

Impacts of mean sea-level rise and marine extremes on islands

Marta Marcos, Angel Amores, Pau Luque



Reasons to focus on islands:

The impacts along the coasts are relatively larger.

Limited possibilities of retreat and even migration of population.

Small islands nation states, among which are many developing countries, are concerned due to their vulnerability to global warming. One of the main hazards is projected sea level rise.

Relative larger weight of coastal activities linked to local economies.

We will show impact case studies for sites facing distinct hazards and problems

1st case study: The Maldives

Low-lying atoll islands (0,5-2 m above present-day MSL)

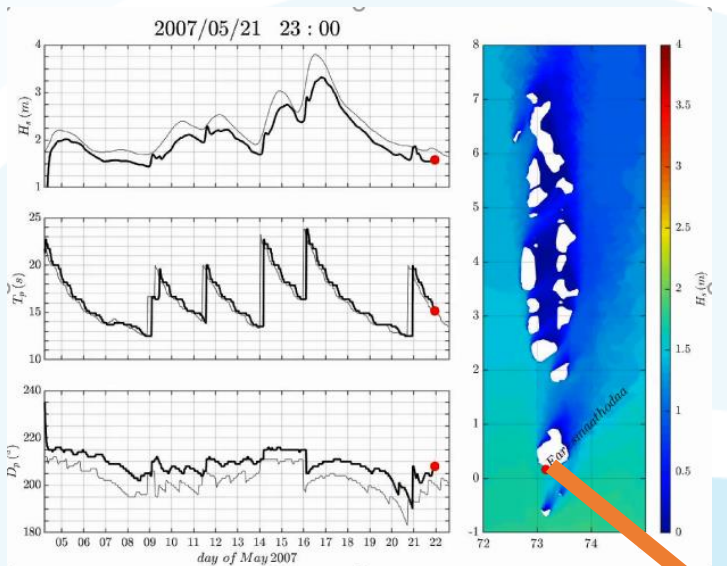
Highly populated

Major hazards are MSL rise and large wave swells

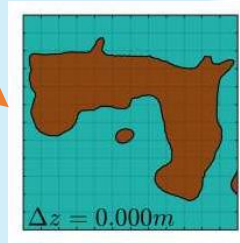
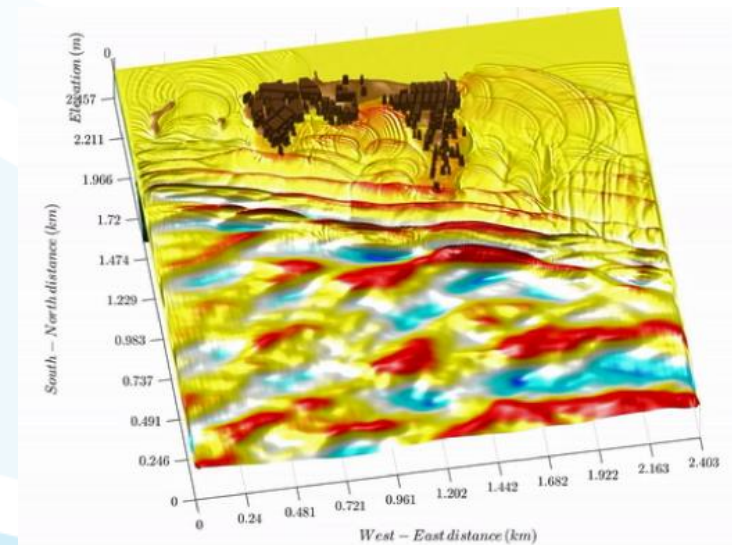


