Supporting Information for

Increased Intensity and Frequency of Global Coastal Compound Wind and Precipitation Extremes: Implications for Sea Level Anomalies

Xinlong Zhang[1], Jiayi Fang[2], Yue Qin[3], Weiping Wang[4, *], Ping Shen[5, *]

[1] State Key Laboratory of Internet of Things for Smart City and Department of Civil and Environmental Engineering, University of Macau, Macao SAR, People's Republic of China

[2] Institute of Remote Sensing and Earth Sciences, Hangzhou Normal University, Hangzhou, Zhejiang, People's Republic of China

[3] College of Environmental Sciences and Engineering, Peking University, Beijing, People's Republic of China

[4] School of National Safety and Emergency Management, Beijing Normal University, Zhuhai, Guangdong, People's Republic of China

[5] State Key Laboratory of Internet of Things for Smart City and Department of Ocean Science and Technology, University of Macau, Macao SAR, People's Republic of China

*Corresponding authors. Ping Shen: pingshen@um.edu.mo; Weiping Wang: wpwang@bnu.edu.cn

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Introduction

This supplementary information (SI) includes one table and five figures, which provide supplements to or evaluation of the data sets, and results in the main paper.

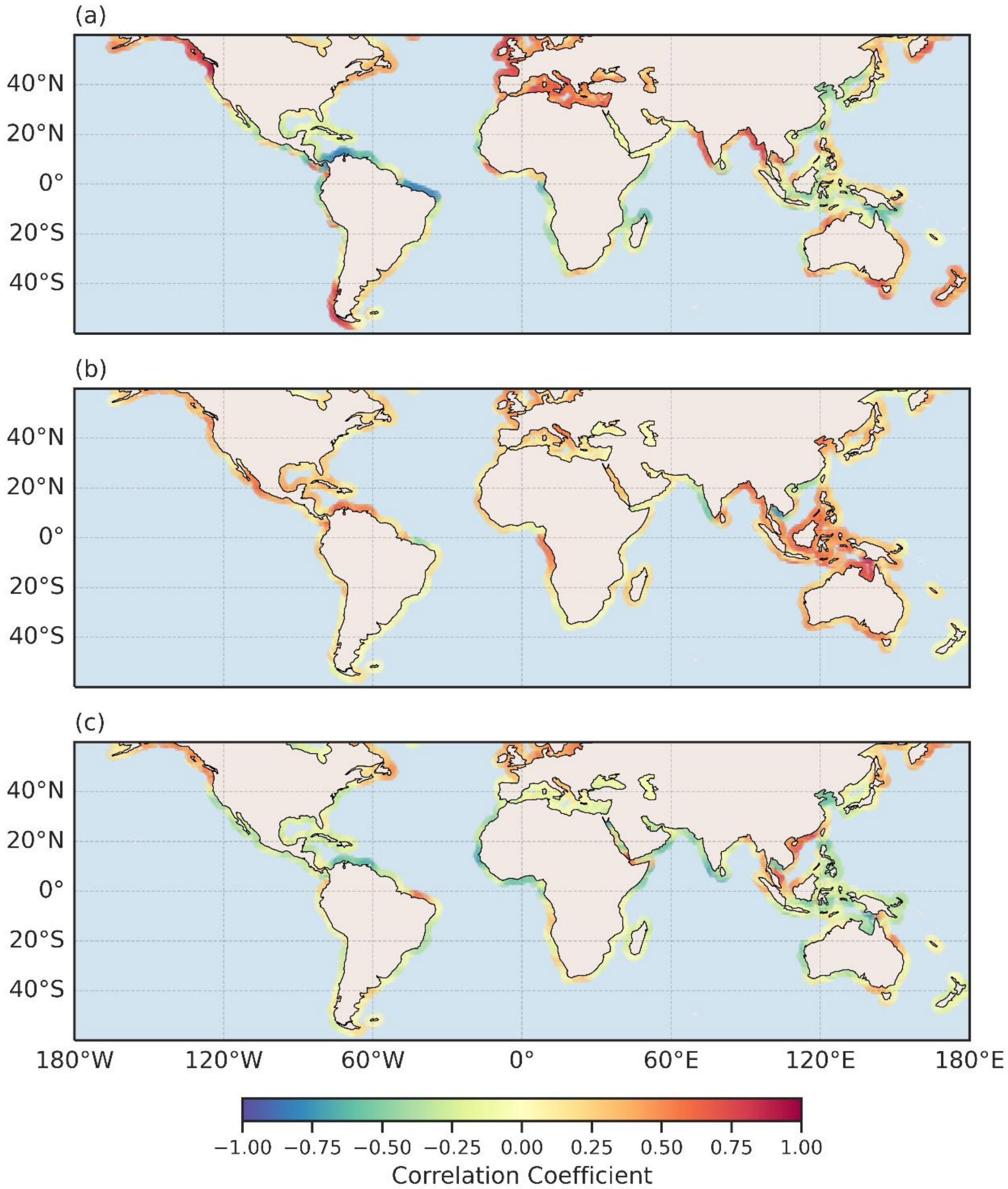

Fig. S1 The global map of the correlation coefficients for the historical period (1993–2020).

