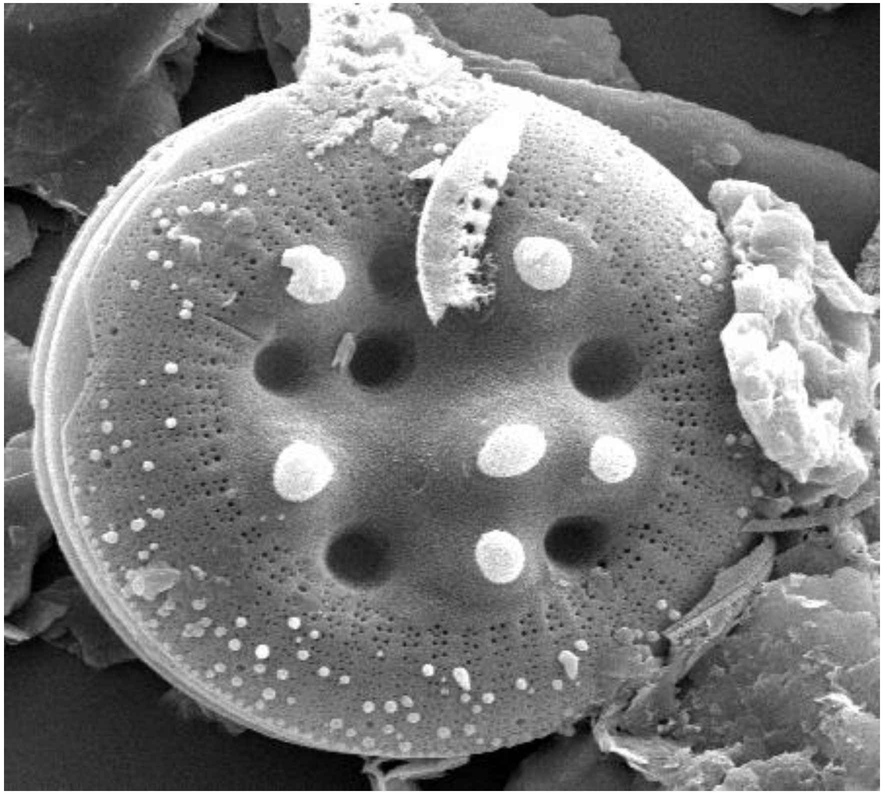


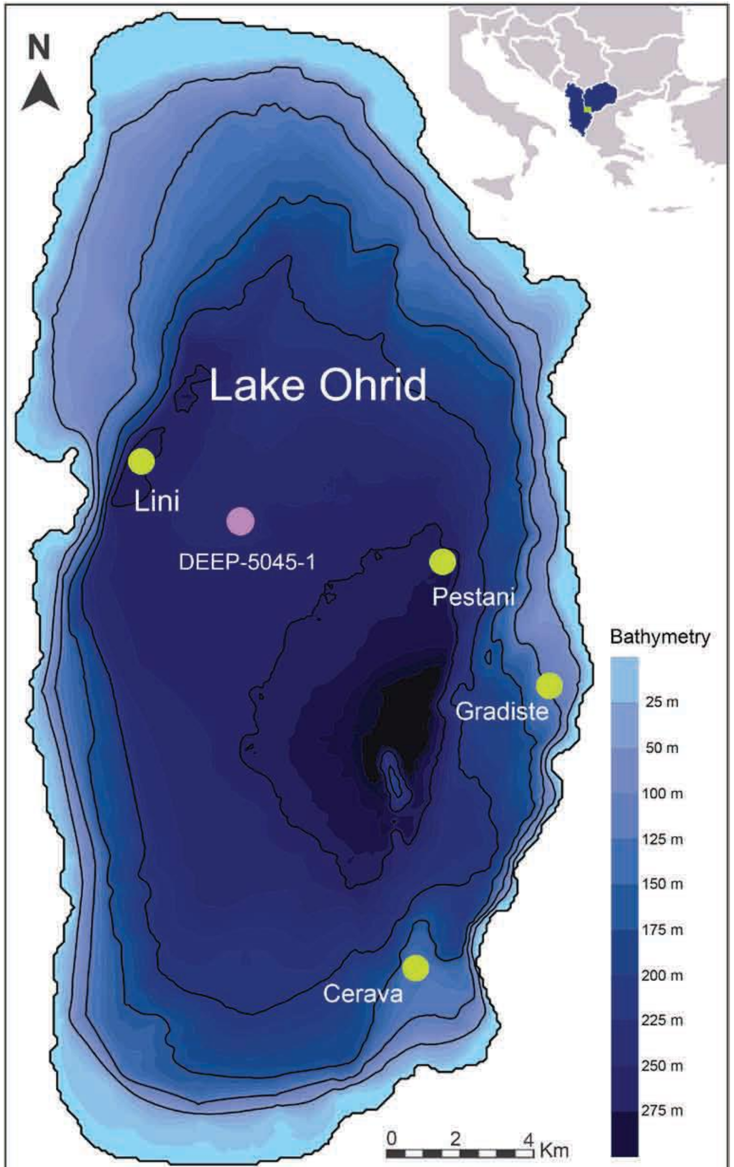
Basin- and global-scale environment alternately drive diatom community structure in ancient Lake Ohrid

