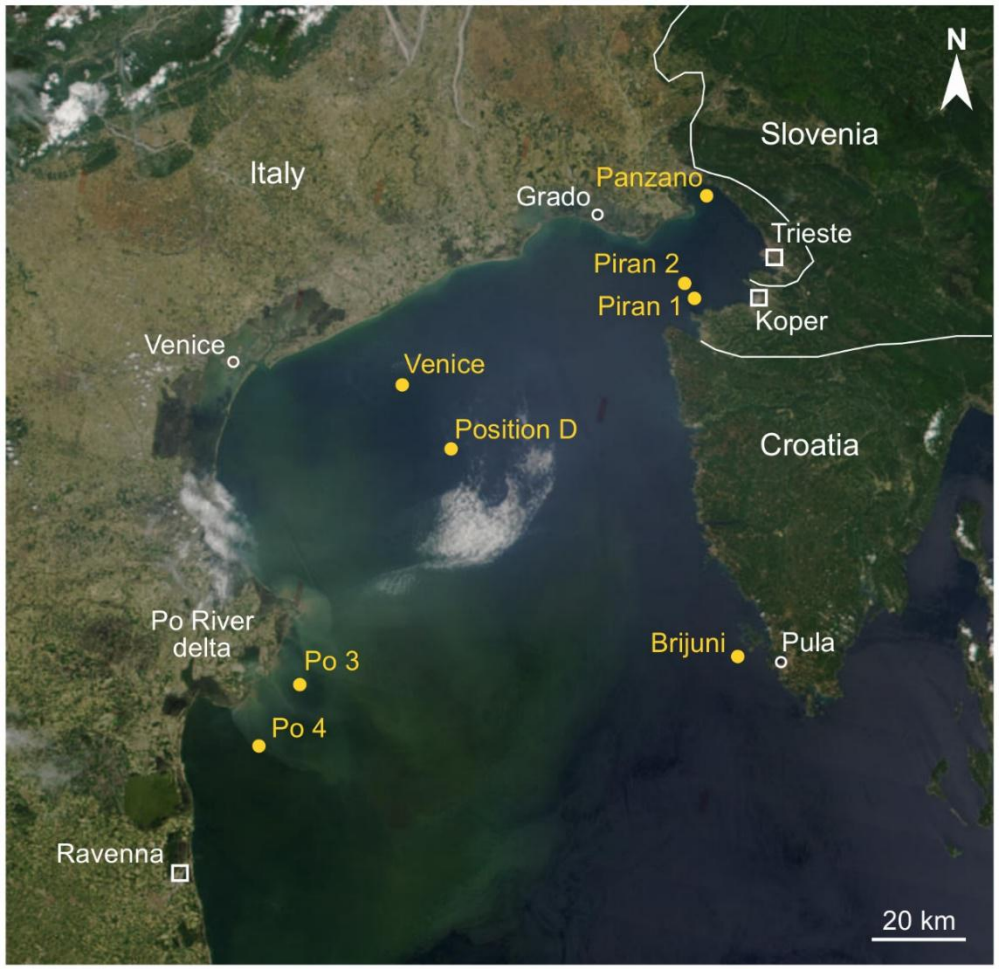
Basin-wide homogenisation of benthic soft-bottom communities in the wake of anthropogenic habitat degradation in the northern Adriatic Sea

Martin Zuschin, Alexandra Haselmair, Ivo Gallmetzer, Anna Wieser, Adam Tomasovych[1]

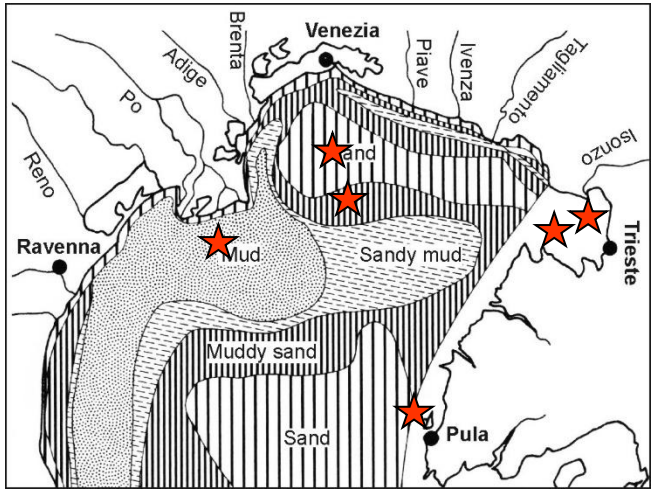
Department of Palaeontology, University of Vienna
[1]Geological Institute, Slovak Academy of Sciences, Bratislava

