

EGU 2020

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These balloons briefly explain each slide



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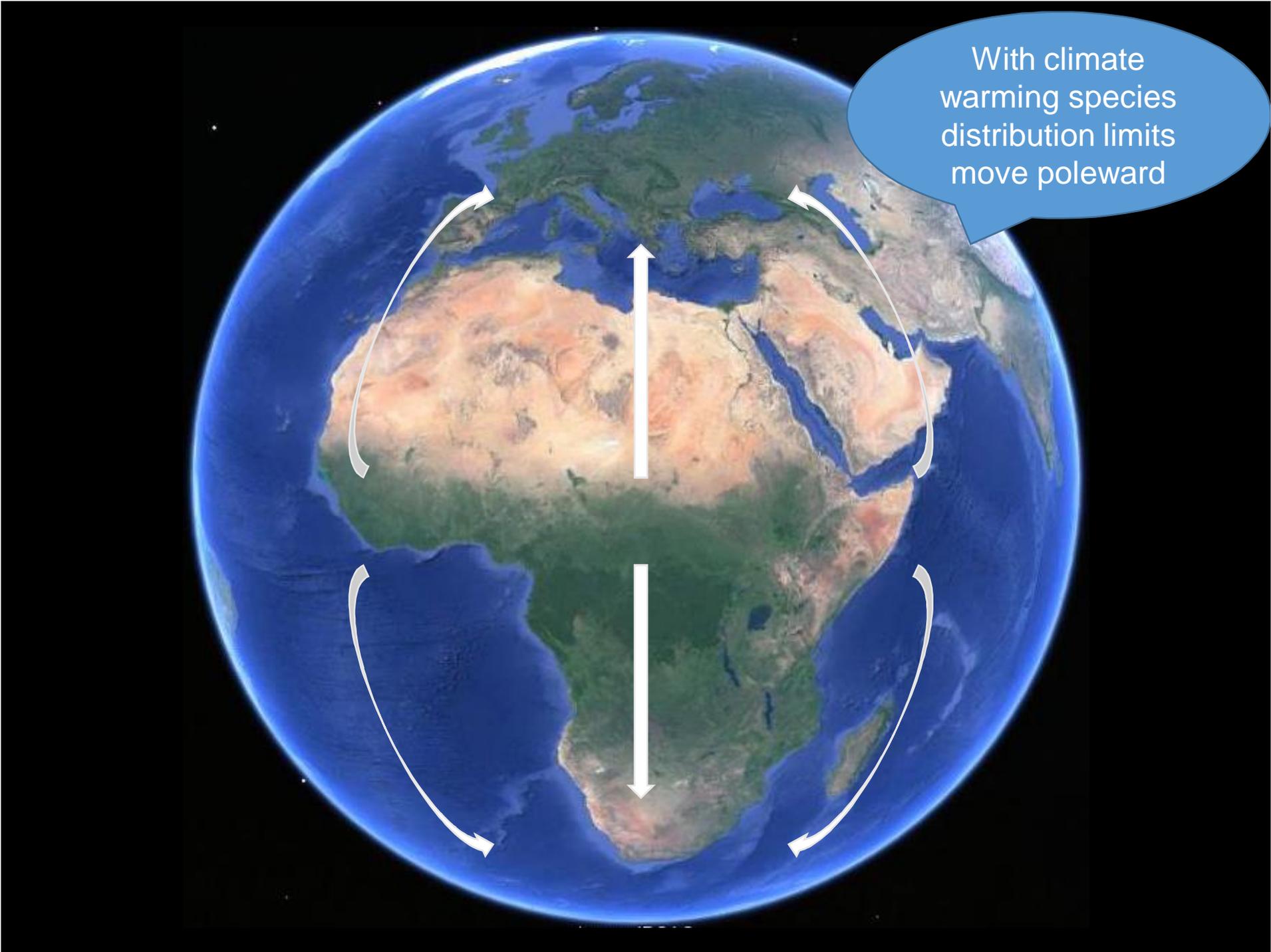
# Climate change driven massive extirpation of native species from the Israeli Mediterranean shelf