Aleksandra Cvetkoska, Dedmer B. Van de Waal, Timme H. Donders, Elena Jovanovska, Zlatko Levkov, Torsten Hauffe, Jane M. Reed, Alexander Francke, Hendrik Vogel, Thomas Wilke, Bernd Wagner, Friederike Wagner-Cremer

icdp

NETHERLANDS INSTITUTE OF ECOLOGY (NIOO-KNAW)

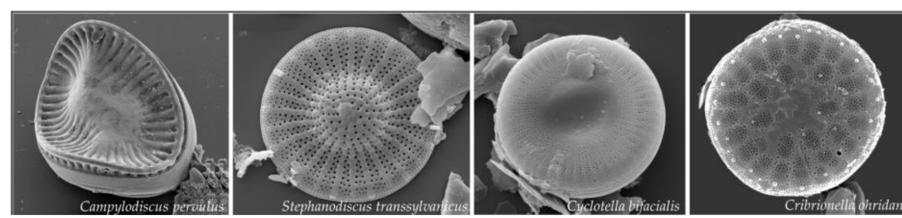
Lake Ohrid (North Macedonia/Albania)



UNESCO World Heritage Site since 1979

Unique biodiversity

Lake	Total # endemic species	Lake size in km²	Endemic biodiversity index (log N x log A^{-1})
Baikal	> 1200	31.494	0.68
Malawi	> 1000	29.600	0.67
Tanganyika	> 800	32.900	0.64
Ohrid	> 300	360	0.97
Titicaca	64	8.372	0.46
Biwa	59	670	0.62



Scientific Collaboration on Past Speciation Conditions in Lake Ohrid - 'SCOPSCO', ICDP project

Major goals are to obtain information about:

1. age and origin of Lake Ohrid,
2. the seismo-tectonic history of the lake area,
3. volcanic activities and climatic changes during the Quaternary, and
4. **the driving forces for biotic evolution.**

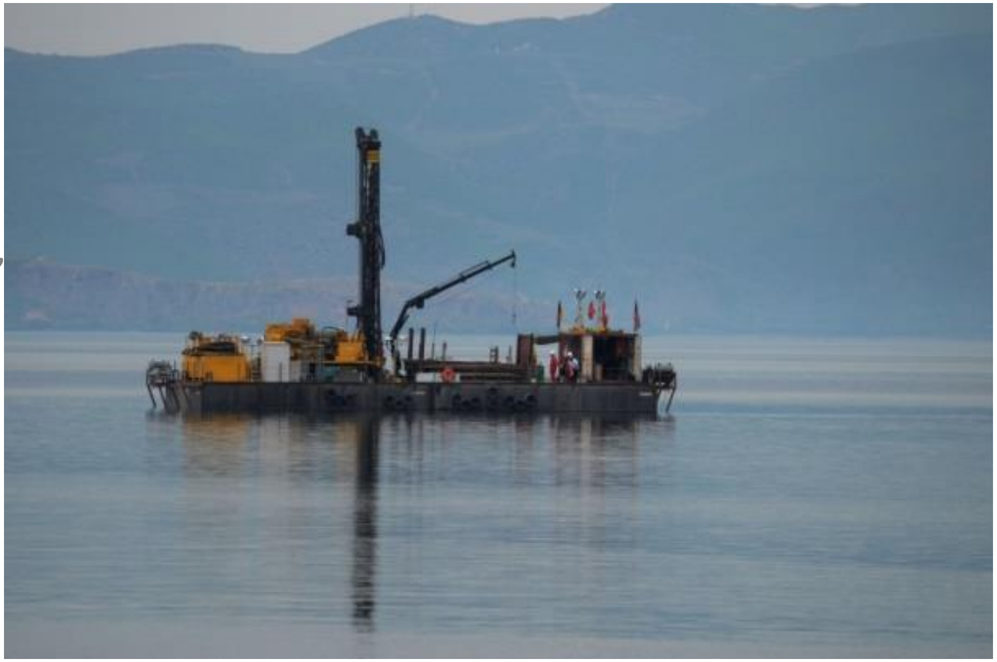


Table 1. SCOPSCO drill sites.

