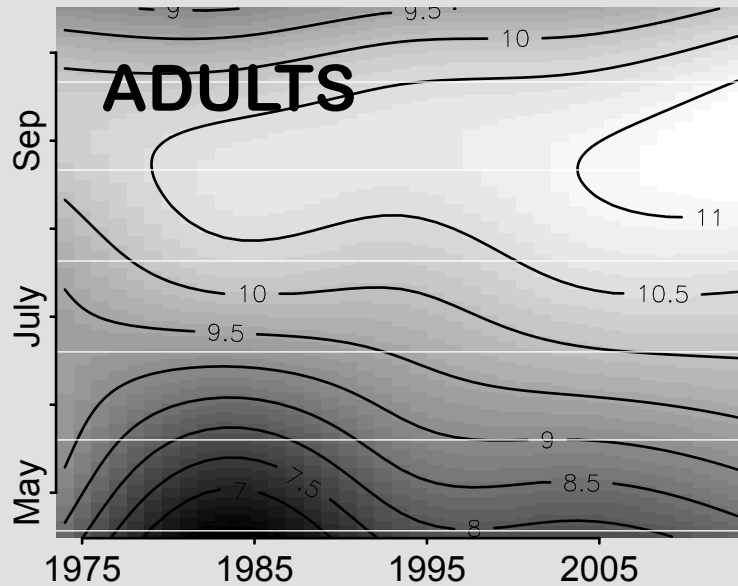
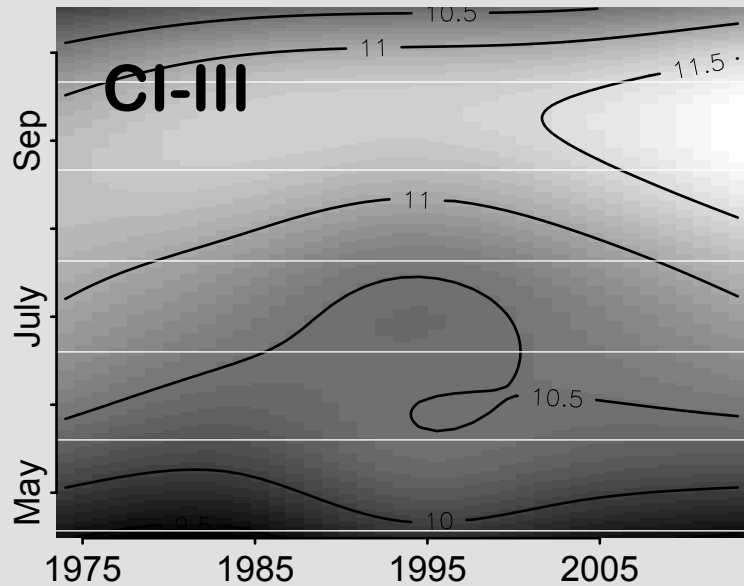


— CI-III
— CIV-V
— ADULTS

Phenology: *E. affinis*



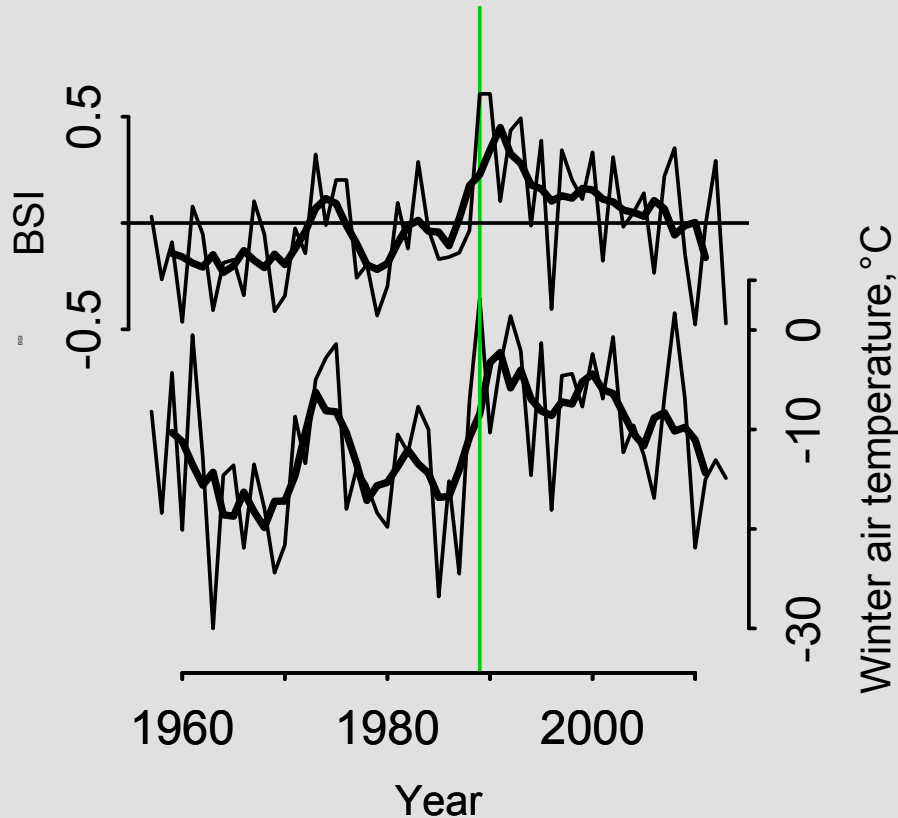
Acartia sp.