Study area

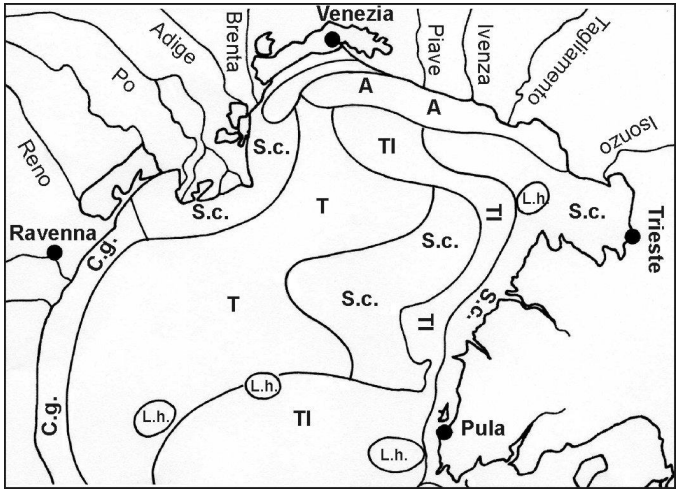


Study area

Sediments

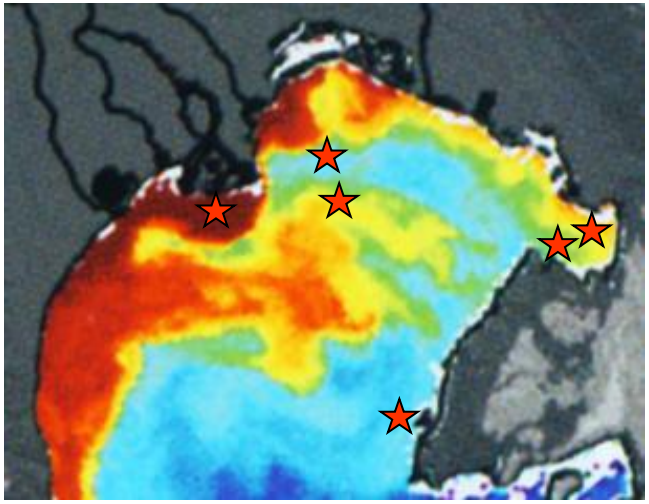


Biofacies



Zuschin & Stachowitsch 2009

Nutrients

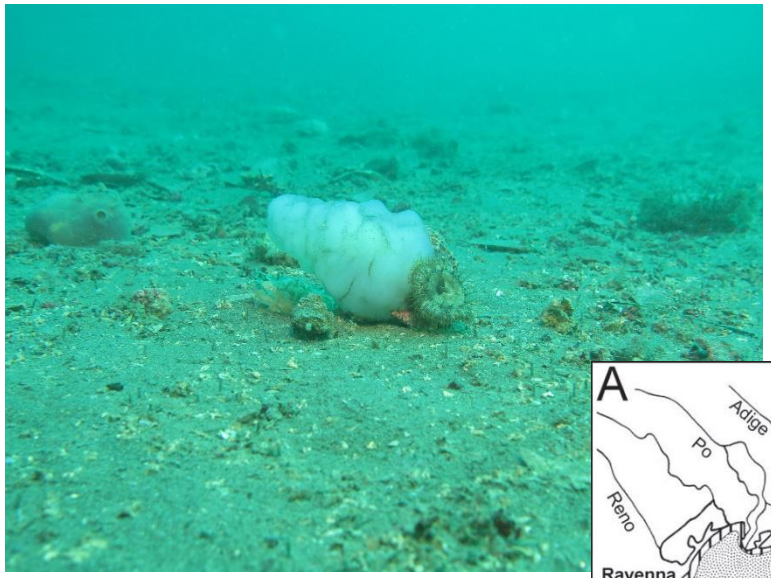


eutrophic: Po delta

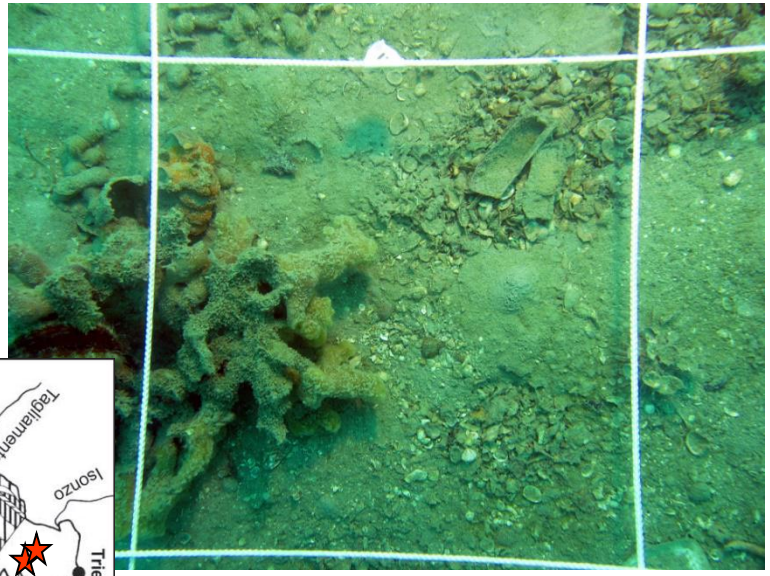
mesotrophic: Panzano, Position D, Piran

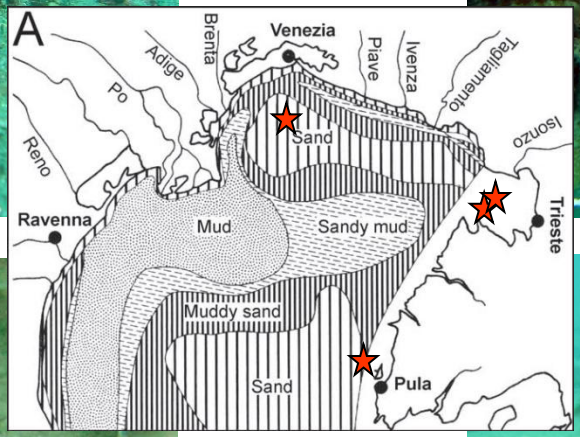
oligotrophic: Venice, Brijuni

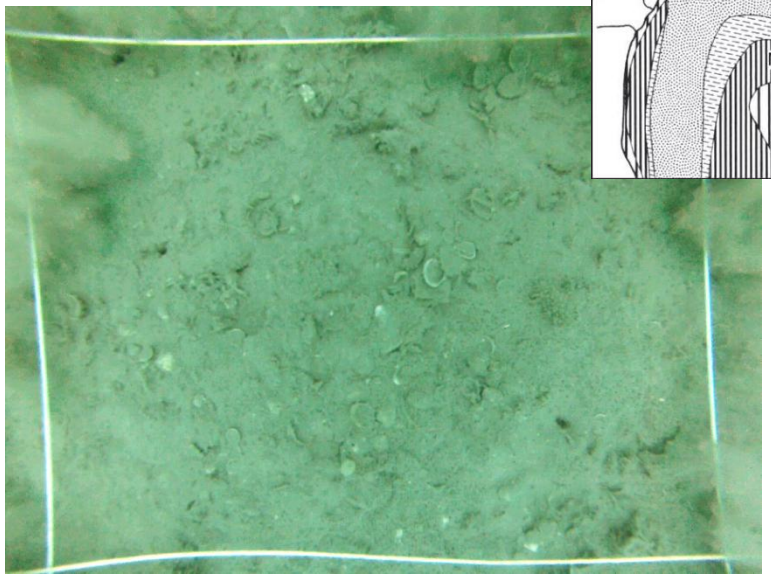
Venice: sand, 21 m

