Global to local coastal modelling as a climate service for coastal adaptation

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Objectives

*A climate service can be considered as the provision of climate information in such a way as to assist decision-making. The service needs to be based on **scientifically credible information and expertise**, have appropriate engagement from users and providers, have an effective access mechanism and meet the users' needs.*
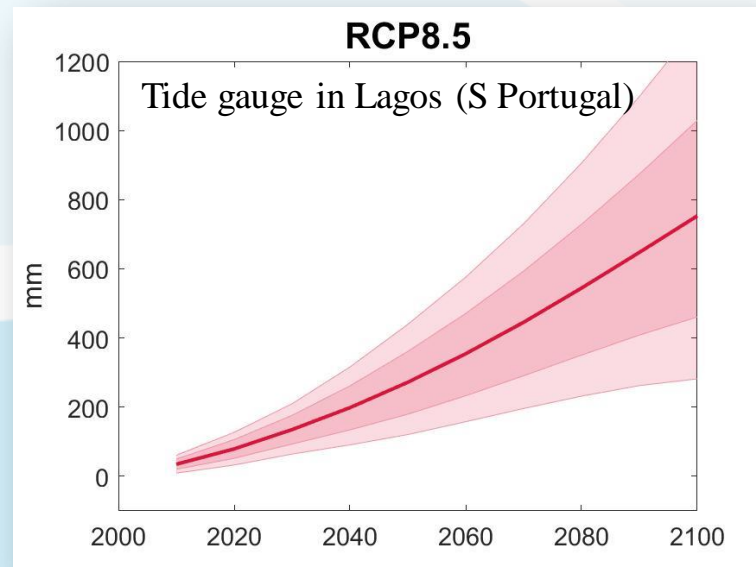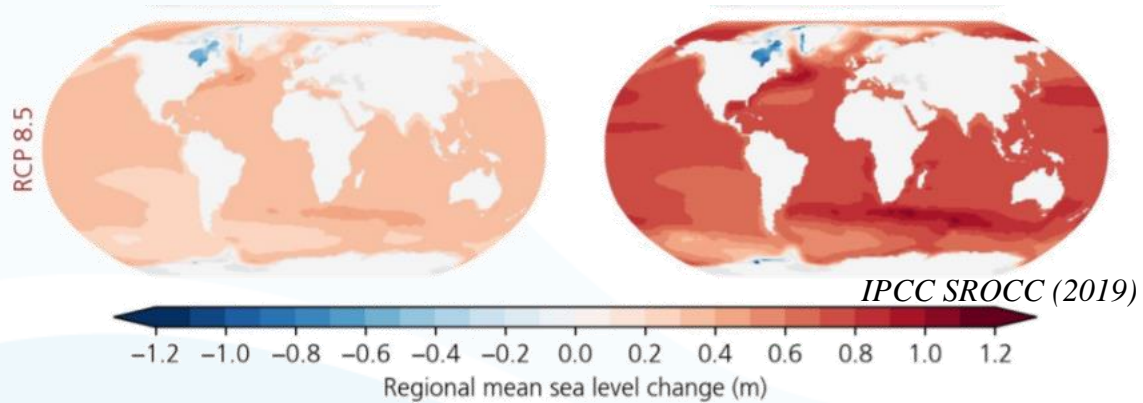
Hewitt et al., 2012

- ❑ On the use of global coastal information (e.g. for large-scale assessments, identification of mechanisms, mitigation strategies)

- ❑ On the regionalization of global coastal information to assist local decision-making

INSeaPTION

What information & tools?

Relative mean sea level (regional scenarios)
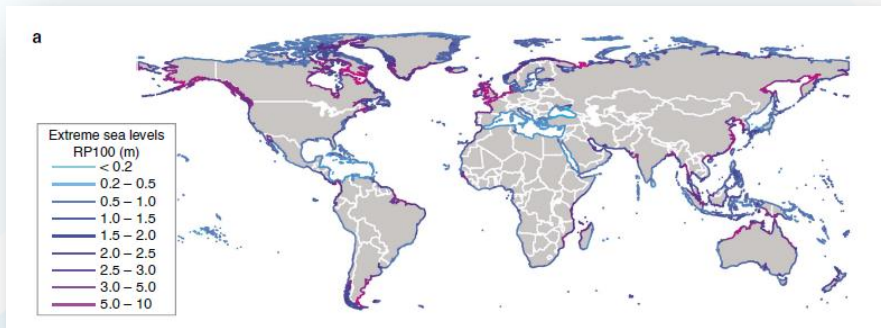

