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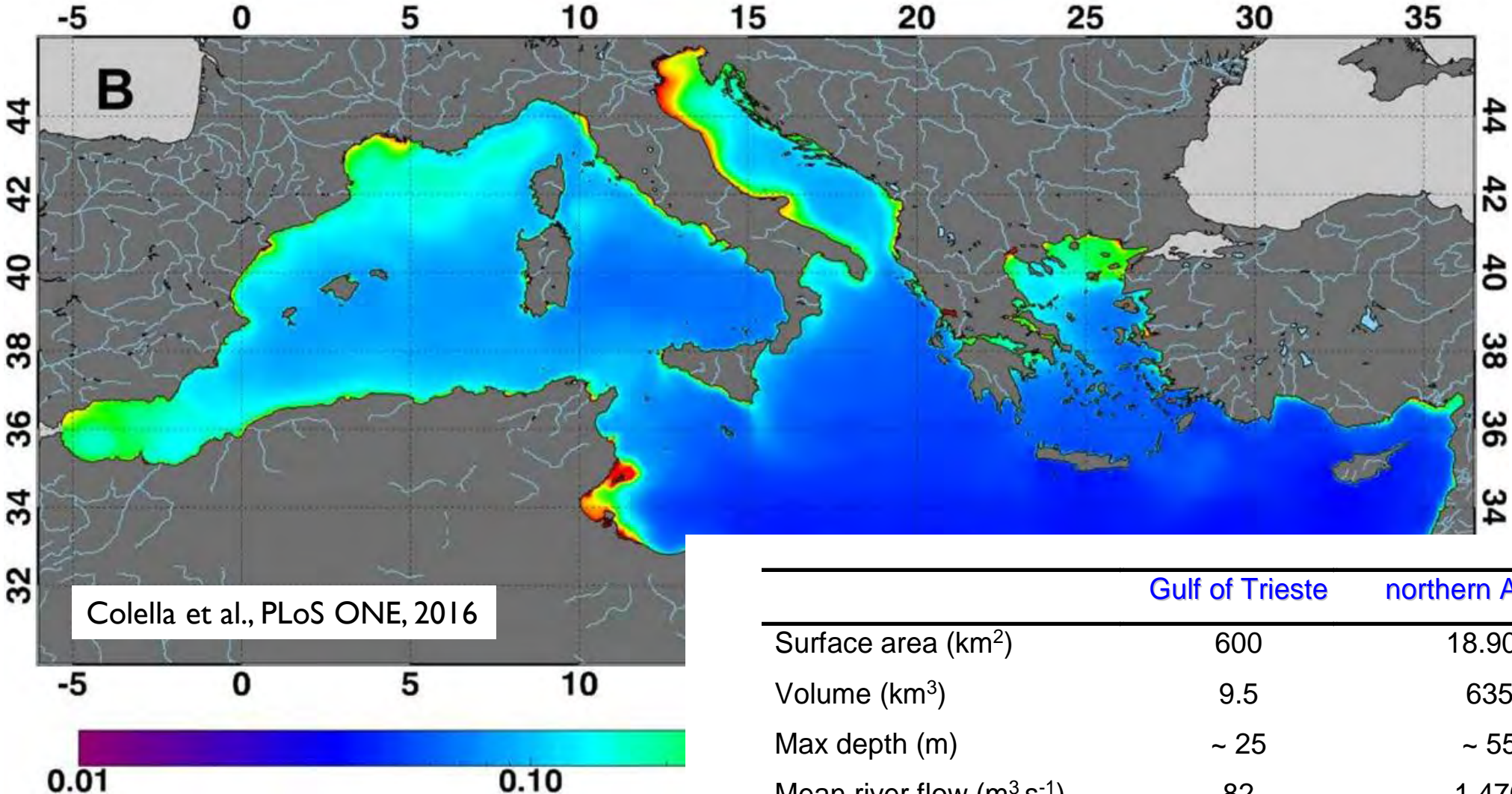
NATIONAL INSTITUTE OF BIOLOGY
MARINE BIOLOGY STATION

Linking long-term changes of pelagic microbial communities to fluctuations in climate and hydrological regime in a coastal ecosystem (Adriatic Sea)

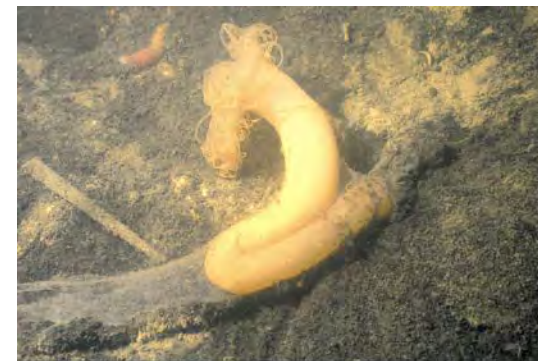
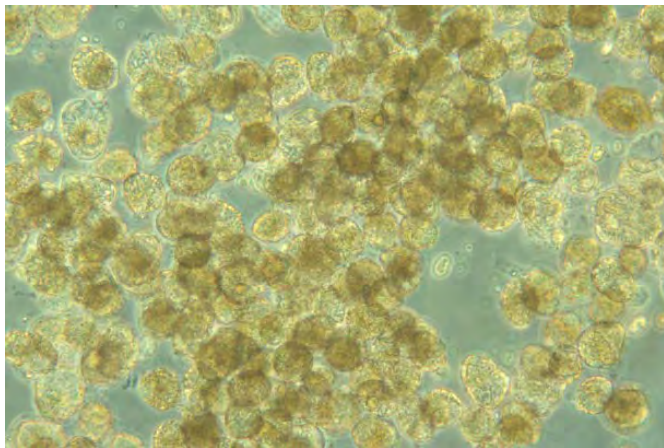
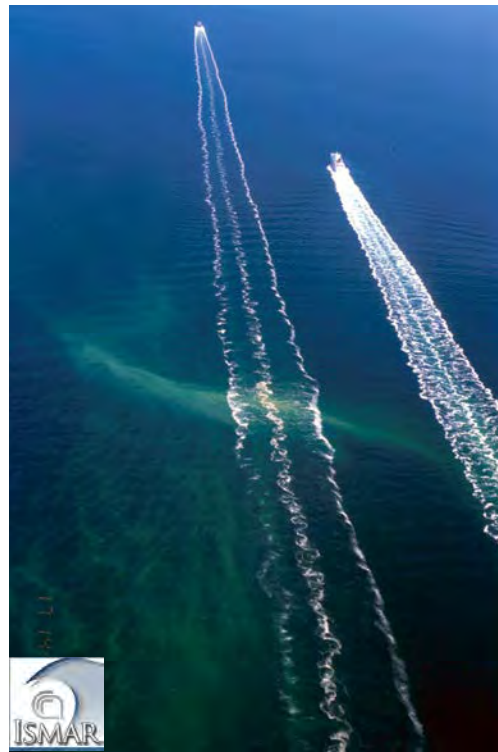
Patricija Mozetic, B. Petelin, J. Francé, V. Flander-Putrle, K. Klun, M. Licer, T. Tinta, V. Turk and V. Malacic