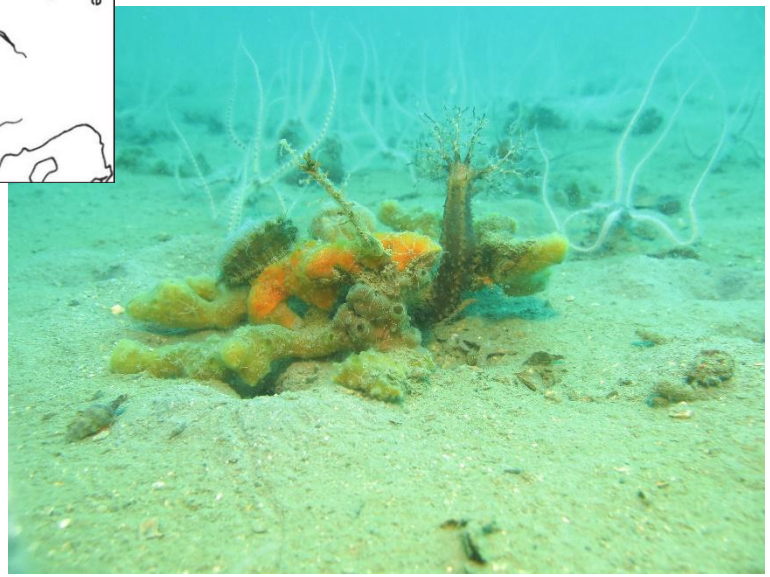


Piran I: muddy sand, 22 m





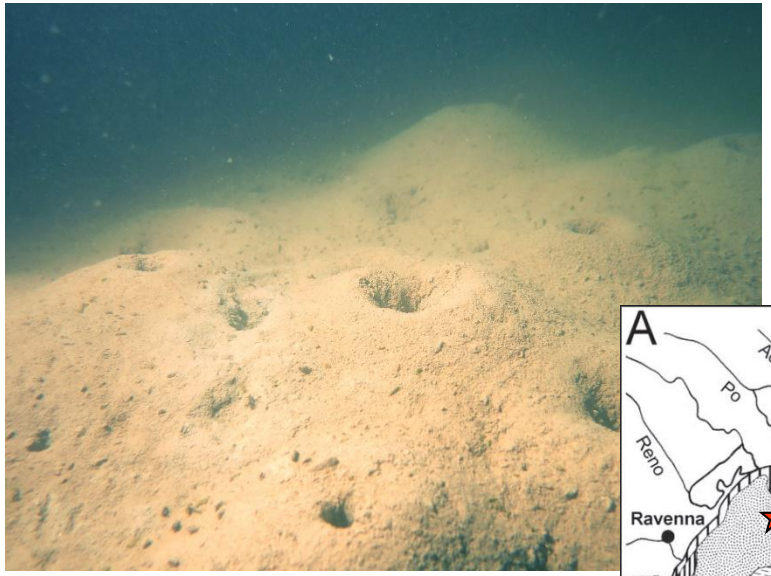




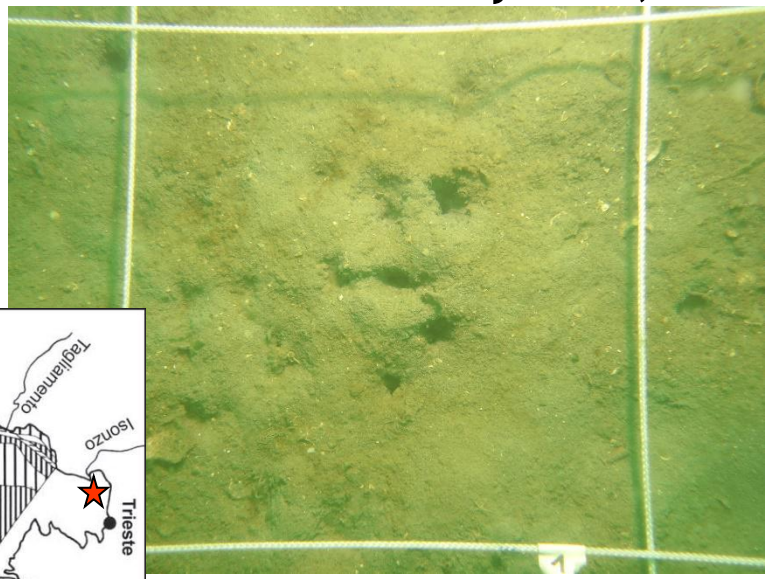
Brijuni: sandy mud, 44m

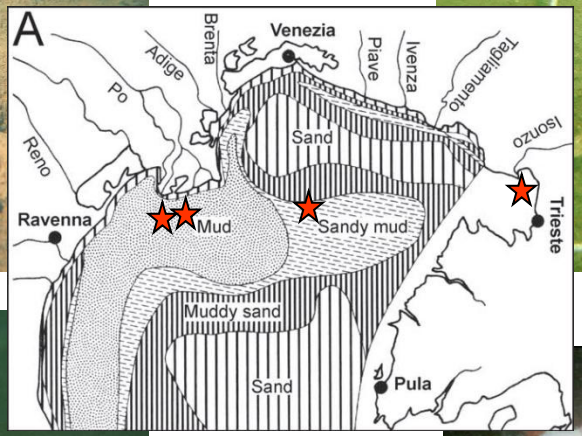
Piran II: muddy sand, 23 m

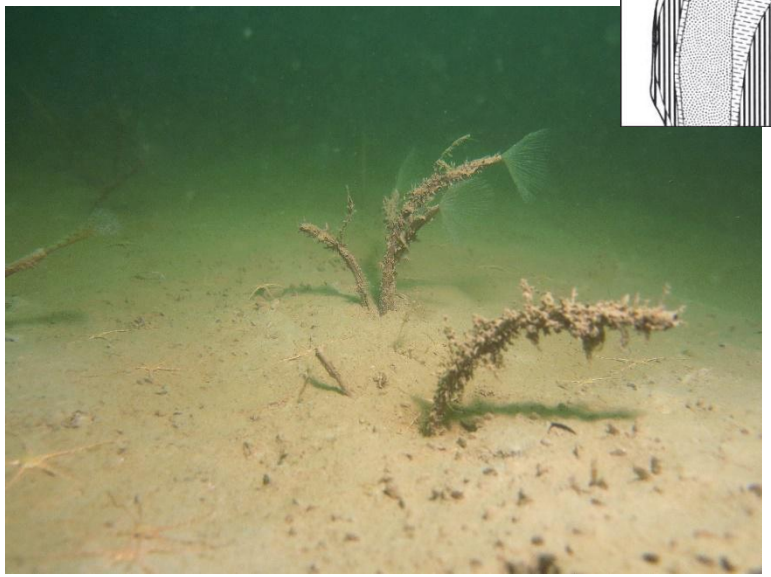
Po 3: mud, 21m



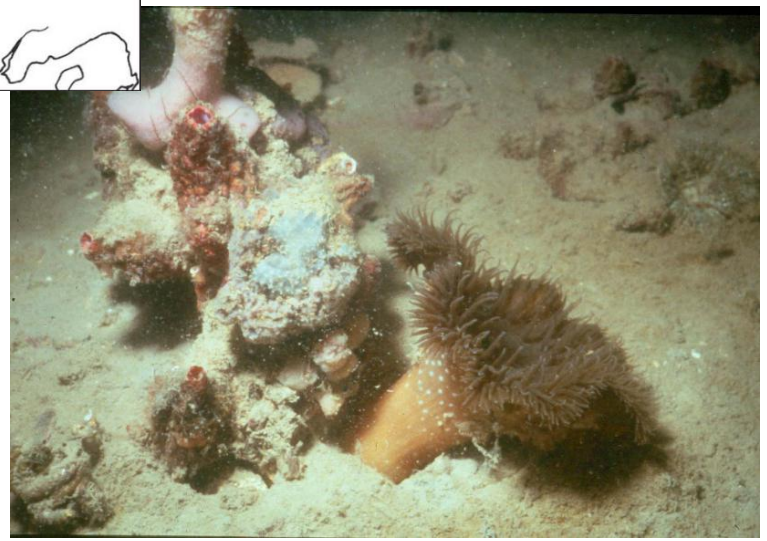
Position D: sandy mud, 30m







Po 4 bouy: mud, 21m



Panzano: muddy sand, 13m

Sampling

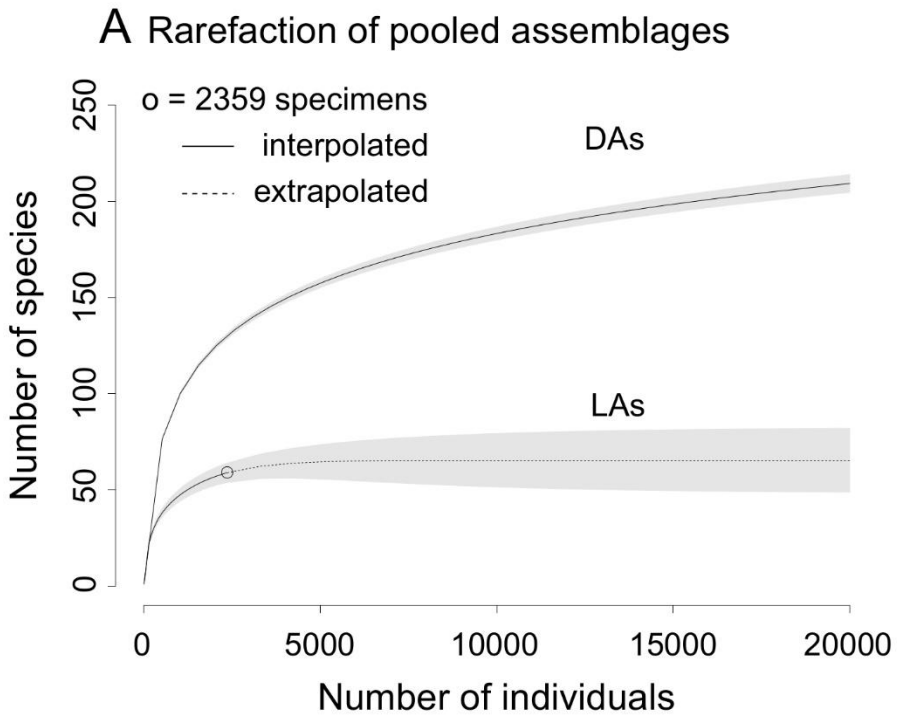
