

EGU 2020

4. 8 May 2020 | Vienna, Austria

These
balloons
briefly explain
each slide



All rights reserved.
You are not
allowed to copy,
distribute, reuse
any content.

Climate change driven massive extirpation of native species from the Israeli Mediterranean shelf

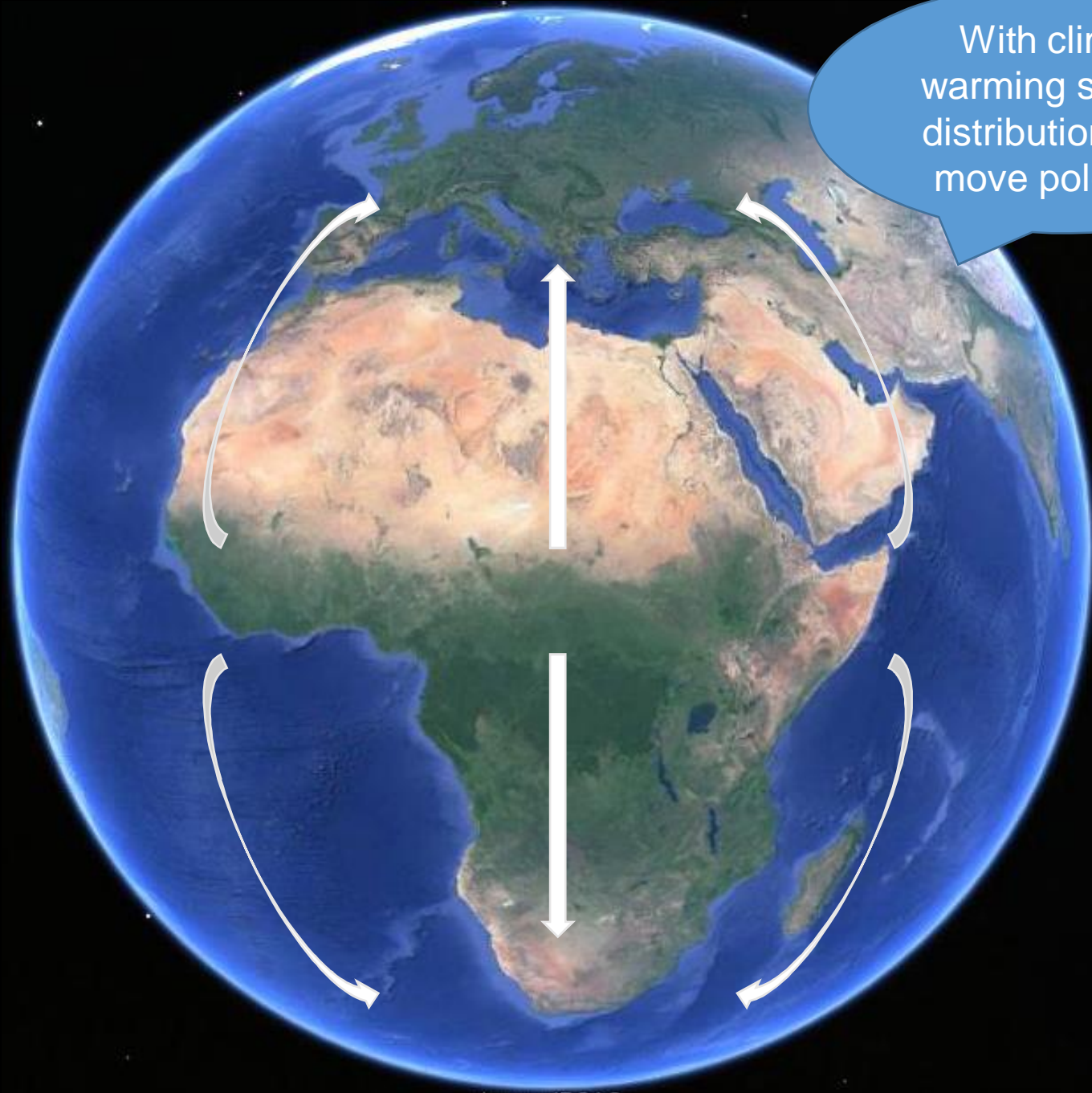
Paolo G. Albano¹, Jan Steger¹, Marija Boznjak^{1,2}, Beata Dunne¹, Zara Guifarro¹, Elina Turapova¹, Bella S. Galil², Gil Rilov³, Martin Zuschin¹