National Institute of Biology, Marine Biology Station, Piran, Slovenia

Northern Adriatic

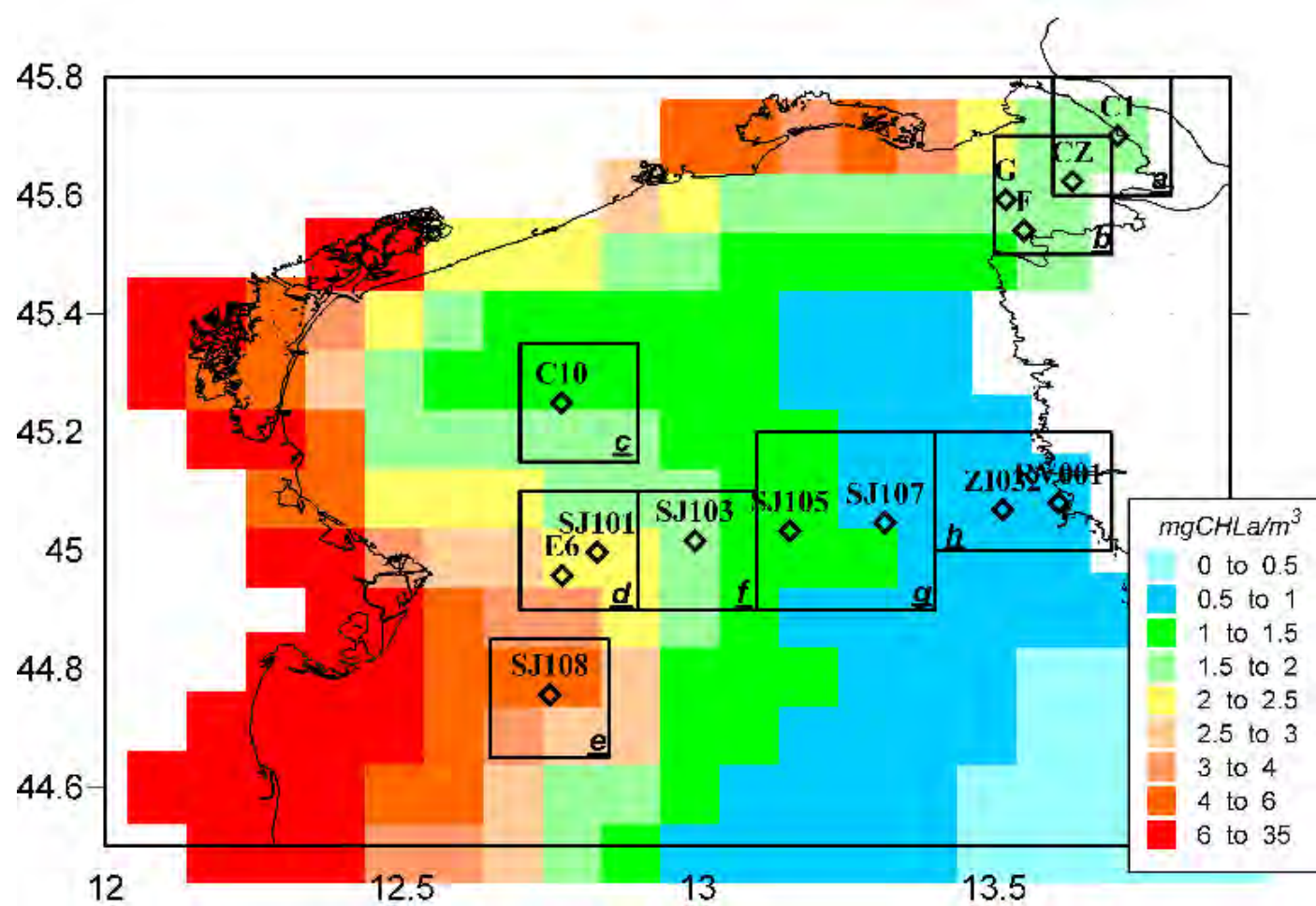


	Gulf of Trieste	northern Adriatic
Surface area (km ²)	600	18.900
Volume (km ³)	9.5	635
Max depth (m)	~ 25	~ 55
Mean river flow (m ³ s ⁻¹)	82	1.470



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Trophic gradient across the northern Adriatic





Research papers

River water and nutrient discharges in the Northern Adriatic Sea:
Current importance and long term changes

Stefano Cozzi ^{a,*}, Michele Giani ^{b,1}

Recent Trends Towards Oligotrophication of the Northern Adriatic: Evidence from Chlorophyll *a* Time Series

Patricija Mozetič · Cosimo Solidoro · Gianpiero Cossarini · Giorgio Socal · Robert Precali · Janja Francé · Franco Bianchi · Cinzia De Vittor · Nenad Smolaka · Serena Fonda Umani

River	Runoff (km ³ yr ⁻¹)			Loads (μM)		
	1917-1994	1995-2008	2003-2007 (%*)	NO ₃	PO ₄	DIN/PO ₄
Po	47.66	44.45	30.62±9.28 (69)	161 (128-202) [#]	1.9 (1.3-2.8) [#]	84 (70-107) [#]
Soča	6.43	2.69	1.71±1.07 (4)	87 (64-136) [¥]	0.3 (0.1-0.5) [¥]	336 (168-748) [¥]

