気候変動予測先端研究プログラム
Advanced Study of Climate Change Projection (SENTAN)

Introduction of Japan's National Climate Program (SENTAN Program) and Case Study on Fiji

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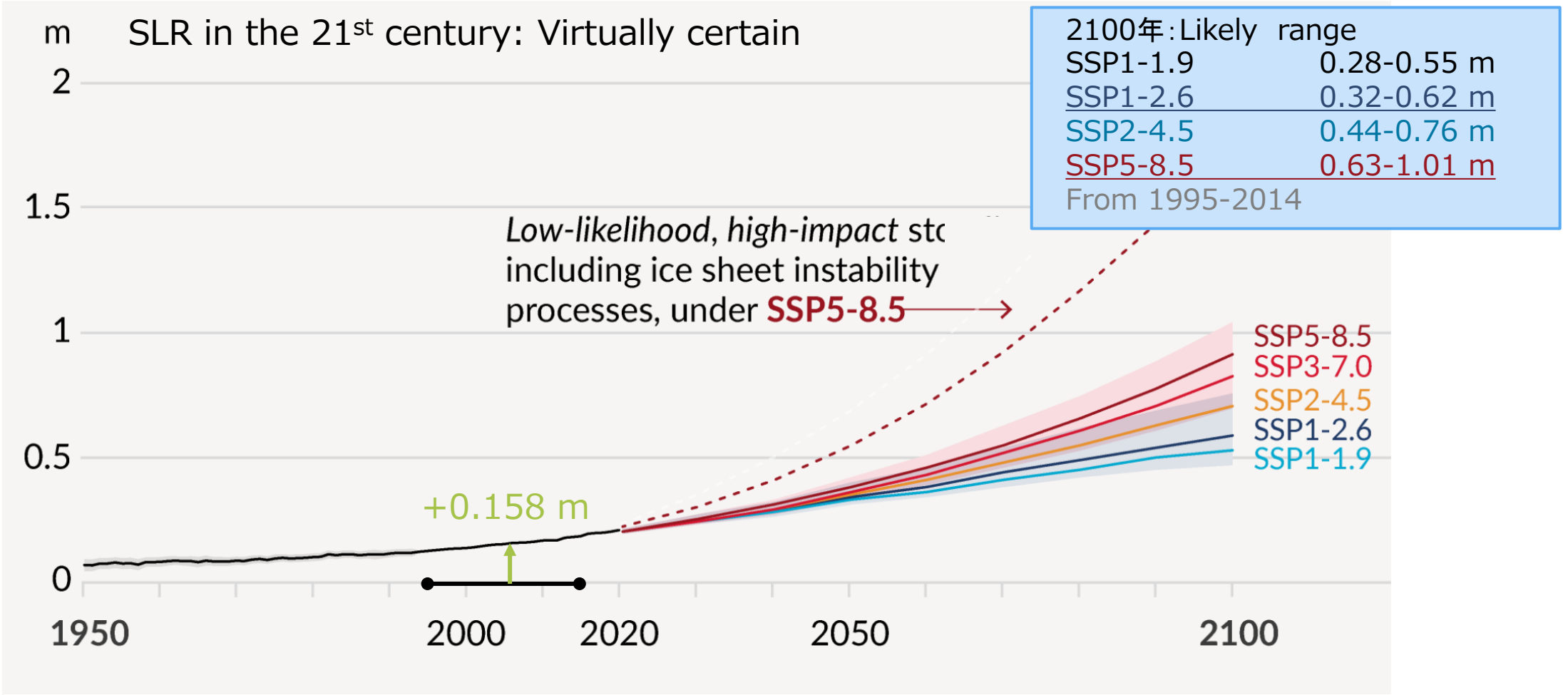
Kyoto University
Leader of SENTAN Program Theme 4 by MEXT, Japan