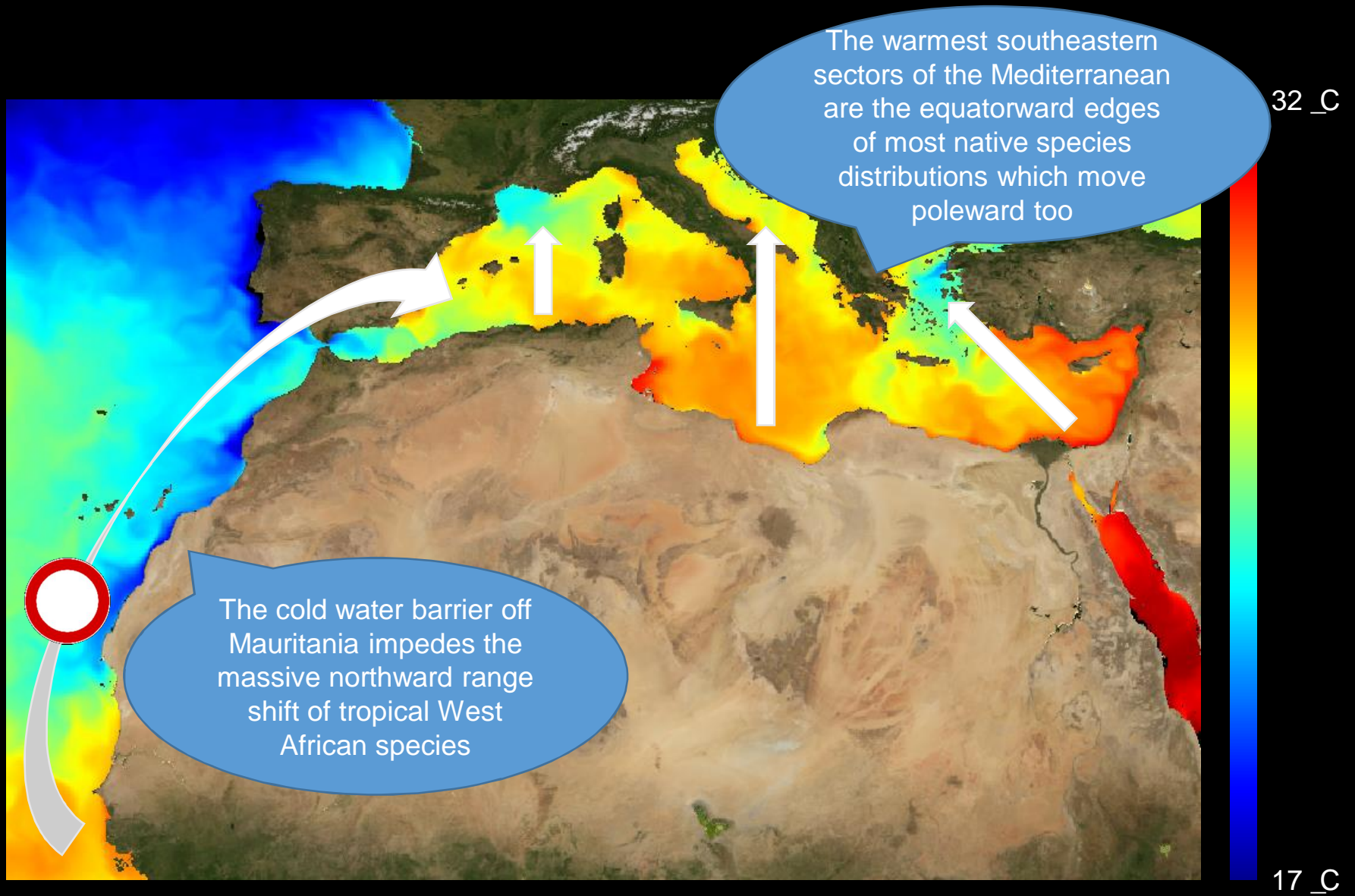
¹ Department of Paleontology, University of Vienna