(a) For correlation coefficient between precipitation and wind. (b) For correlation coefficient between precipitation and sea level anomalies (SLA). (c) For correlation coefficient between wind and SLA.

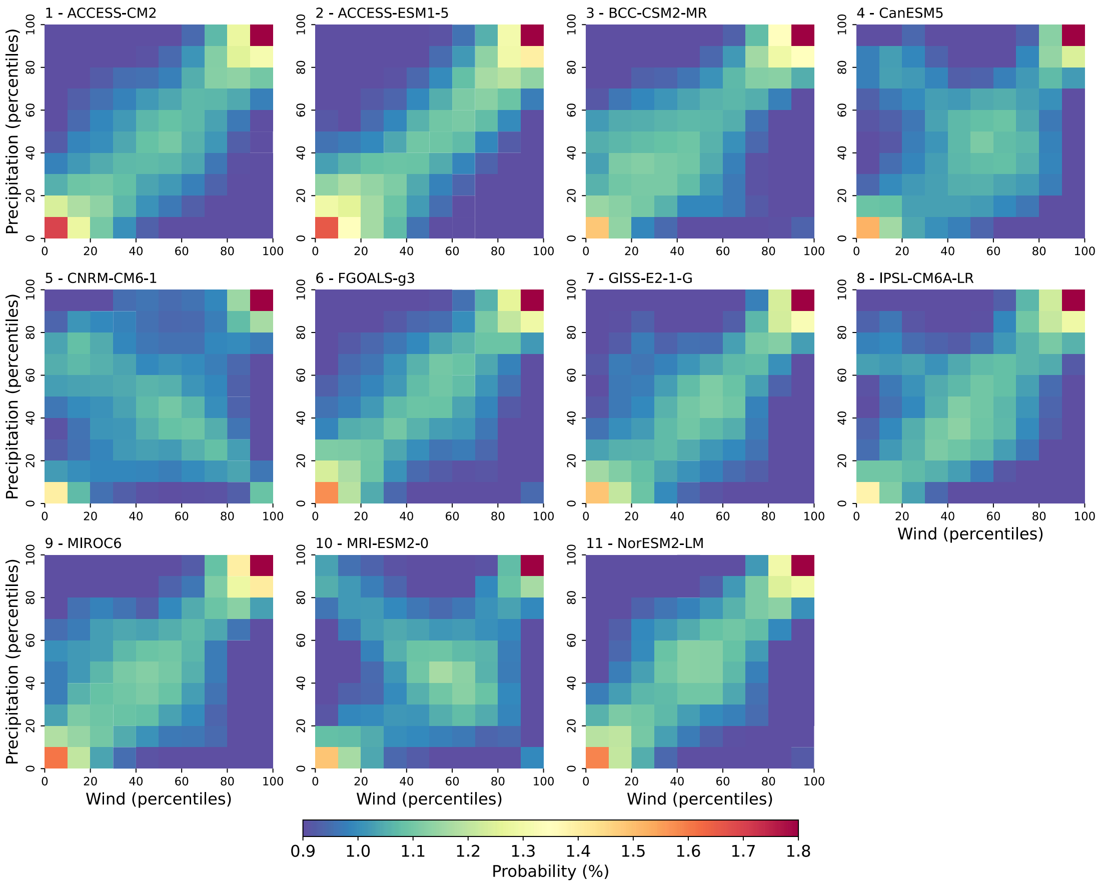

Fig. S2 Distribution of precipitation and wind speed in historical simulations (1940-2014).

The probabilities shown in each percentile bin for precipitation and wind speed were calculated as the average probability for all grid cells in each model.