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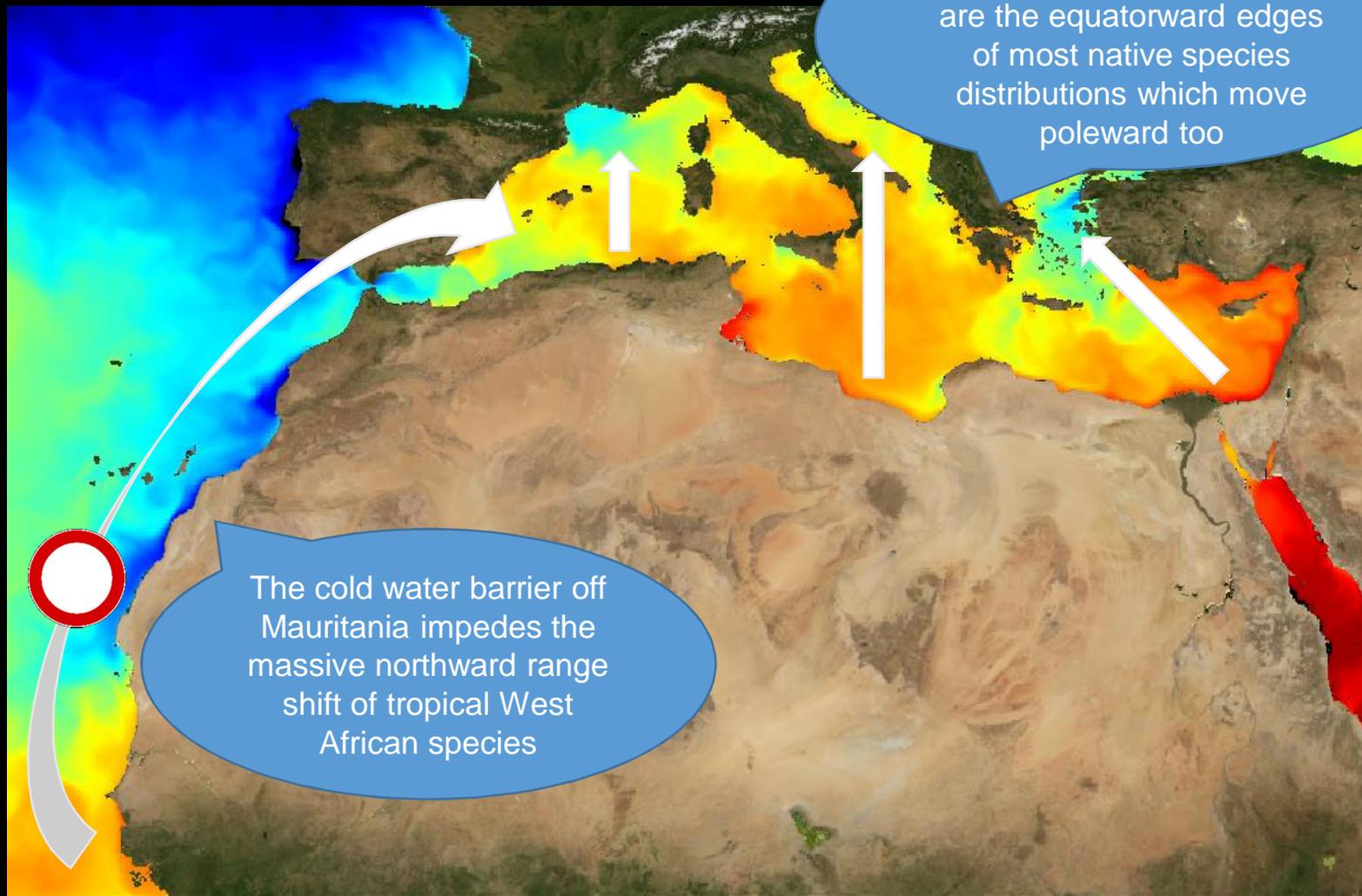
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With climate warming species distribution limits move poleward