² Steinhardt Museum of Natural History, Tel Aviv, Israel

³ National Institute of Oceanography, Israel Oceanographic and Limnological Research (ILOR), Haifa, Israel

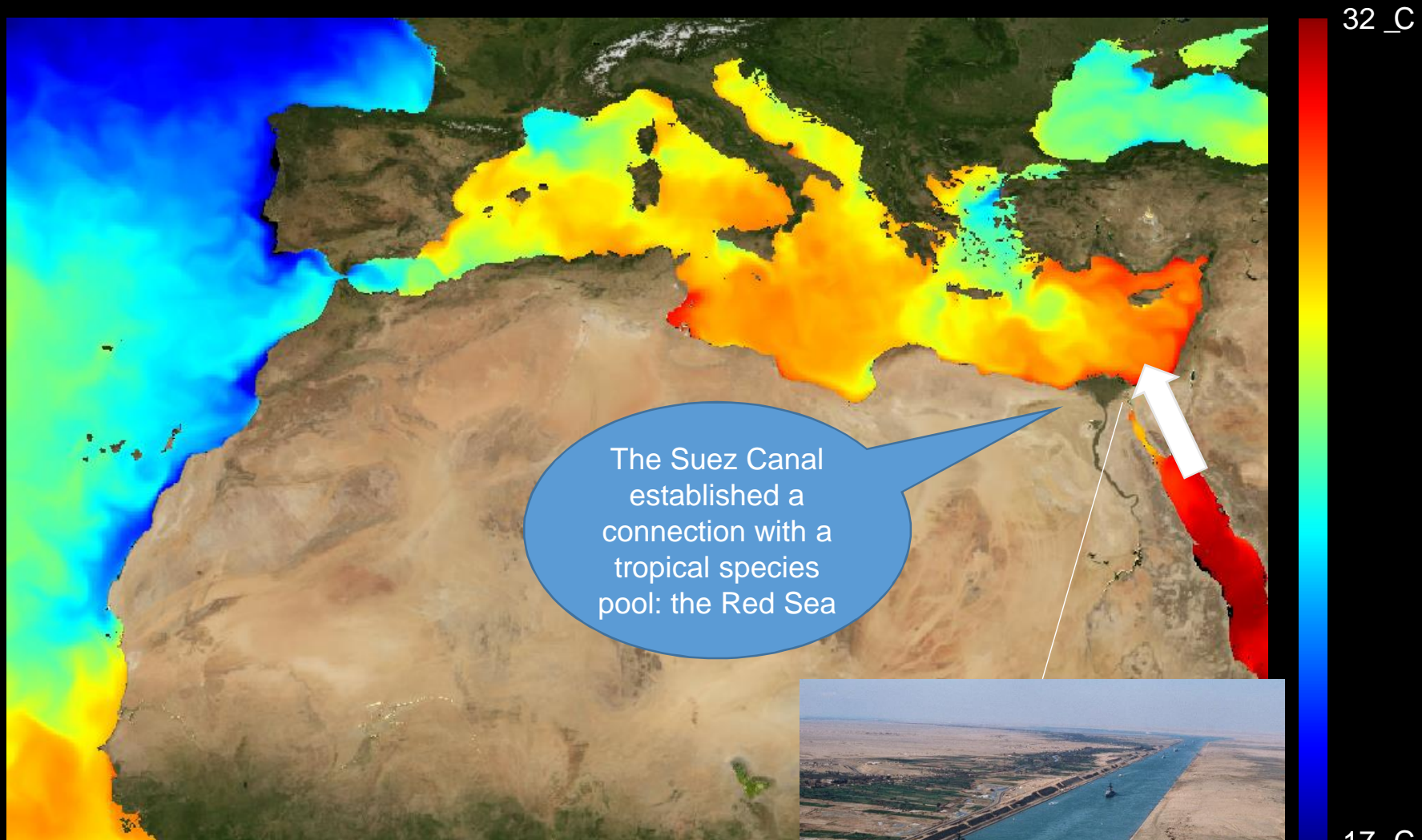
With climate warming species distribution limits move poleward