IPCC SROCC (2019)

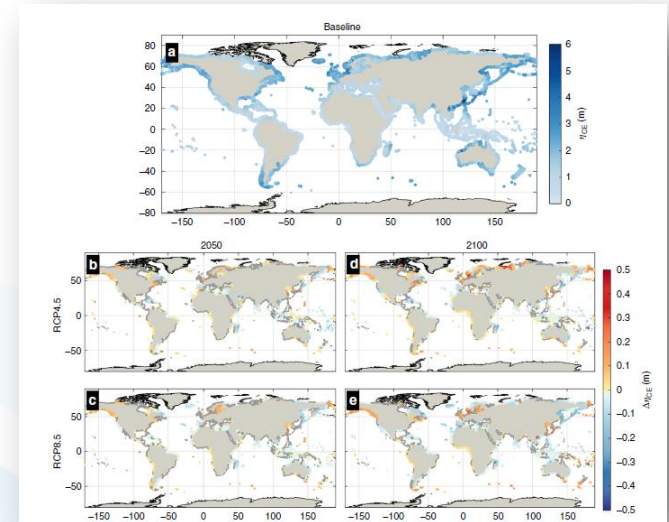*Kopp et al (2014)*

What information & tools?

Extreme sea levels (storm surges, wind-waves)
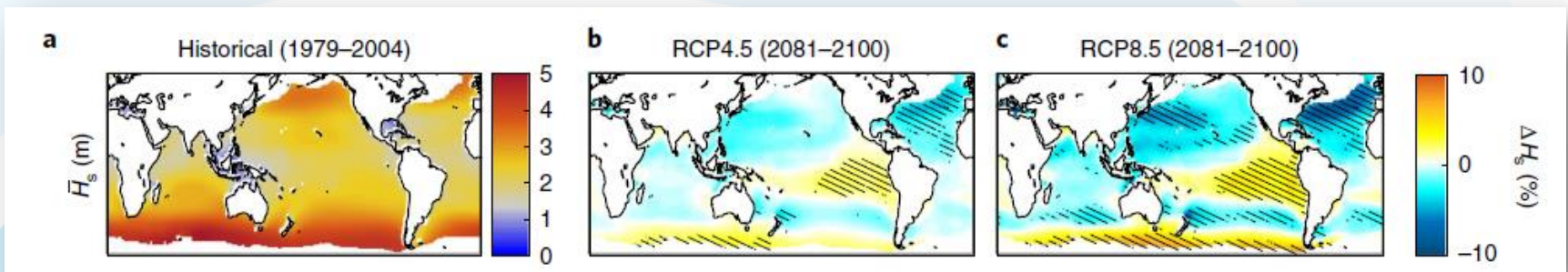
Storm surges (global hydrodynamic models)