32\_C

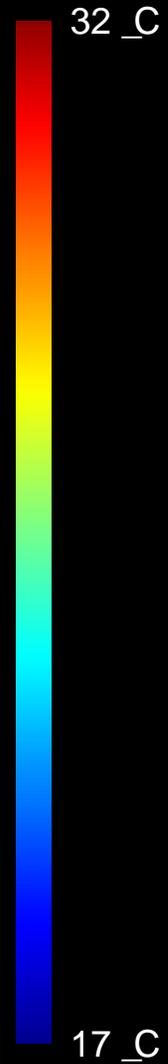
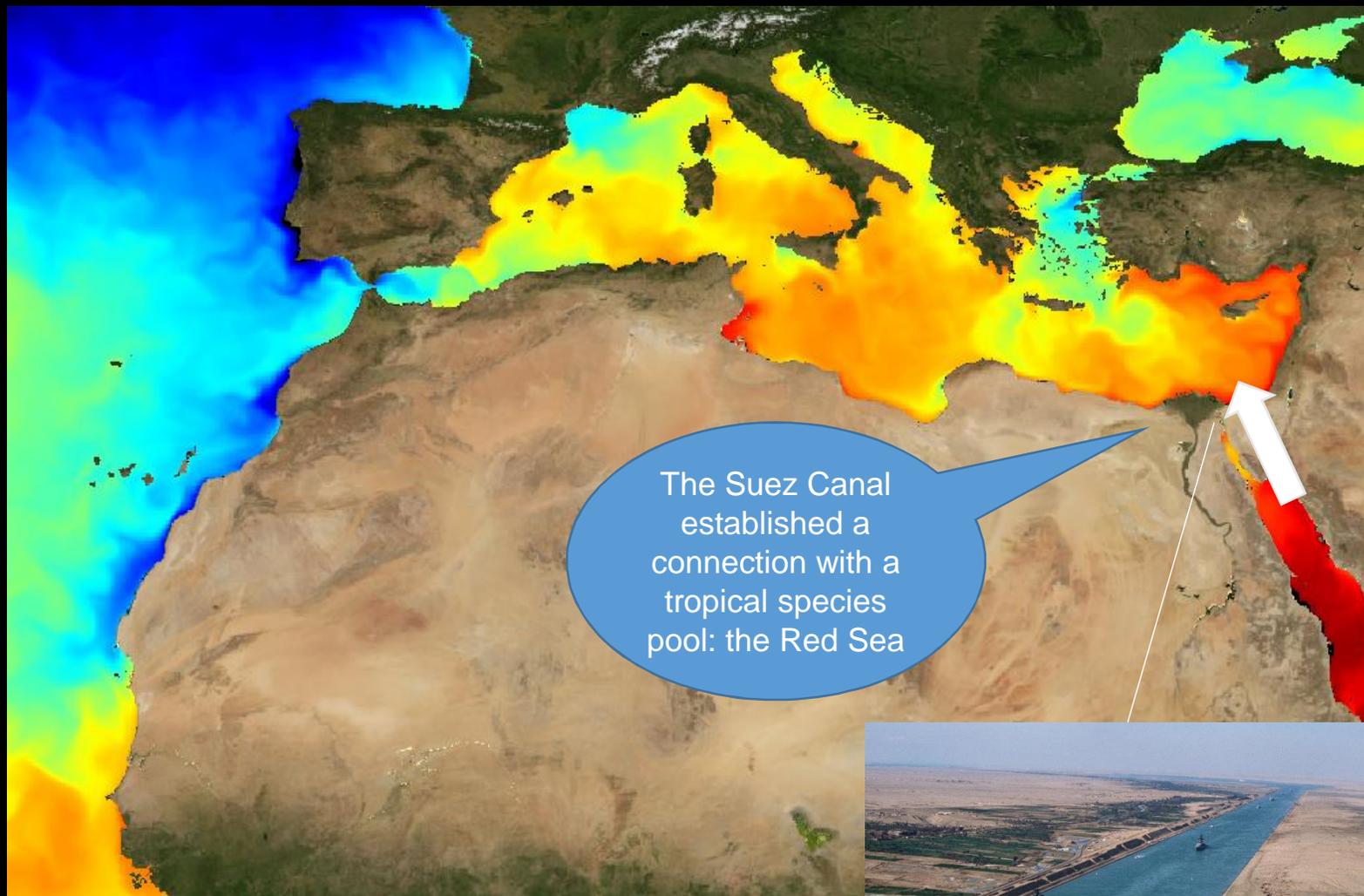
The cold water barrier off Mauritania impedes the massive northward range shift of tropical West African species

