

Climate Change Impacts in the Mediterranean



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Climate projections for the Mediterranean



- There is a consensus that along the XXI century the Mediterranean region will be warmer, moderately drier, and moderately calmer in term of storms.
- Regarding the Mediterranean Sea, it will experience higher temperatures and sea level rise. Also a salinization of the amount of salt in the basin, although at the surface that may evolve differently. The marine storms are expected to be reduced.
- The magnitude of the change will depend on the emission scenario and the temporal horizon.



All those changes will imply impacts, but the magnitude and the sign of them is very variable

E.g:

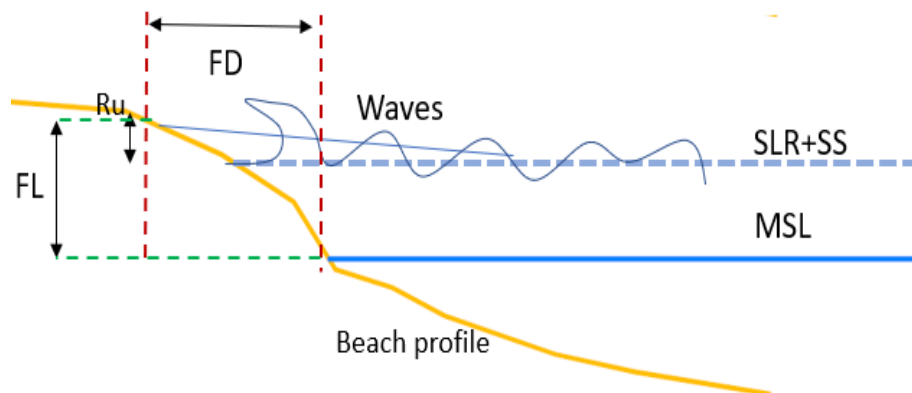
- Impact on beach flooding - Threaten by Sea Level Rise, no easy adaptation
- Impact on harbours – Threaten by Sea Level Rise, viable adaptation
- Impact on phytoplankton distribution – Threaten by Warming. Impact may be low
- Impact on seagrasses coverage – Threaten by Warming, high impact
- Impact on fisheries – Threaten by Warming, unknown impact

Beach Flooding – Non stoppable impact

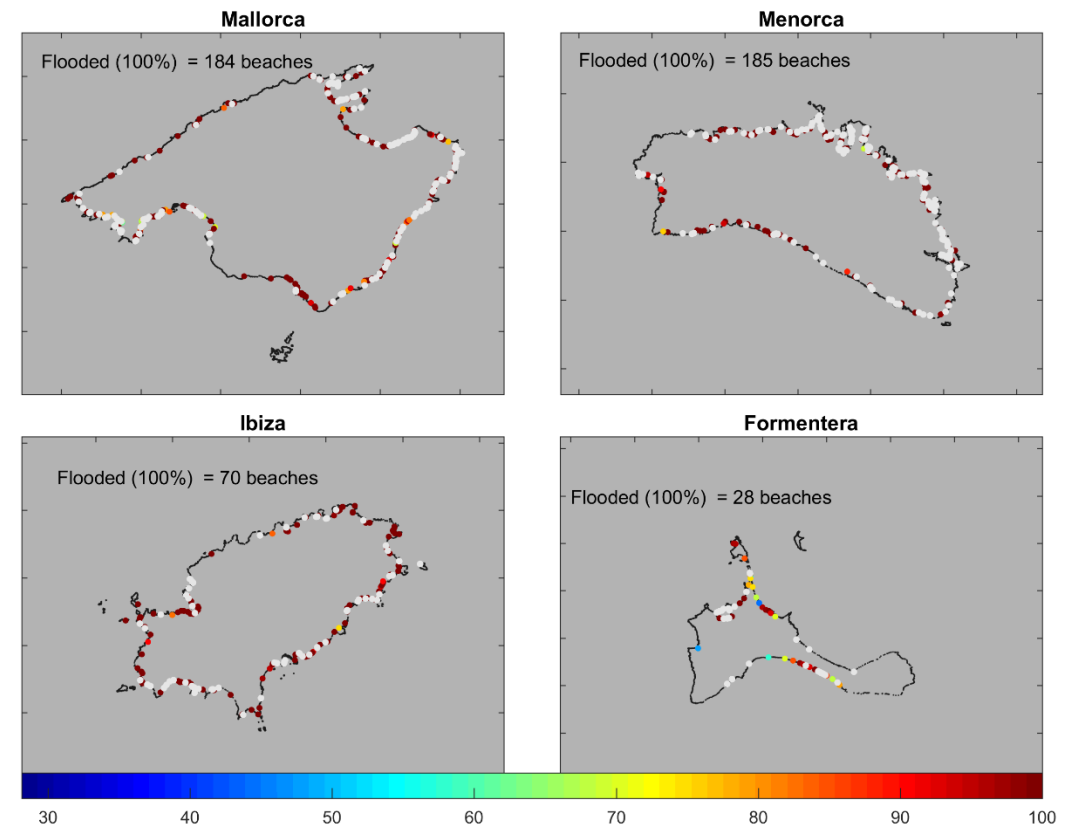
Most of sandy beaches will experience a large reduction

Sea Level Rise will dominate over the expected reduction in the wave field. Due to their small slope, sandy beaches will be flooded both under mean and extreme conditions

→ Huge impact on economy



Loss beach area (%) under extreme conditions at the end of the century. RCP 4.5 scenario. Beaches completely flooded (white dots).