* total load of 13 rivers: 44.61; [#] period 1995-2007; [¥] period 1998-2006

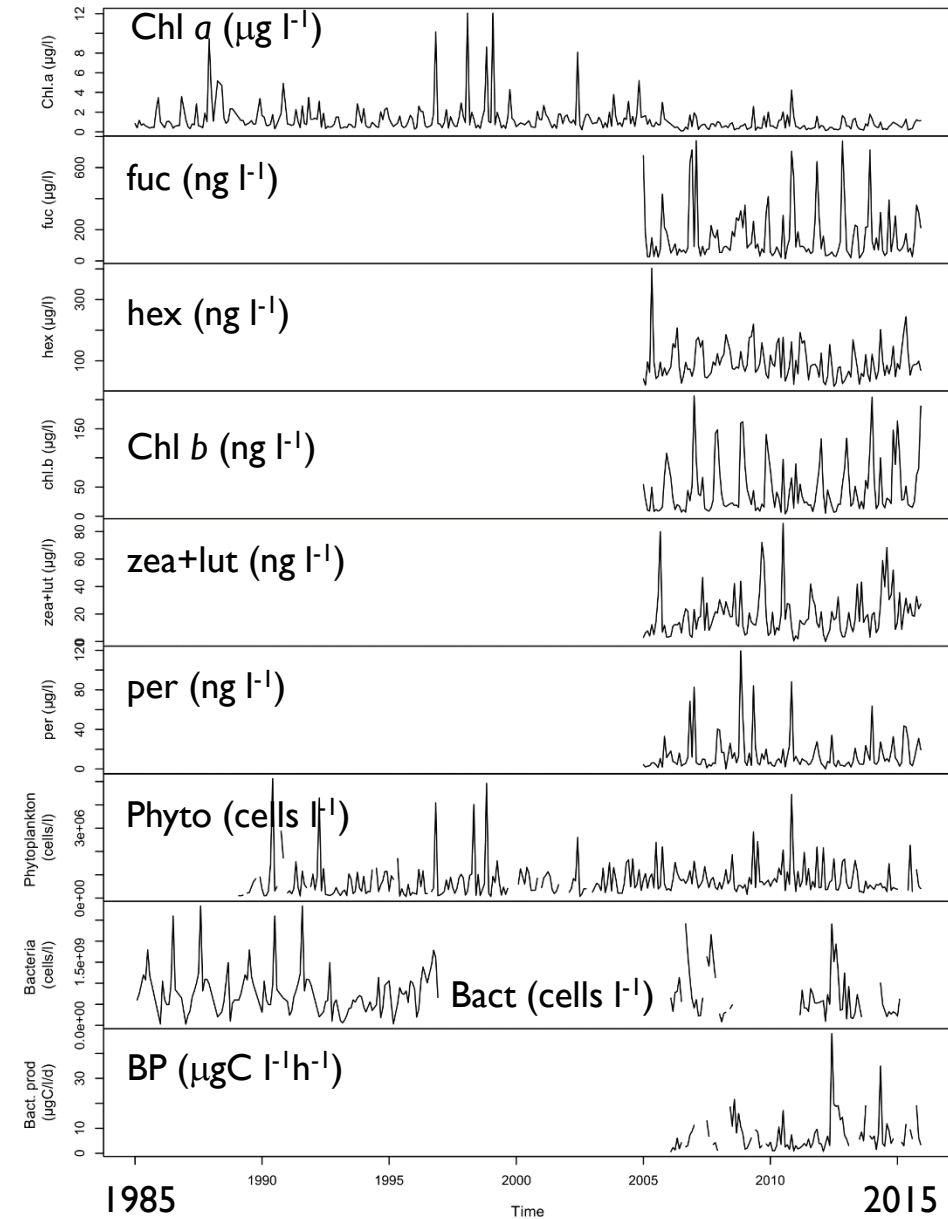
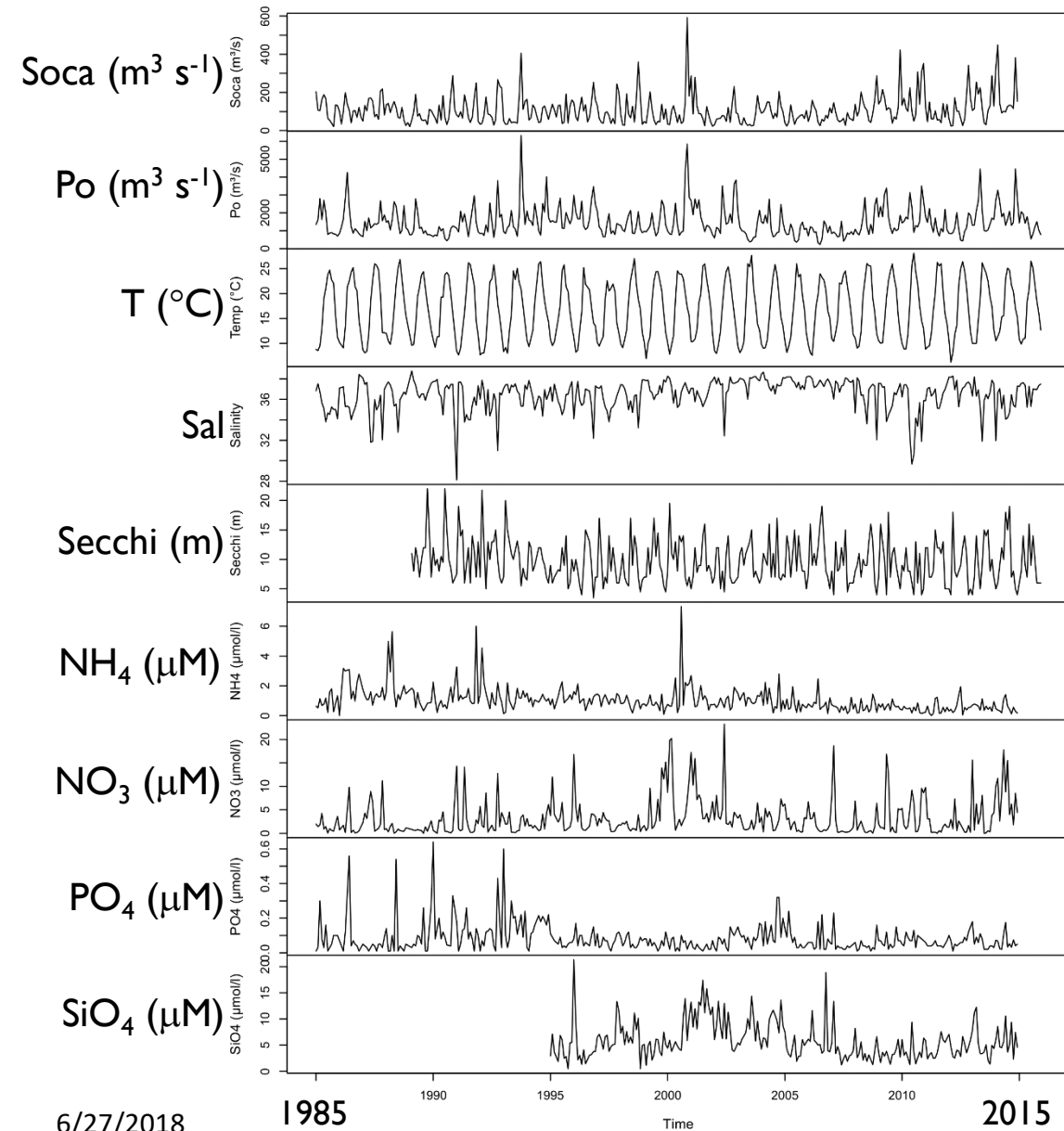
Years	Po Q km ³ yr ⁻¹)	TN (t N yr ⁻¹ × 10 ³)	TP (t P yr ⁻¹ × 10 ³)
1974-1978	45-81	89	11.8
1976-1978	55-81	114	15.6
1985-1987	45-52	110	12.9
1996-2000	39-65	173	8.1

