

Investigating the relationship between Sea Level Rise and Extreme Events in Indonesia

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Climatematch
Academy

Agenda

Comment from Camille:
WOW, this looks fantastic. You guys are brilliant, as demonstrated by the amazing insights you have pulled :) Sorry I wasn't able to keep up with the programming

- Introduction (Camille) (30 seconds)
- Research Questions & Hypothesis (Camille) (15 seconds)
- Data and Analyses (Bharti) (30 seconds)
- Results (2.5 minutes)
 - Satellite measurements of SLR in Indonesia (Anthea)
 - Tidal gauge measurements of SLR in Indonesia (Anthea)
 - Extreme weather events in Indonesia (Siyu)
- Conclusion (1 minute) (Bharti)



Introduction

Literature Review

- Climate Change is an existential physical threat globally
- Impacts are not evenly distributed
- Indonesia is both impacted by SLR and extreme events
- Socio-economic impacts of SLR and extremes are significant
- Limited research on correlation between SLR and extremes in Indonesia

[Speaker
Zoom
video]

Research Questions & Hypothesis

Final Hypothesis:

“In Indonesia, SLR and climatological extreme events, such as precipitation and temperature anomalies, are positively correlated and this creates compounding socio-economic impacts.”

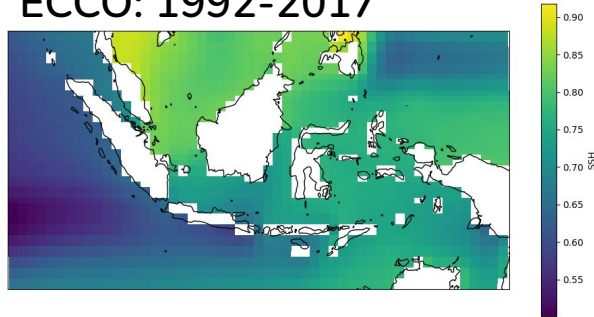
RQ1: What is the relationship between SLR and, temperature and precipitation anomalies, in Indonesia?

RQ2: What are the trends of extreme event occurrence in Indonesia?