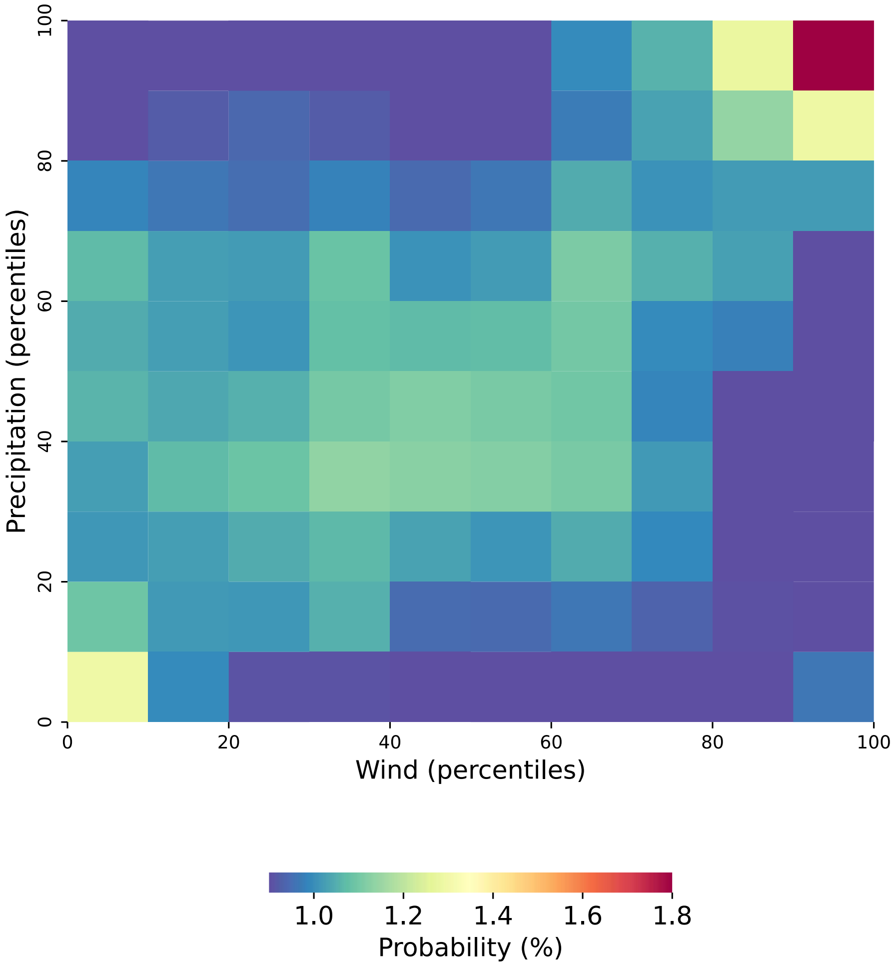

Fig. S3 Coupling of precipitation and wind and their effect on coastal sea level anomalies on the observed data (1993-2014). Average probability of each percentile bin for precipitation and wind.

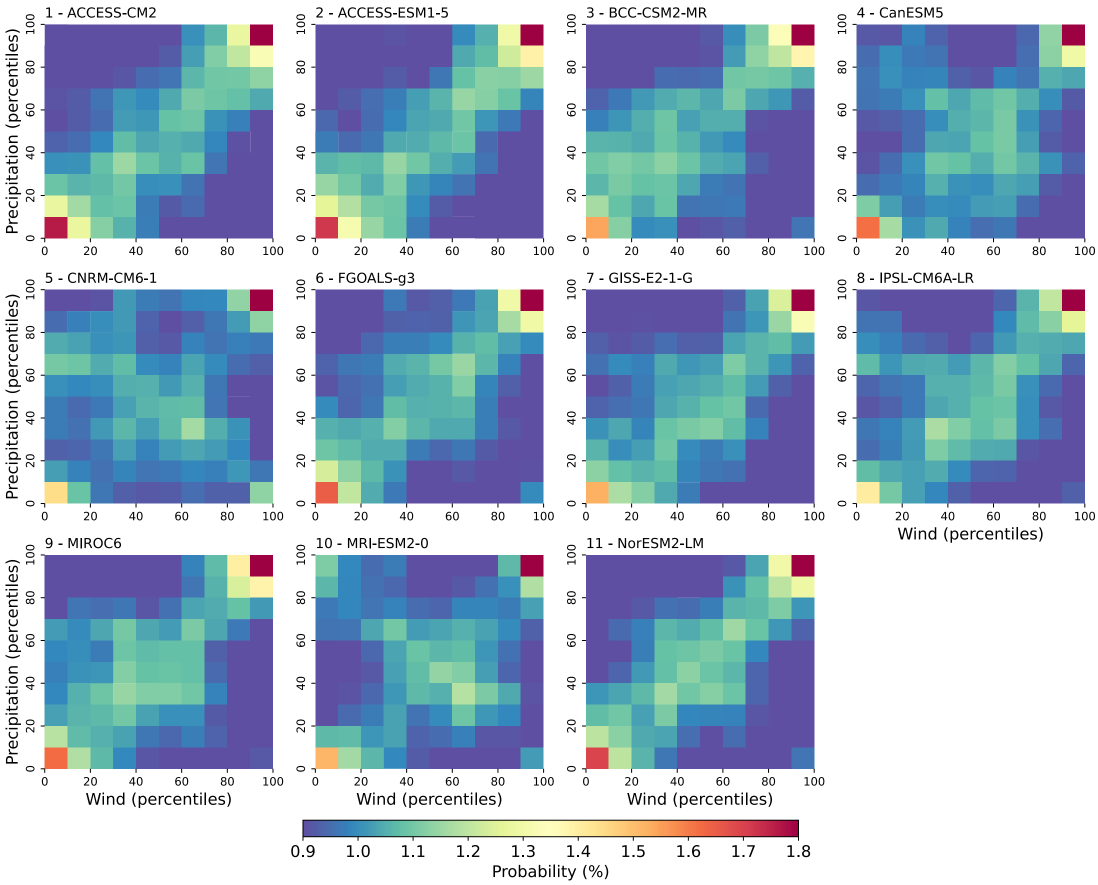

Fig. S4 Distribution of precipitation and wind speed in historical simulations (1993-2014).