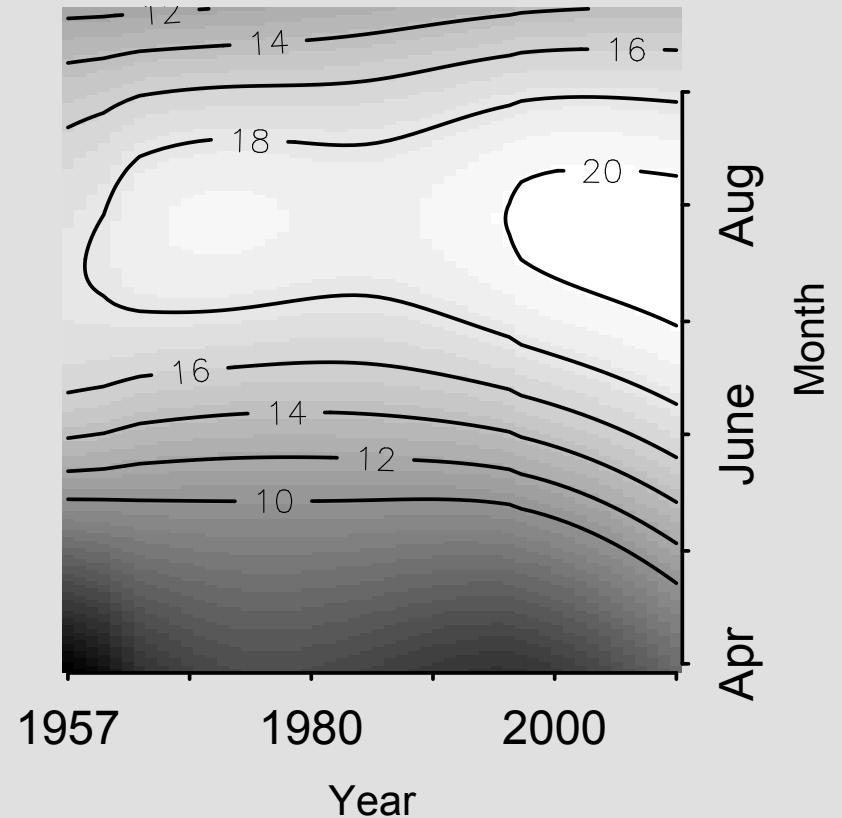
Physical environment:

In last two decades, trends in winter conditions and spring water temperature decoupled

a) BSI and winter air temperature



b) sea surface temperature, °C

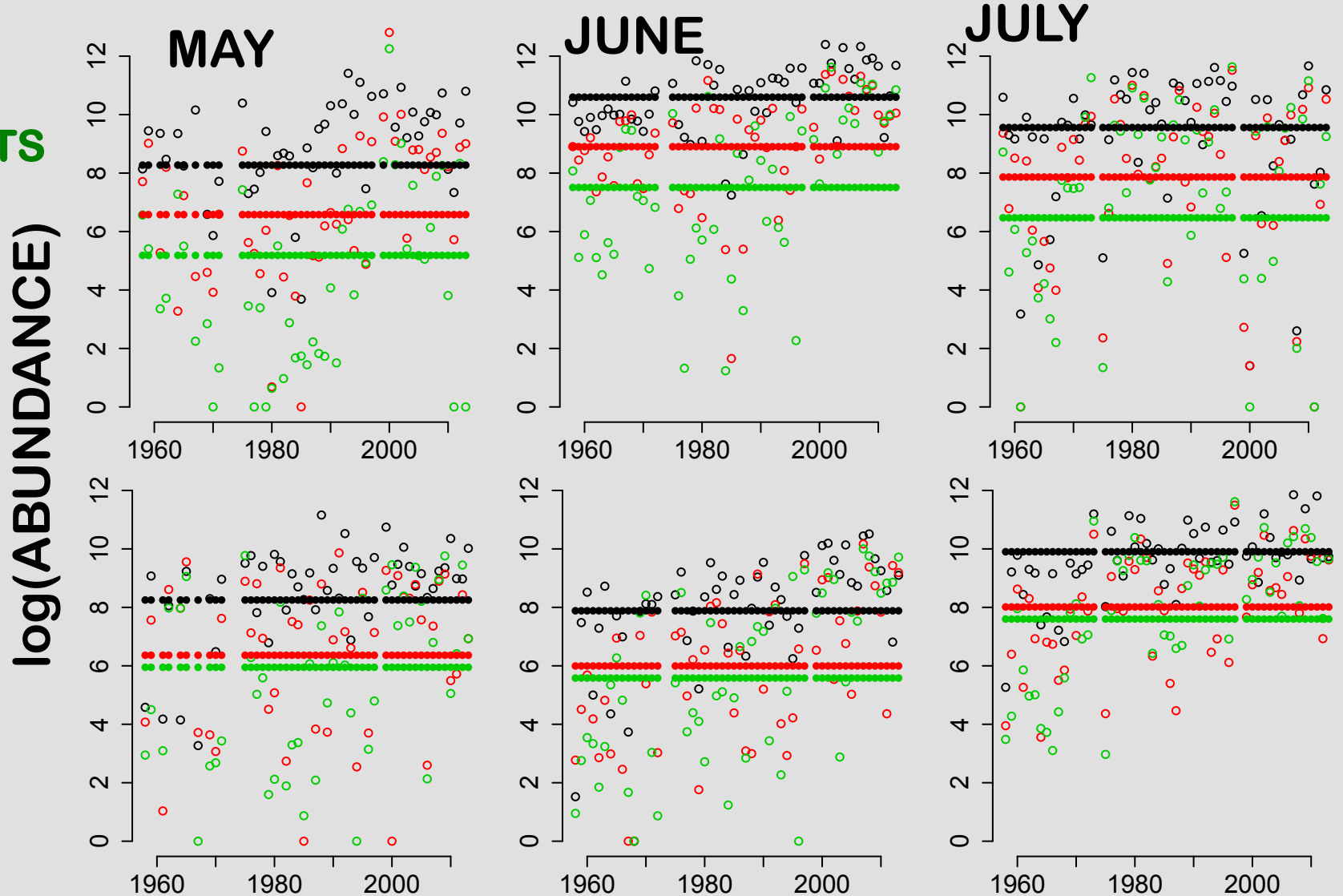


'base' model=

monthly means by stages:

CI-III
CIV-V
ADULTS

E. affinis: $R^2= 0.29$



Acartia spp.: $R^2= 0.25$

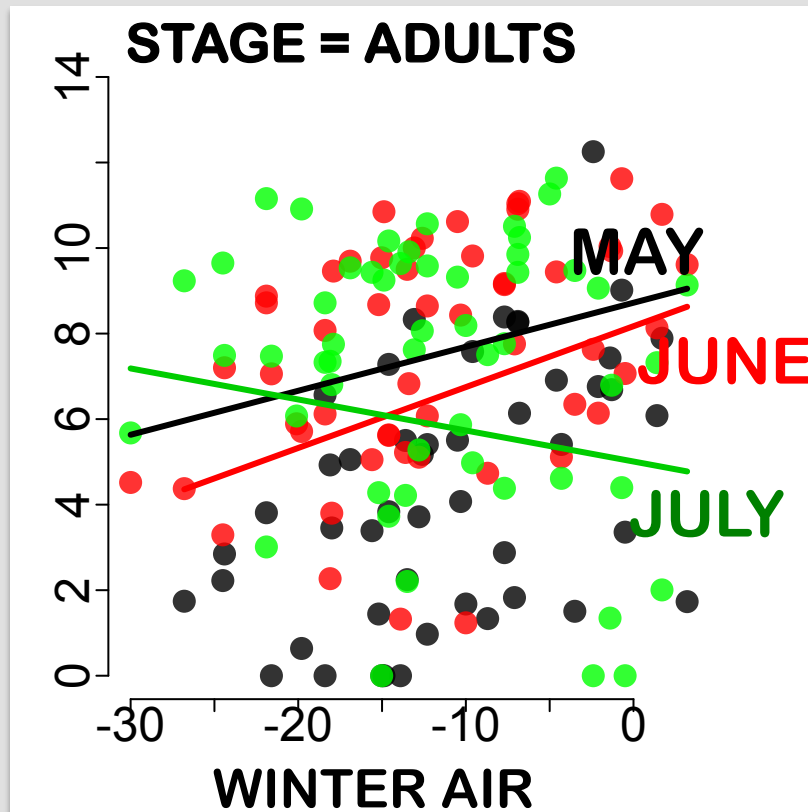
“full” model

E. affinis:

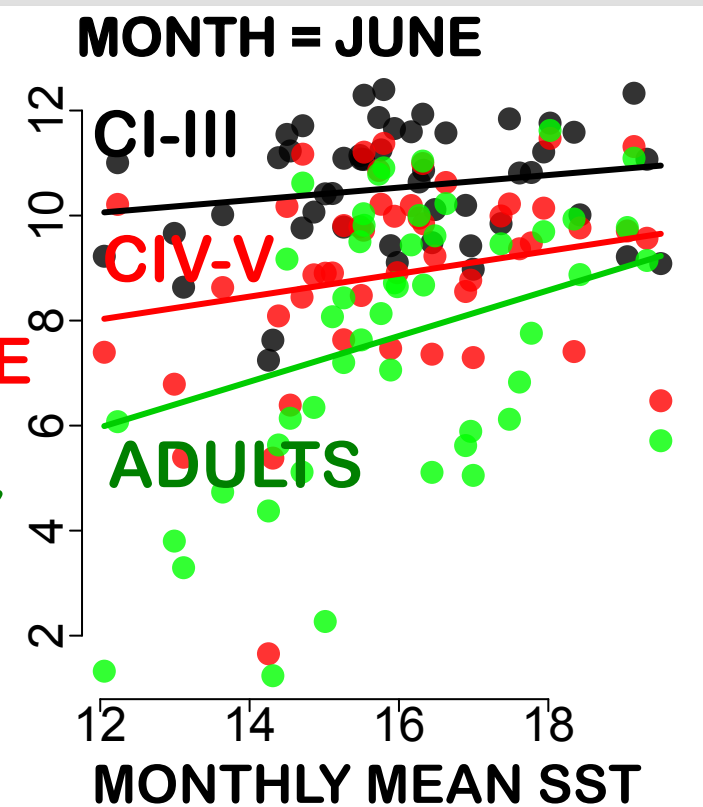
month-specific effect of winter air + stage-specific effect of SST