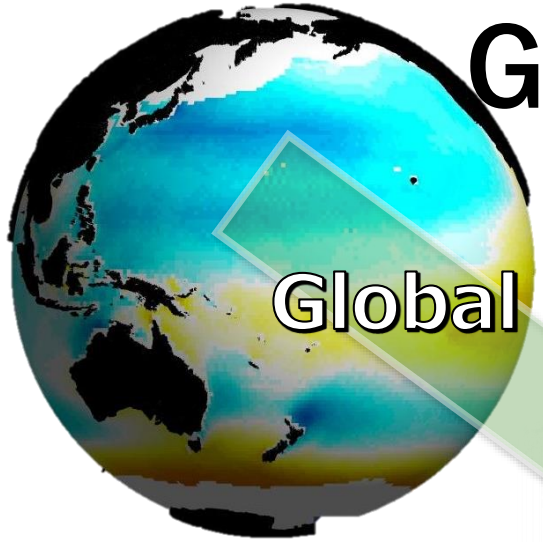
Sea-Level Rise Projection in AR6 WGI



IPCC AR6 WGI Chapter 9 Figure SPM.8 (baseline period: Y1900）

But… Extreme hazard projection is limited

Global to local climate risk



Global

Typhoons, Extra-TCs
Sea level rise

Asia/Pacific

Heavy precipitation
Storm surges
Water resources

National

River and coastal flooding
Hazard Risk

Local

Time-line
Hazard intensity
Adaptation

Extreme Projections
Winter Storms
ENSO
Tropical Cyclones

DPRI-KU

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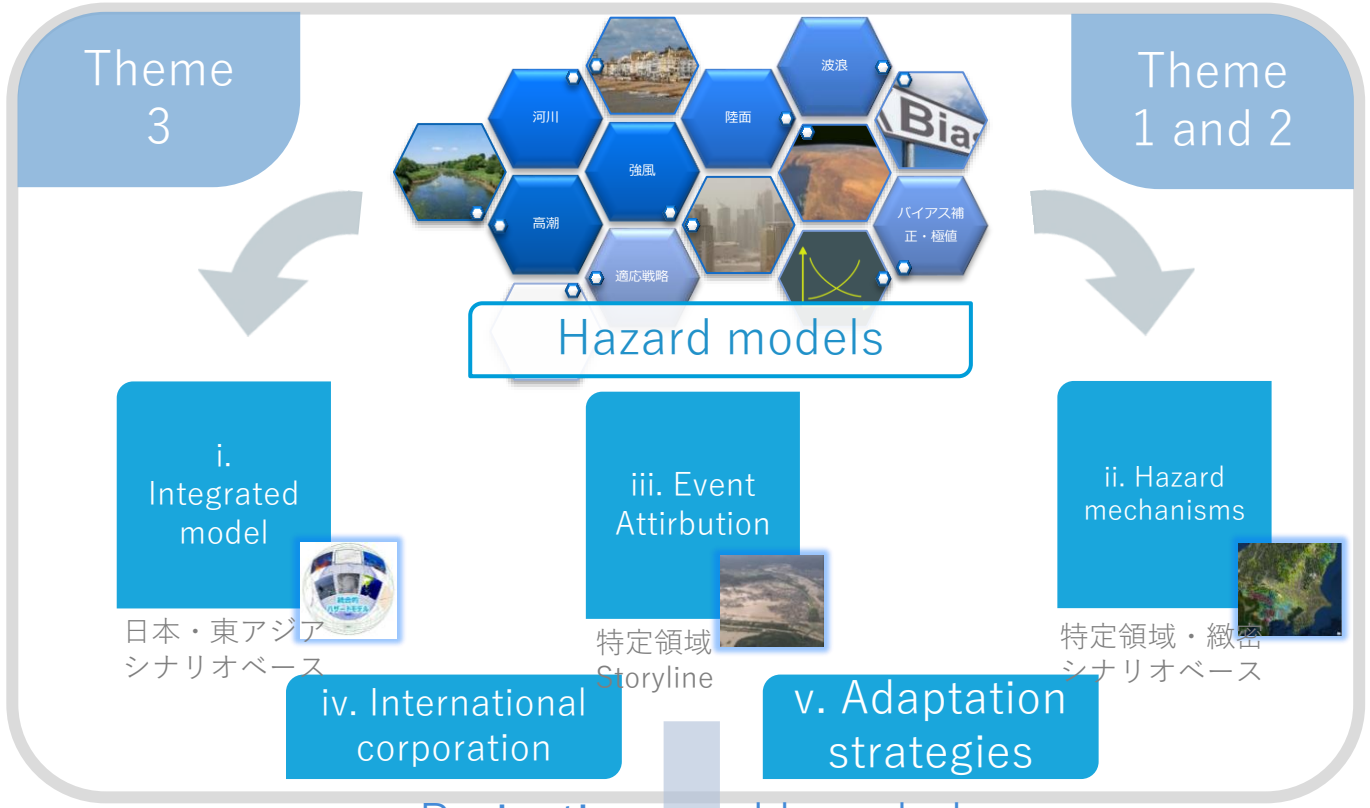
Japan's National Climate Research Programs

TOUGOU Program (2017-2021)
to
SENTAN Program (2022-2026)

SENTAN Program Theme 4: Outline



i. Integrated hazard model development
- Prof. T. Sayama (Kyoto U)

ii. Hazard mechanisms
- Prof. K. Tanaka (Kyoto U)
- Prof. M. Fujii (Hokkaido U)

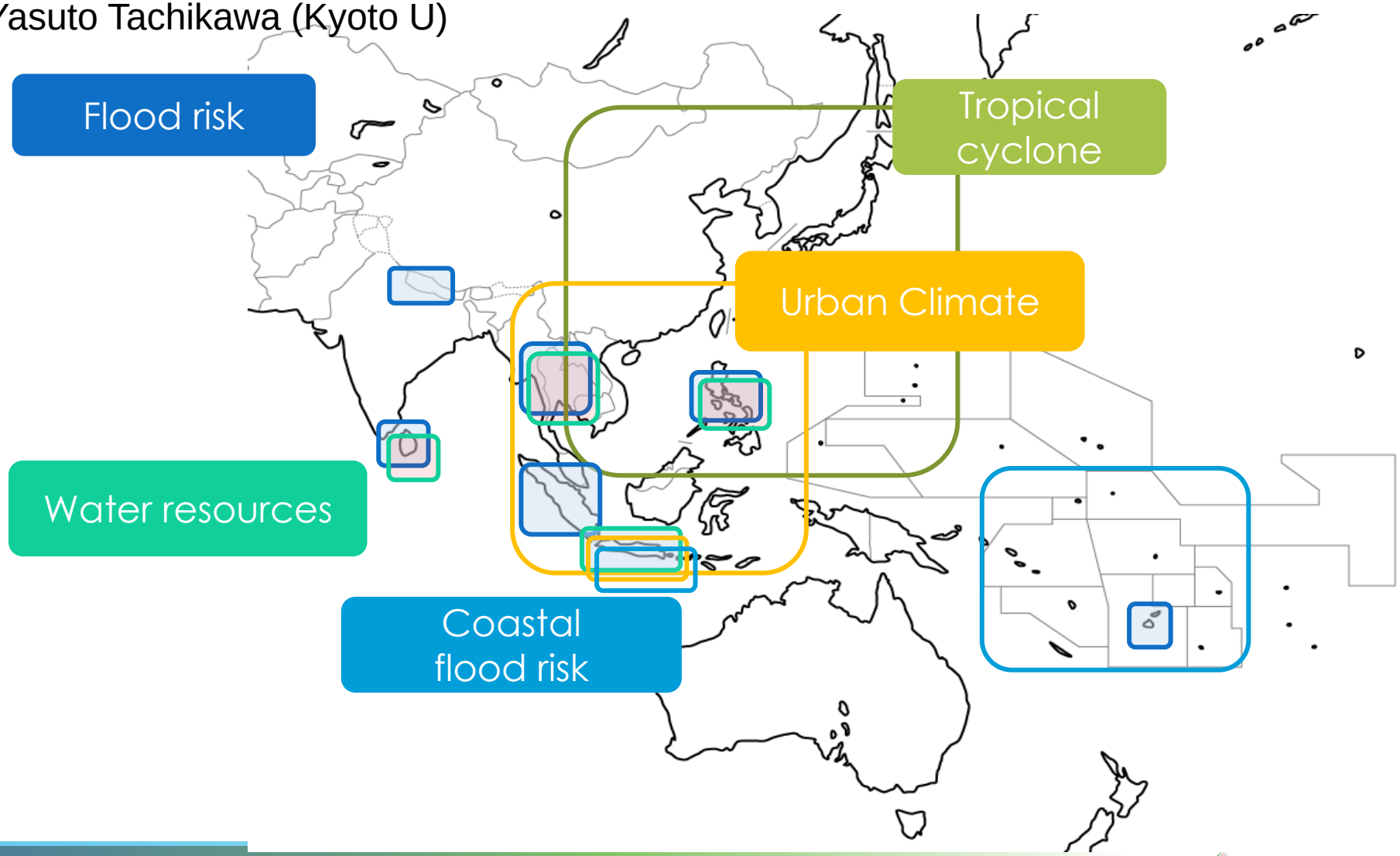
iii. Hazard Event Attribution
- Prof. T. Takemi (Kyoto U)

iv. International cooperation
- Prof. Y. Tachikawa (Kyoto U)

v. Adaptation strategy
- Prof. T. Fujimi (Kyoto U)