The warmest southeastern sectors of the Mediterranean are the equatorward edges of most native species distributions which move poleward too

17\_C

### August 2018 mean sea surface temperature

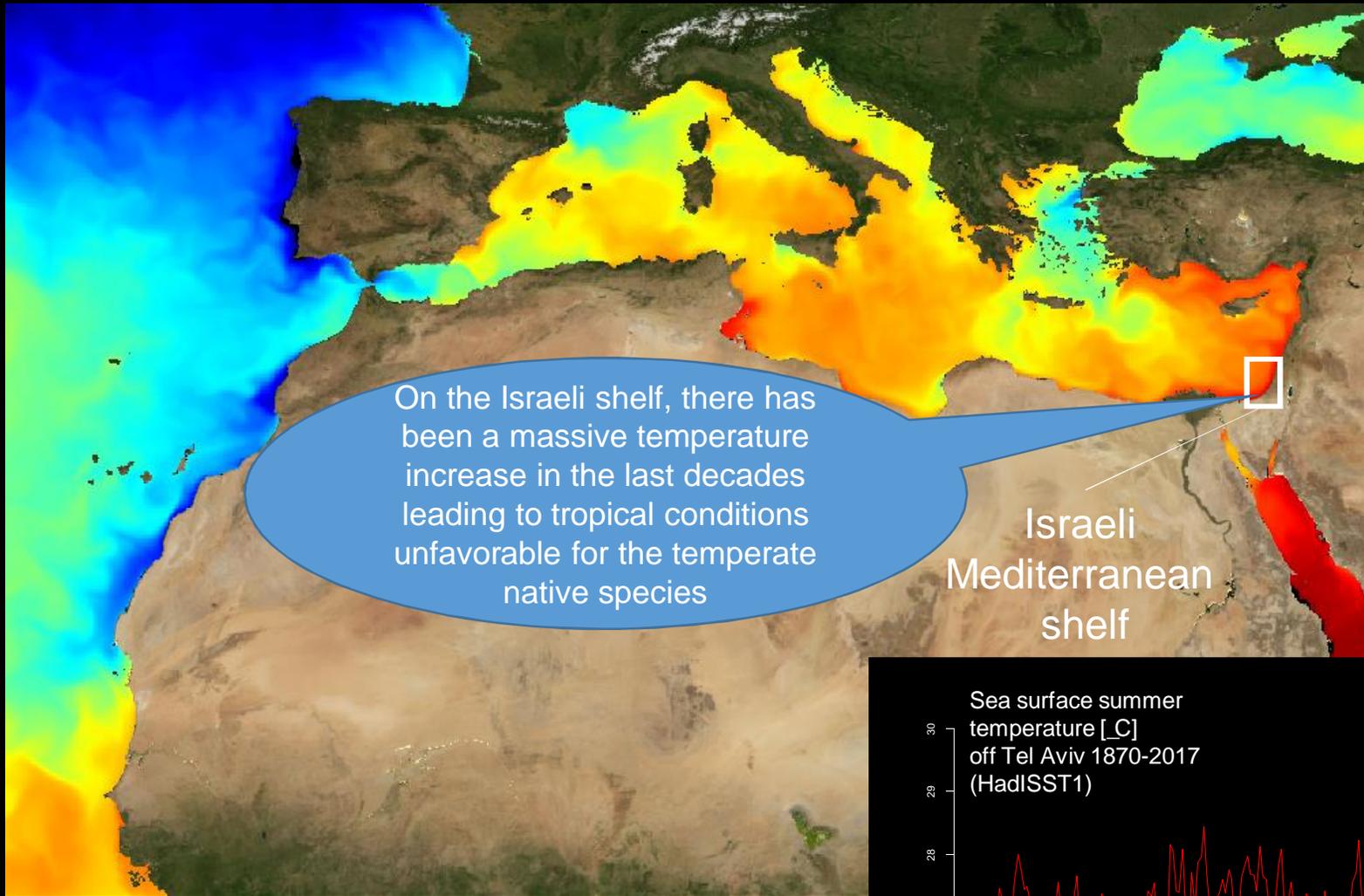
Source: myOcean Global Analysis PHY 001 024