8 grabs per station (1 m² surface)

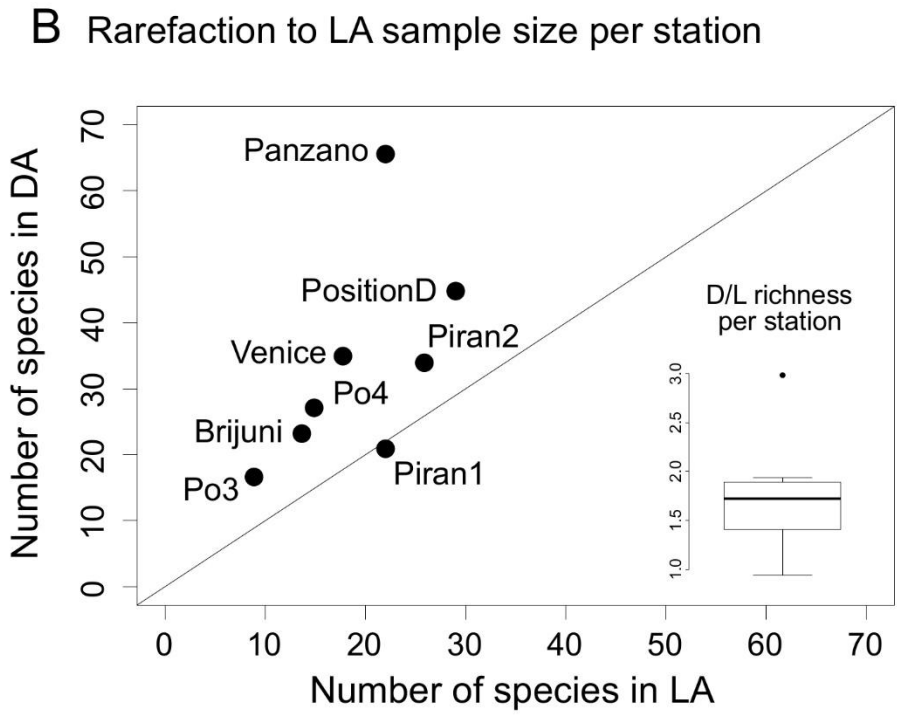
LD analysis (molluscs)

N total DA: 57.912
N total LA: 2.359
Species: 245

Station	grabs DA	grabs LA	N DA	N LA	Sobs DA	Sobs LA	IQR
Po3	6	8	1372	111	40	9	10
Po4	7	8	2854	210	58	15	3
Panzano	3	8	2382	1441	75	22	38
Position D	1	8	4452	232	121	29	-
Brijuni	1	8	2978	41	137	14	1460
Piran 1	1	8	22168	64	152	22	1724
Piran2	1	8	17976	166	152	26	1960
Venice	2	8	3730	94	128	18	2169