Sub-theme iv：International cooperation for hazard and risk assessments in the Asia-Pacific region

Leader: Yasuto Tachikawa (Kyoto U)



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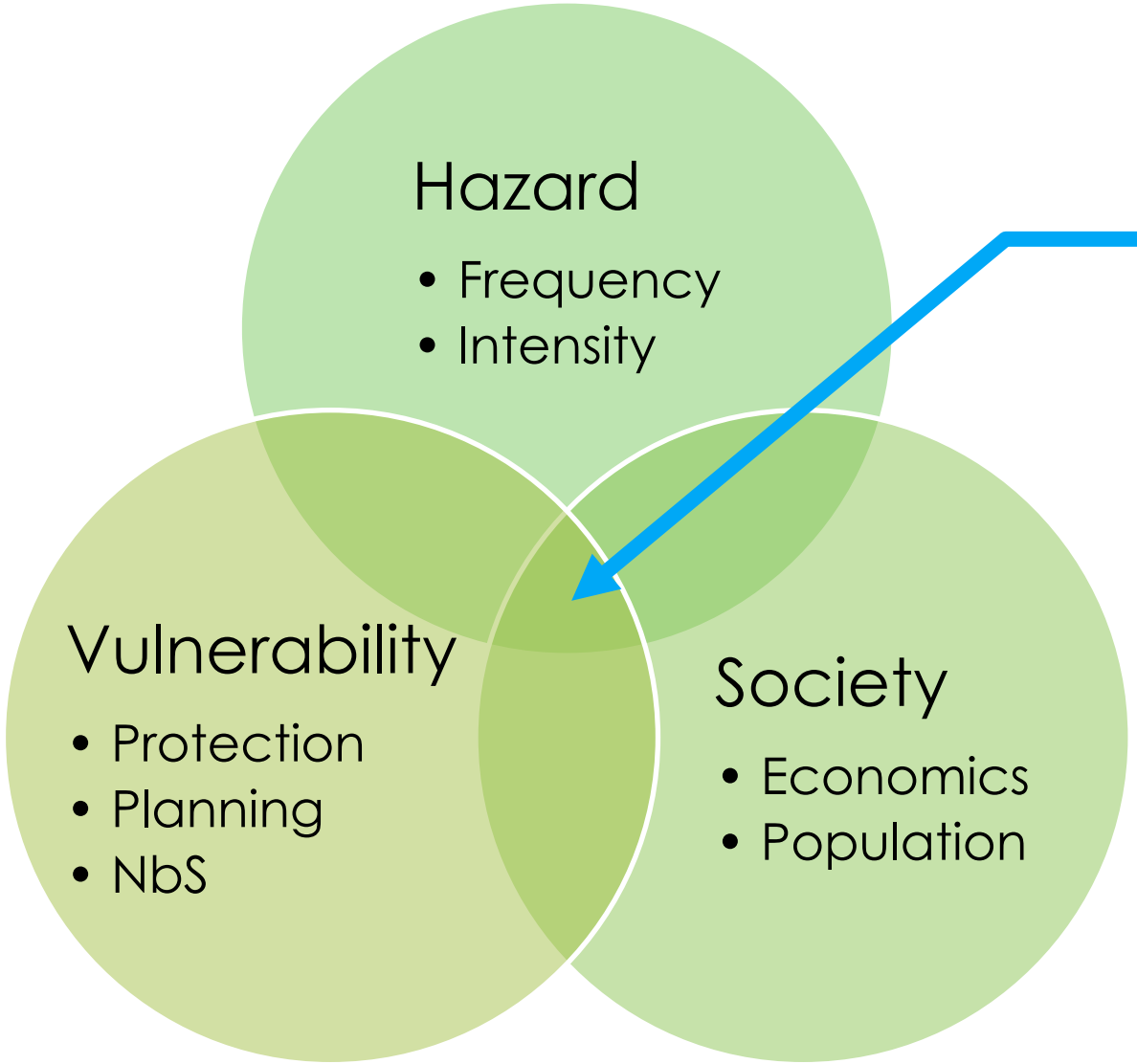
Quantify the Hazard Risks



Potential risk change

- sea-level rise
- precipitation
- coastal flooding
- river flooding
- water resources

SENTAN Program aims for Asia-Pacific/Fiji applications

Hazard projection for the Pacific islands

- The Pacific islands are vulnerable for sea-level rise, coastal and river flooding, precipitation and water resources.
- Coastal areas are frequently known for a higher population density and serve as significant society hubs.
- Number of climate study is limited comparing with the continents.