$R^2=0.41$

Winter effect by months



SST effect by stages



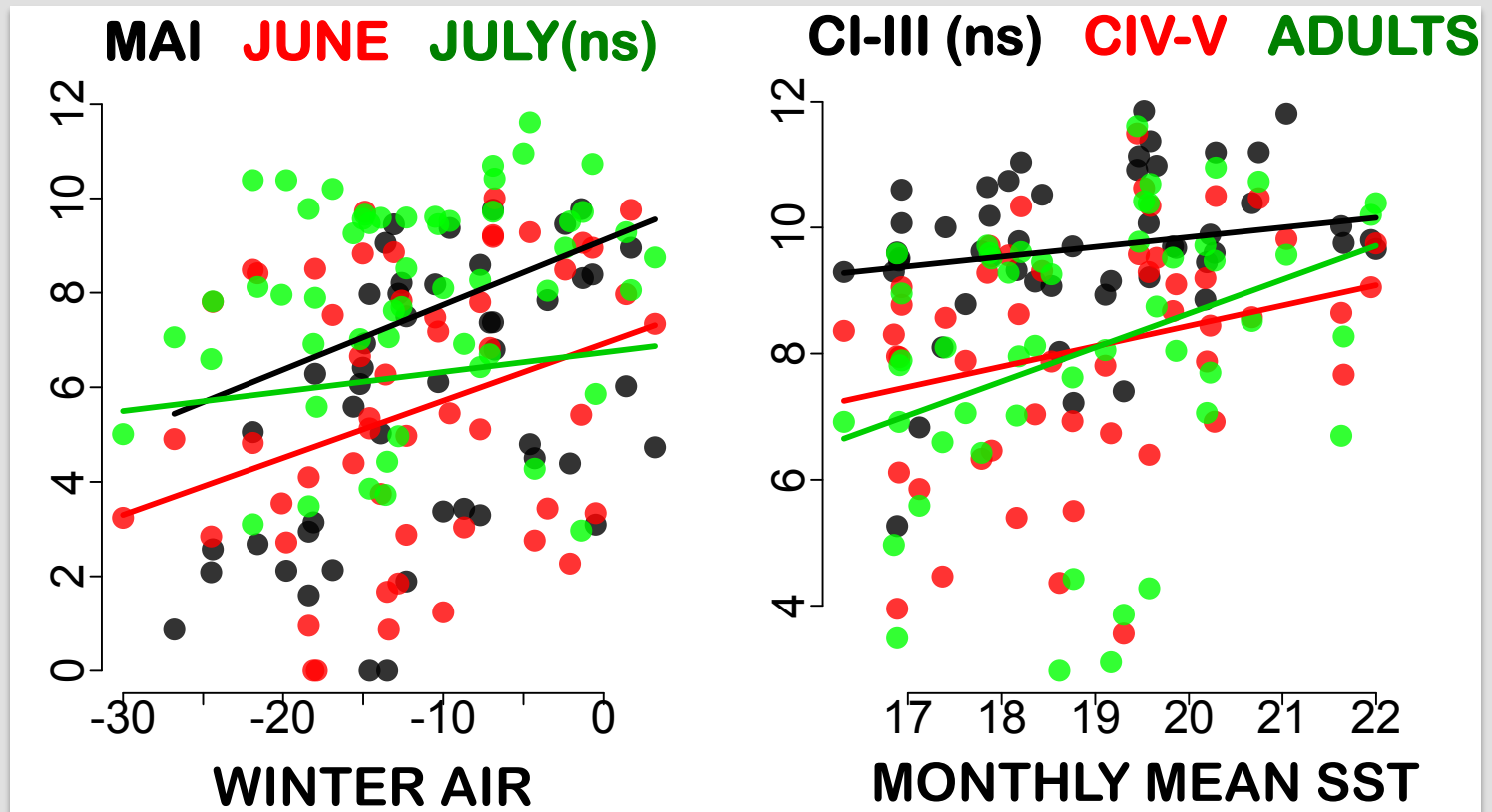
“full” model

Acartia sp.:

month-specific effect of winter air + stage &
month-specific effect of SST

$R^2=0.38$

May-June: adults, July:
adults + CIV-V



Can the data tell us about the mechanism?

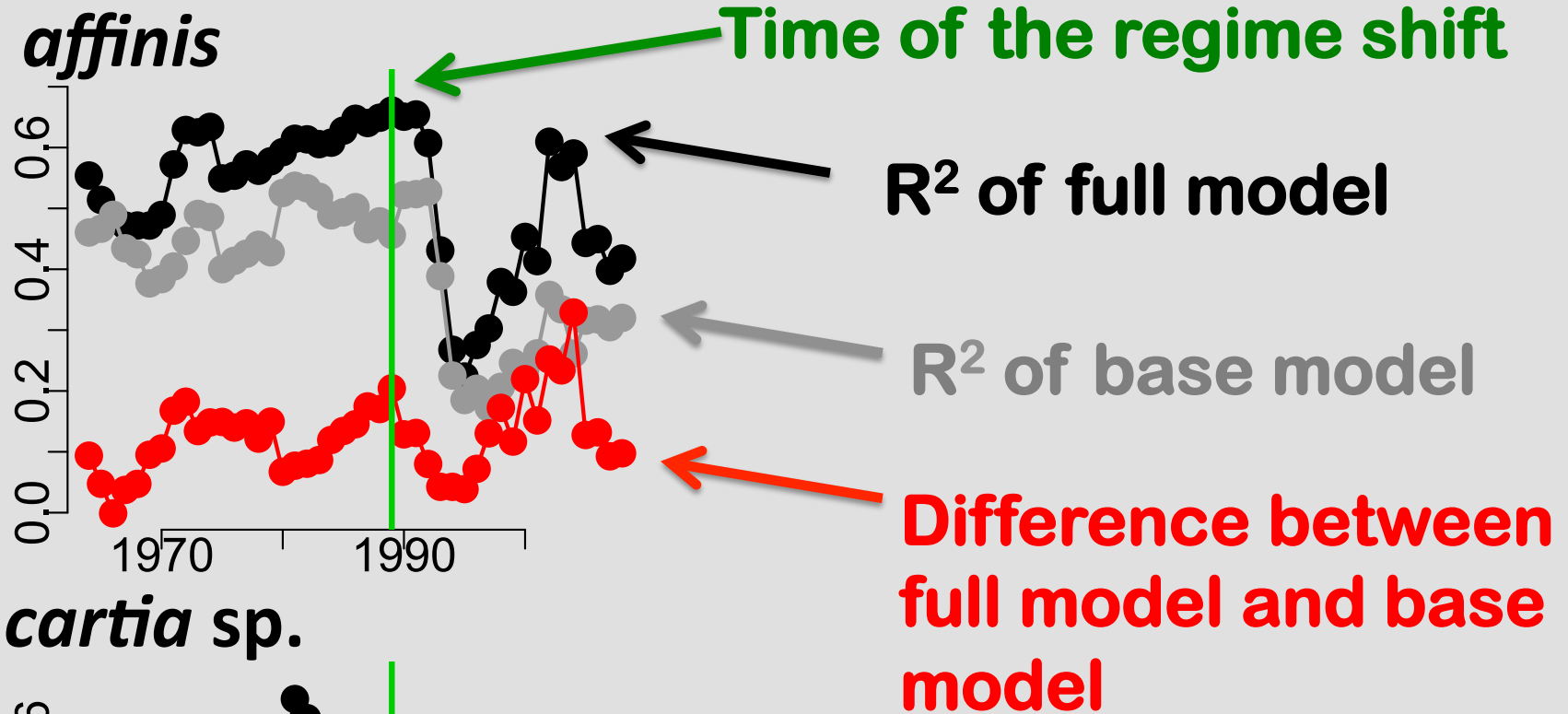
We identified CORRELATIONS, not mechanisms.