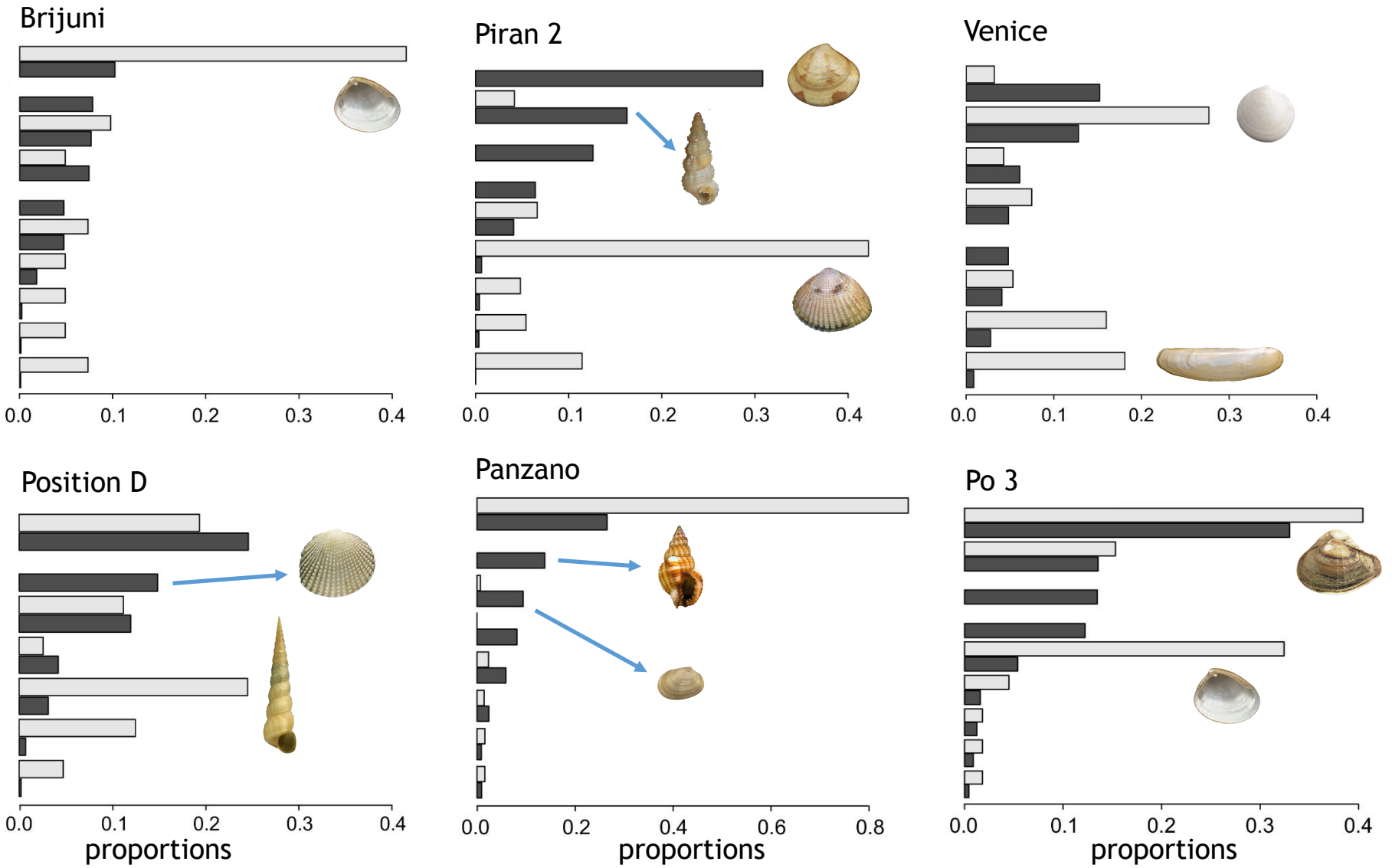
Species richness



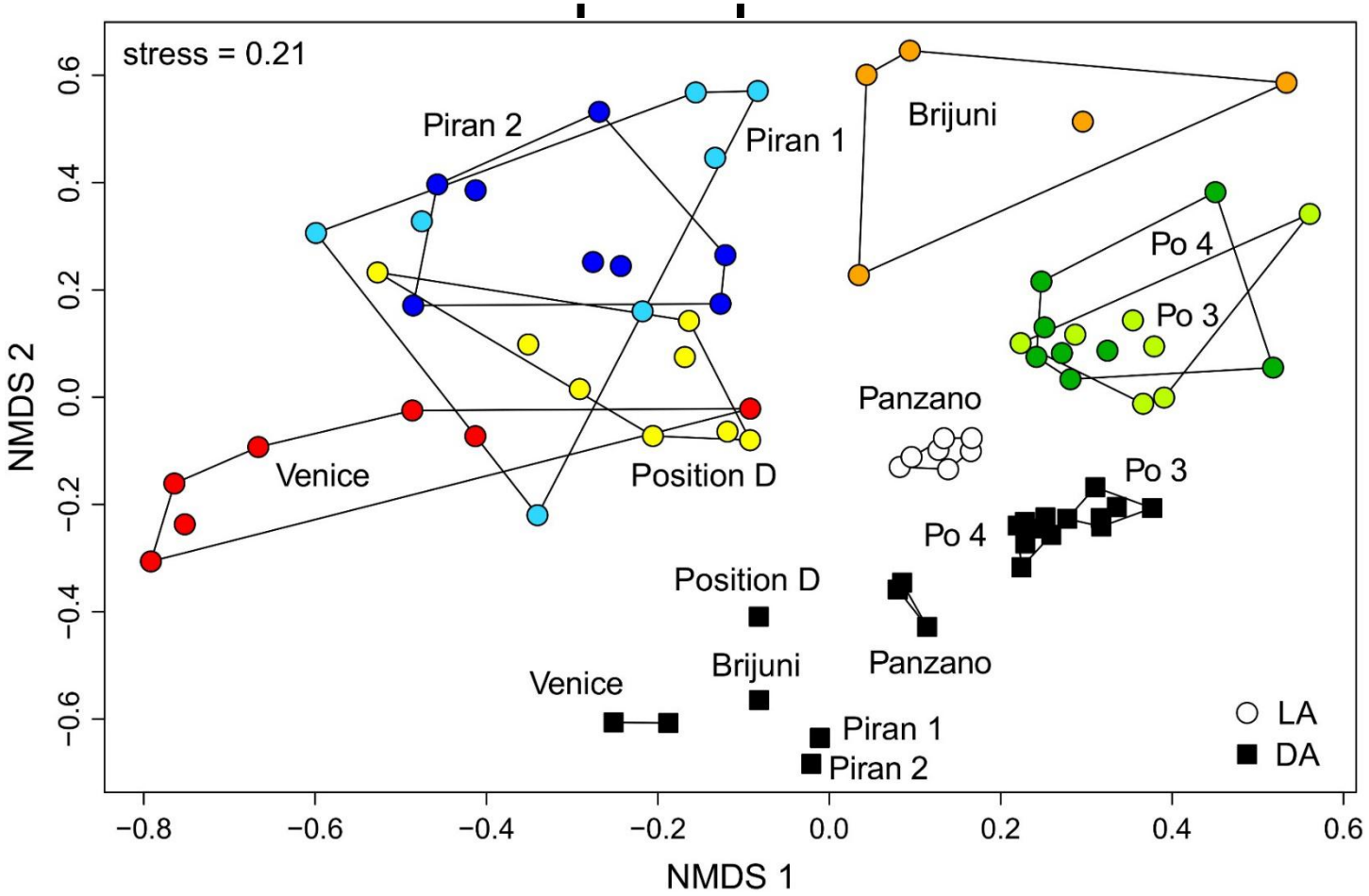


Differences in species-abundance composition

between LA and DA



Differences in species composition /