Aim of the study

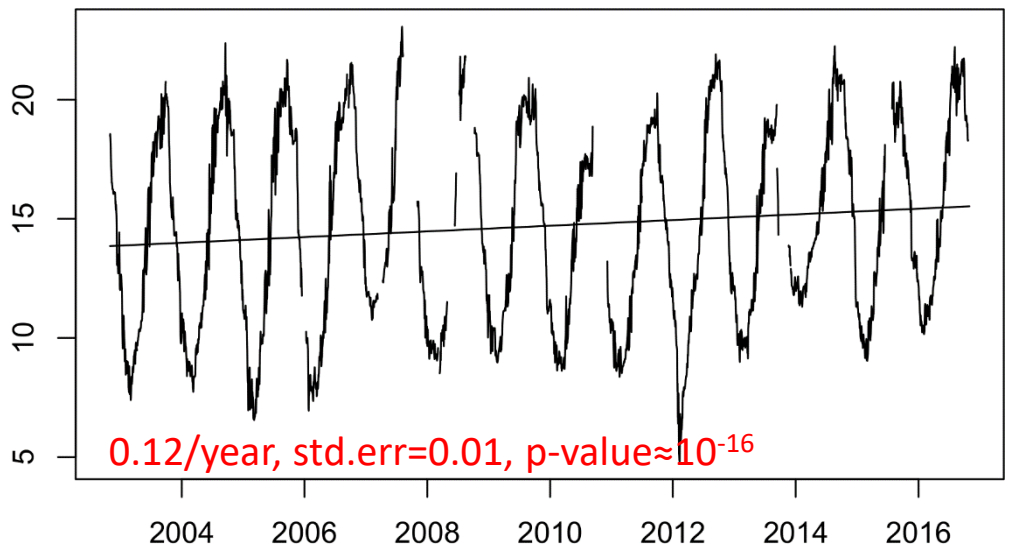
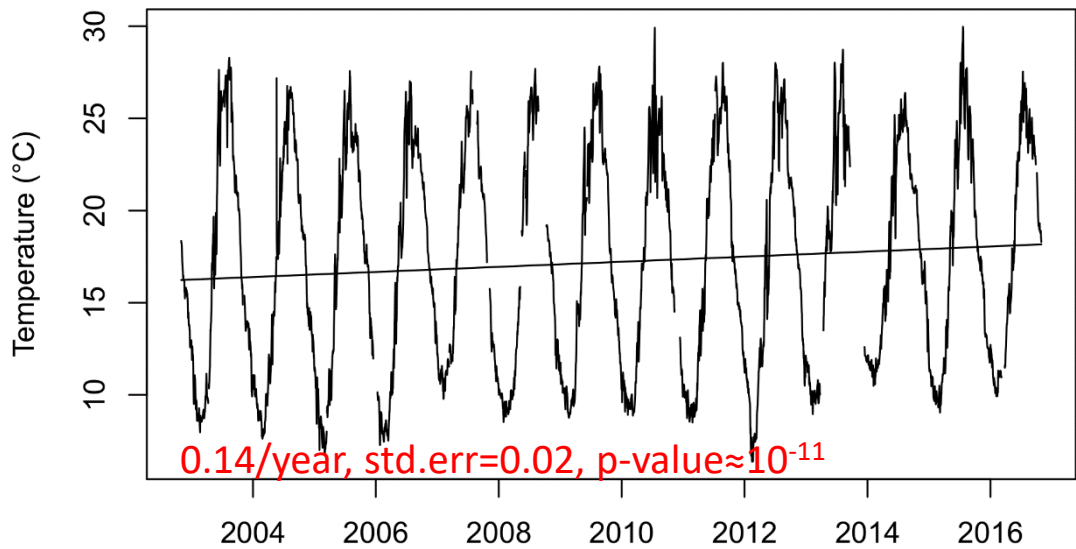
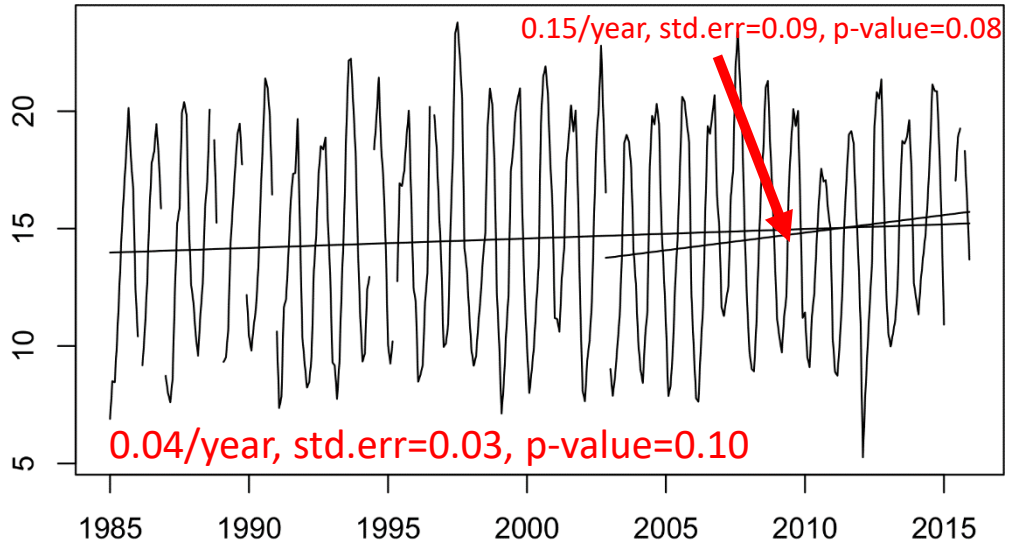
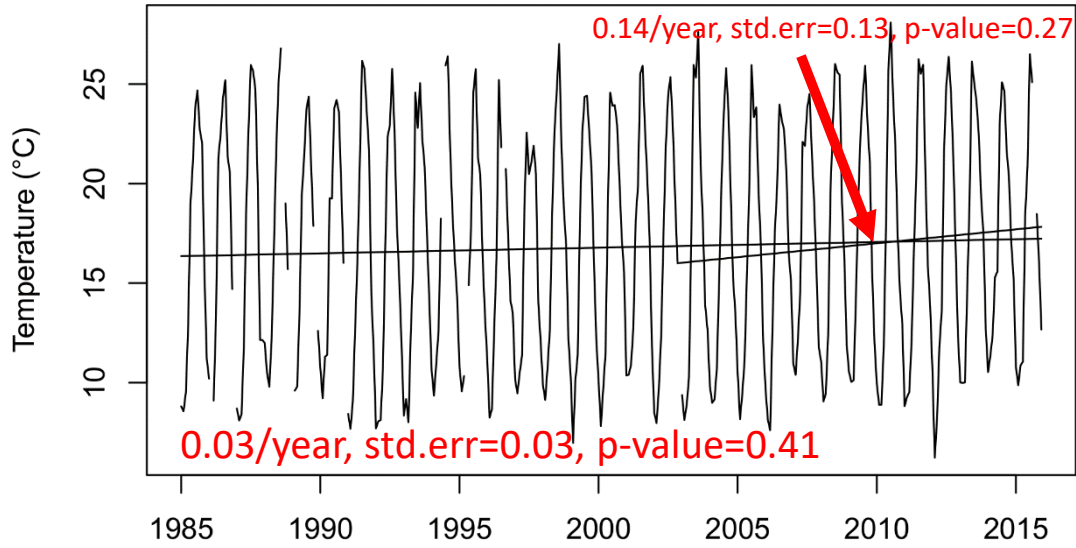
30 year long time-series (**1985-2015**) in a coastal ecosystem, the **Gulf of Trieste** (45° 32.925' N, 13° 33.042' E):

- 1) A continuation of trend or multiannual oscillations of environmental parameters?
- 2) Which drivers are behind these changes?
- 3) What is their role in the bottom-up control of microbial communities?