Site	Water depth (m)	# of holes (planned)	Total drill metres (m)	Total recovery (m)	Deepest drill depth (m b.l.f.)	Length of composite record * (m)	Remarks
DEEP	243	6 (2)	2088.71	1526.06	568.92	544.88 (95.77 %)	spot coring
Cerava	119/131	2 (2)	175.71	172.20	90.48	87.86 (97.10 %)	site on a slope
Gradište	131	3 (2)	327.35	224.46	123.41	114.07 (92.43 %)	
Peštani	262	1 (0)	194.50	177.90	194.50	177.90 (91.45 %)	
Lini	260	1 (2)	10.08	10.08	10.08	10.08 (100.00 %)	drilled in 2011
Struga	0	0 (2)	0	0	0	0	skipped

* Composite field recovery is estimated based on field depths and magnetic susceptibility measurements.

SCOPSCO

icdp

Origin: de novo formation in a tectonic valley with fluvial conditions

Deep lake

Relatively shallow

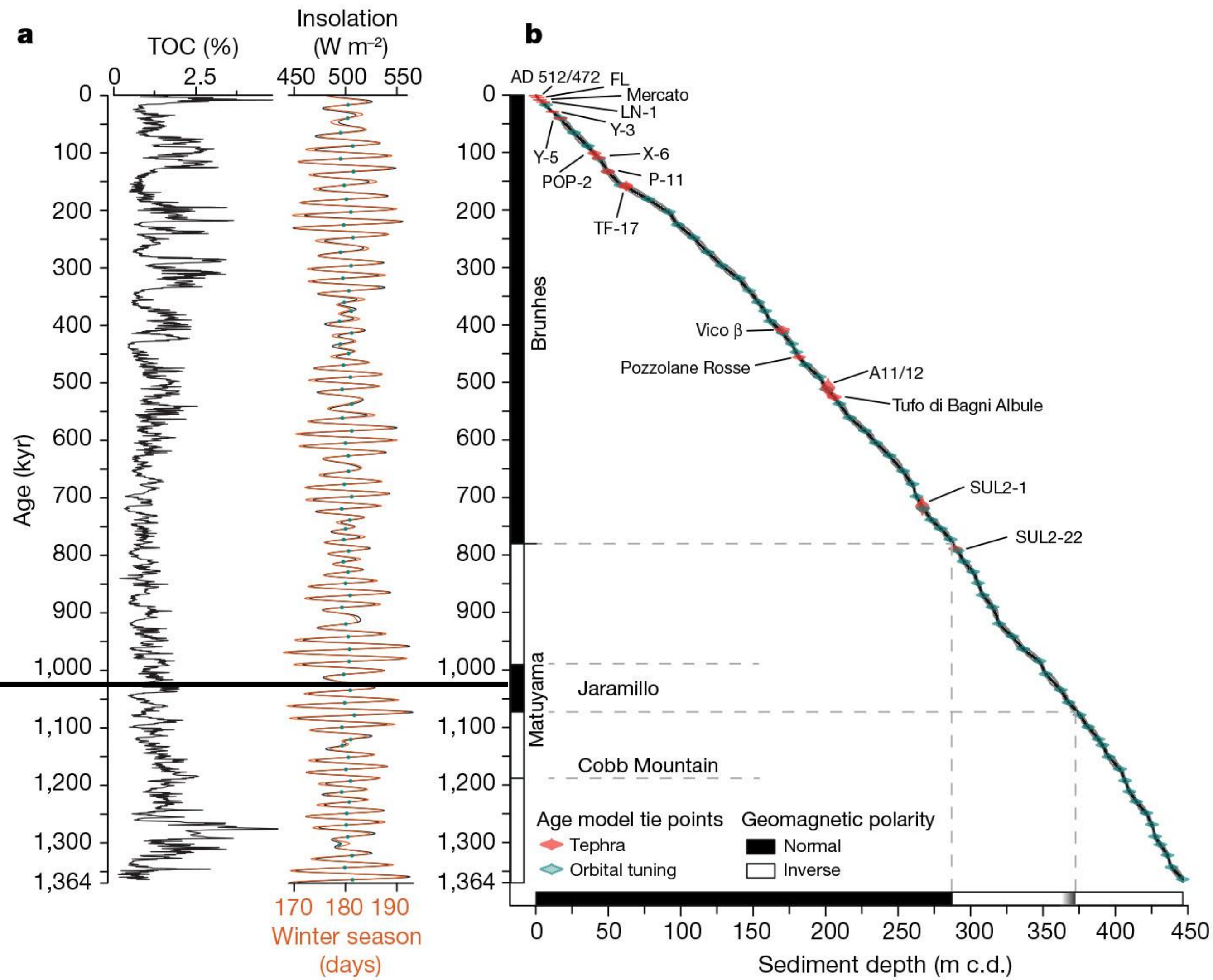


Figure credit: Wagner et al., Nature, 2019

Lake Ohrid diatom fossil record

Undisturbed, well-preserved record of planktonic diatoms during the entire lacustrine history of the lake (1.36 Ma)