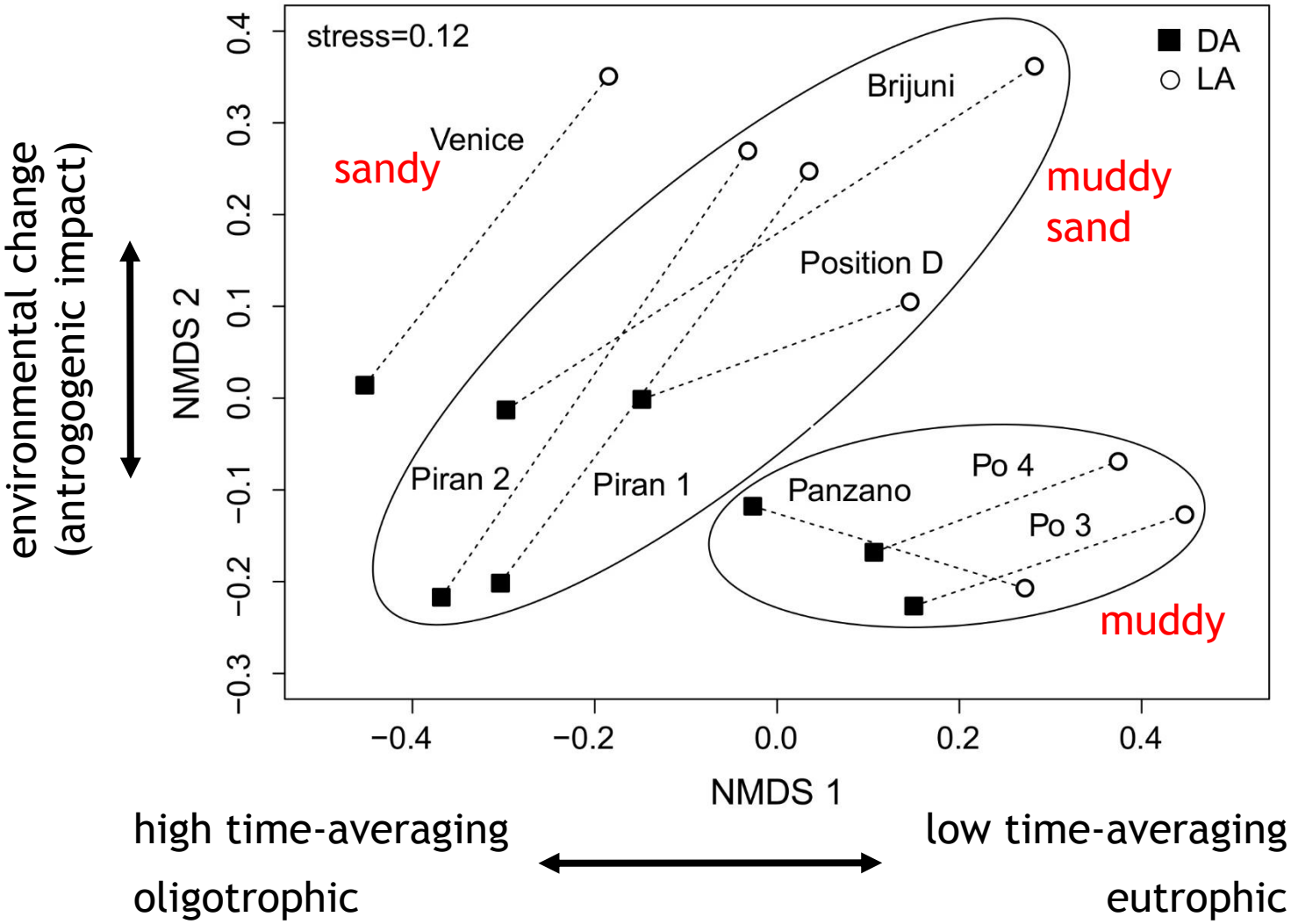


sandy
oligotrophic
high time-averaging

muddy
eutrophic
low time-averaging

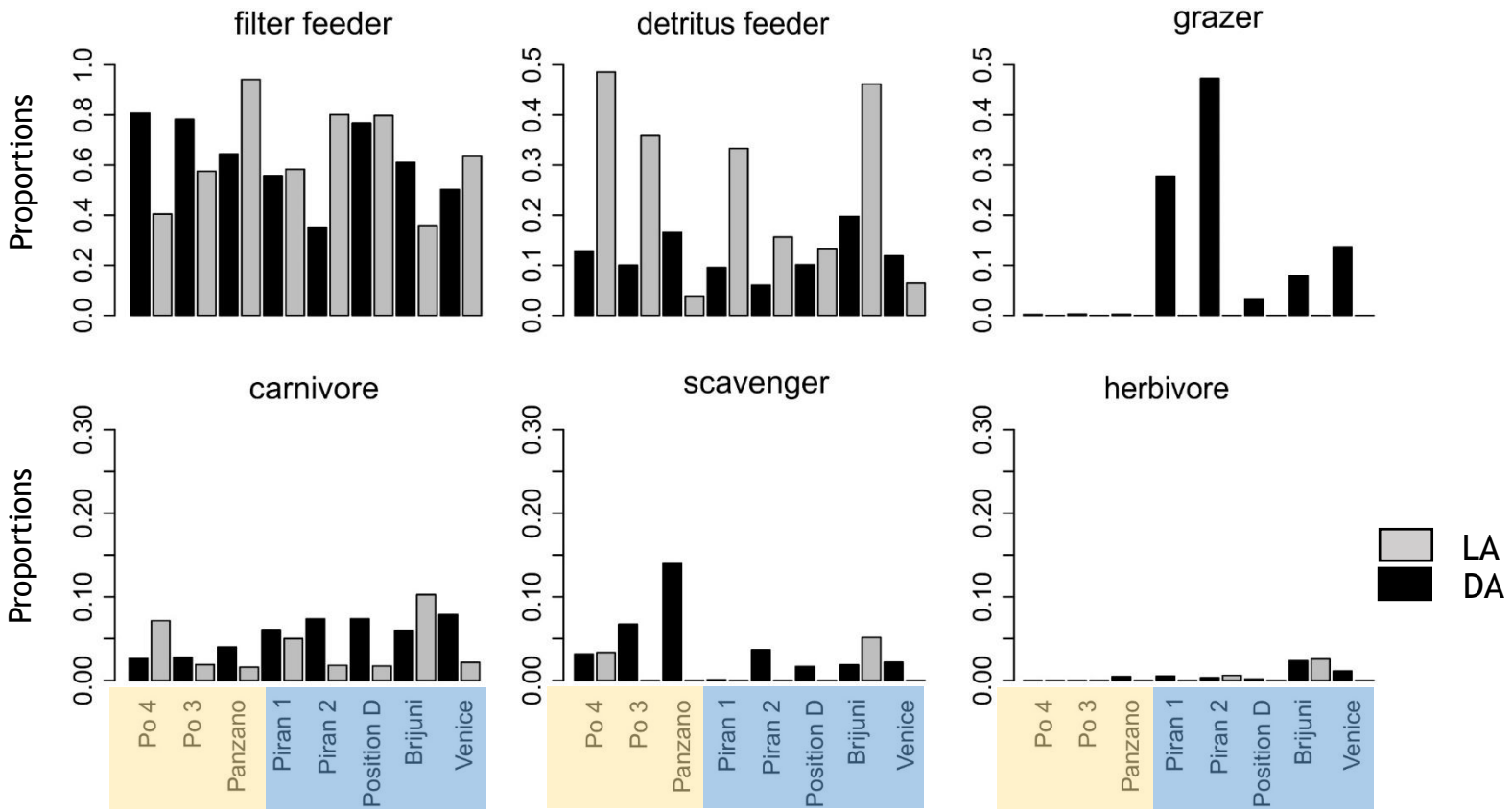
Differences in species composition / abundance