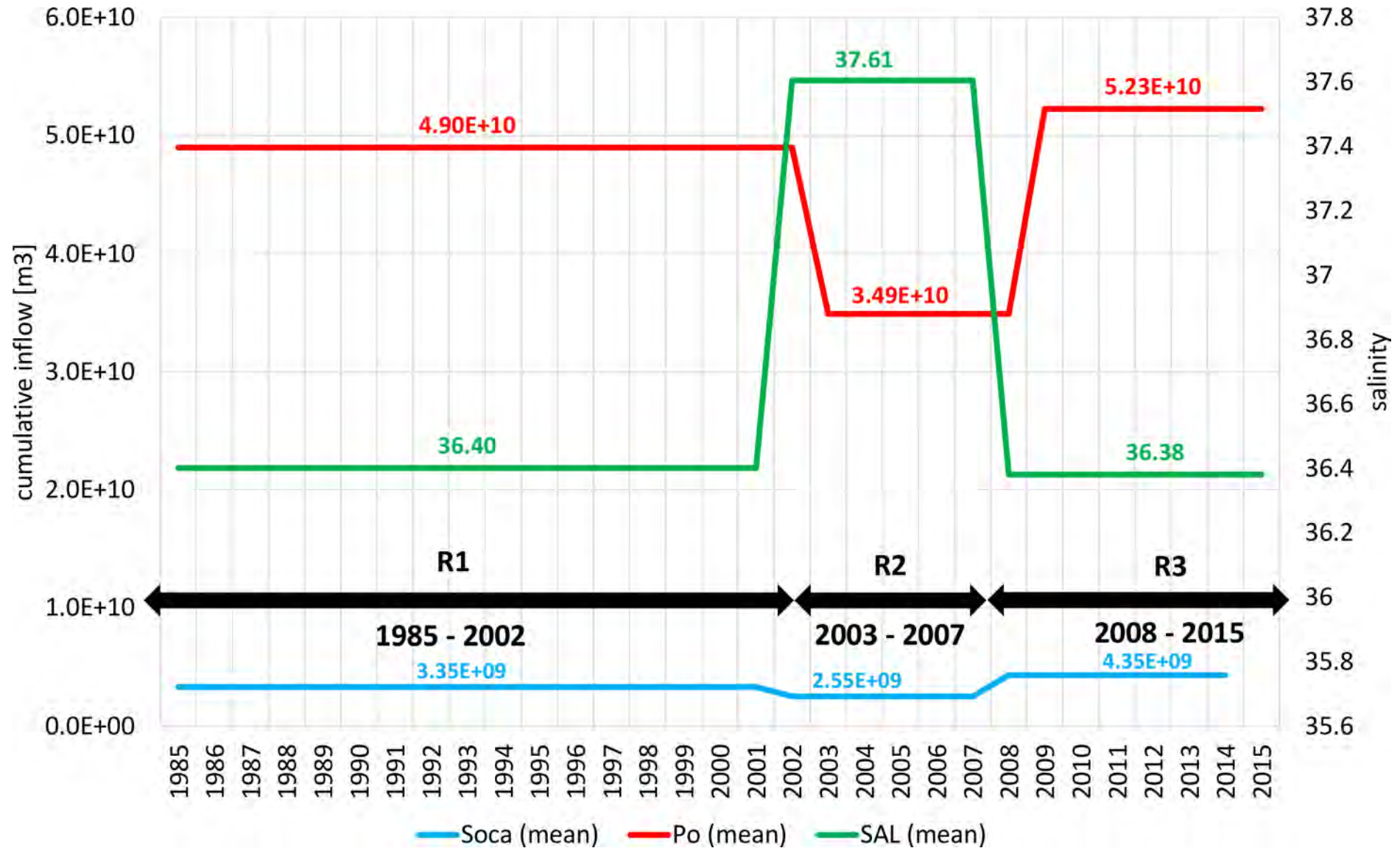
Time series of measured parameters



Linear trends of sea surface and bottom temperature

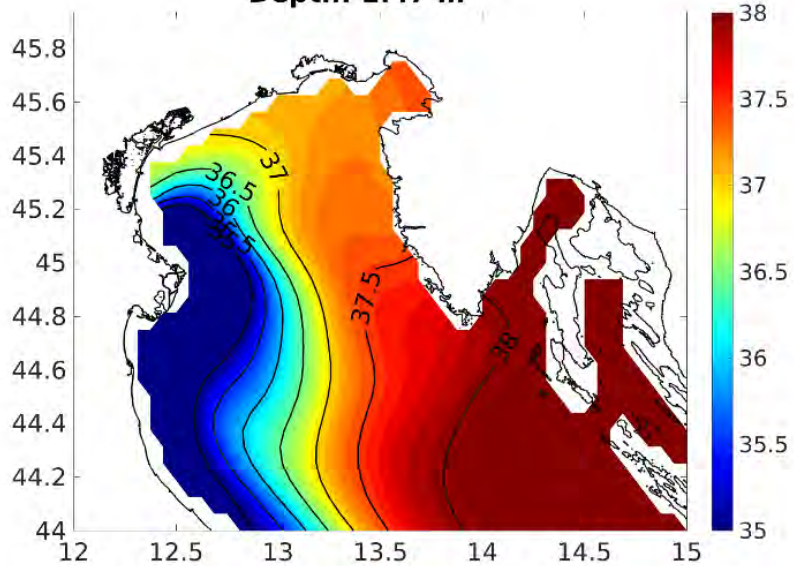


Regime shifts of river discharges and surface salinity

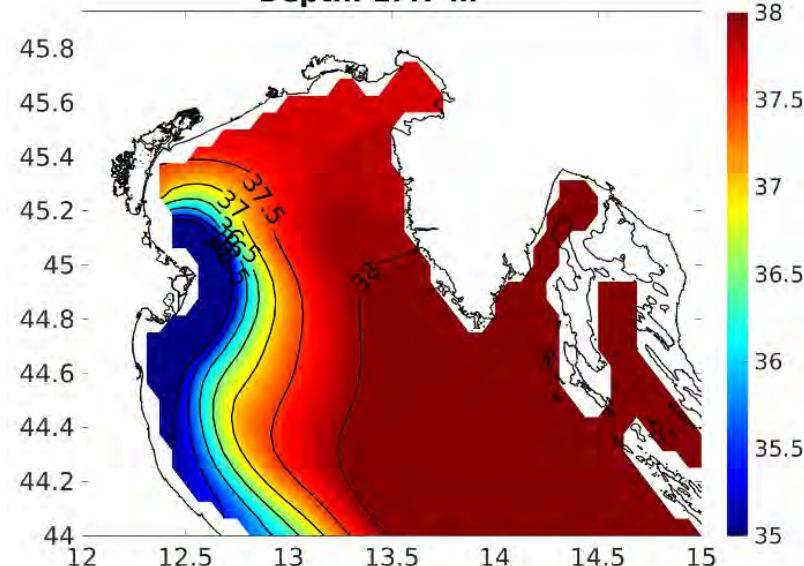


CMEMS MFS surface salinity regime averages

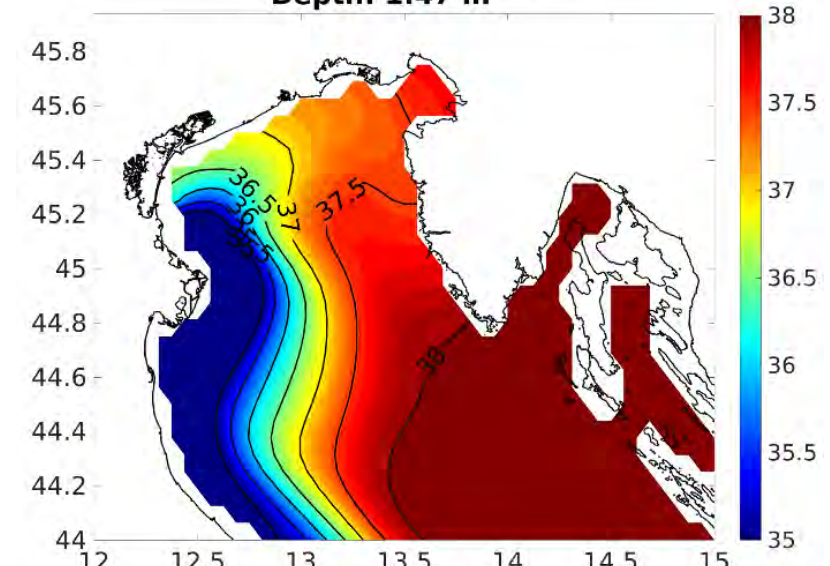
Variable: Salinity
Season: OND
Regime: 1985-2002
Depth: 1.47 m