August 2018 mean sea surface temperature

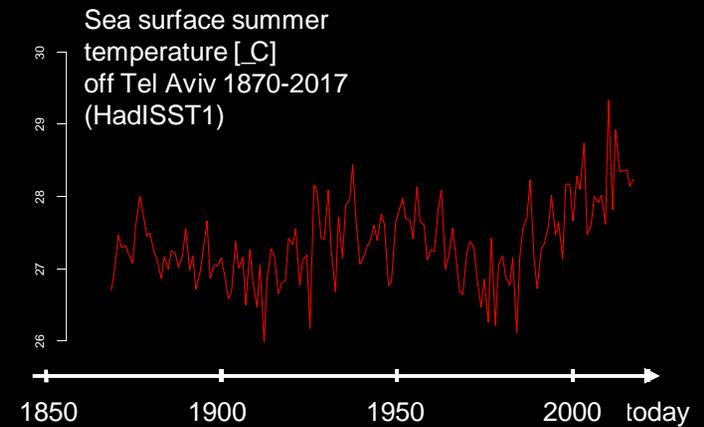
Source: myOcean Global Analysis PHY 001 024

32\_C



## August 2018 mean sea surface temperature

Source: myOcean Global Analysis PHY 001 024

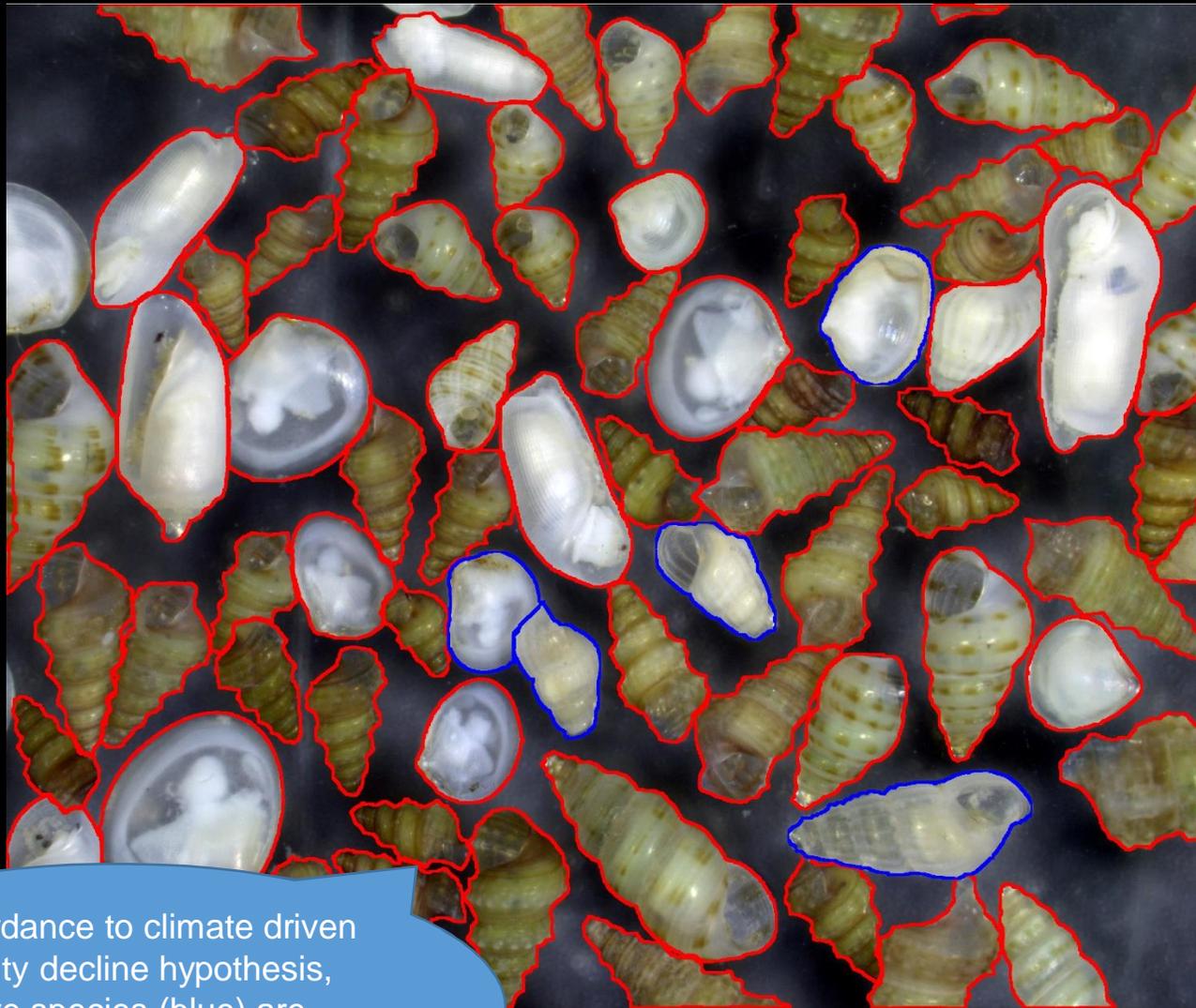


**Hyp:** climate warming is causing native biodiversity loss on the Israeli shelf

**Problem:** Lack of a baseline



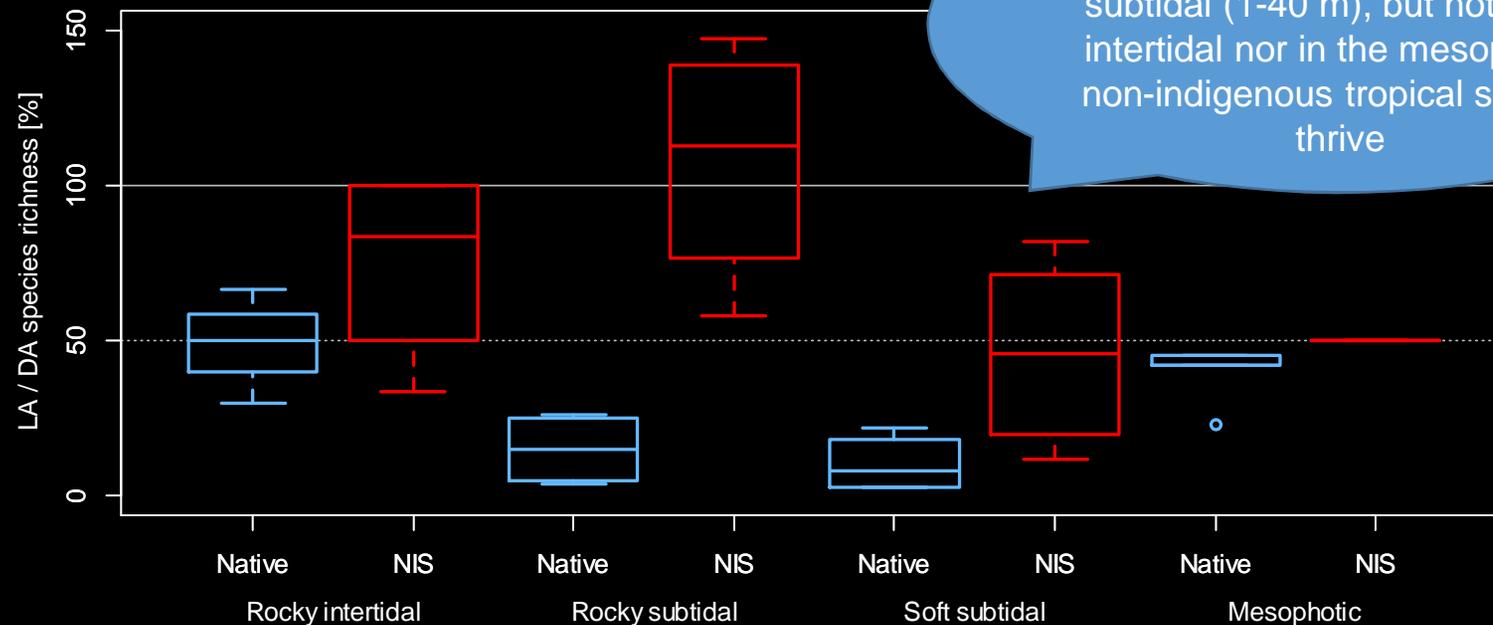
Death assemblages record  