grabs pooled per station

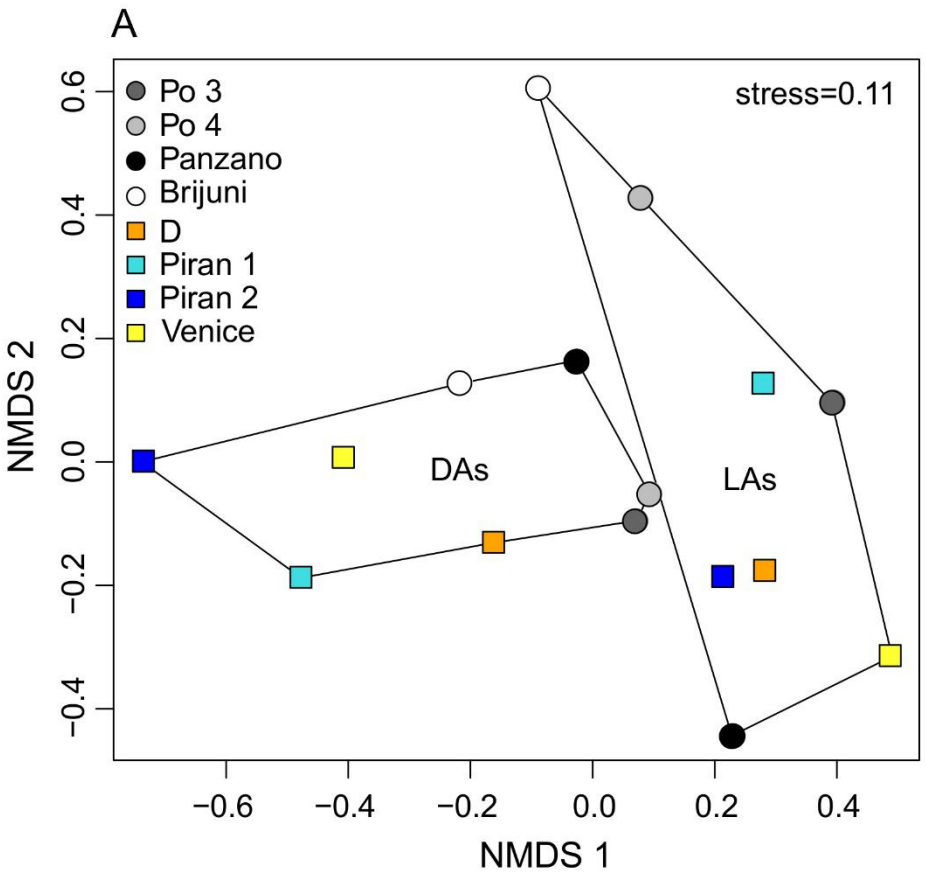


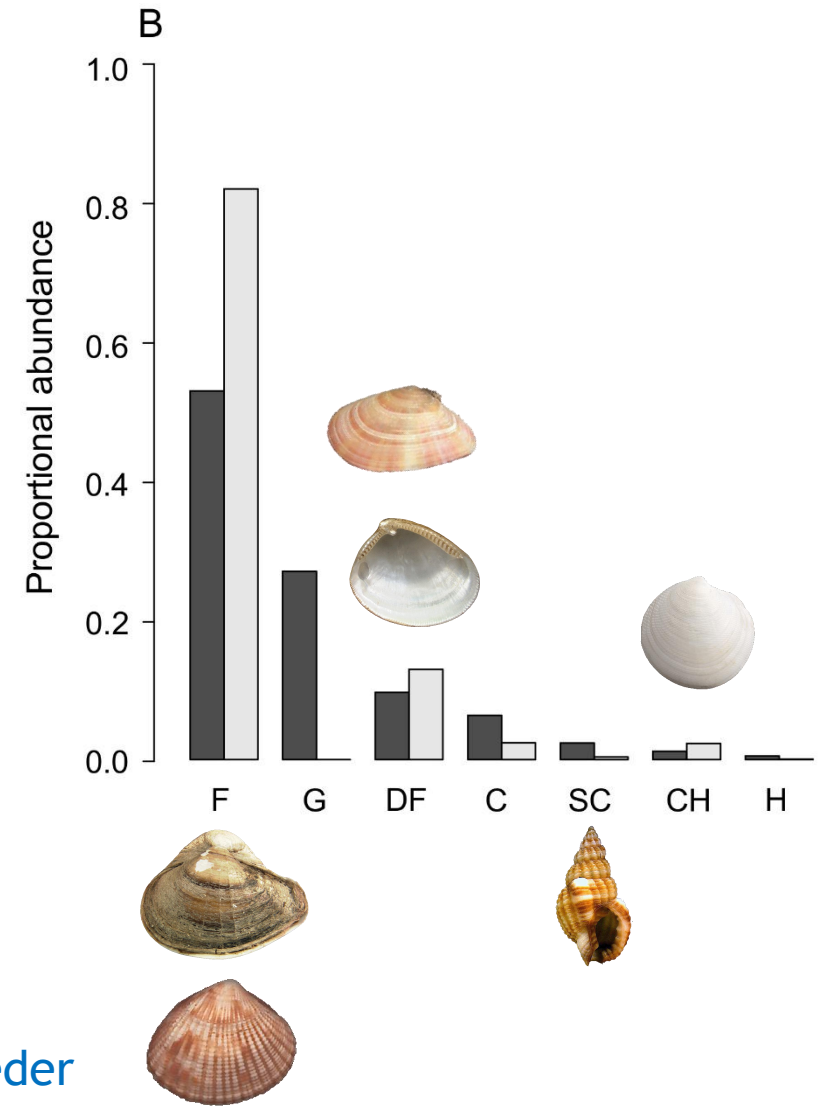
Differences in feeding guild composition