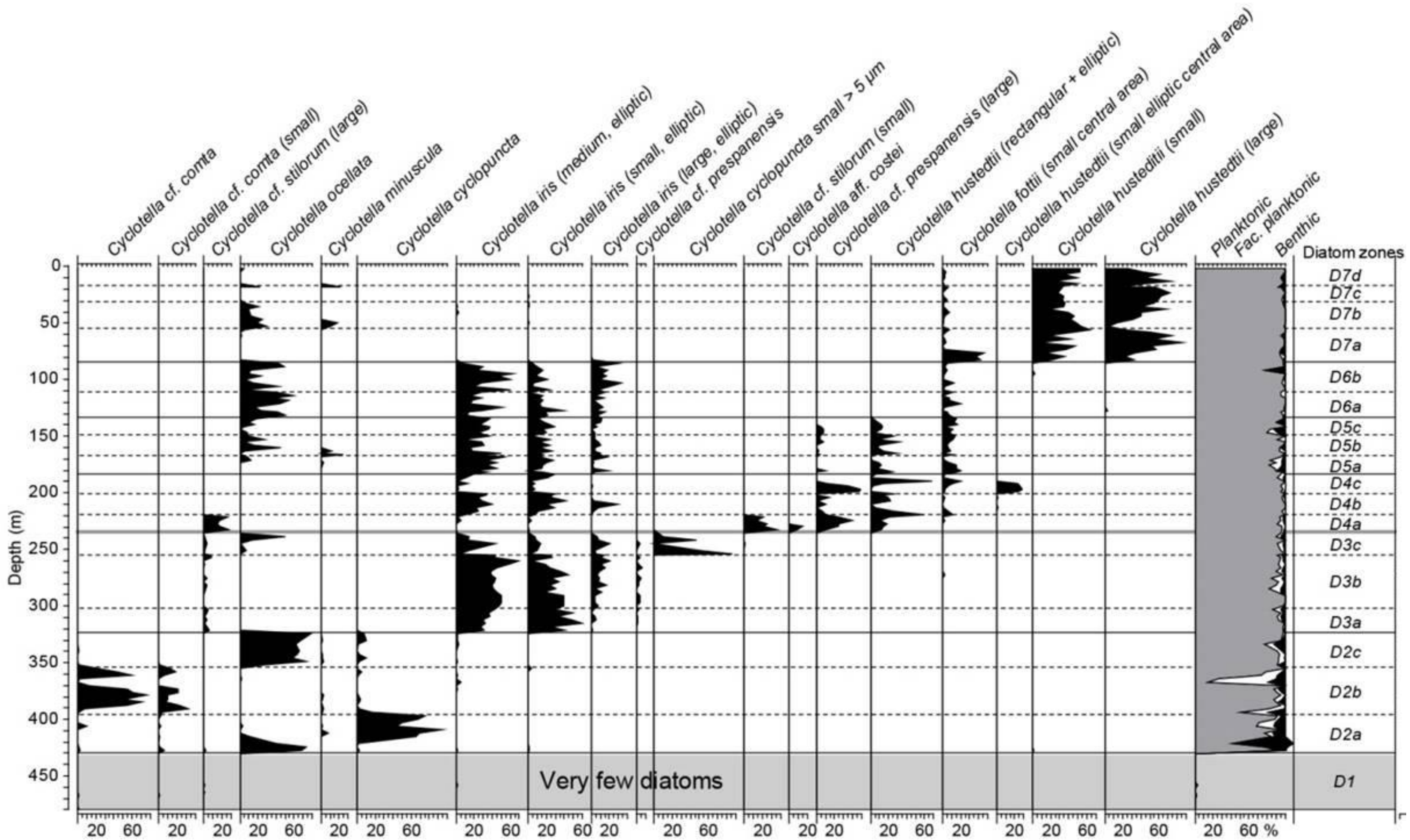


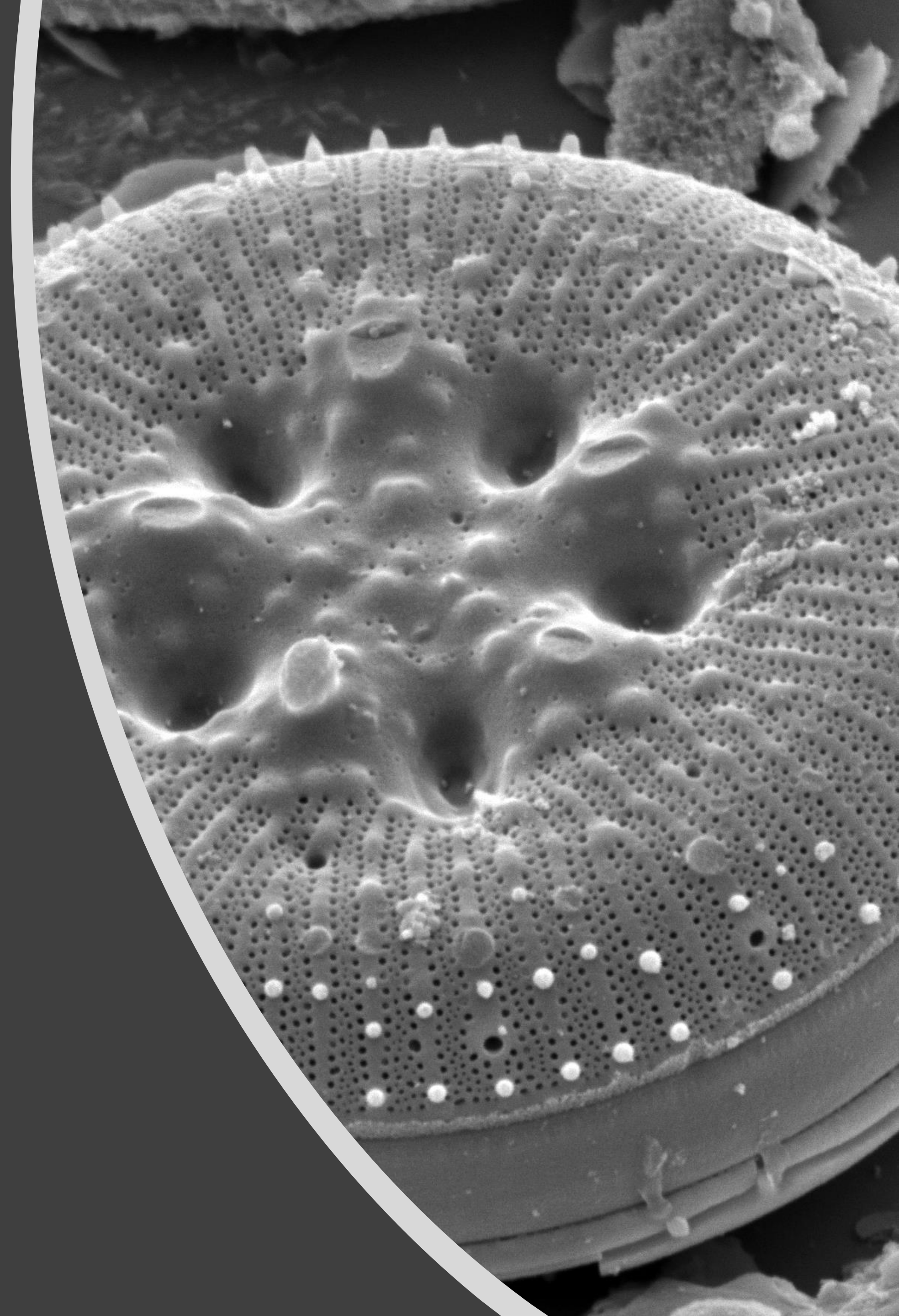
Figure. Preliminary diatom data from smear slides of core catcher samples (hole 1C, DEEP).