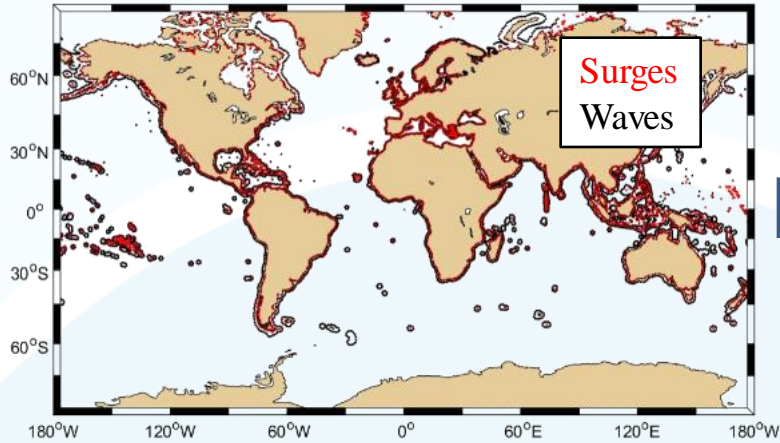*Muis et al (2016)*

Vousdoukas et al (2018)
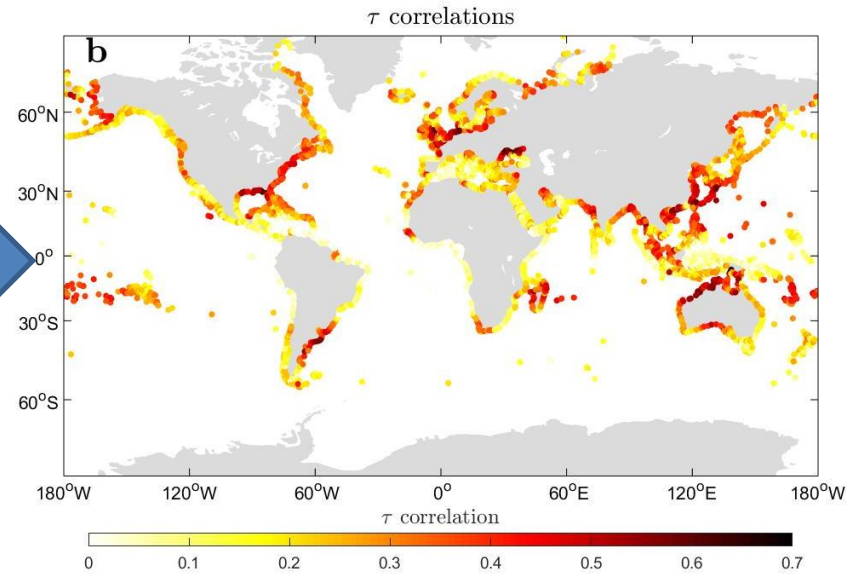
Wind-wave models

Morim et al (2019)

Global coastal modelling

Surge and wave grid points

Surges
Waves

Mentaschi et al., (2017)
Vousdoukas et al. (2017)

Identification of regions with compound surges-waves extremes

τ correlations

τ correlation
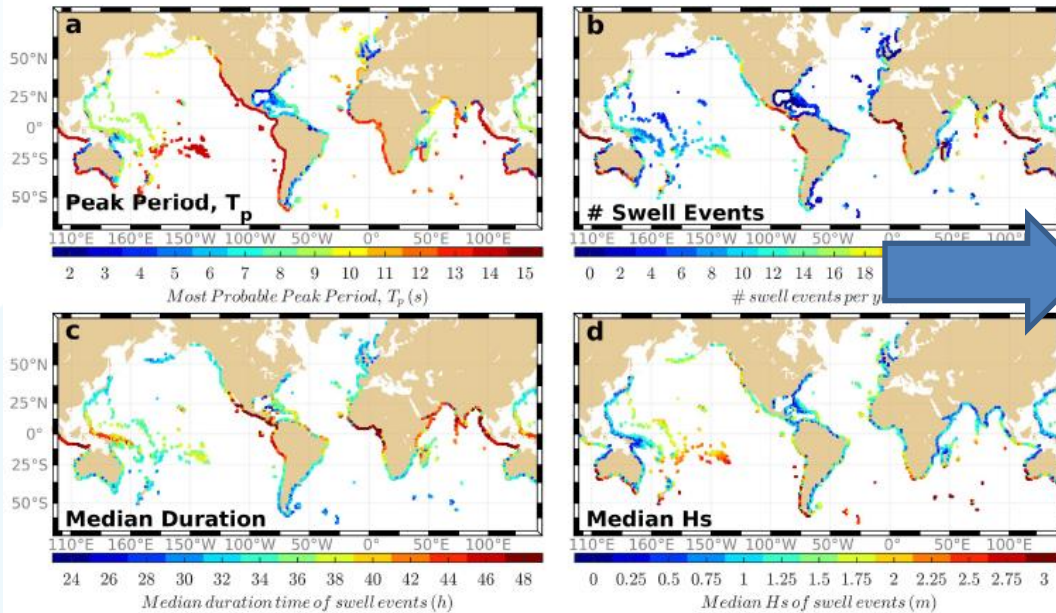
0   0.1   0.2   0.3   0.4   0.5   0.6   0.7

Marcos et al (2019)