[Speaker
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Sea level data

Sea Surface Height (m)*
ECCO: 1992-2017

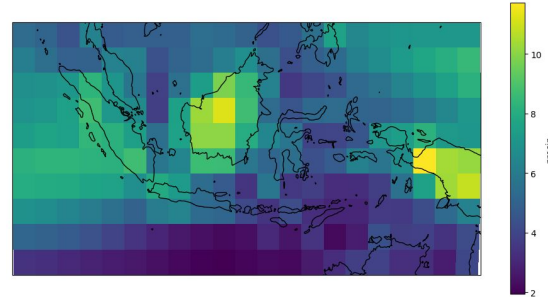


Tidal gauge (mm above msl)
UHSLC

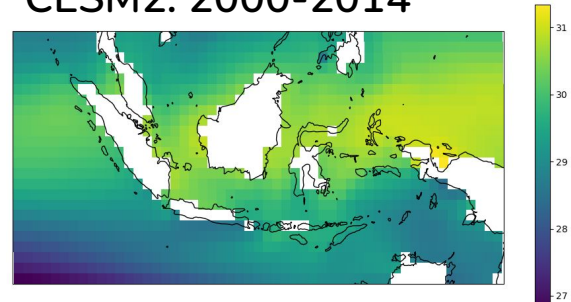


Climate data

Precipitation (mm/day)*
GPCP: 1979-2023



Sea Surface Temperature (degC)*
CESM2: 2000-2014



*plots show
mean values
across years

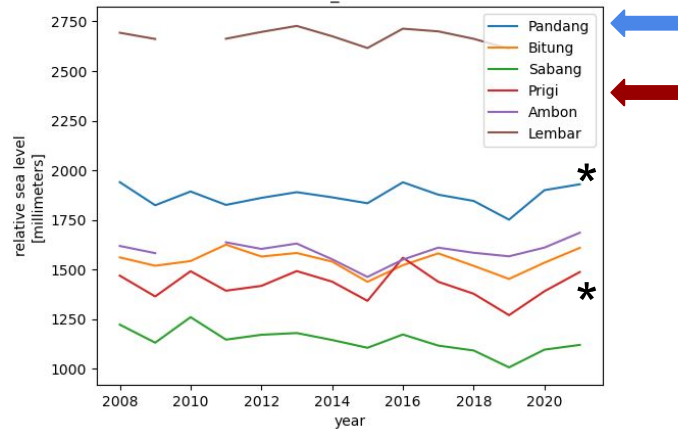
1. Calculate **anomalies** for representative months (Jan and July) for all data

For eg. $SSH_{Jan} \text{ climatology} = \text{mean}(SSH_{Jan} \text{ observations})$

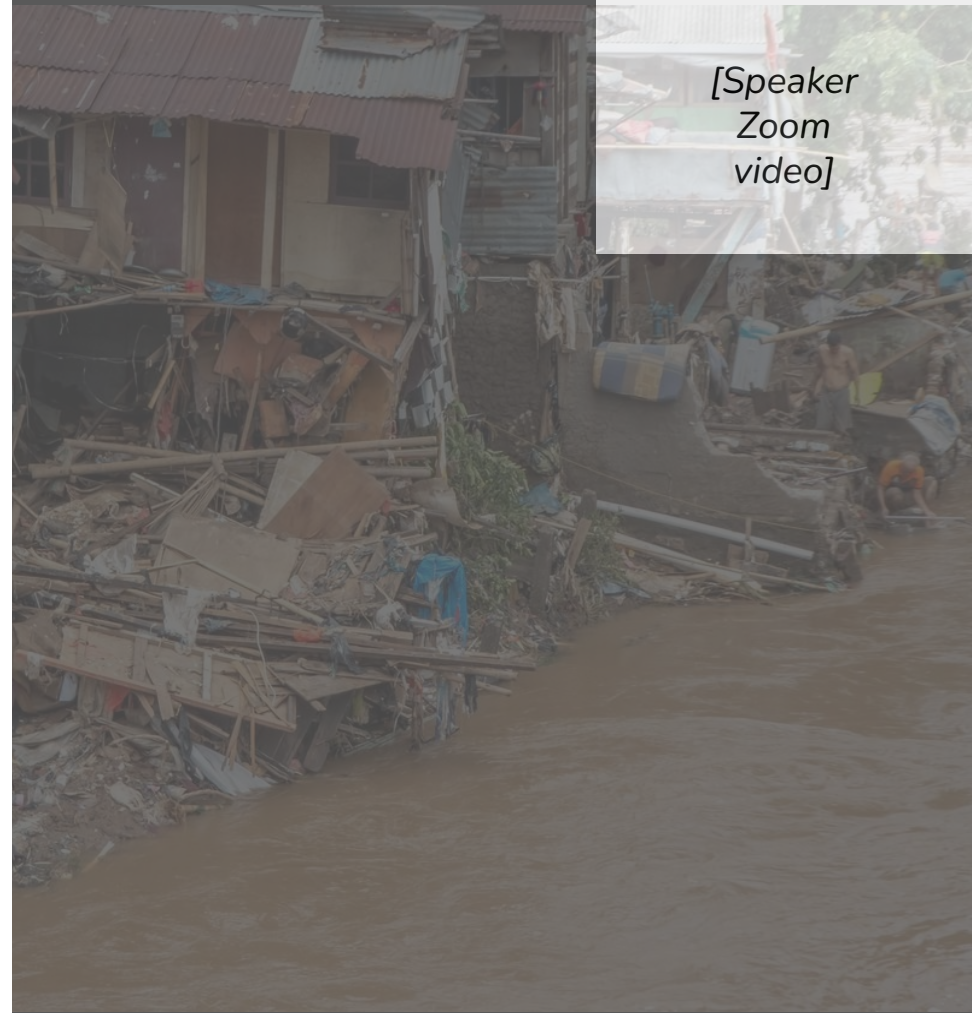
$$SSH_{Jan} \text{ anomaly} = SSH_{Jan} \text{ observations} - SSH_{Jan} \text{ climatology}$$