Climate change impact on coastal flooding

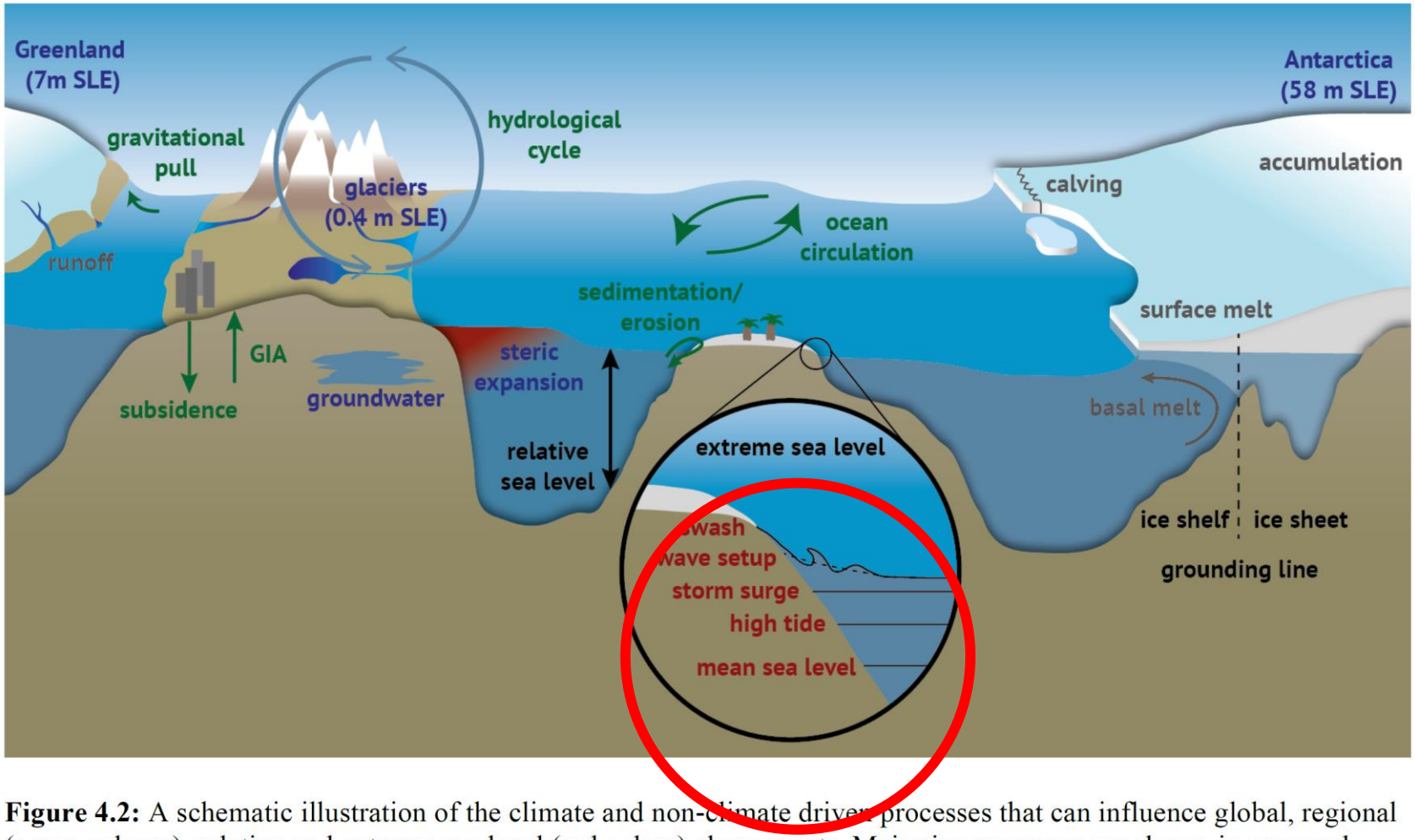


Figure 4.2: A schematic illustration of the climate and non-climate driven processes that can influence global, regional (green colours), relative and extreme sea level (red colors) along coasts. Major ice processes are shown in grey and general terms in black.

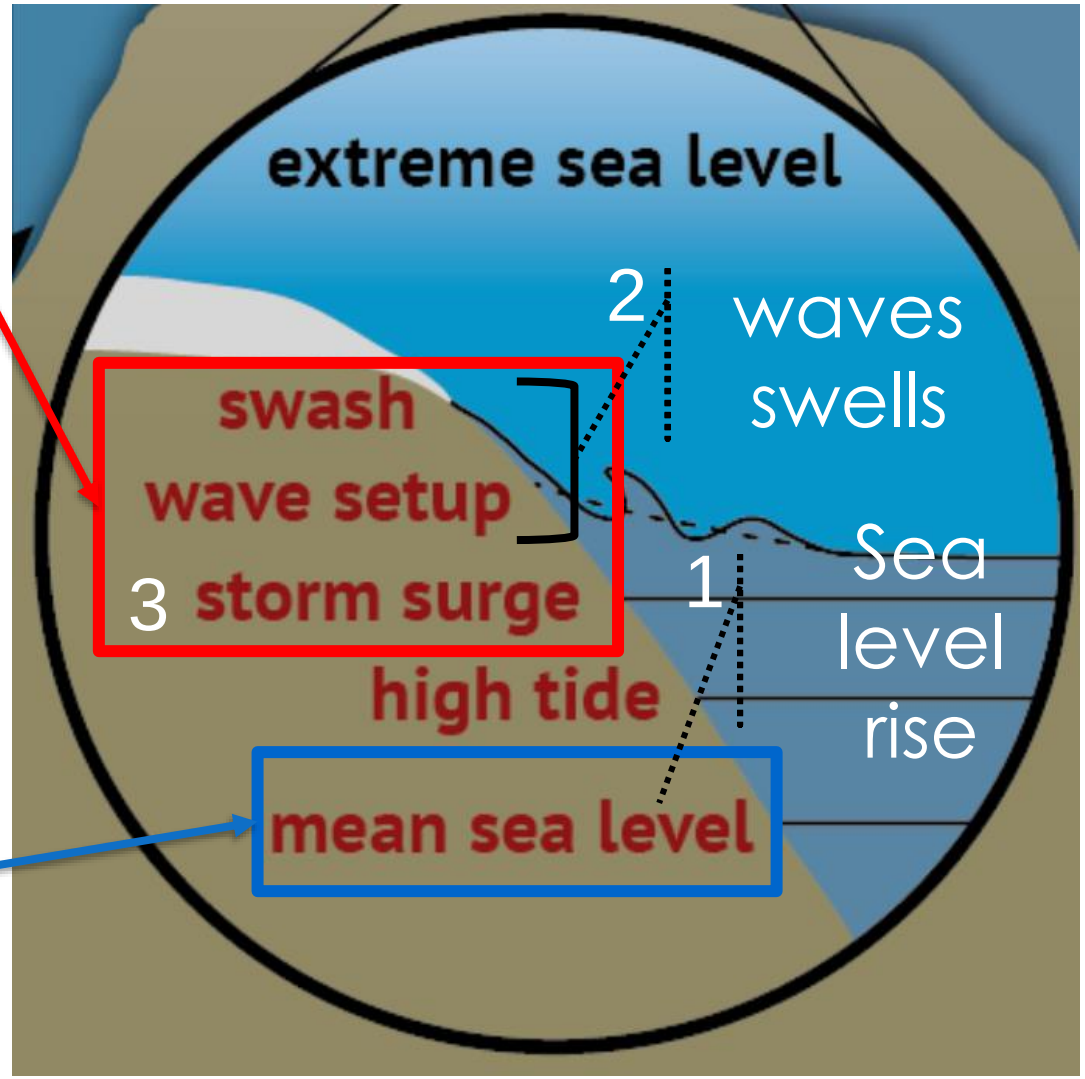
Climate change impact on coastal flooding