How to get more information on the mechanism?

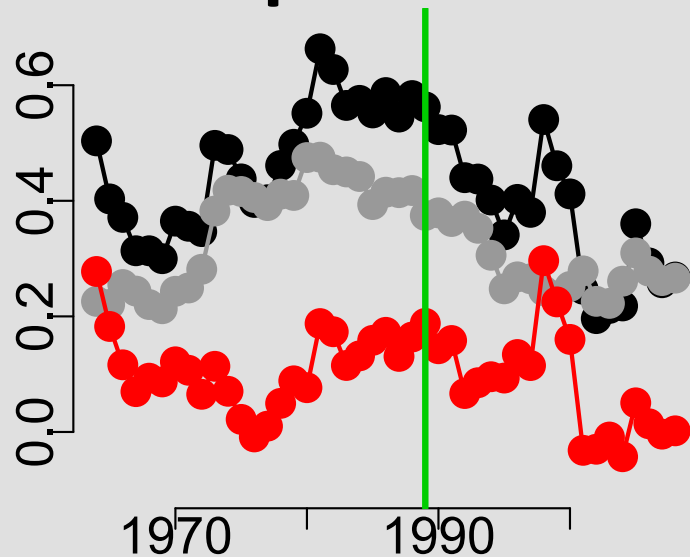
SUBSAMPLE!

EXPLANATORY POWER (R^2)

E. affinis



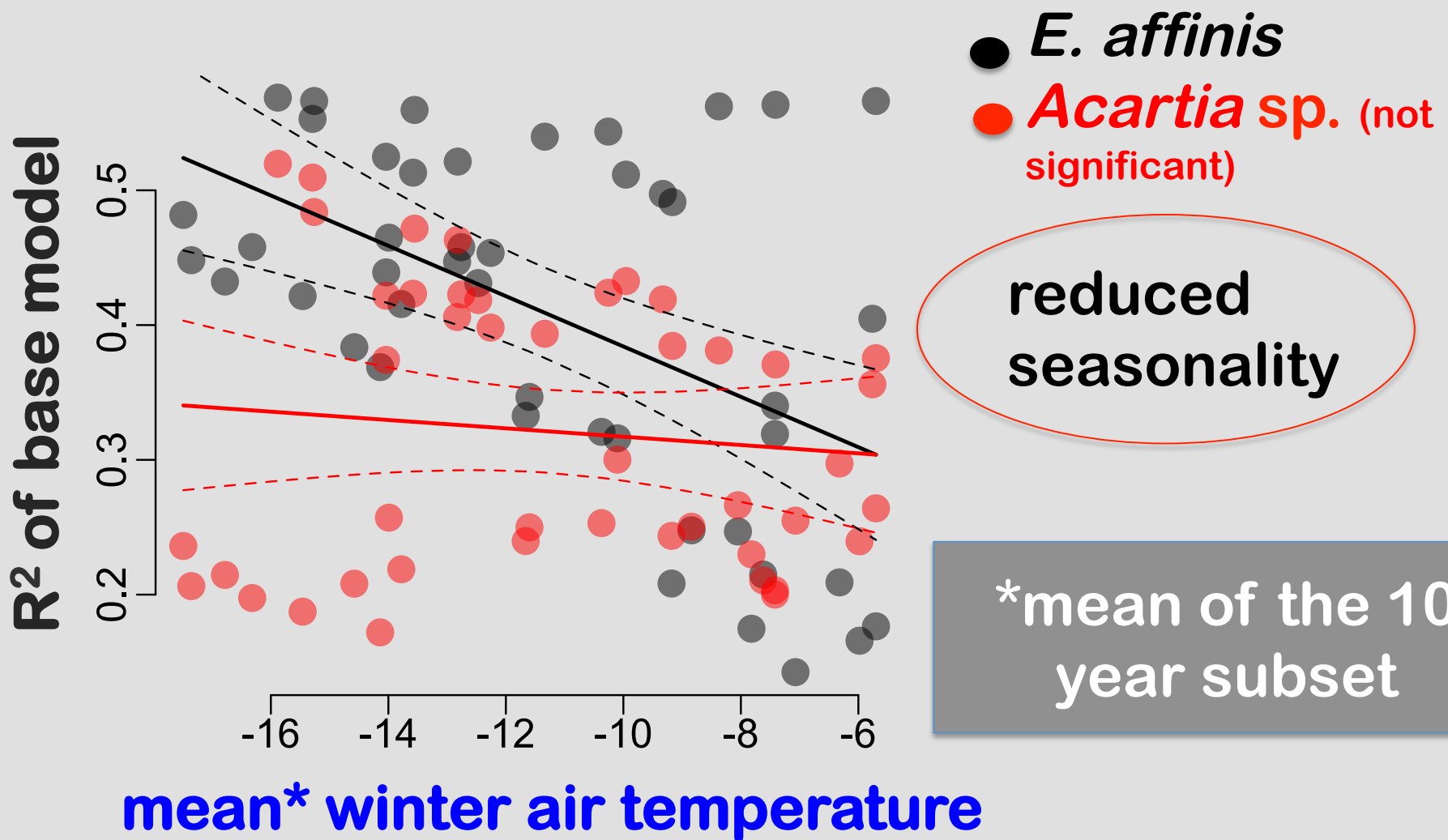
Acartia sp.