August 2018 mean sea surface temperature

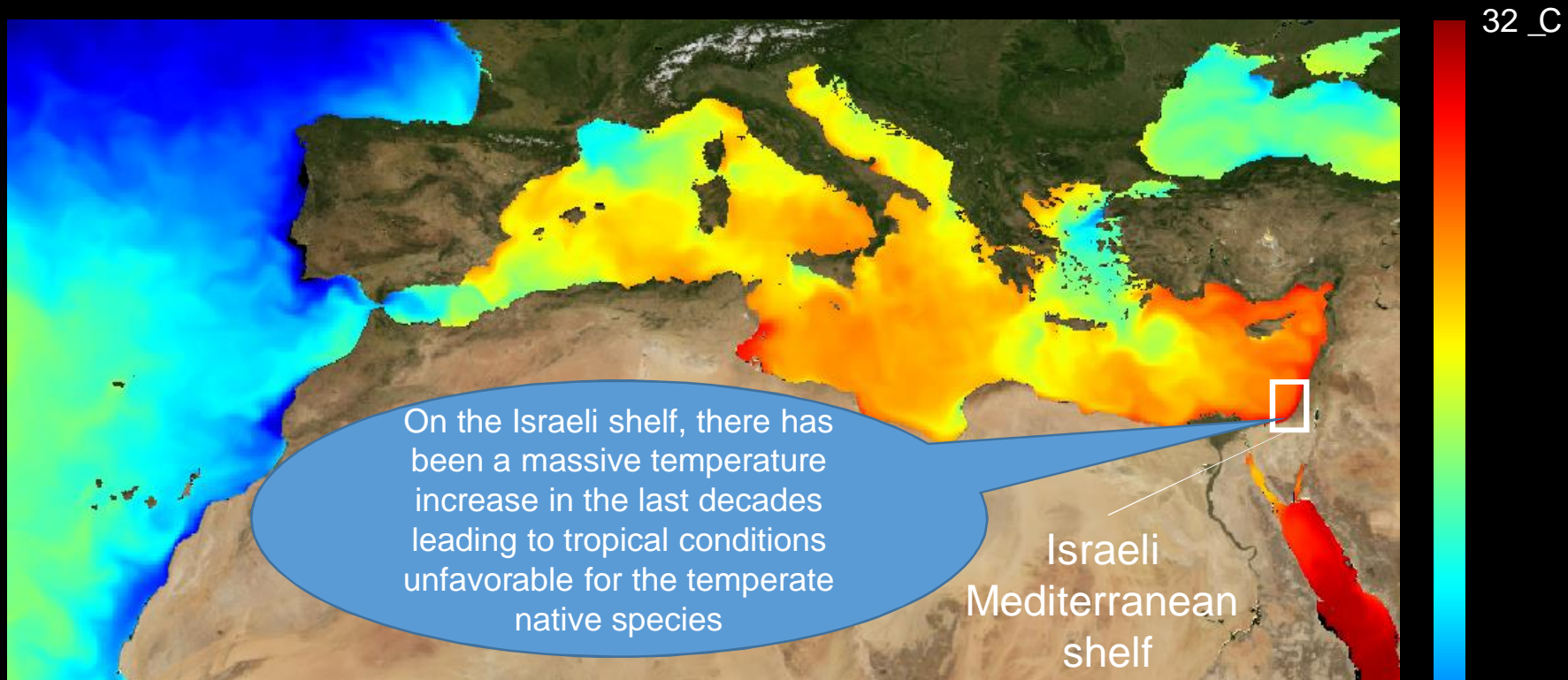
Source: myOcean Global Analysis PHY 001 024