Cause/scale/impact

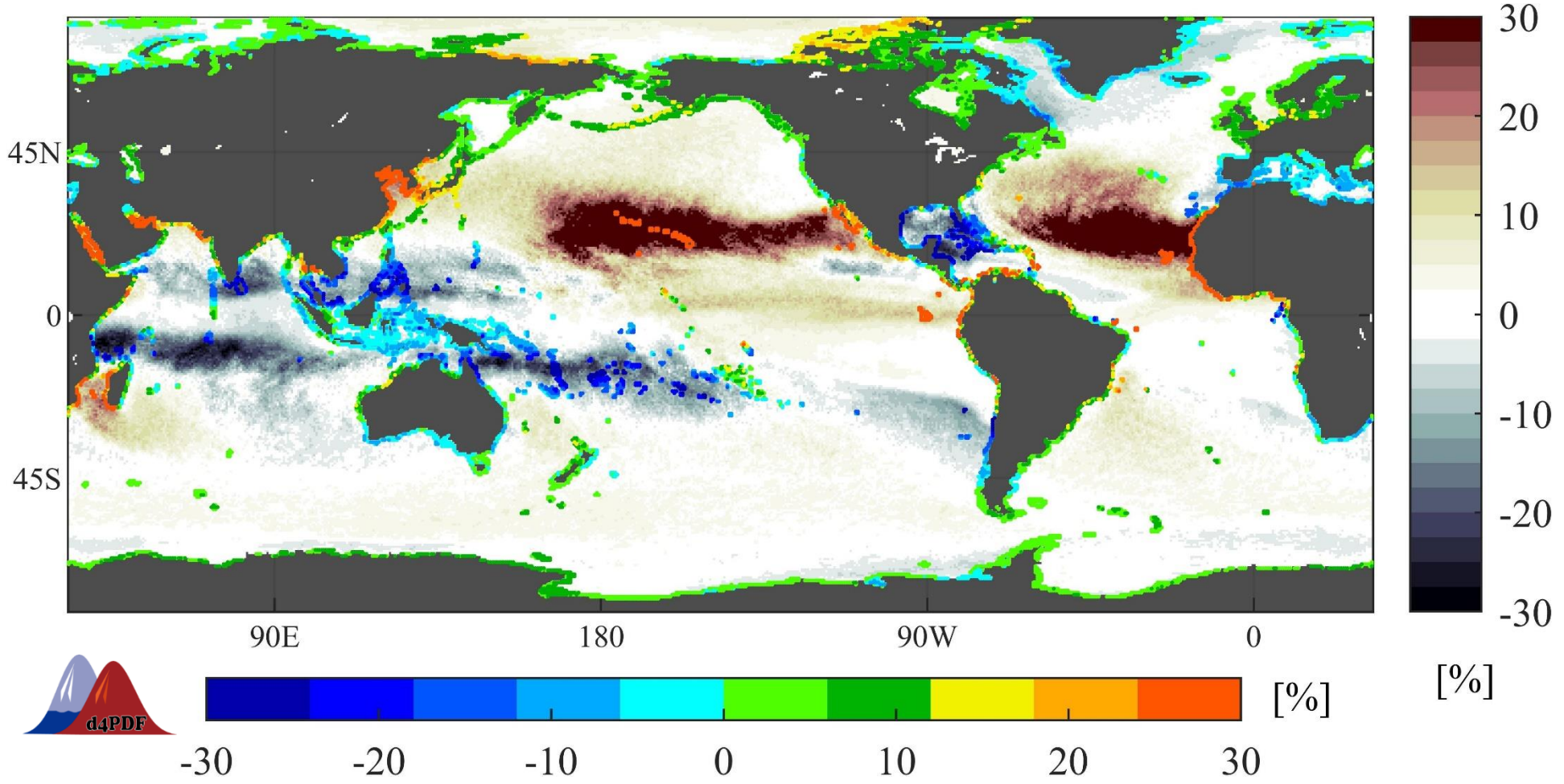
Tropical cyclone *or*
Low pressure system
- short in time, local in space
- H=1-10m/each

Climate change impact

Thermal expansion/land ice
- gradual in time, smooth in space
- ΔH=0.5-1m



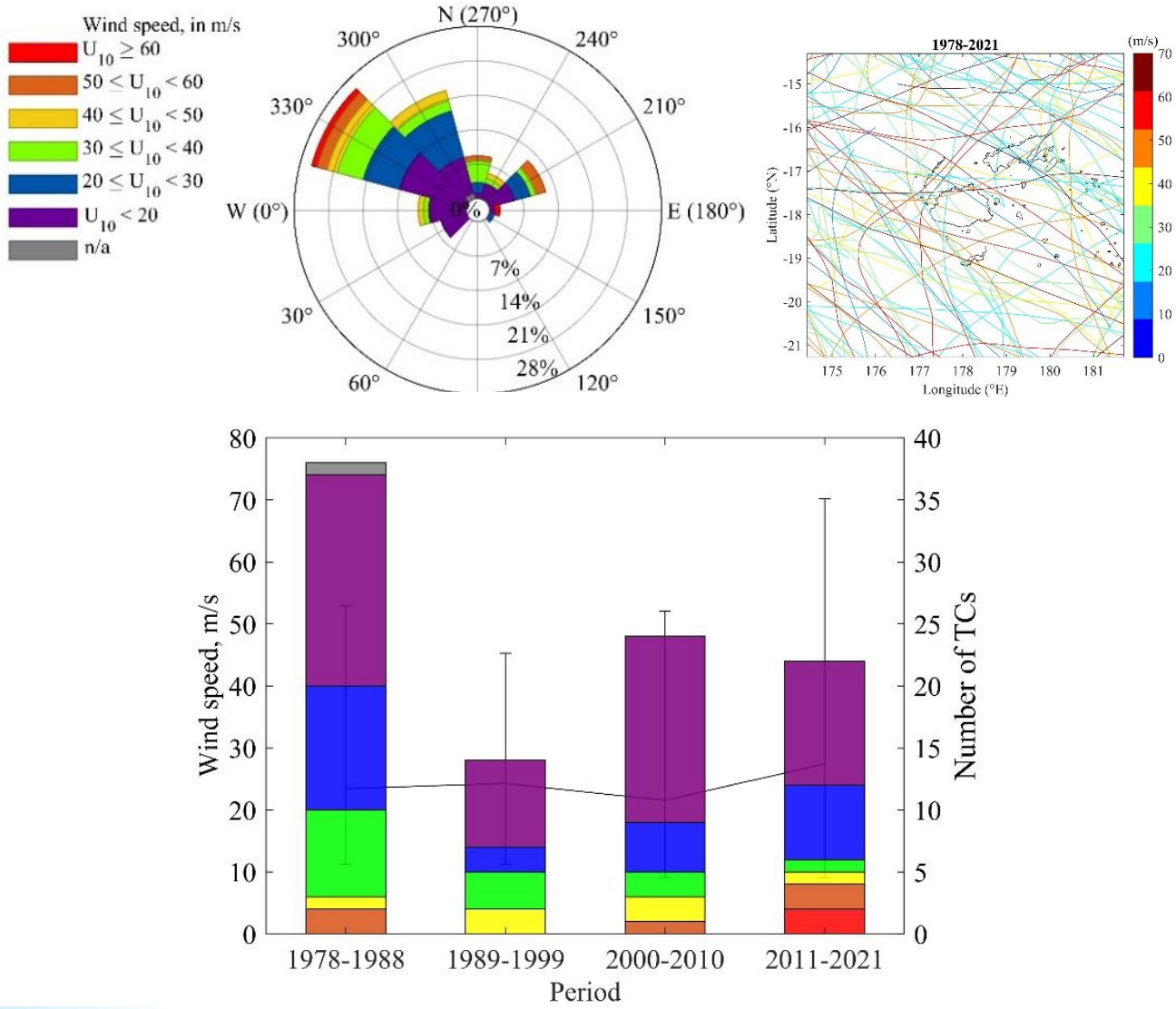
Future change in 100yrs storm surge in +4K climate (d4PDF)