From: Wagner et al., Scientific drilling, 2014

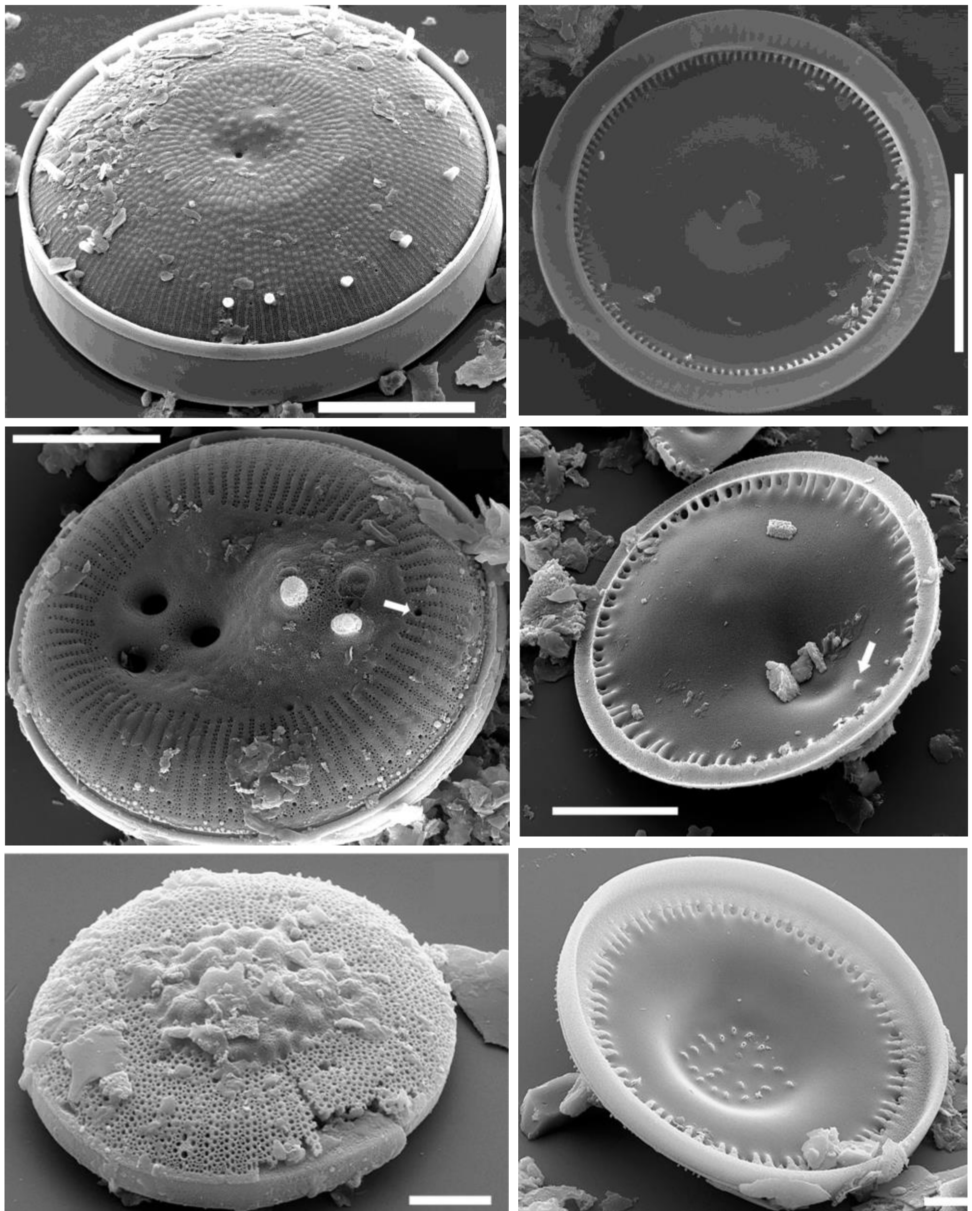
Main objectives

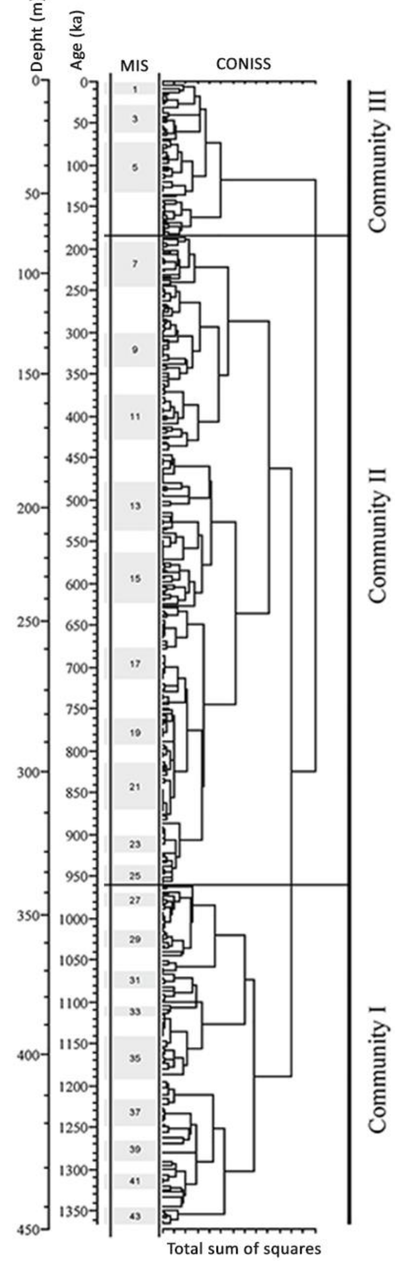
1. Quantify the relative contribution of basin-scale environmental versus global climate change in shaping diatom community composition over time