the past of ecosystems



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

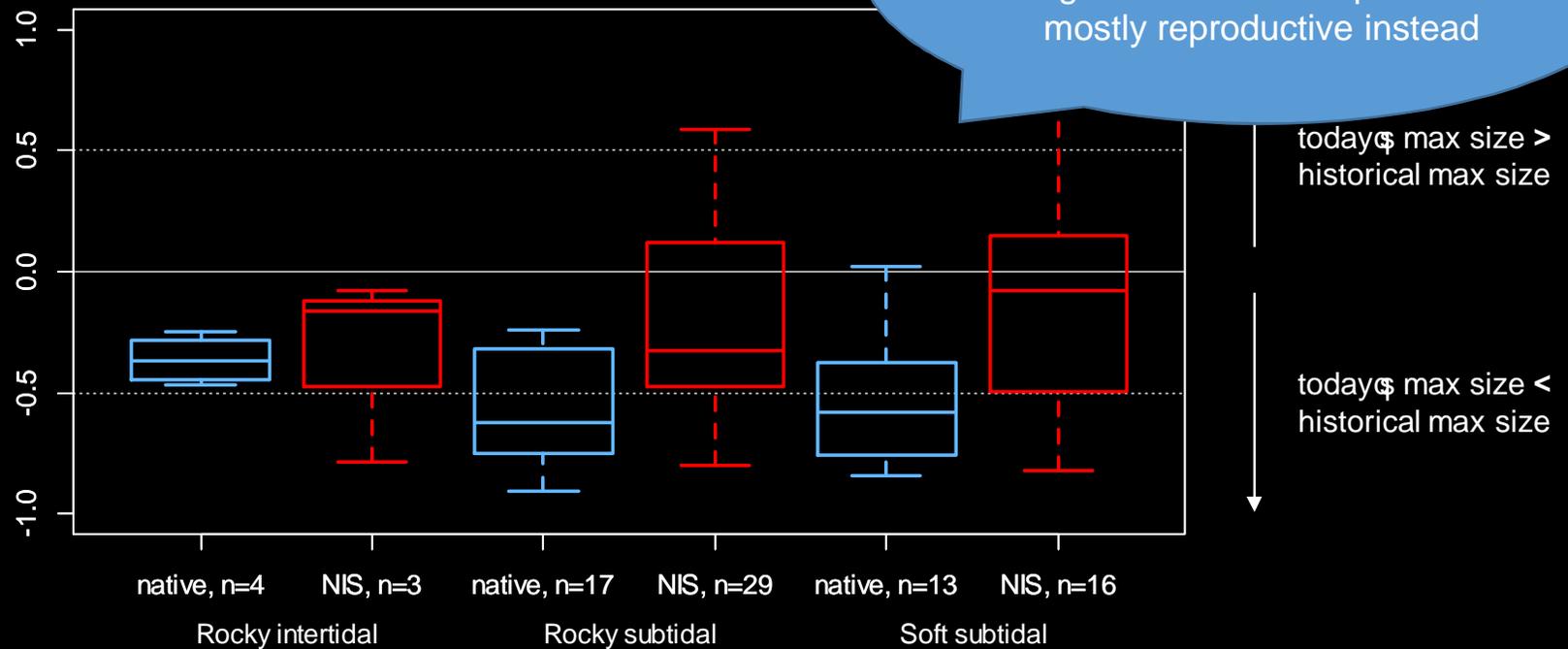
## Ratio between today's (living assemblage) and historical (death assemblage) species richness