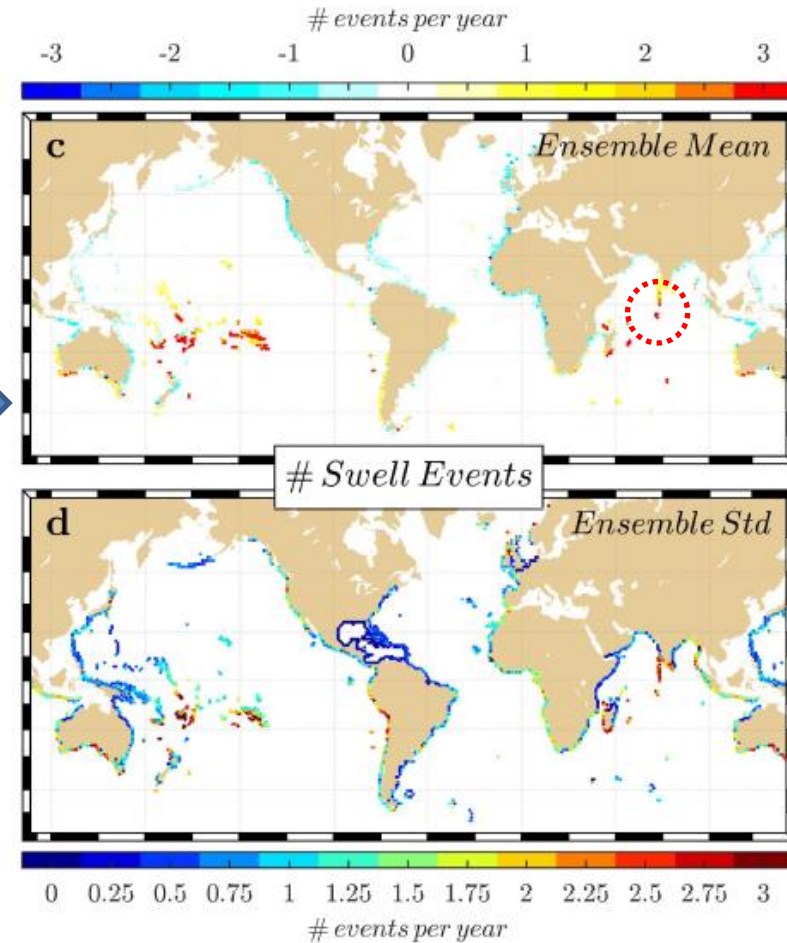# Global coastal modelling

Swell events along global coastlines
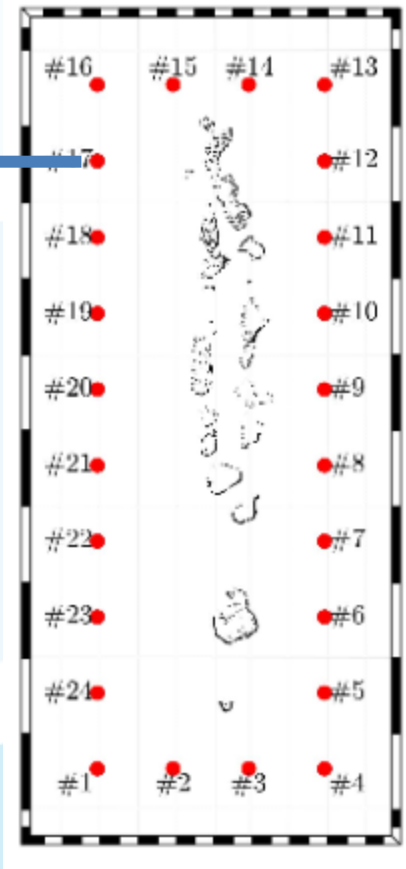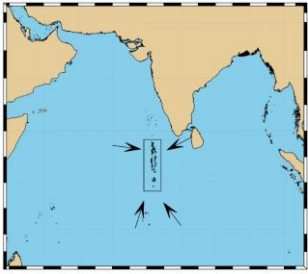
Changes in swell events: areas with increased exposure

Amores & Marcos (2019)

STEP 1- Characterization of large-scale wave climate
STEP 2- Evaluation of changes from projections

Amores et al (in prep)