2. Asses whether their influence changed across multiple glacial-interglacial cycles

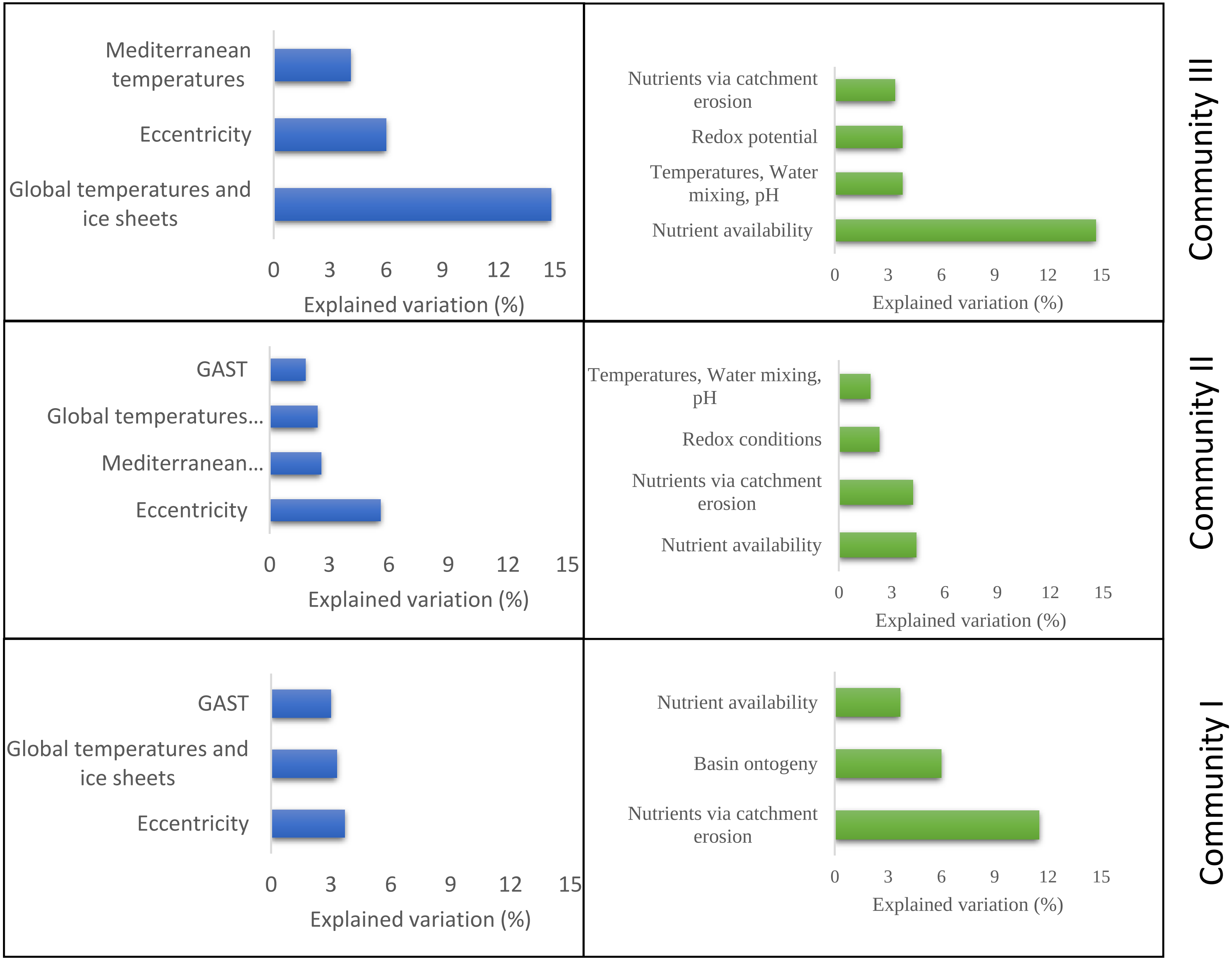


Diatom community patterns

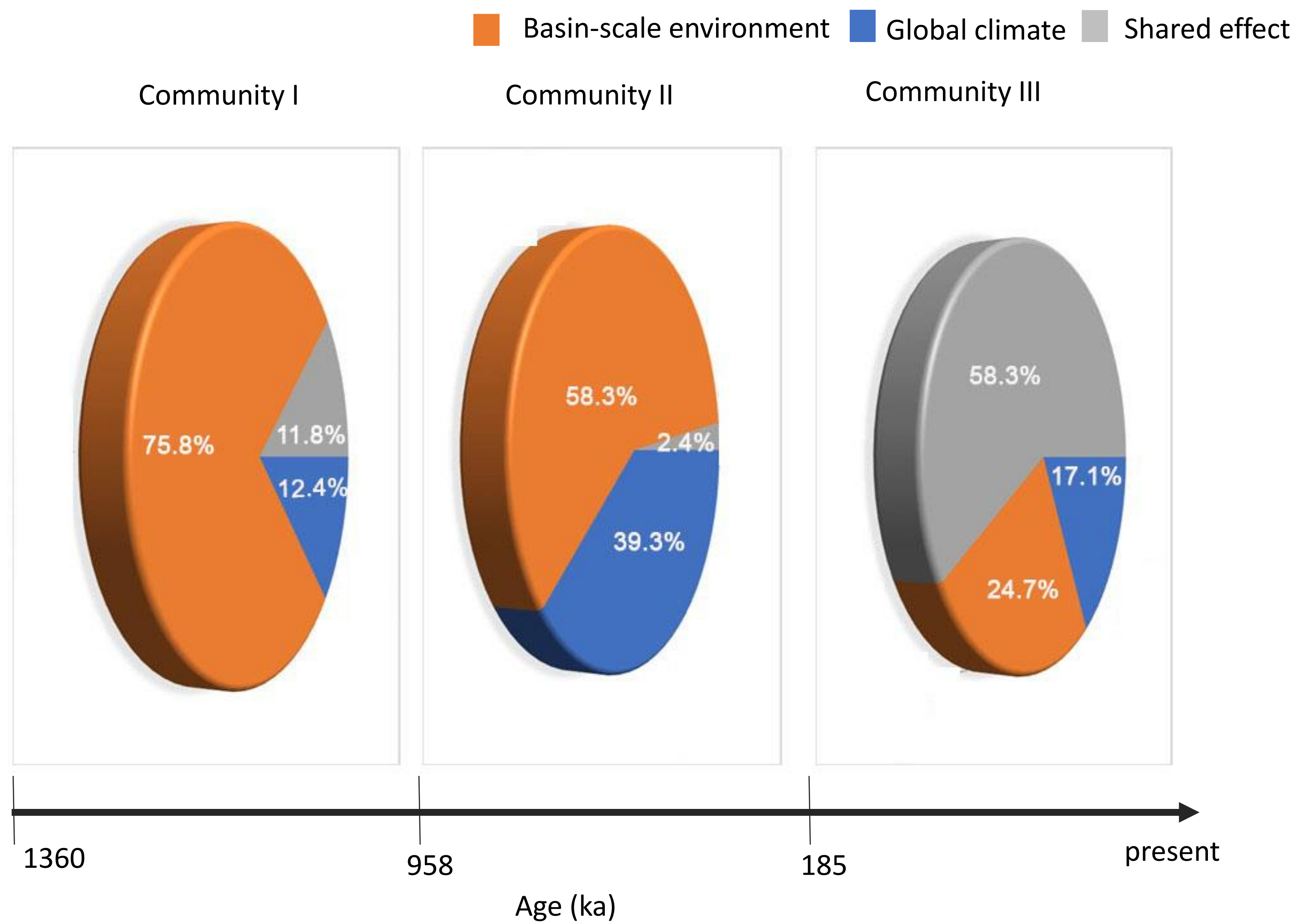




Relative contribution of global climate change and basin-scale environmental factors



Relative contribution of paleoenvironmental factors over time



Conclusions

1.36 Ma to 0.185 ka: planktonic diatom community structure was mostly corelated to the basin-scale environment: nutrient availability, water temperature and catchment dynamics

185 ka to present: Lake Ohrid is driven by external, global scale climate factors

Lake thermal structure and nutrient availability among the most important factors influencing primary producers in deep lakes

Change in any factor and/or lake ontogeny may lead to species extinctions and community replacements


Stojan Stojanovski 2S Photography -