Mori et al. (2020) CEJ

Historical tropical cyclones for Fiji

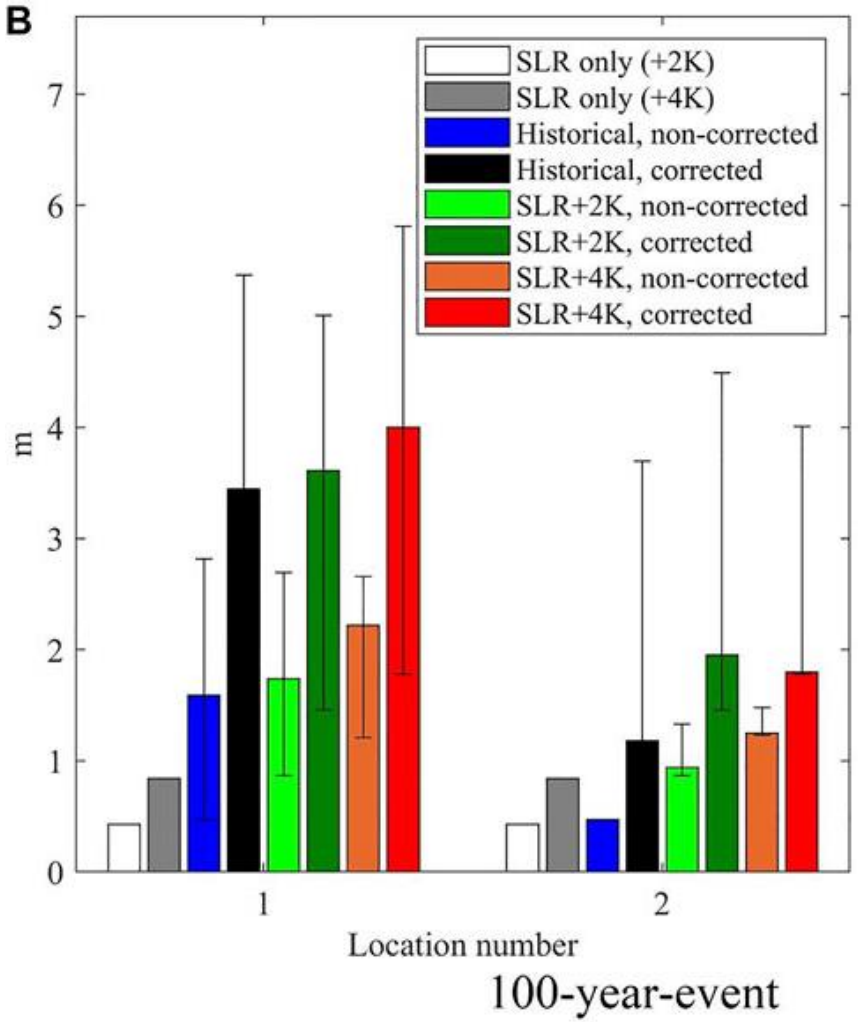
- 101 TCs recorded since the 1978 season (#2.4/yr)
- The number of TCs have decreased by 72% during the period 2011–2021 compared with 1978–1988.
- 74% of all TCs approached from NW but the wide range of approaching direction can be possible.
- d4PDF is useful studying extreme cyclone impacts.