between LA and DA



Functional analysis - feeding guilds

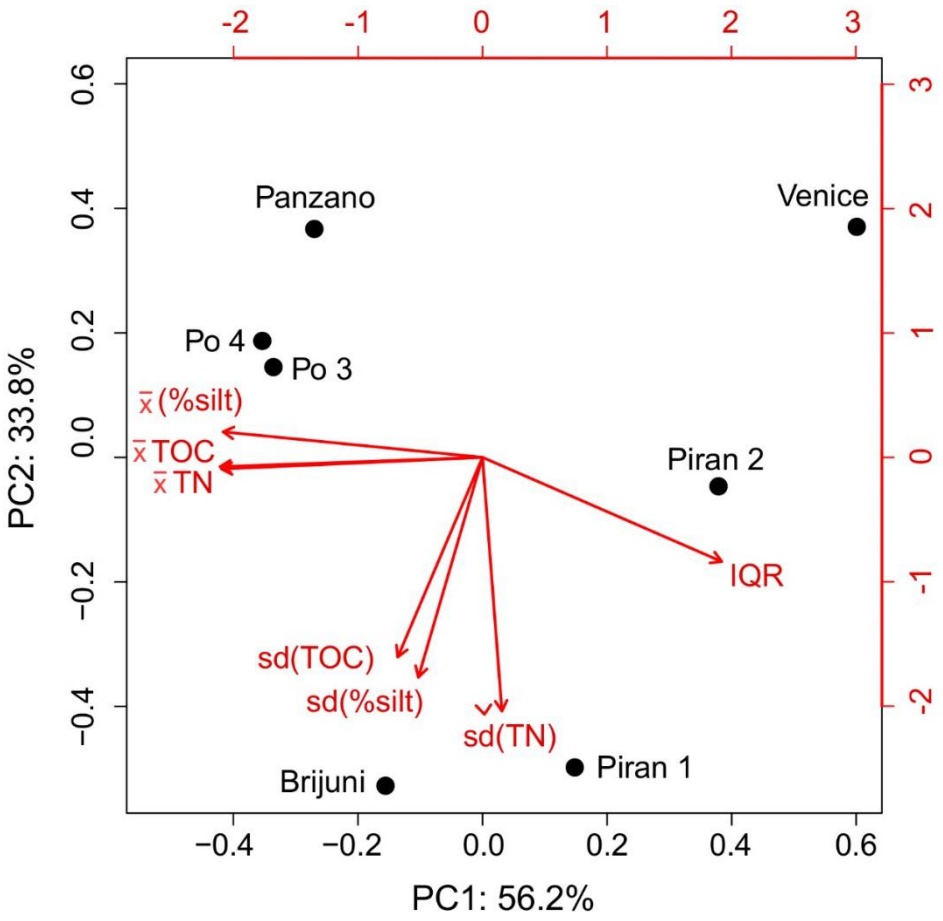




→ loss of grazers

→ increase of filter and detritus feeder

Factors influencing fidelity

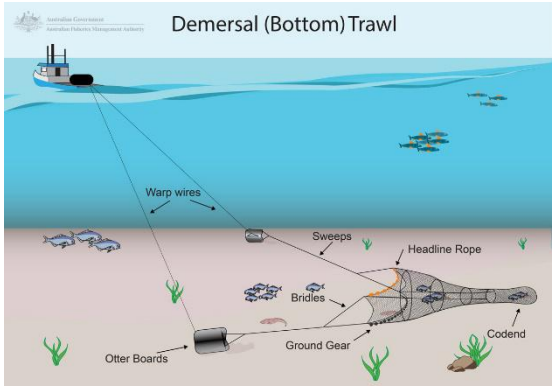


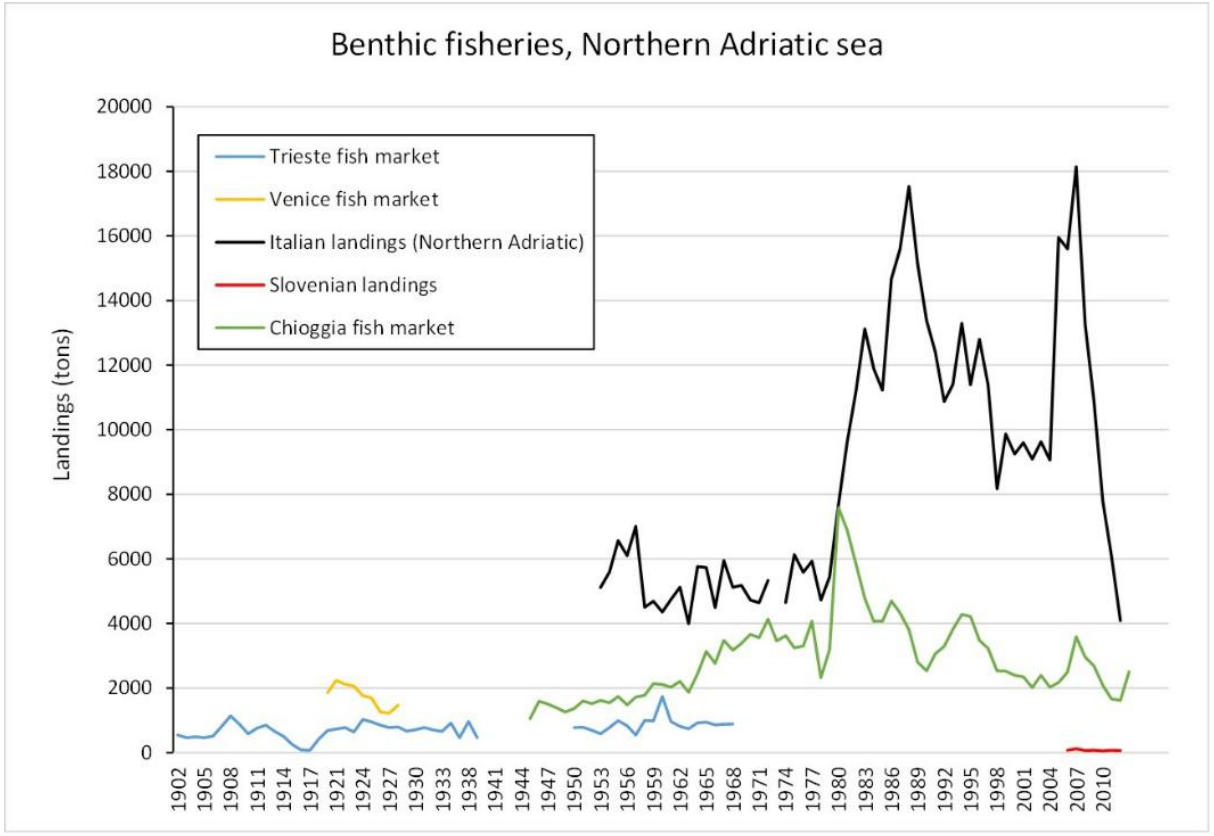
PC1: time-averaging (IQR), environmental conditions ($\bar{x}$)

PC2: environmental variability (sd)

Anthropogenic impact

Bottom trawling

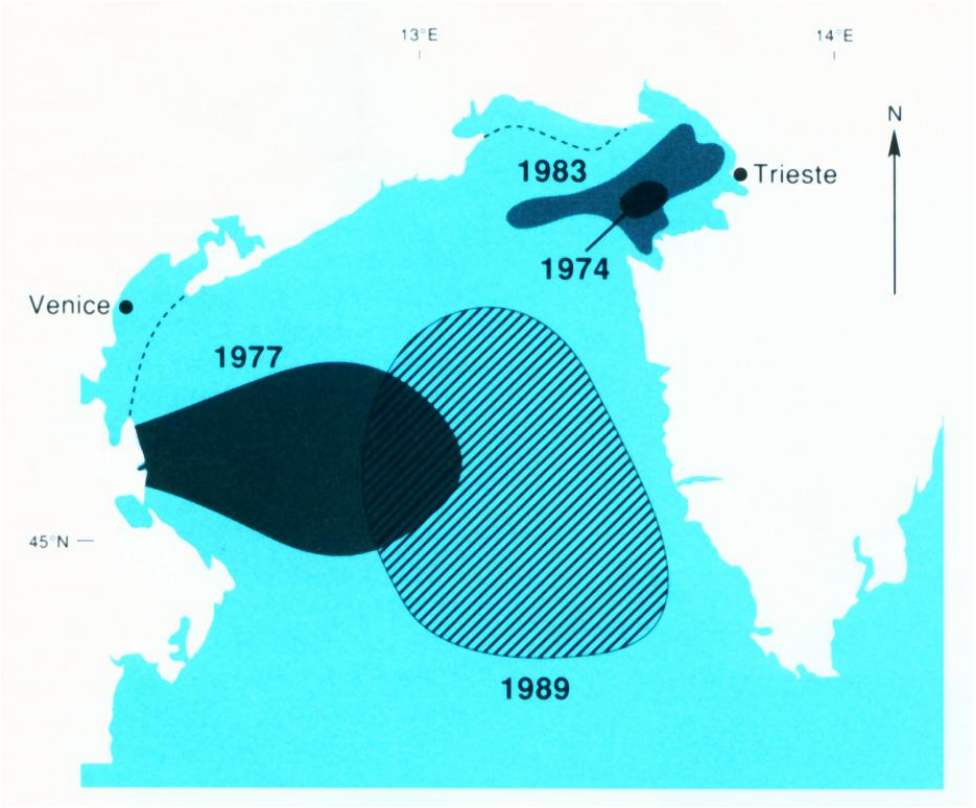




based on data from Fortibuoni et al. 2017

Anthropogenic impact

Hypoxia



Ott 1992

Epifauna: "Rapid death, slow recovery"

Corbula gibba blooms

pictures: Michael Stachowitsch

Tomasovych et al. 2018 Paleobiology 44, 1-28
Fuksi et al. 2018 MPB 135, 361-375
Albano et al. 2018 Biol. Invasions, 20, 361-375

Conclusions

- Comparison between LA and DA shows a compositional shift with an increase of infaunal and a loss of epifaunal species
- Functional composition shifts towards suspension and detritus feeders, grazers disappear
- Bottom trawling, eutrophication and hypoxia are the main anthropogenic drivers of change
- Reduction of trawling is most important measure for conservation or restoration of previous community states

Thank you for your attention