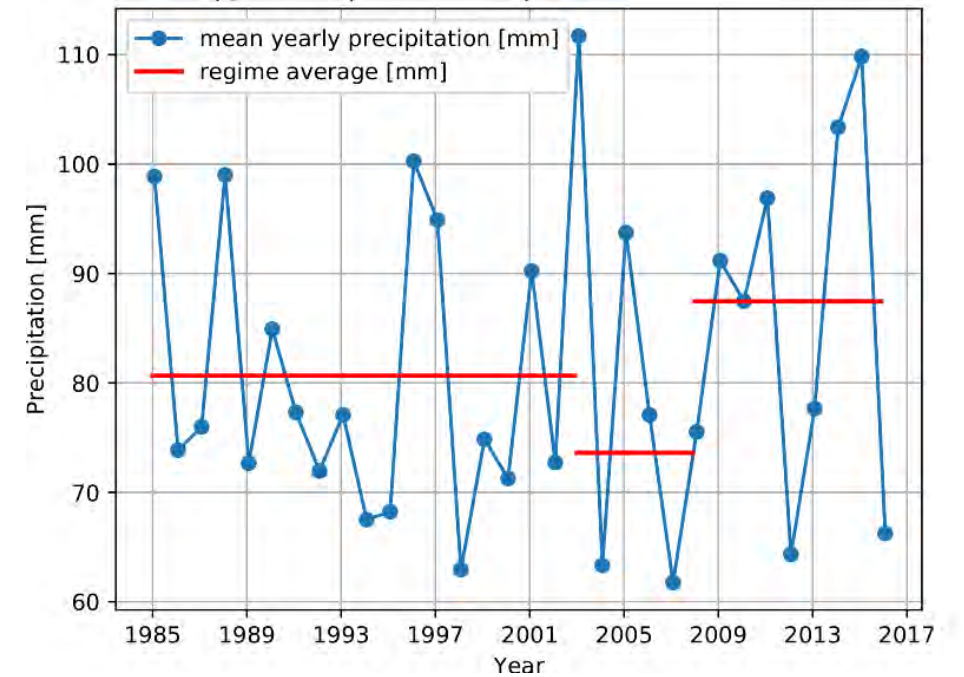
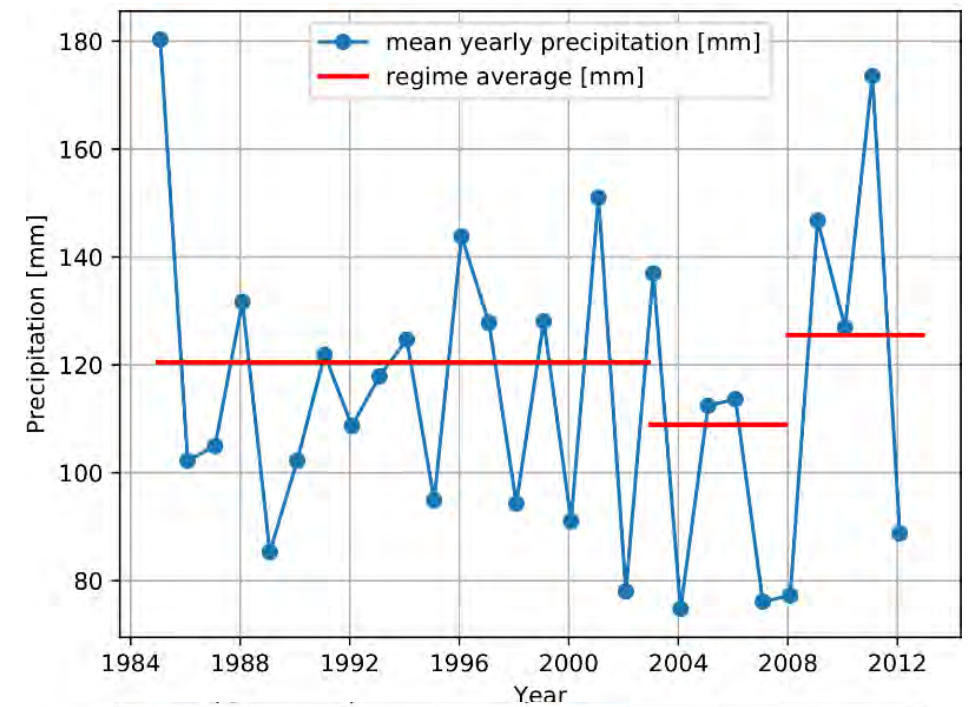
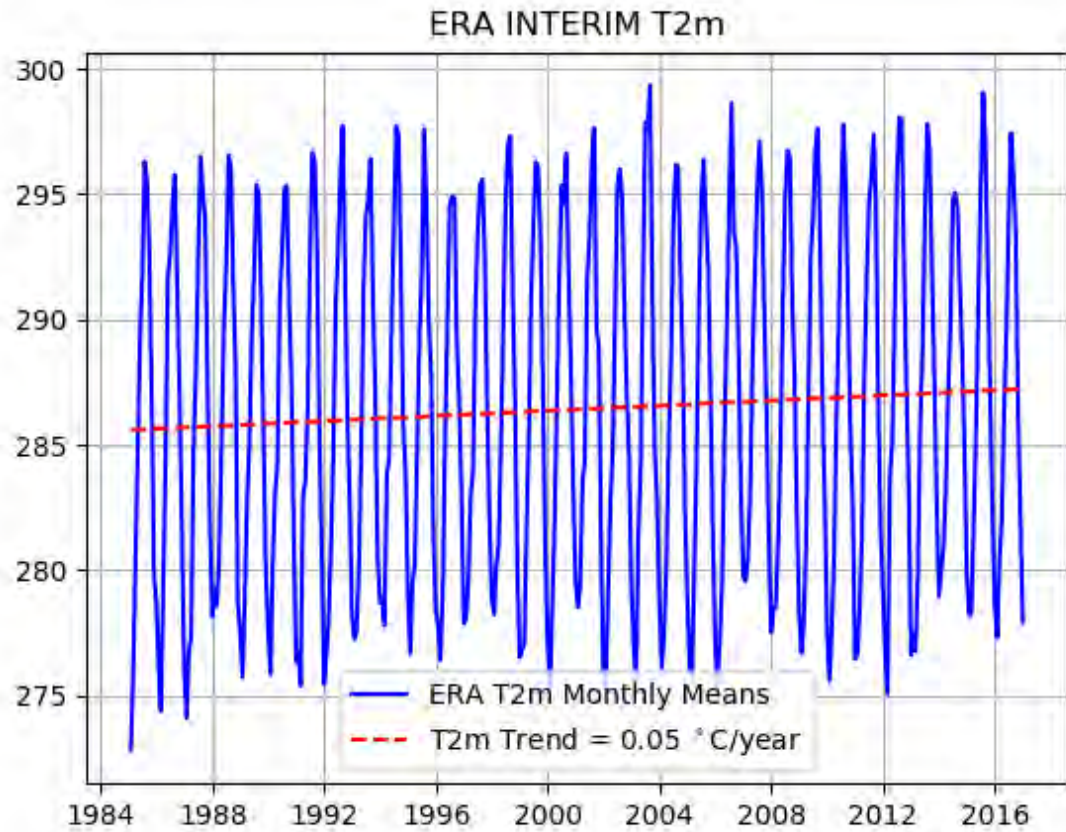
Variable: Salinity
Season: OND
Regime: 2003-2007
Depth: 1.47 m