100 km

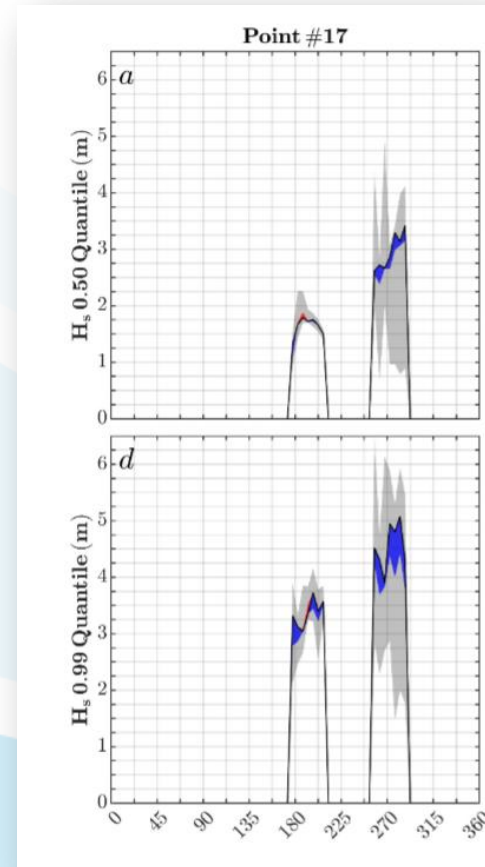# *Global to local coastal modelling*

STEP 1- Characterization of large-scale wave climate
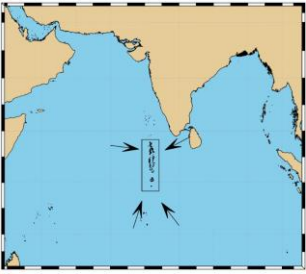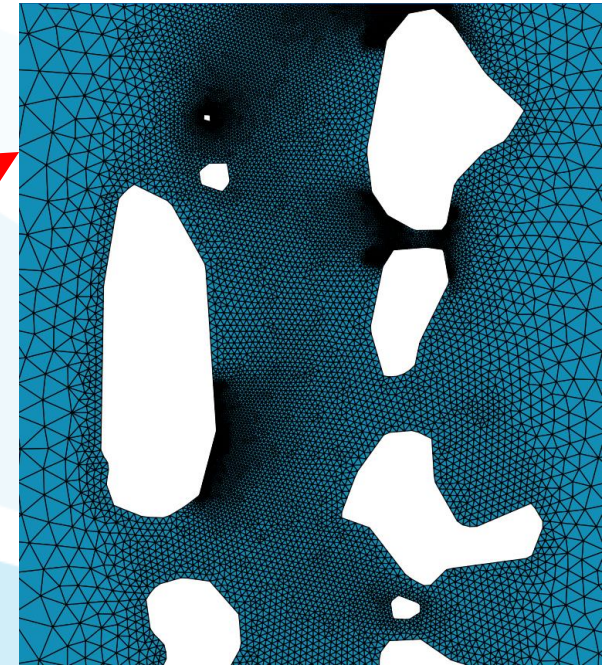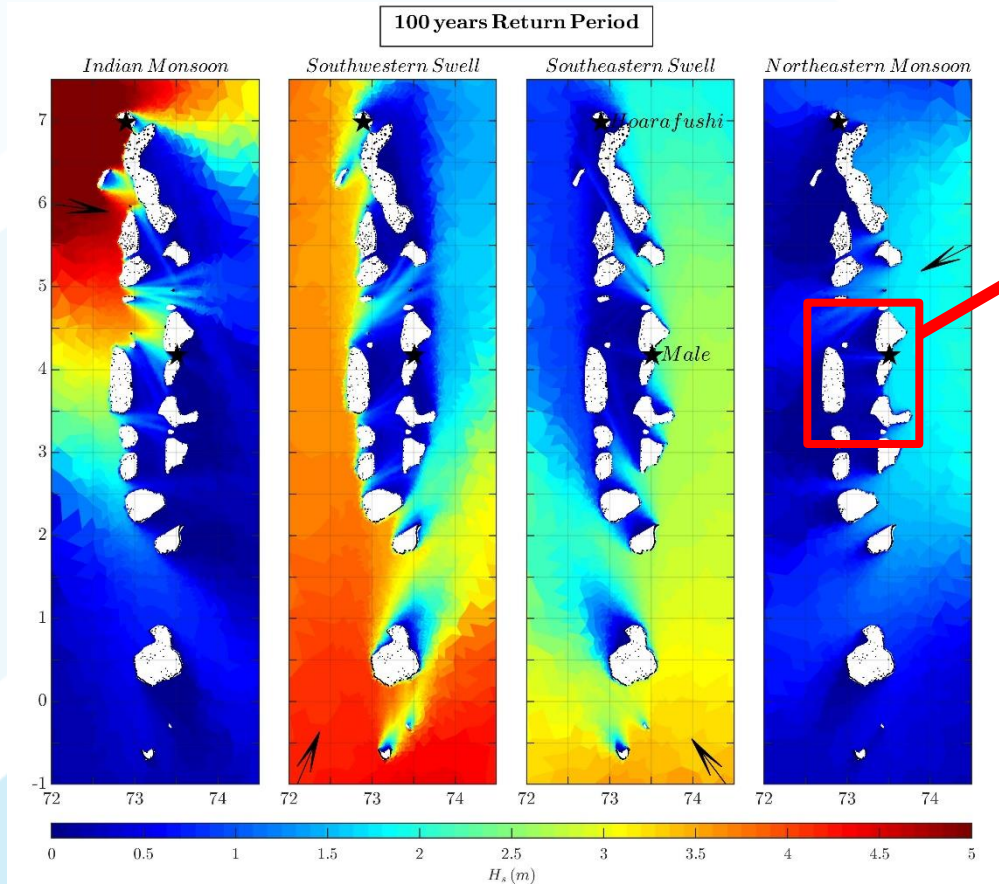STEP 2- Evaluation of changes from projections
STEP 3- Regionalization (downscaling)