Each point based on a model fitted to 10 years of data – x-axis the center year of each model period

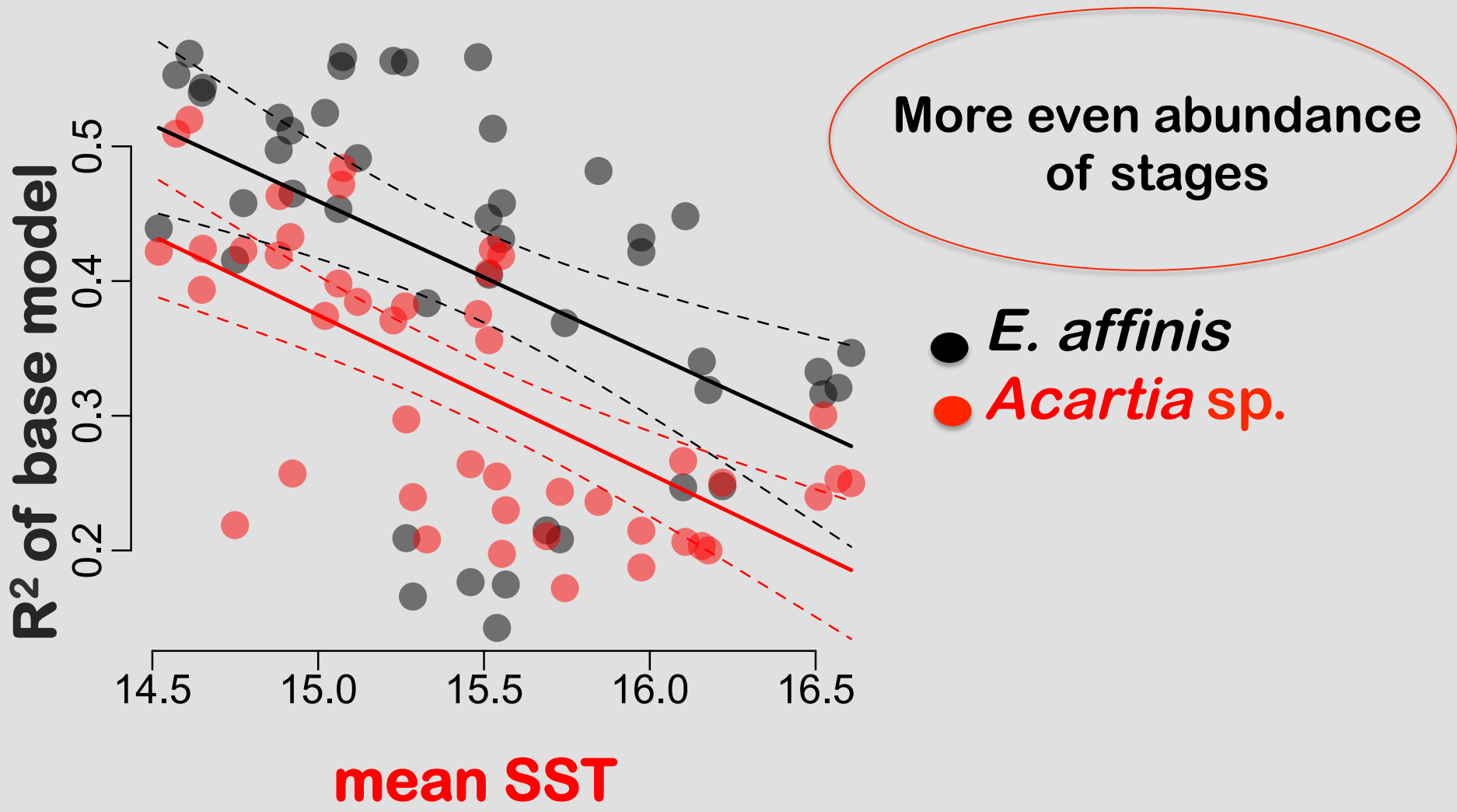
R² of base model

decreases with higher winter air temperatures (only *E. affinis*)



R² of base model:

decreases with higher mean SST:



Summary

Multiple effects of thermal conditions:

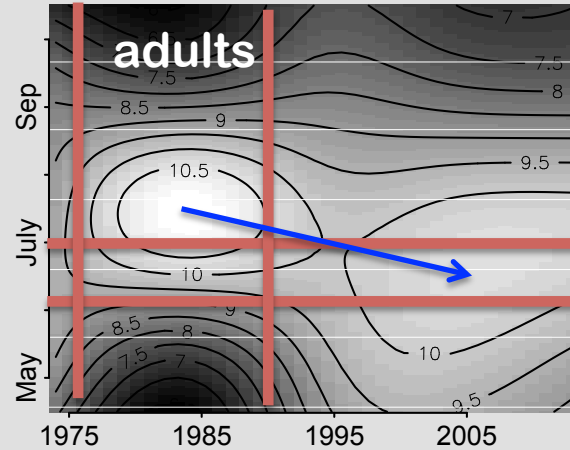
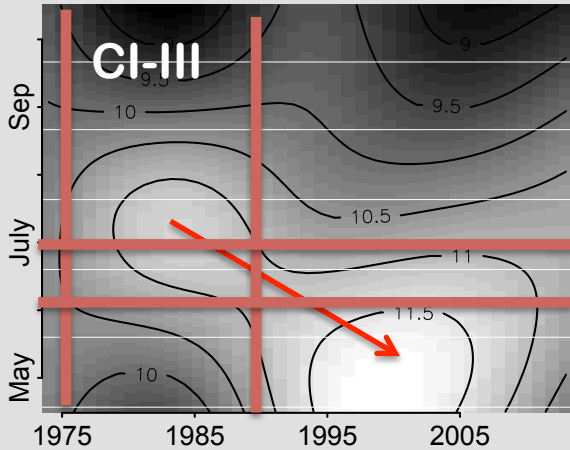
Both, SST and winter air linked to higher spring abundance, but additionally:

- **winter air affected the seasonality (*E. affinis*)**

and

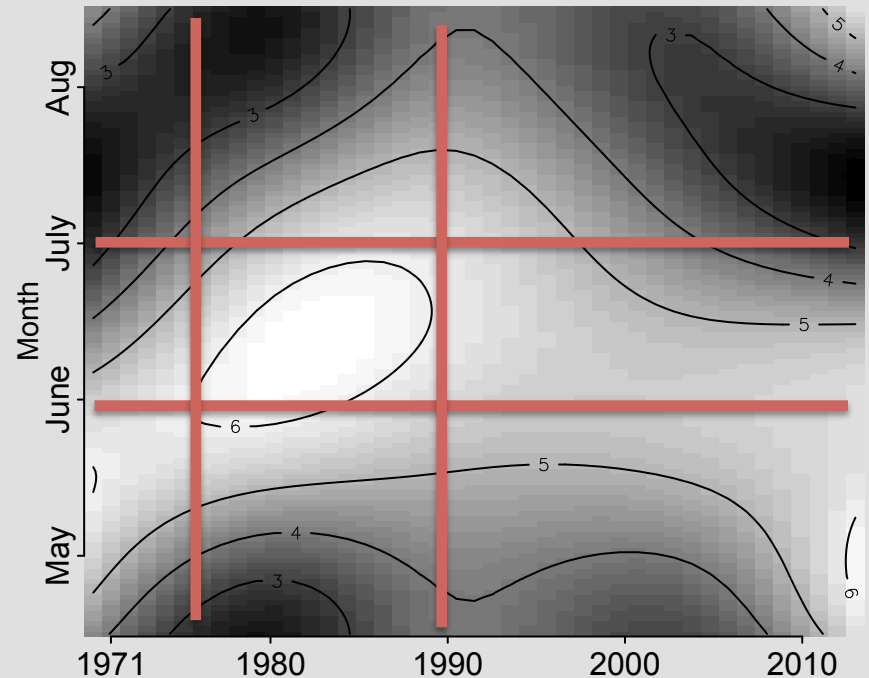
- **SST the abundance differences between the copepodites and adults (both taxa)**

Higher abundance of earlier peak of *E. affinis* due to lack of top-down control?



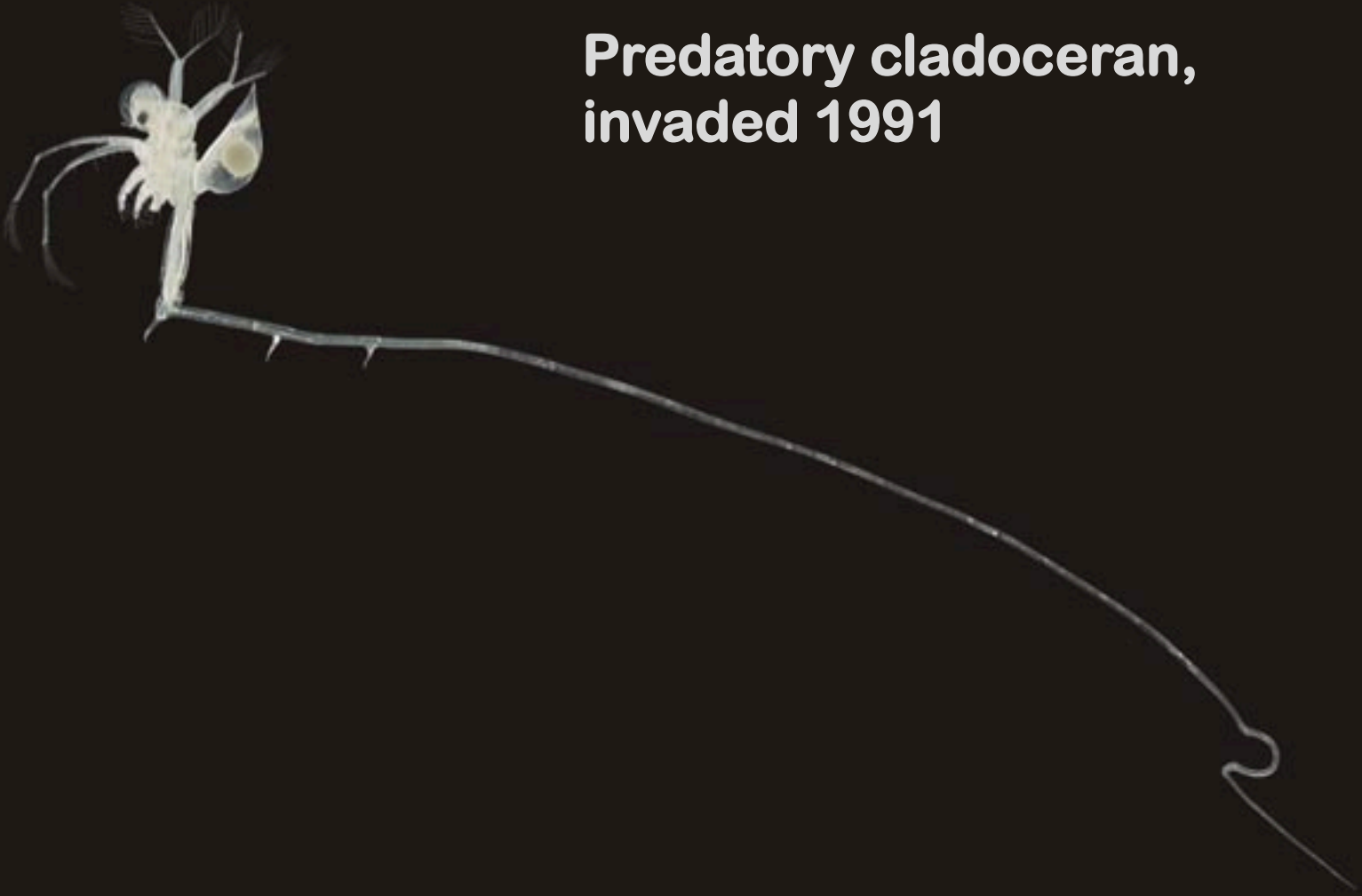
If herring larvae peak **before** *E. affinis*, top down control occurs?