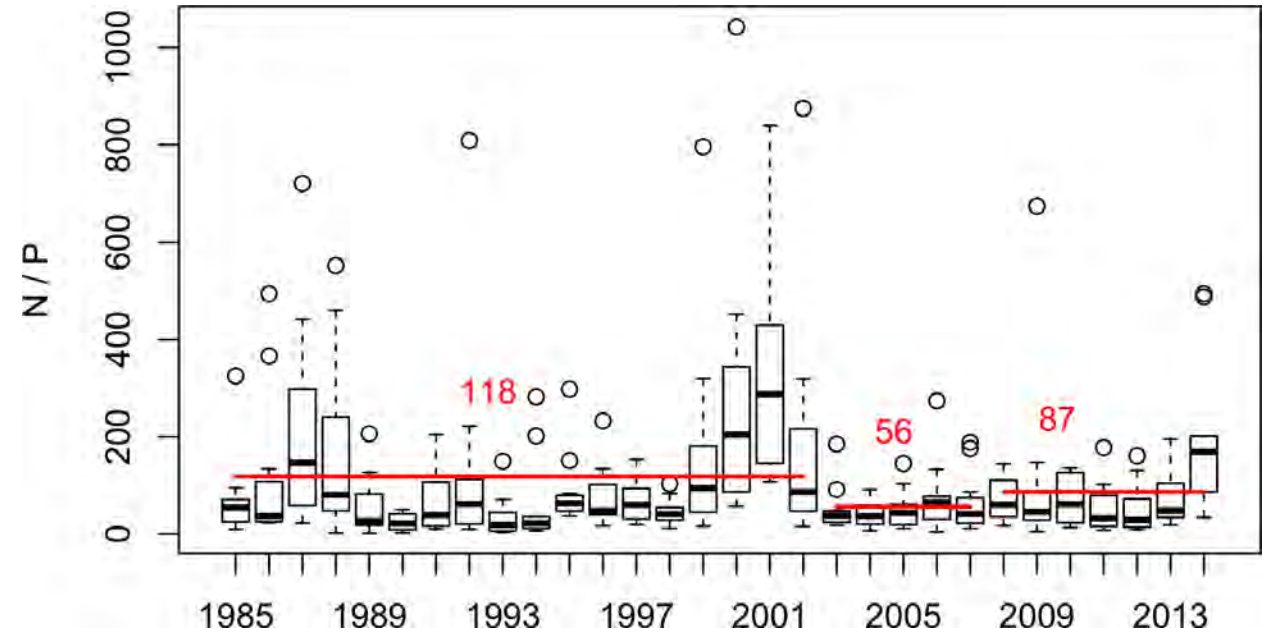
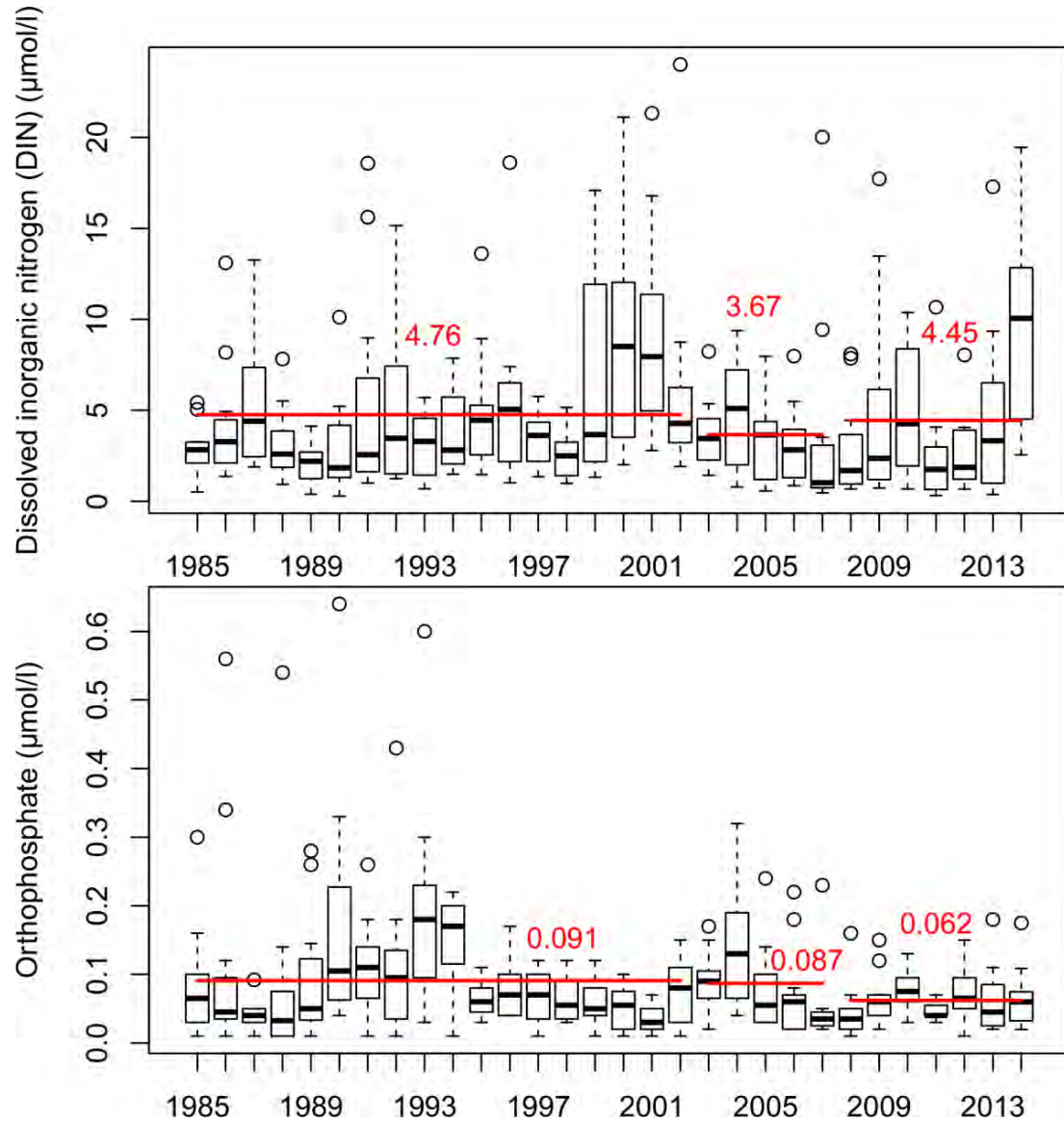
Variable: Salinity
Season: OND
Regime: 2008-2015
Depth: 1.47 m