Regionalised information for swell events

From global to regional



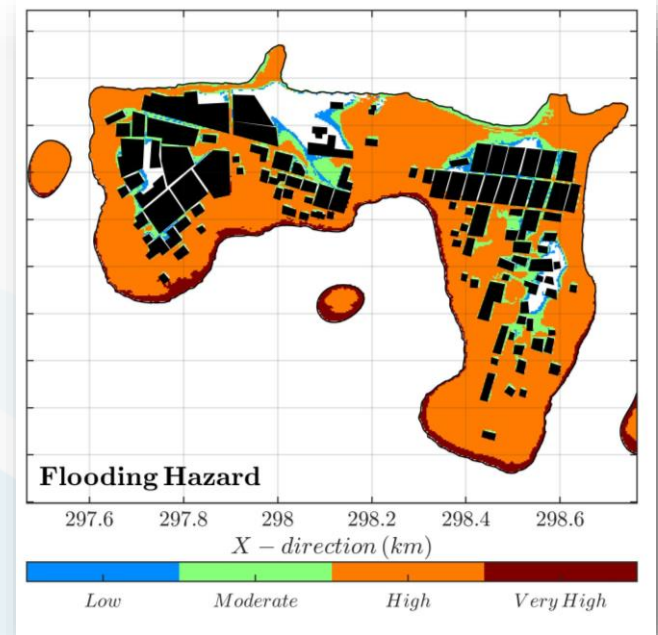
From regional to local



Local impacts of flooding



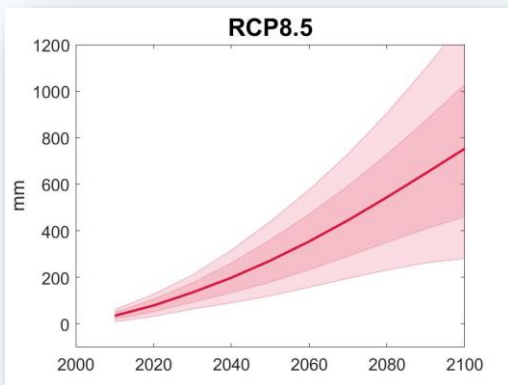
Risk classification from modelling



2nd case study: The Balearic Islands (Western Mediterranean Sea)

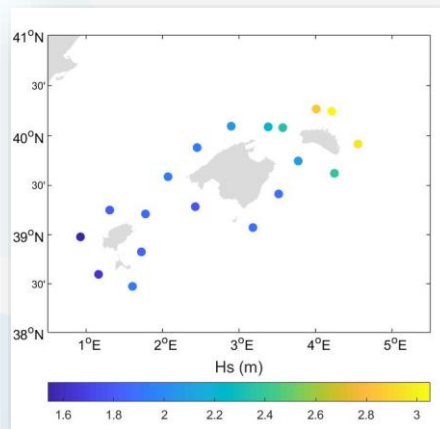
Major hazards are MSL rise, storm surges and waves

MSL



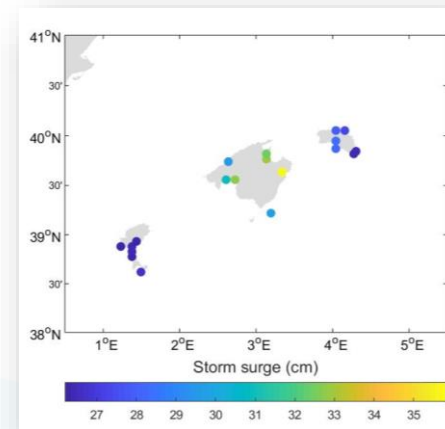
Kopp et al (2014)

