

# Assessment of future changes in storm surges based on CMIP6 ScenarioMIP Experiments



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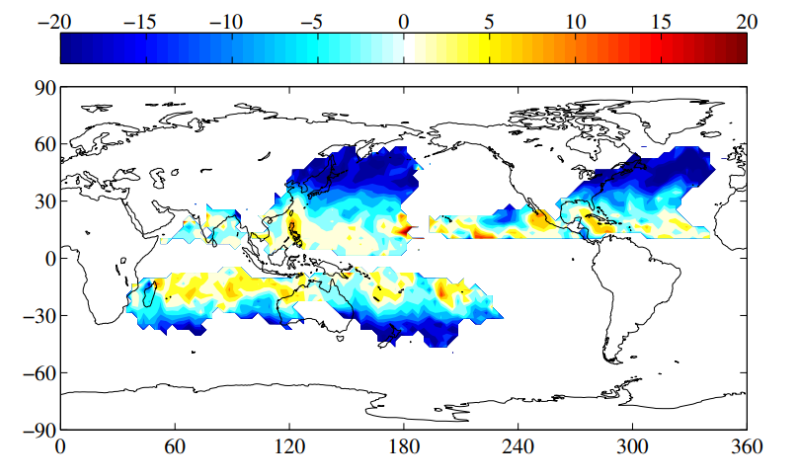
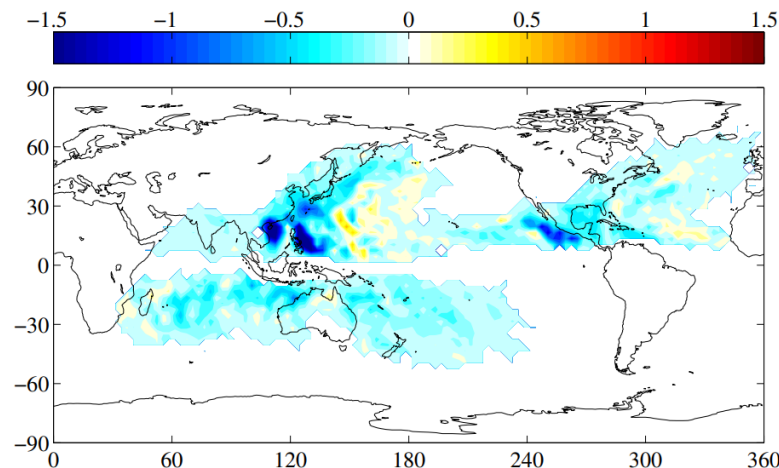
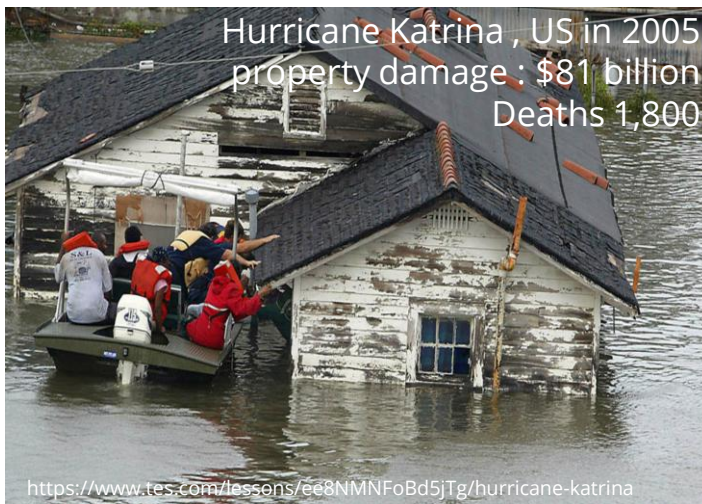
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# RESEARCH BACKGROUND - Motivation

- Storm surges have repeatedly caused severe disasters in many coastal areas in the past.
- Climate change is expected to affect the characteristics of atmospheric pressure and wind fields, thereby affecting the intensity and frequency of tropical cyclones. The pattern of these changes varies depending on the climate change scenario.
- Therefore, to reduce coastal disaster risk, it is essential to project storm surges under multiple climate change scenarios.



# RESEARCH BACKGROUND – Climate projection experiment data (CMIP6)

- CMIP6 consists of various MIPs designed for different research purposes.
- For storm surge studies, ScenarioMIP, HighResMIP, and CORDEX-EA data can be utilized.
- Comparison of ScenarioMIP, HighResMIP, and CORDEX-EA characteristics:

Item	ScenarioMIP	HighResMIP	CORDEX-EA
Purpose	Multi-scenario climate projections (SSPs)	Role of high resolution in climate & extremes	Regional downscaling for East Asia
Experimental area	Globe	Globe	East A
Spatial resolution	~100-250 km	~25 -50km	~10~50 km
Strengths	Standardized global projections	Better extremes & storm representation	High-resolution regional detail
Limitations	Coarse resolution, misses local extremes	Computationally expensive, few models	Depends on driving GCM quality

# DATA – CMIP6 ScenarioMIPs

- 51 AOGCMs participate in CMIP6 ScenarioMIPs.
- 21 AOGCMs that provide sea-level pressure and surface wind information for three SSP scenarios were used.

	Scenario	Institution	Capacity
1	ACCESS-CM2	Commonwealth Scientific and Industrial Research	36G
2	ACCESS-ESM1-5	Commonwealth Scientific and Industrial Research	67G
3	AWI-ESM-1REcoM	Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research (Germany)	19G
4	CanESM5	Canadian Centre for Climate Modelling and Analysis (Canada)	22G
5	CMCC-CM2-SR5	'Euro-Mediterranean Center on Climate Change (Italia)	68G
6	CMCC-ESM2	'Euro-Mediterranean Center on Climate Change (Italia)	68G
7	EC-Earth3	European Center–Earth Consortium (Europe)	184G
8	EC-Earth3-Veg	European Center–Earth Consortium (Europe)	444G
9	EC-Earth3-Veg-LR	European Center–Earth Consortium (Europe)	72G
10	GFDL-ESM4	NOAA Geophysical Fluid Dynamics Laboratory (USA)	65G
11	IITM-ESM	The Centre for Climate Change Research, Indian Institute of Tropical Meteorology (India)	27G
12	INM-CM4-8	Institute for Numerical Mathematics, Russian Academy of Science (Russia)	28G
13	INM-CM5-0	Institute for Numerical Mathematics, Russian Academy of Science (Russia)	29G
14	IPSL-CM6A-LR	Institute Pierre Simon Laplace (France)	51G
15	KACE-1-0-G	National Institute of Meteorological Sciences/Korea Meteorological Administration, Climate Research Division (Korea)	29G
16	KIOST-ESM	Korea Institute of Ocean Science and Technology (Korea)	32G
17	MIROC6	Japan Agency for Marine-Earth Science and Technology (Japan)	41G
18	MPI-ESM1-2-HR	ETH Zurich (Switzerland), Max Planck Institute for Meteorology (Germany)	66G
19	MPI-ESM1-2-LR	Max Planck Institute for Meteorology (Germany)	19G

# RESEARCH OBJECTIVE AND FLOW

Selection of CMIP6 ScenarioMIP models with high skill in SLP and wind



Storm surge modeling based on SSP scenarios



Estimation of future changes in storm surge height statistics based on SSP scenarios

# RESEARCH METHOD and RESULTS

We can talk and discuss at my poster **P B 0 6 !**

*In Storm surge poster session*

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