Vectors of changes: air T and precipitations



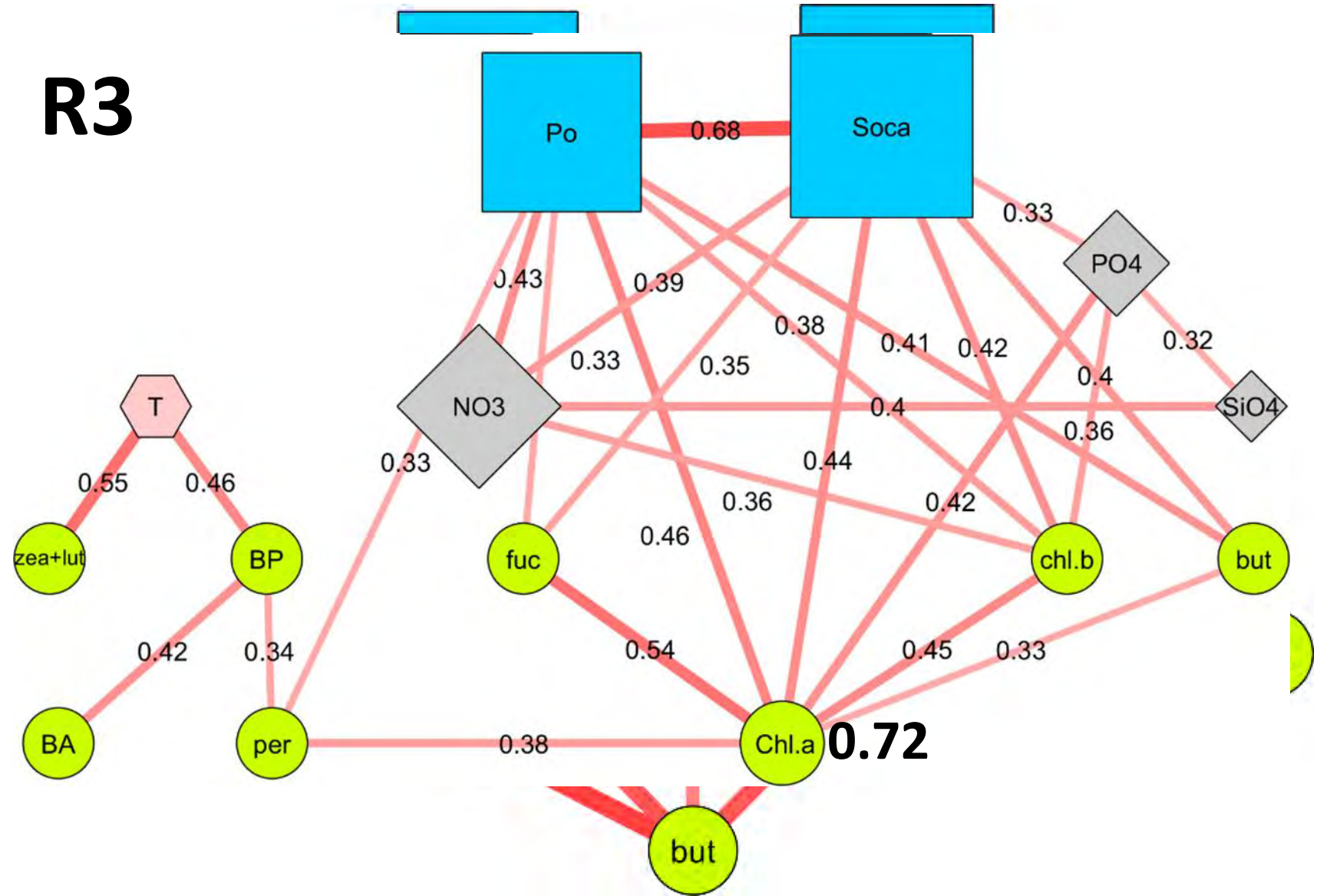
Long-term changes in nutrient status



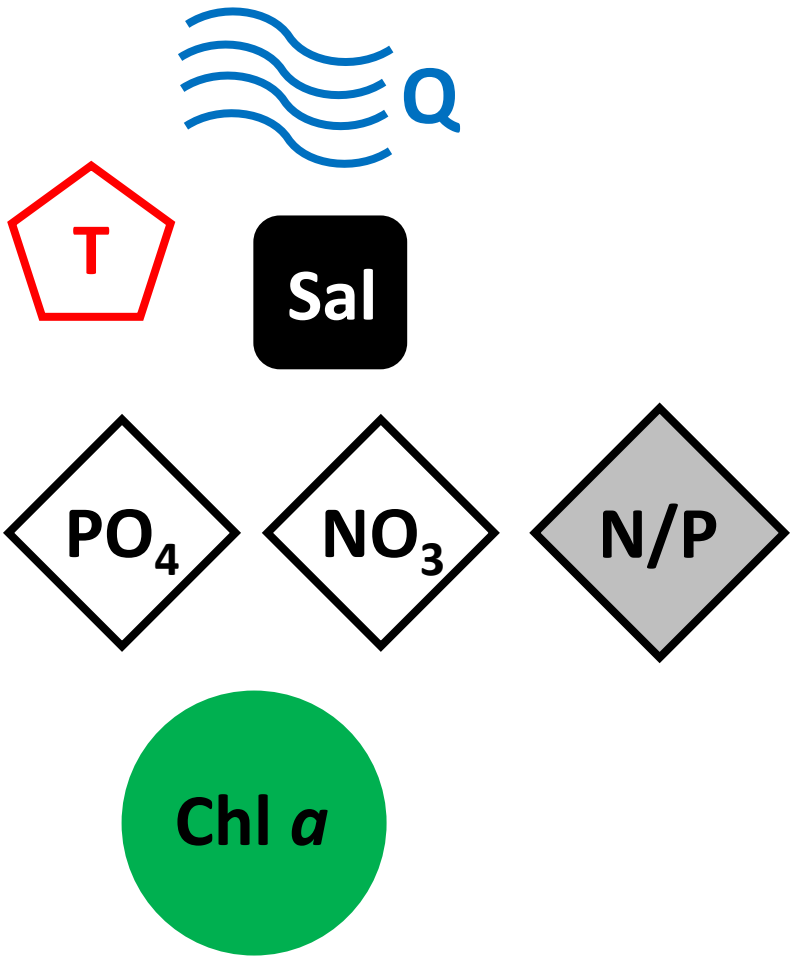
Bottom-up control of microbial communities

Conditions:
Transformed data
 $n \geq 15$
 $r \geq 0.3$
 $p < 0.01$

Cytoscape tool
for **association networks**



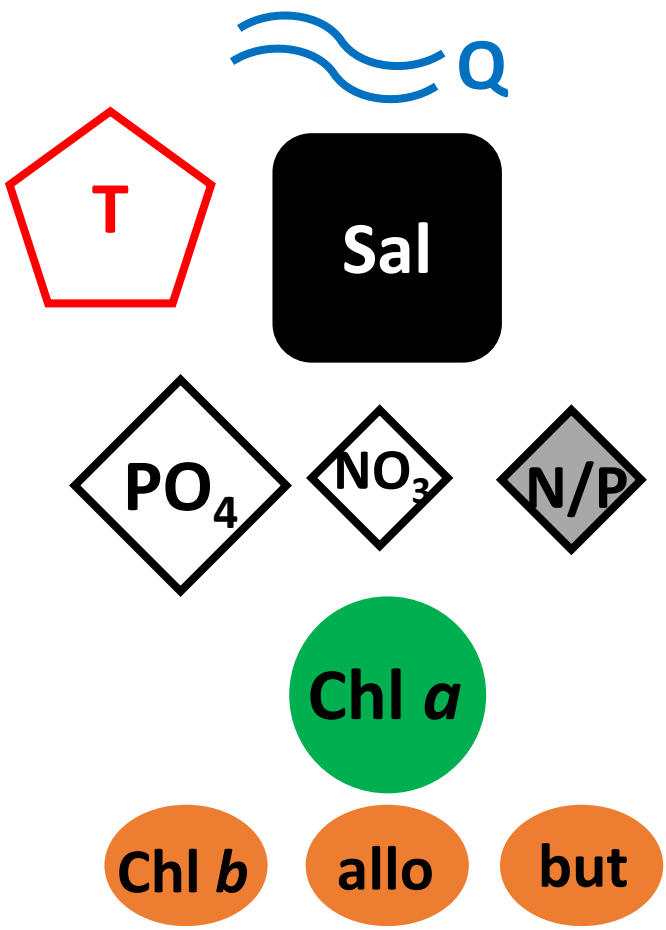
RI (1985-2002)



eutrophication

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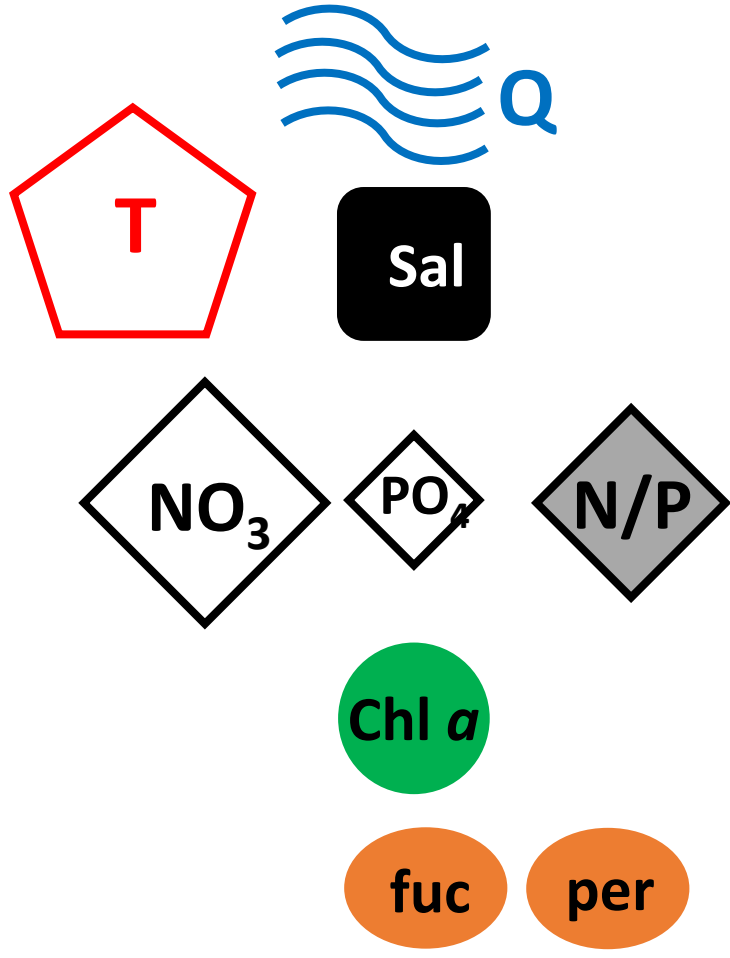
R2 (2003-2007)



oligotrophication

Effects of Climate Change on the World's Oceans

R3 (2008-2015)



**oligotrophication
*cont.***



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