August 2018 mean sea surface temperature

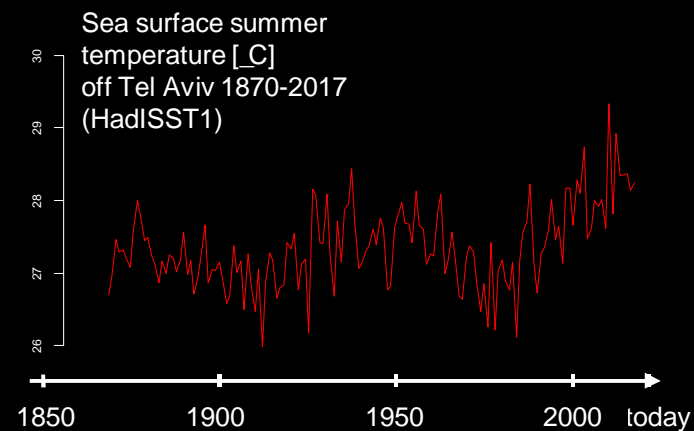
Source: myOcean Global Analysis PHY 001 024





August 2018 mean sea surface temperature

Source: myOcean Global Analysis PHY 001 024

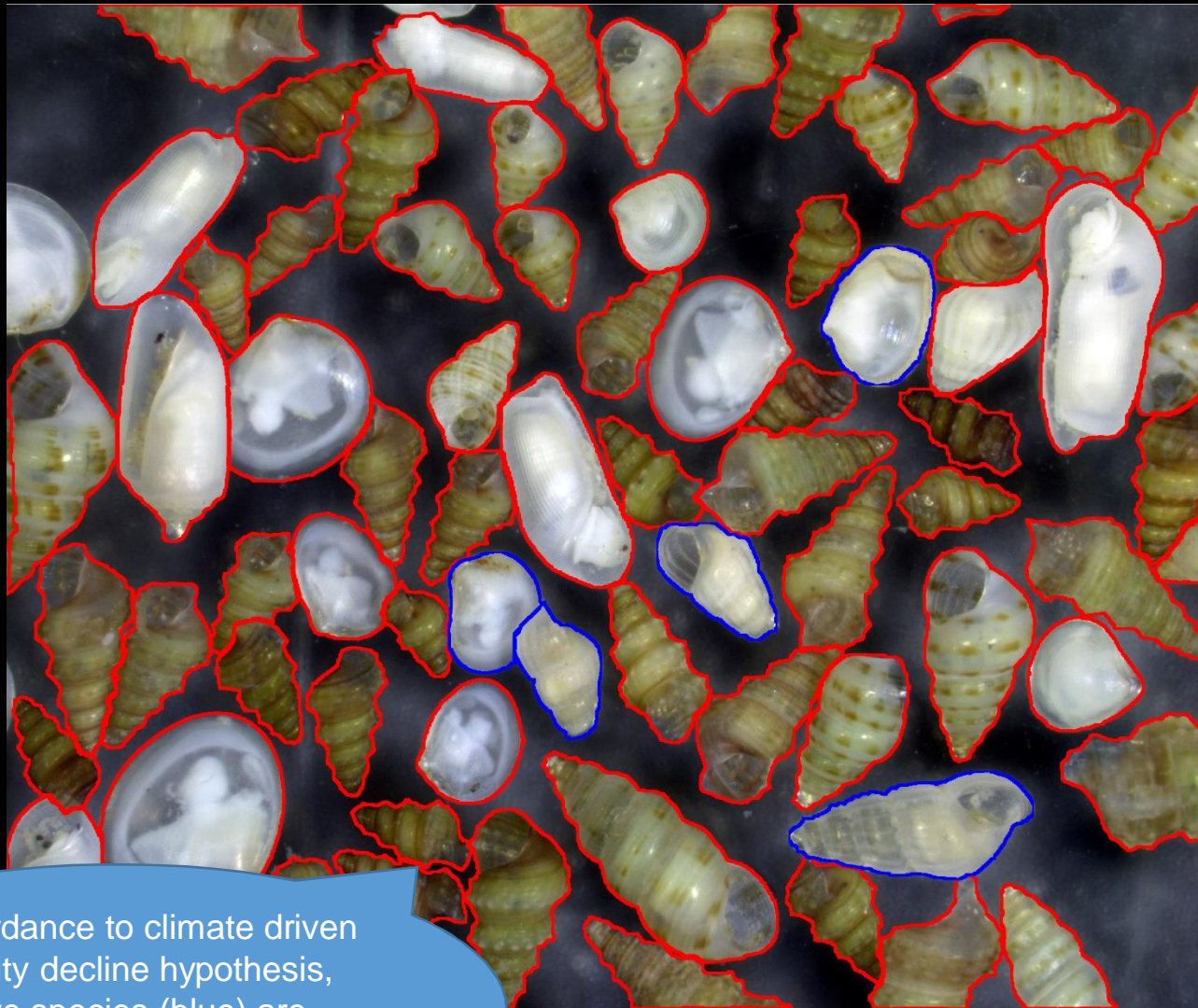


Hyp: climate warming is causing native biodiversity loss on the Israeli shelf

Problem: Lack of a baseline



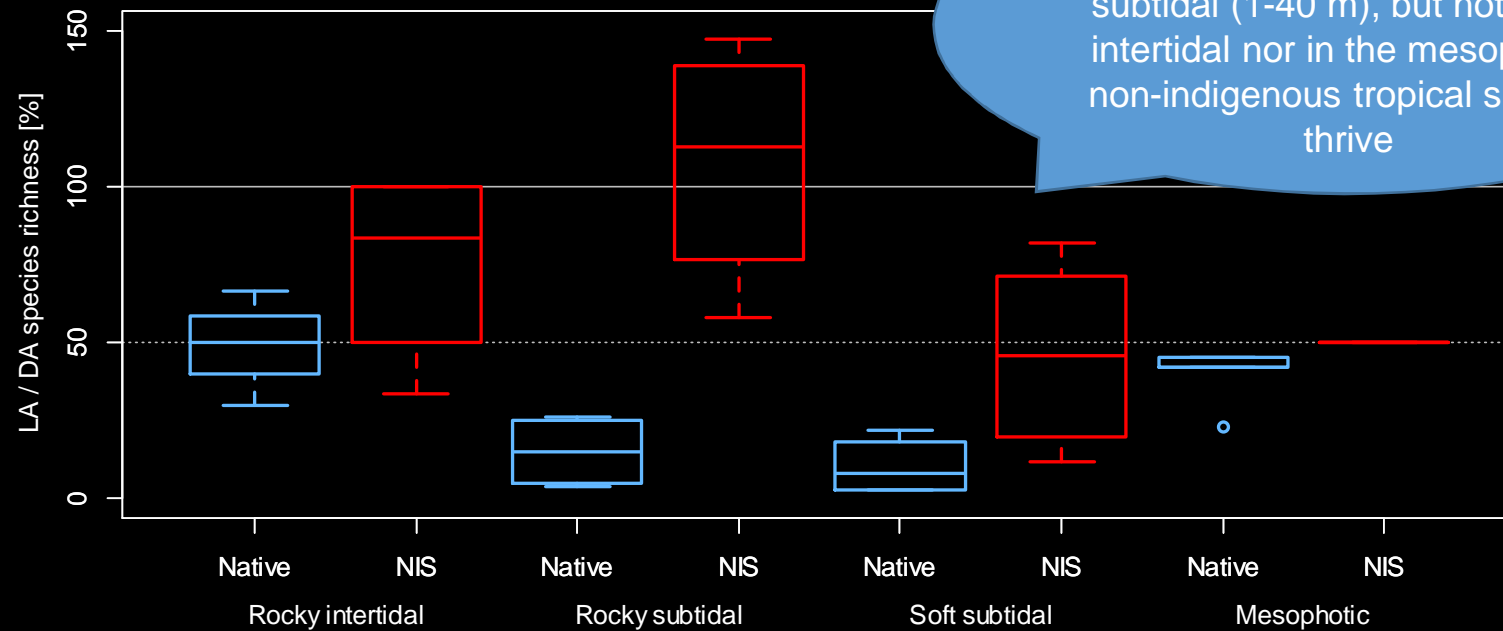
Death assemblages record
the past of ecosystems