Aguiles et al., 2020

Sea Level Rise will threaten the harbour infrastructures but risk may be low

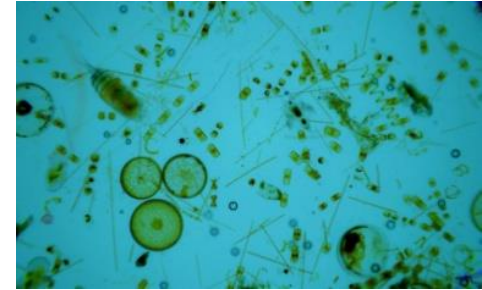
In a risk assessment typically we combine the Hazard (*sea level rise*), the Exposure (*assets in the harbour infrastructures*) and Vulnerability (*capacity to cope with the negative impacts*).

The harbours are an example of High Hazard, High Exposure, but low Vulnerability as they harbours have the capacity to adapt to new conditions (i.e. economic resources and technically viable alternatives)

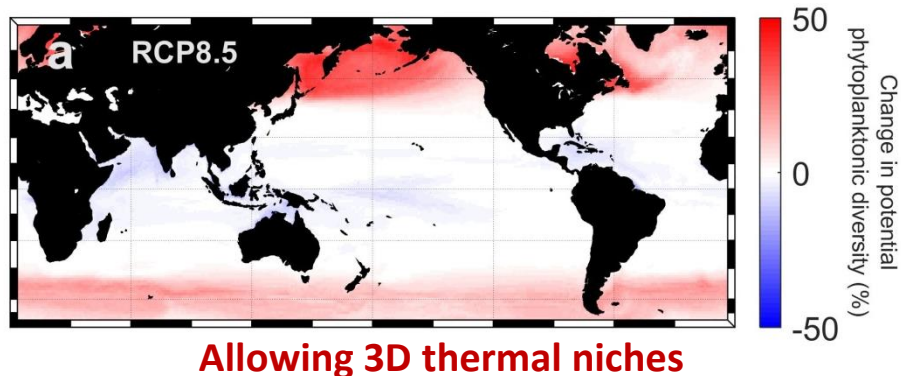
Seawater warming will imply a shift in the distribution of phytoplankton species in the water column

Due to its capacity to vertically migrate within the photic layer, phytoplankton diversity will be preserved even under a large warming.

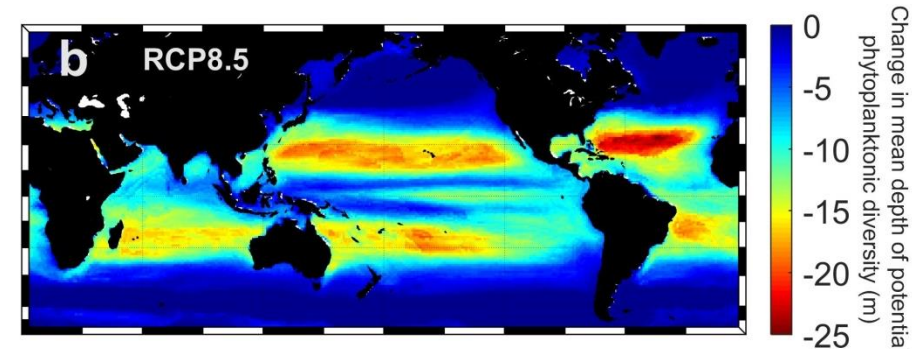
However, the phytoplankton communities will go to deeper layers.



Change in potential phytoplankton diversity



Change in the mean depth of the potential community



Posidonia Oceanica is close to its upper thermal limit.



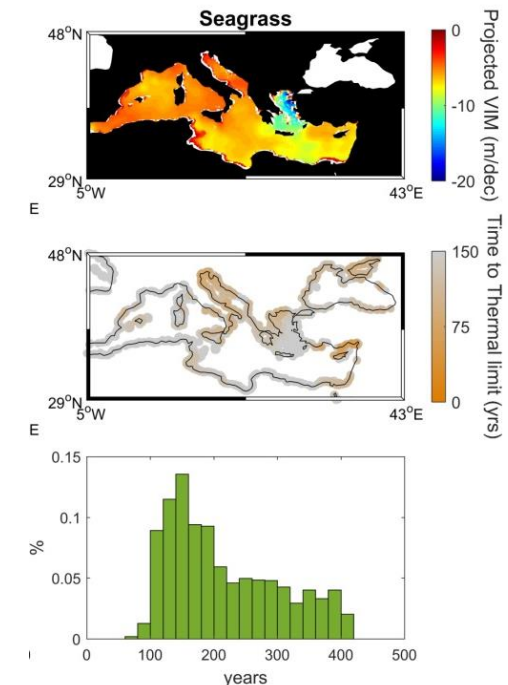
Warming will imply a compression of the suitable 3D habitat for Posidonia.

It is a foundation plant species, the base of most coastal ecosystems in the Mediterranean.

Adaptation is unlikely but it could be replaced by other species.

VIM rates

Time to reach thermal limit



Fishes can swim and look for better thermal niches but ...

Will they find a suitable thermal niche in the Med?

Will their sources of food be available?

Will they be substituted by other similar species better adapted?