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

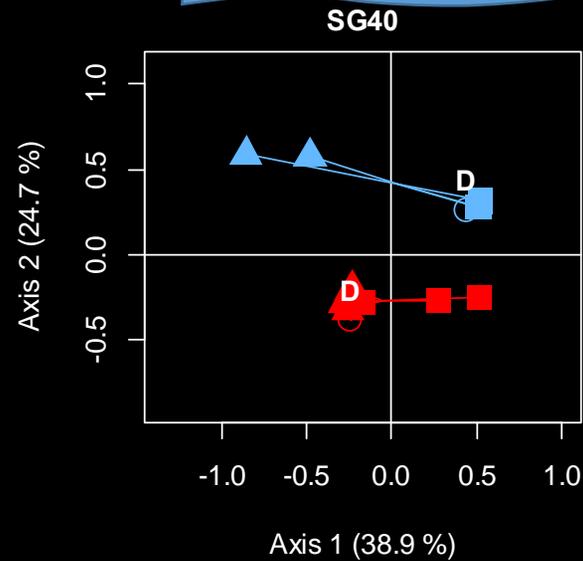
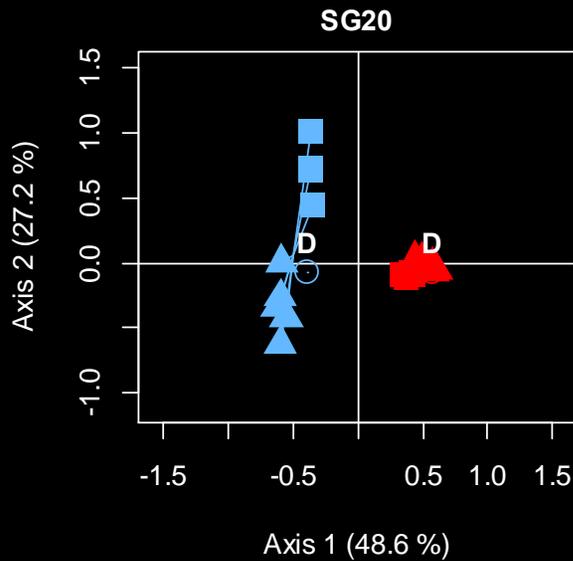
Coverage standardized species richness (Chao & Jost 2012 *Ecology* 93:2533-2547)  
 R package iNEXT (Hsieh et al 2016 *Methods in Ecology and Evolution* 7: 1451-1456)

Ratio between today's (living assemblage)  
and historical (literature) maximum size  
species with abundance  $\geq 10$  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



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