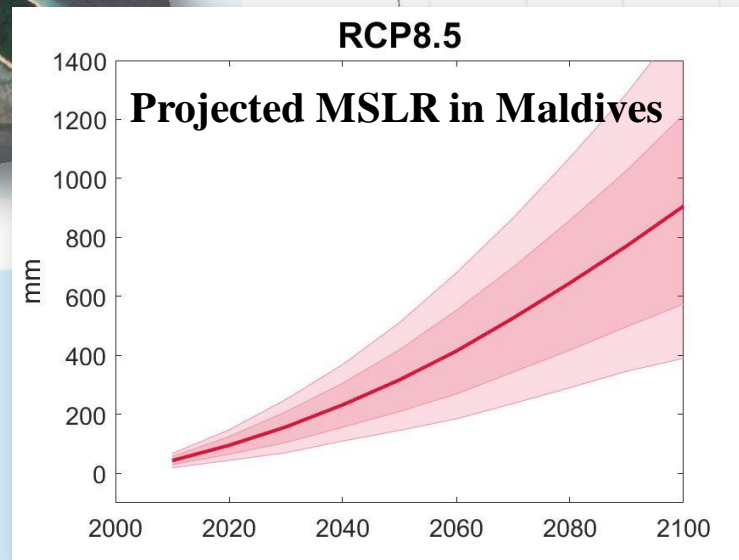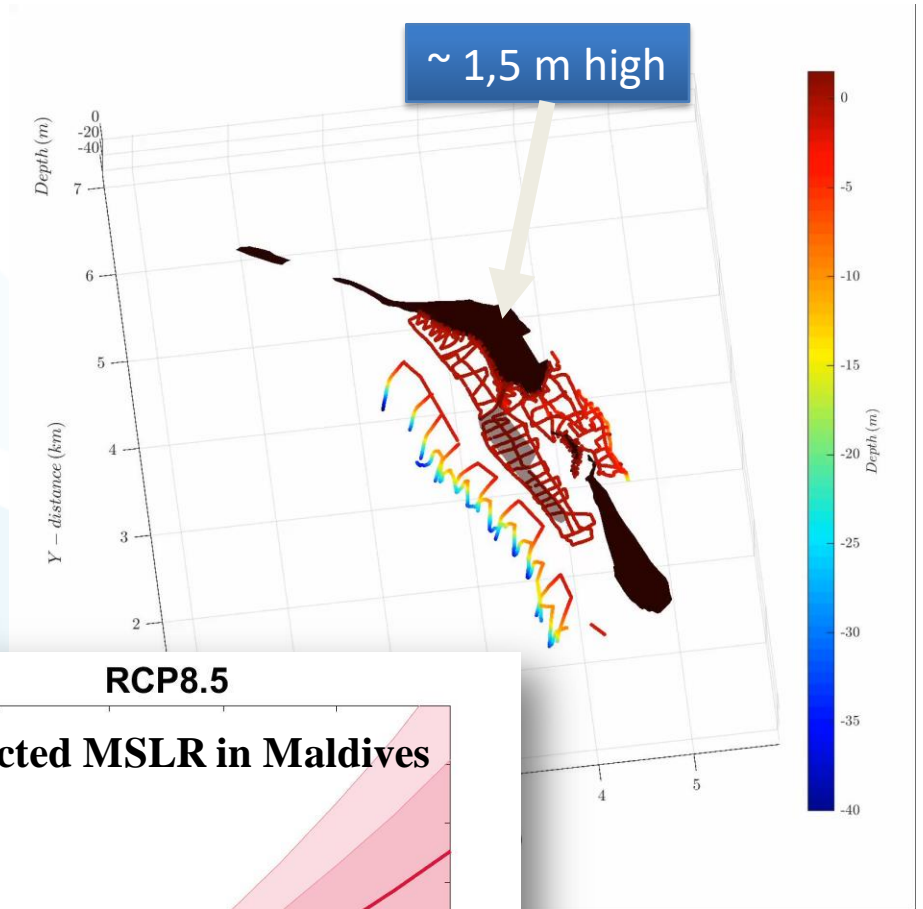Dynamical downscaling
Resolution from 50 km at boundaries to
500 m in the channels between atolls.