In accordance to climate driven
diversity decline hypothesis,
native species (blue) are
nowadays rare whereas tropical
Red Sea ones (red) dominate

Off Ashqelon, southern Israel
-20 m on sand, autumn 2016

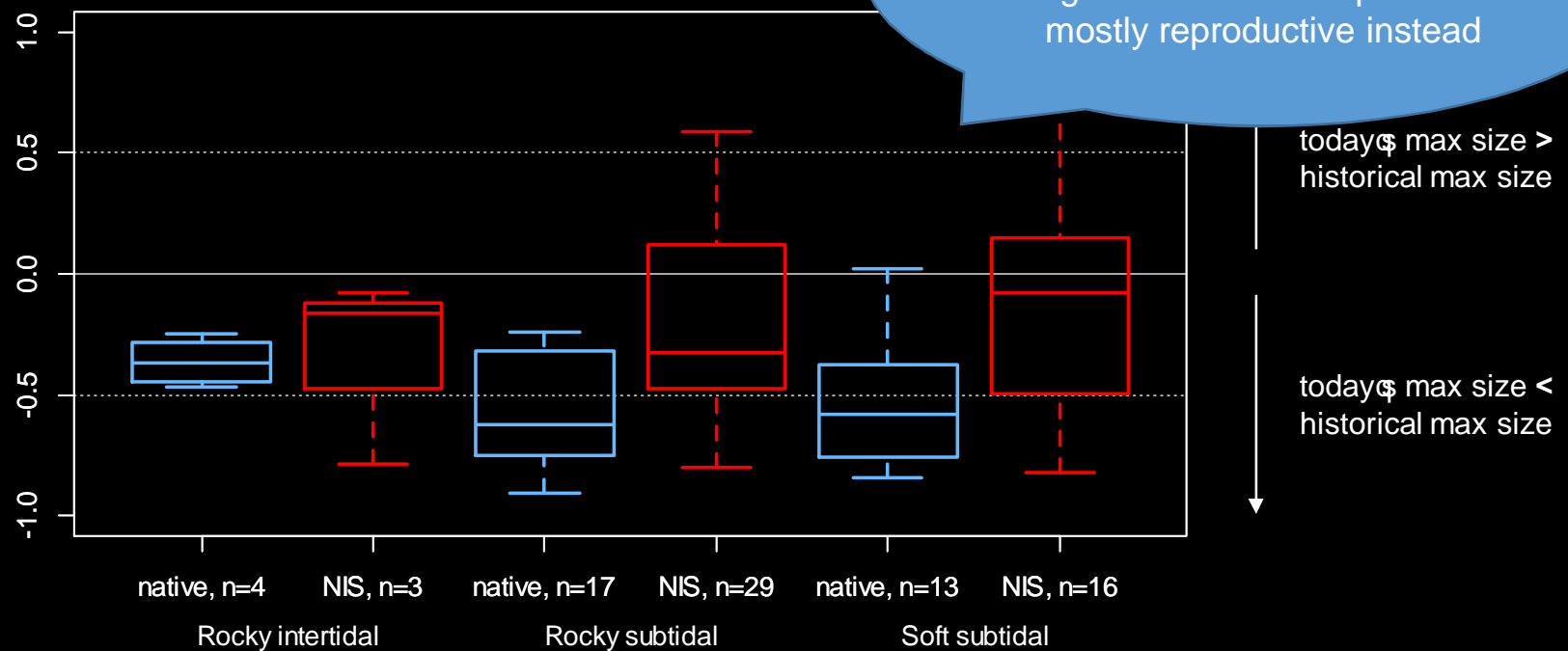
Ratio between today's (living assemblage) and historical (death assemblage) species richness