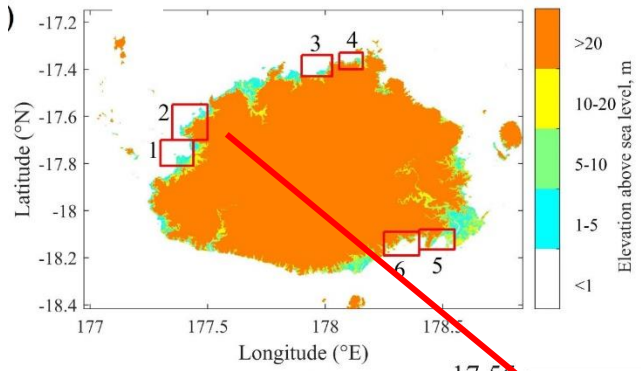
Sabunas et al. (2021) Frontiers

Case study of Sea-level rise+Storm surge

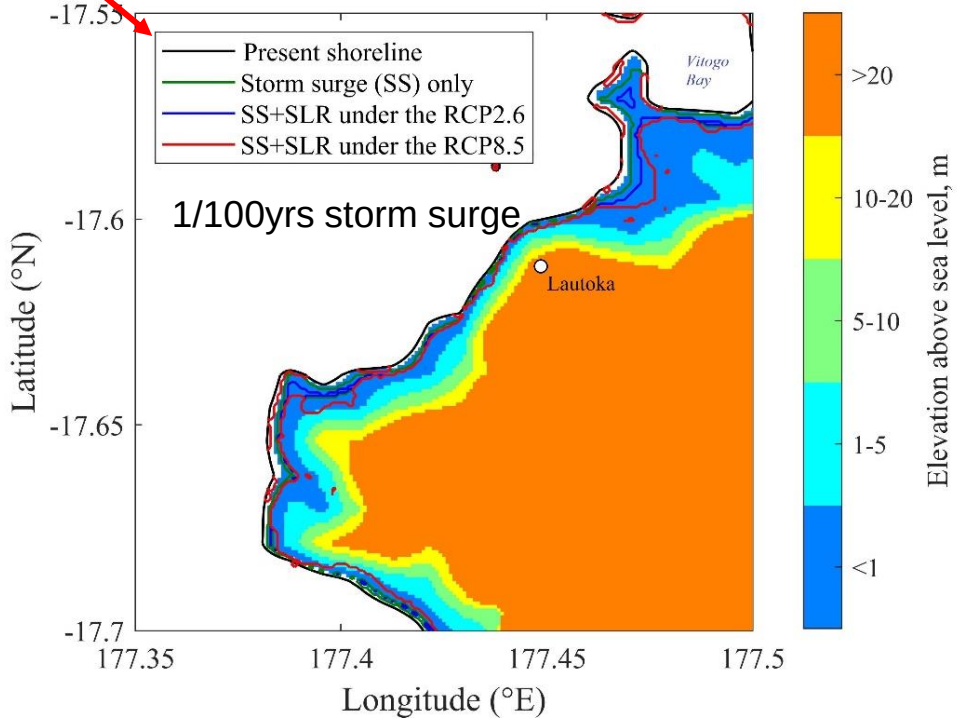
Viti Levu island in Fiji



Total extreme water level



Projected inundation limit



Sabunas et al. (2021) Frontiers

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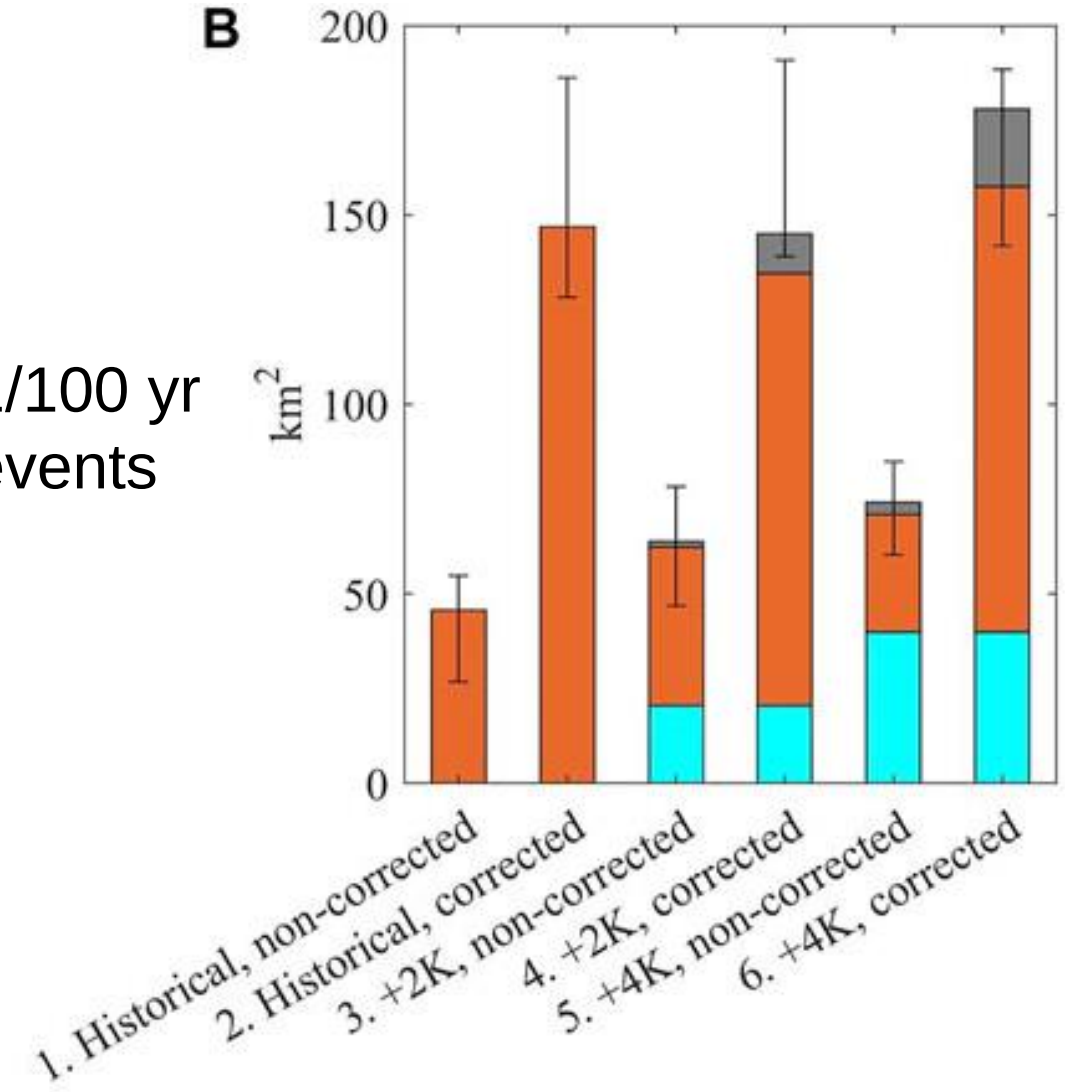
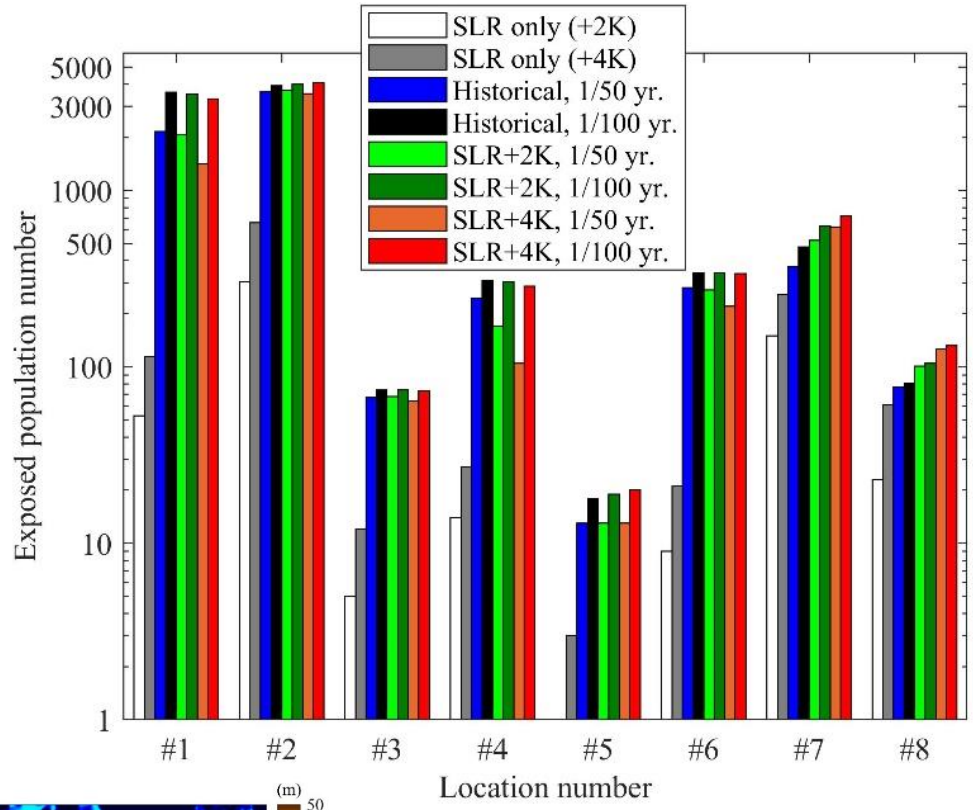
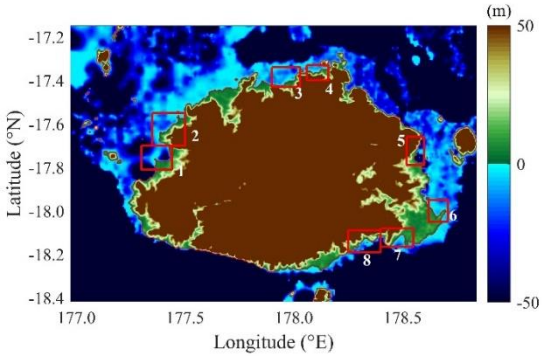
Exposed impact on Viti Levu