The probabilities shown in each percentile bin for precipitation and wind speed were calculated as the average probability for all grid cells in each model.

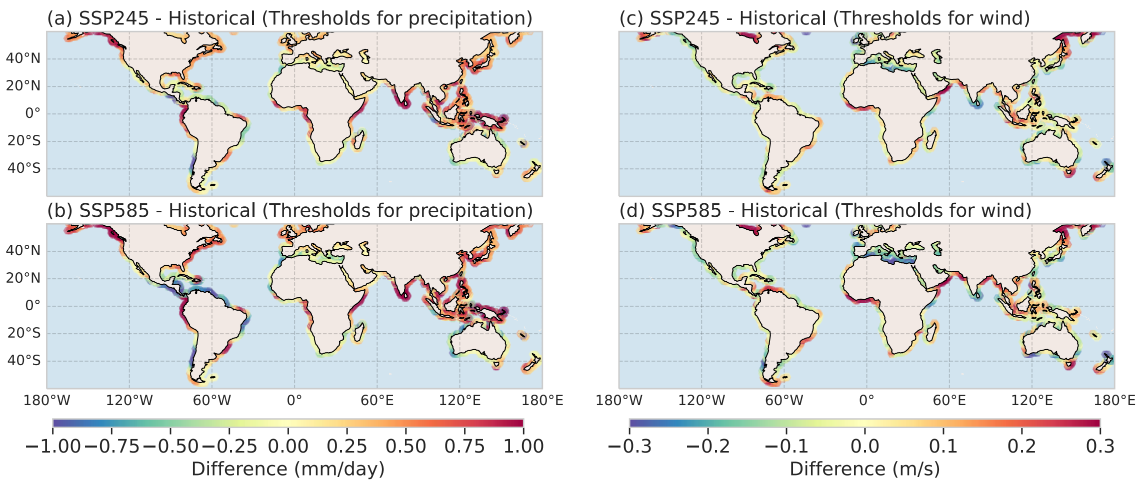

Fig. S5. Comparison of historical and future simulated precipitation and wind speed thresholds.

Differences in precipitation and wind speed thresholds for the two periods (future *thresholds - historical thresholds.)*

Table S1 The CMIP6 models involved in this study.

This table summarizes the Coupled Model Intercomparison Project Phase 6 (CMIP6) models used in our study to project compound extreme wind and precipitation events in global coastal areas. CMIP6 is the latest generation of climate models that provide a comprehensive set of simulations for a wide range of climate variables under different scenarios of future greenhouse gas emissions and land use changes.

Model	Ensemble	Institution, Country
ACCESS-CM2	r1i1p1f1	ACCESS, Australia
ACCESS-ESM1-5	r1i1p1f1	ACCESS, Australia
BCC-CSM2-MR	r1i1p1f1	BBC, CMA, China
CanESM5	r1i1p1f1	CCCMA, Canada
CNRM-CM6-1	r1i1p1f2	CNRM-CERFACS, France
FGOALS-g3	r1i1p1f1	IAP, CAS, China
GISS-E2-1-G	r1i1p1f2	GISS, United States
IPSL-CM6A-LR	r1i1p1f1	IPSL, France
MIROC6	r1i1p1f1	MIROC, Japan
MRI-ESM2-0	r1i1p1f1	MPI, Germany
NorESM2-LM	r1i1p1f1	NCC, Norway

The models listed in Table S1 represent a diverse set of modeling centers from around the world, including Australia (ACCESS), China (BCC-CSM2-MR, FGOALS-g3), Canada (CanESM5), France (CNRM-CM6-1, IPSL-CM6A-LR), the United States (GISS-E2-1-G), Japan (MIROC6), Germany (MRI-ESM2-0), and Norway (NorESM2-LM). Each model has its unique characteristics in terms of model physics, resolution, and parameterizations, which contribute to the ensemble of projections used in our analysis.

By utilizing these CMIP6 models, we aim to provide a robust assessment of the potential changes in compound extreme wind and precipitation events in global coastal areas under different future scenarios. The inclusion of multiple models allows us to account for uncertainties in the projections and to identify robust signals across different modeling frameworks.