(explaining the increase in CI-III when their peak is before herring)

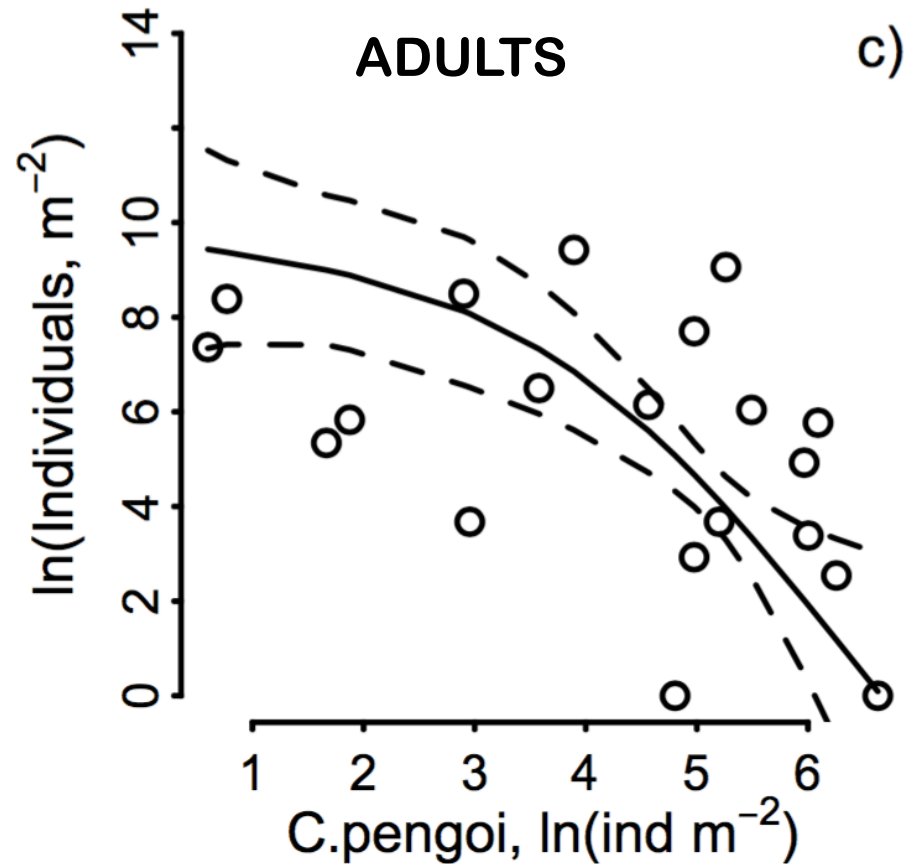
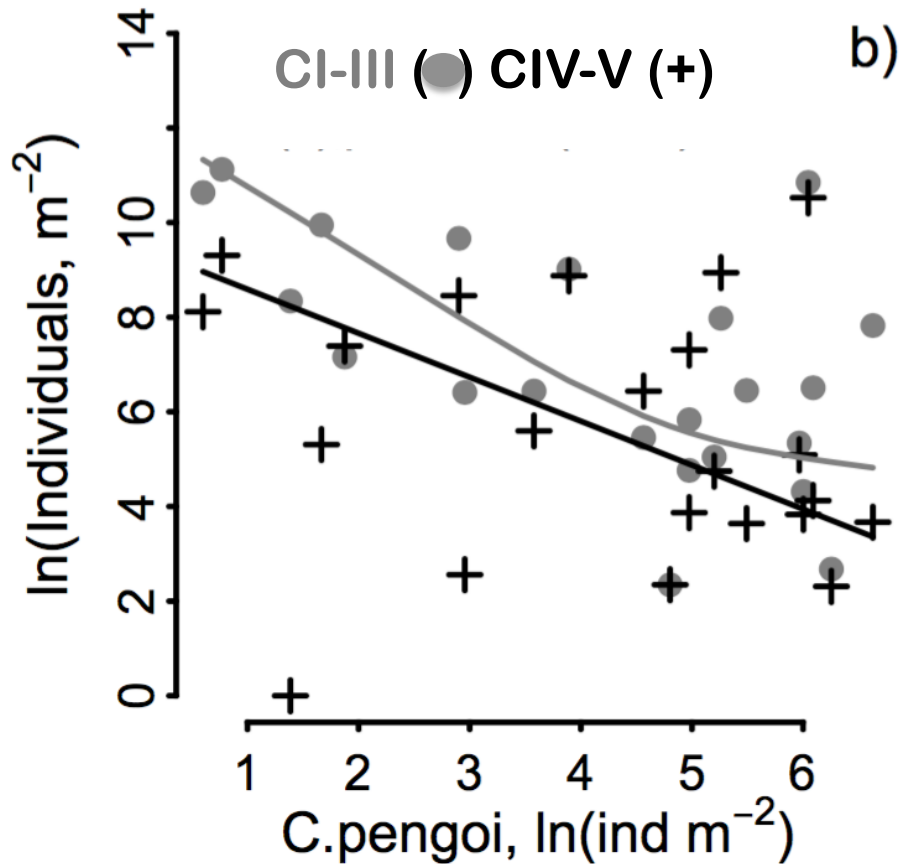


Cercopagis pengoi

Predatory cladoceran,
invaded 1991



C. pengoi predation on *E. affinis*



All stages of *E. affinis* negatively correlated to abundance of *C. pengoi*

Big review of small copepods:
check www.riinaklais.com



Do you know something of...
... long-term trends of small copepods
in **coastal seas?**
CHECK www.riinaklais.com