100 years Return Period

Indian Monsoon   Southwestern Swell   Southeastern Swell   Northeastern Monsoon

H_s (m)

Local information is essential

Hoarafushi

~ 1,5 m high

RCP8.5

Projected MSLR in Maldives
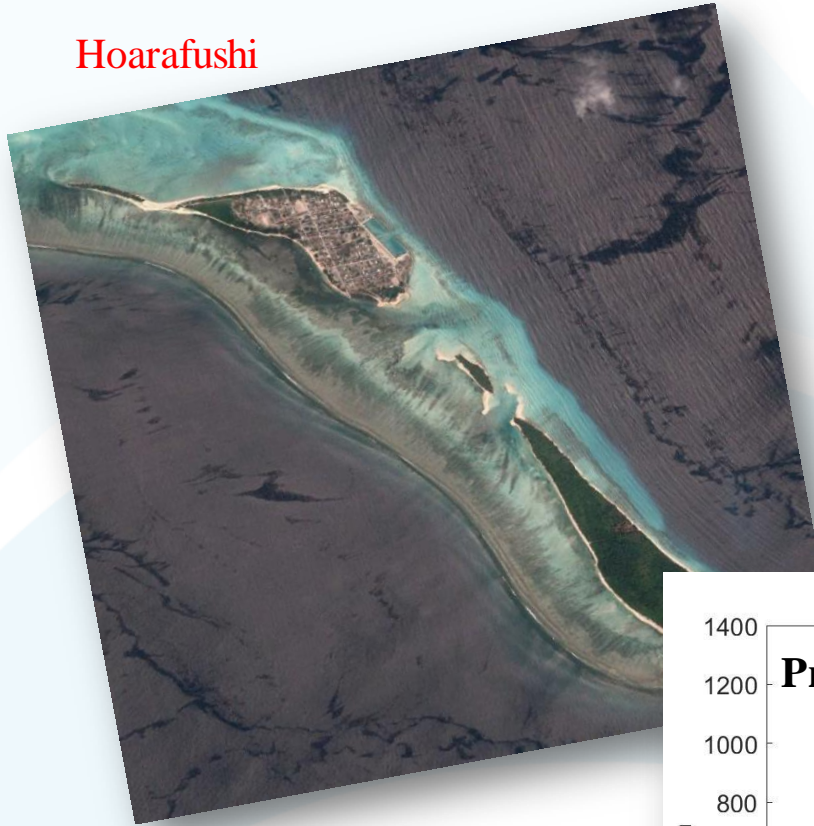
Concluding Remarks

❑ Translation of global climate information for coastal modelling requires careful assessment and appropriate regionalization

❑ Suitable information of regionalized mean sea level rise

❑ Extreme sea levels must be modelled at the local scale, especially where waves are the dominant mechanism (e.g. when erosion is concerned)

❑ Need of **local information** in coastal modelling: e.g. bathymetries for wave propagation, topographies for flood risks