Waves

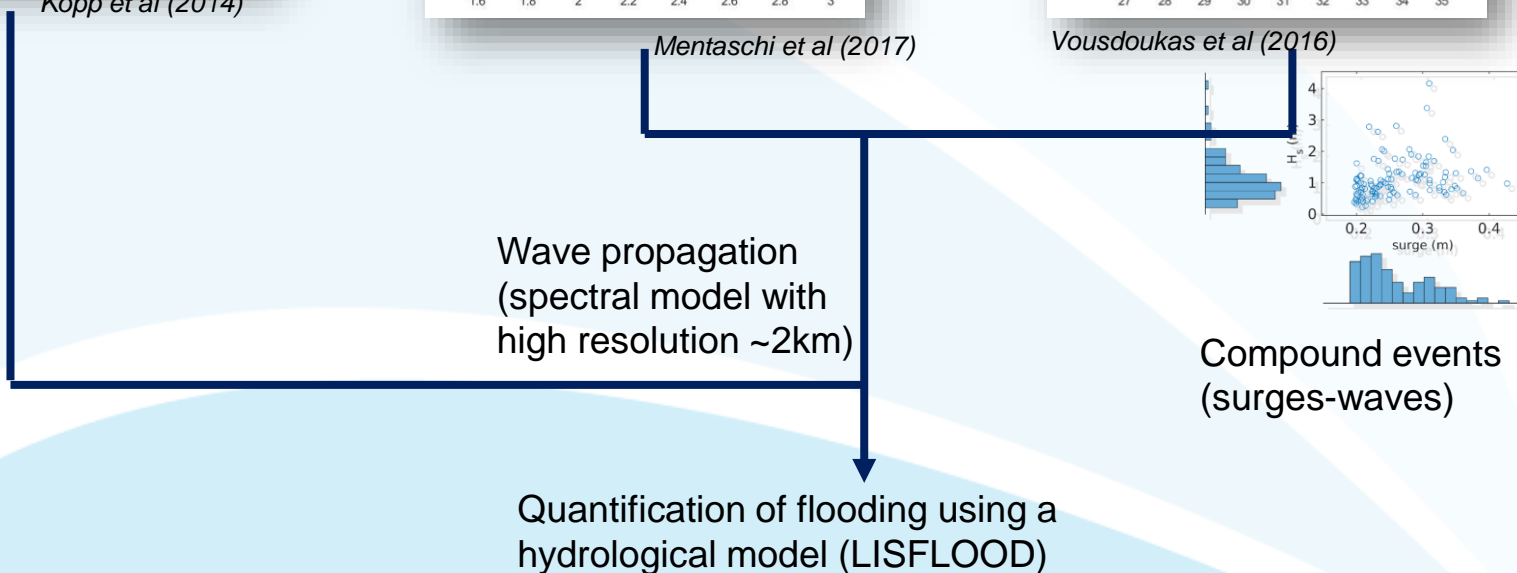


Mentaschi et al (2017)