1/100 yr events

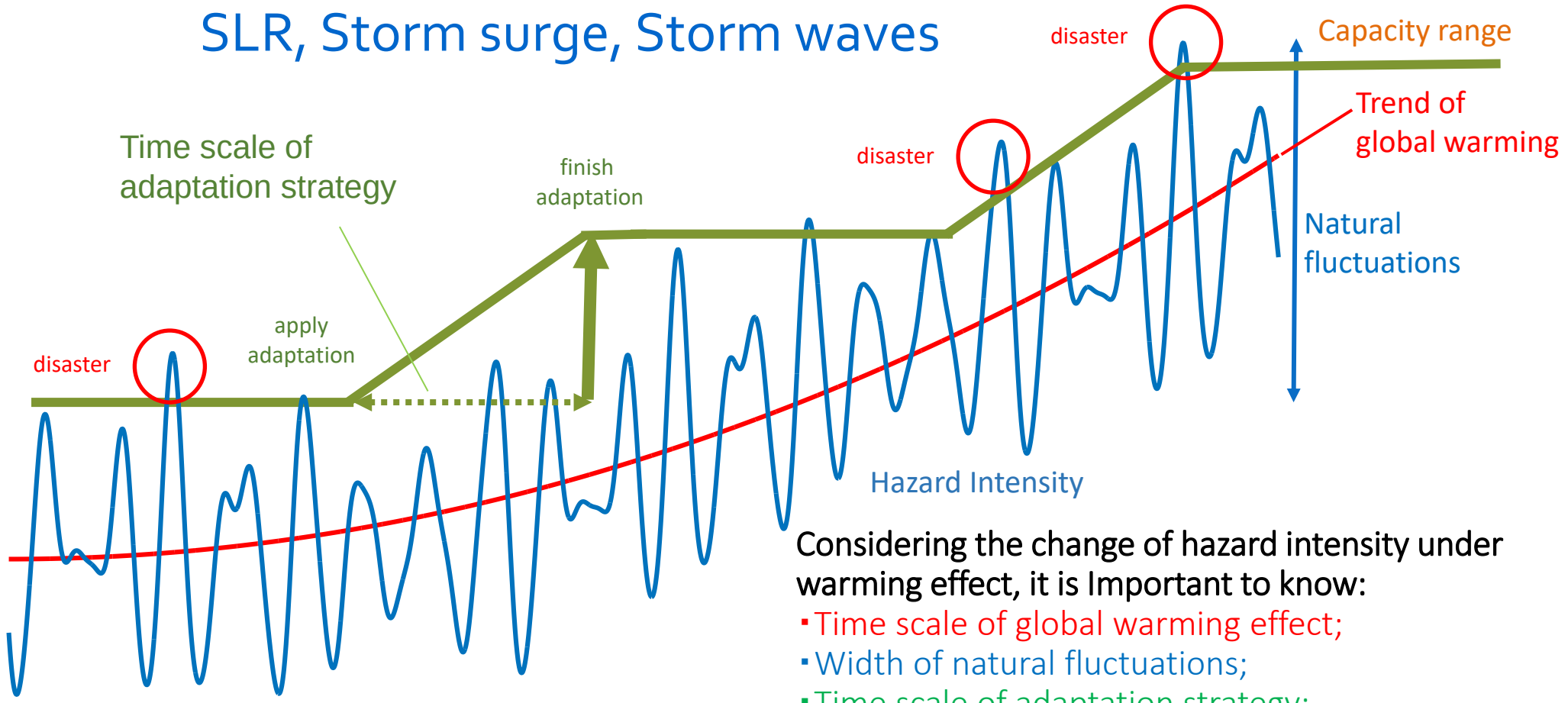






Sabunas et al. (2021) Frontiers

No-regret adaptation strategy for climate change



Considering the change of hazard intensity under warming effect, it is Important to know:

- Time scale of global warming effect;
- Width of natural fluctuations;
- Time scale of adaptation strategy;
- Cost effectiveness.

Summary

- Impact assessment for extremes will be dramatically improved in SENTAN program.
- Targets for the next 5 years
  - Multi-hazard assessment
  - Risk assessment
  - Maximum class assessment
  - Close linkage with adaptation measures
- Impact assessment for Asia and the Pacific areas
  - IPCC does not care individual country
  - Need for international cooperation

Thank you for listening and willing to collaboration