# samples	21	21	24	24	44	44	5	5
# species	5	3	208	73	234	56	154	0

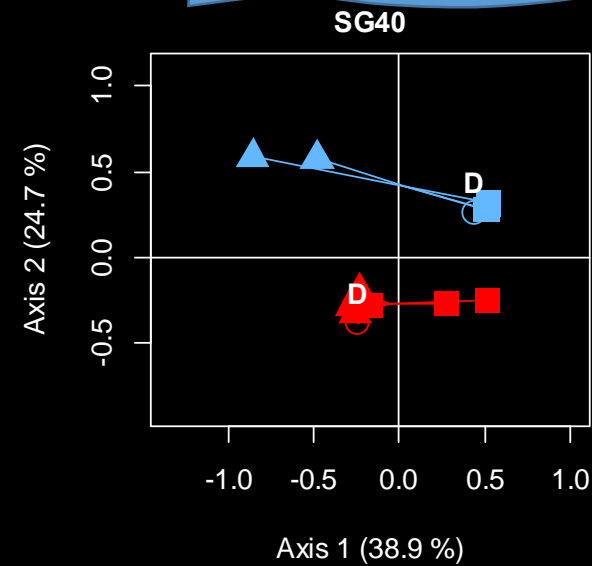
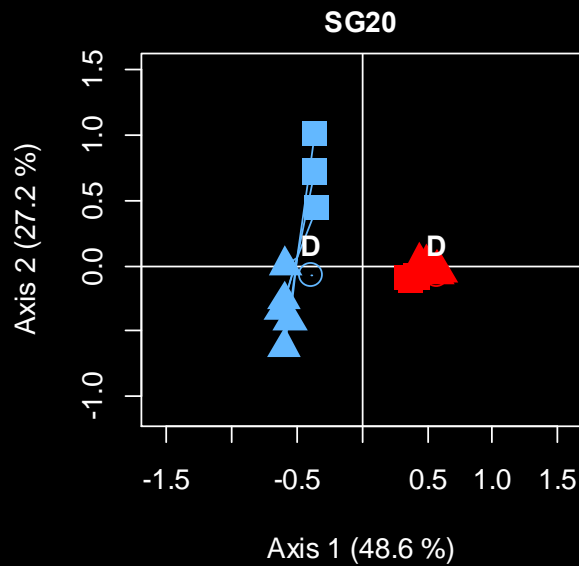
Coverage standardized species richness (Chao & Jost 2012 *Ecology* 93:2533-2547)
R package iNEXT (Hsieh et al 2016 *Methods in Ecology and Evolution* 7: 1451-1456)

Ratio between today's (living assemblage) and historical (literature) maximum size species with abundance ≥ 10 living individuals



Alternative hyp 1: alien species outcompeted native species

Competition with non-indigenous species is not the main driver of native diversity loss



Fuzzy Correspondence Analysis of functional traits

Alternative hyp 2: Pathogens



Pathogens are not the main driver of native diversity loss

The recent mass mortality of the pen shell *Pinna nobilis* in the Mediterranean was caused by the parasite *Haplosporidium pinnae*. The co-generic *Pinna rudis* was not affected

Conclusions

- Evidence of a climate-driven regional scale biodiversity loss on the Israeli shelf
- Most of the native populations may be non-reproductive
- Current environmental conditions disproportionately favor alien species
- Competition for niche space with alien species is not the driver of this diversity loss
- Pathogens unlikely to play a role on a taxonomically so diverse array of species



Post-doc award



Help from: Yoni Belmaker & Shahar Malamud for diving assistance

Itay Katzman and the crew of the Mediterranean Explorer vessel for their assistance during fieldwork



<http://www.univie.ac.at/lessepsian>