Storm surges

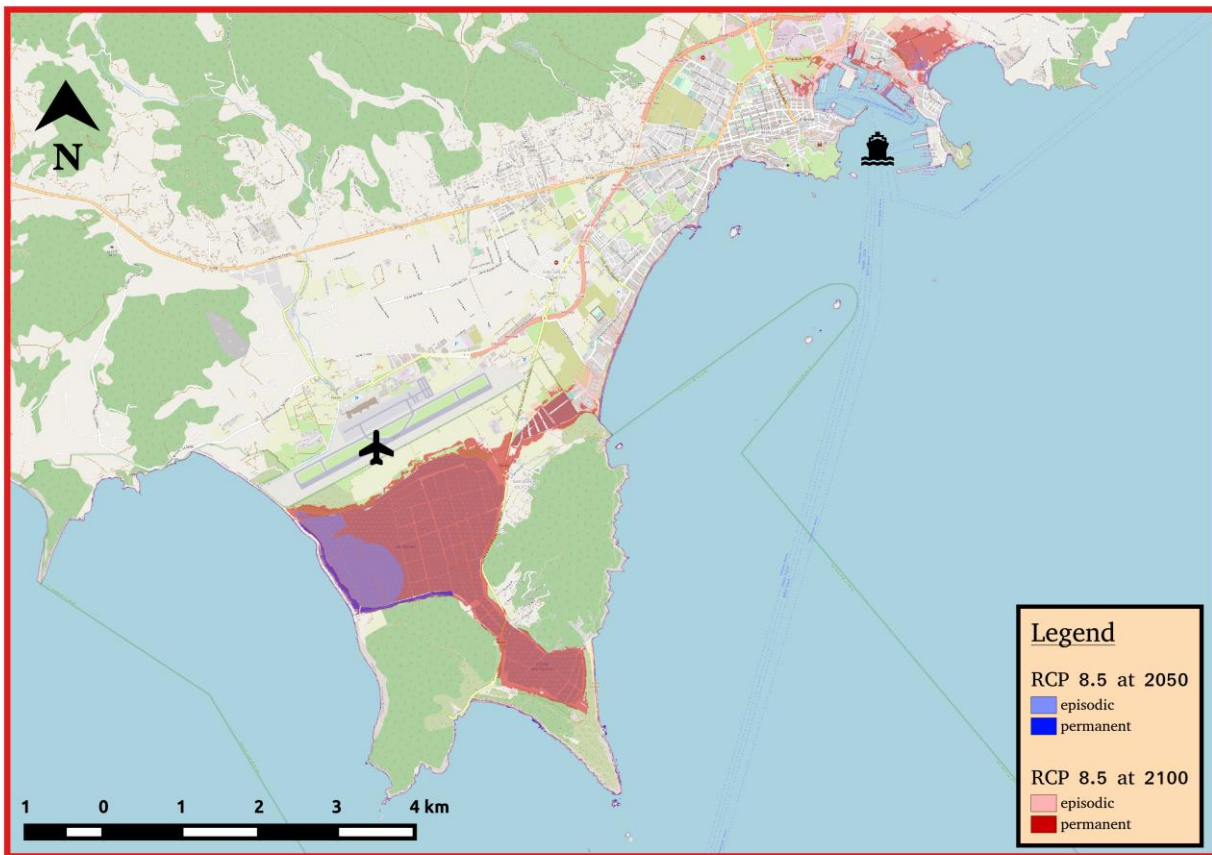
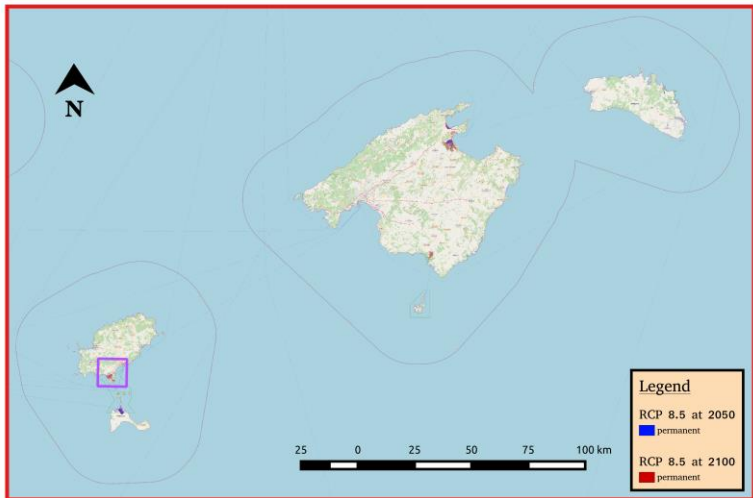


Vousdoukas et al (2016)



Compound events (surges-waves)

Quantification of flooding using a hydrological model (LISFLOOD)



Concluding Remarks

- Low-lying islands, especially those highly urbanised, may be facing permanent inundations due to MSLR, but they may become uninhabitable much earlier due to the impacts of marine extreme events such as ocean swell waves.
- Critical infrastructures, often located in coastal plains, will become more vulnerable to marine extreme events.

[GENERAL STATEMENTS (not only for islands)]:

- Need of identification and regionalisation of major climate drivers for coastal modelling and assessment and for the design of adaptation.
- Information on local topo-bathymetries is essential and determines the extent of impacts.