[Speaker
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video]

2. Calculate Pearson **correlation** coefficient between **sea level anomaly** and **climate anomaly**

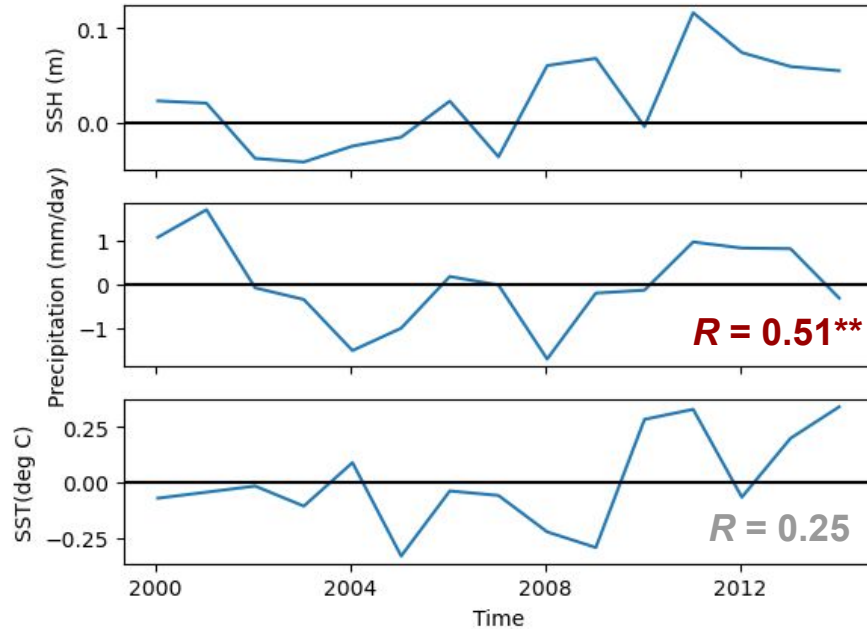


Results

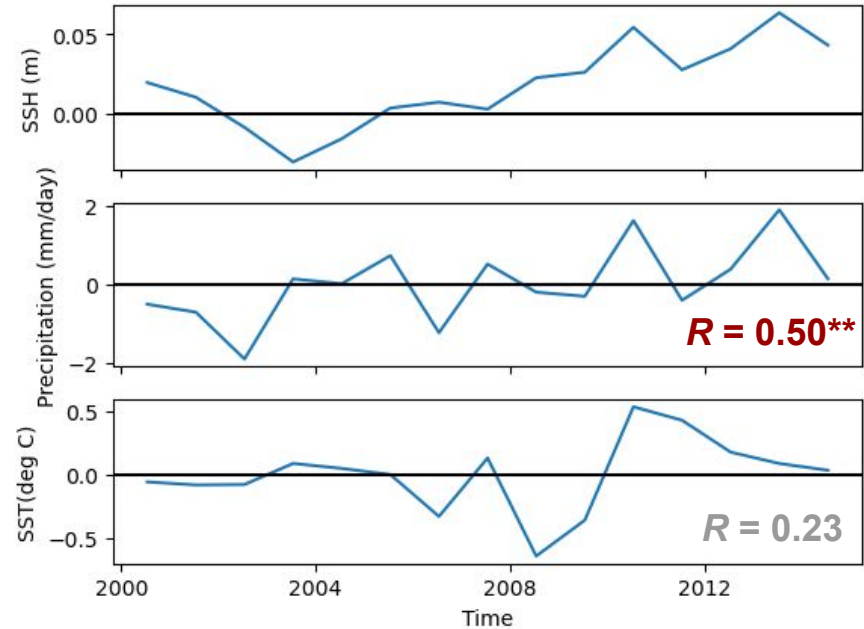


SSH (ECCO) ~ SST (CESM2), Precipitation (GPCP)

January

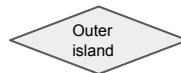
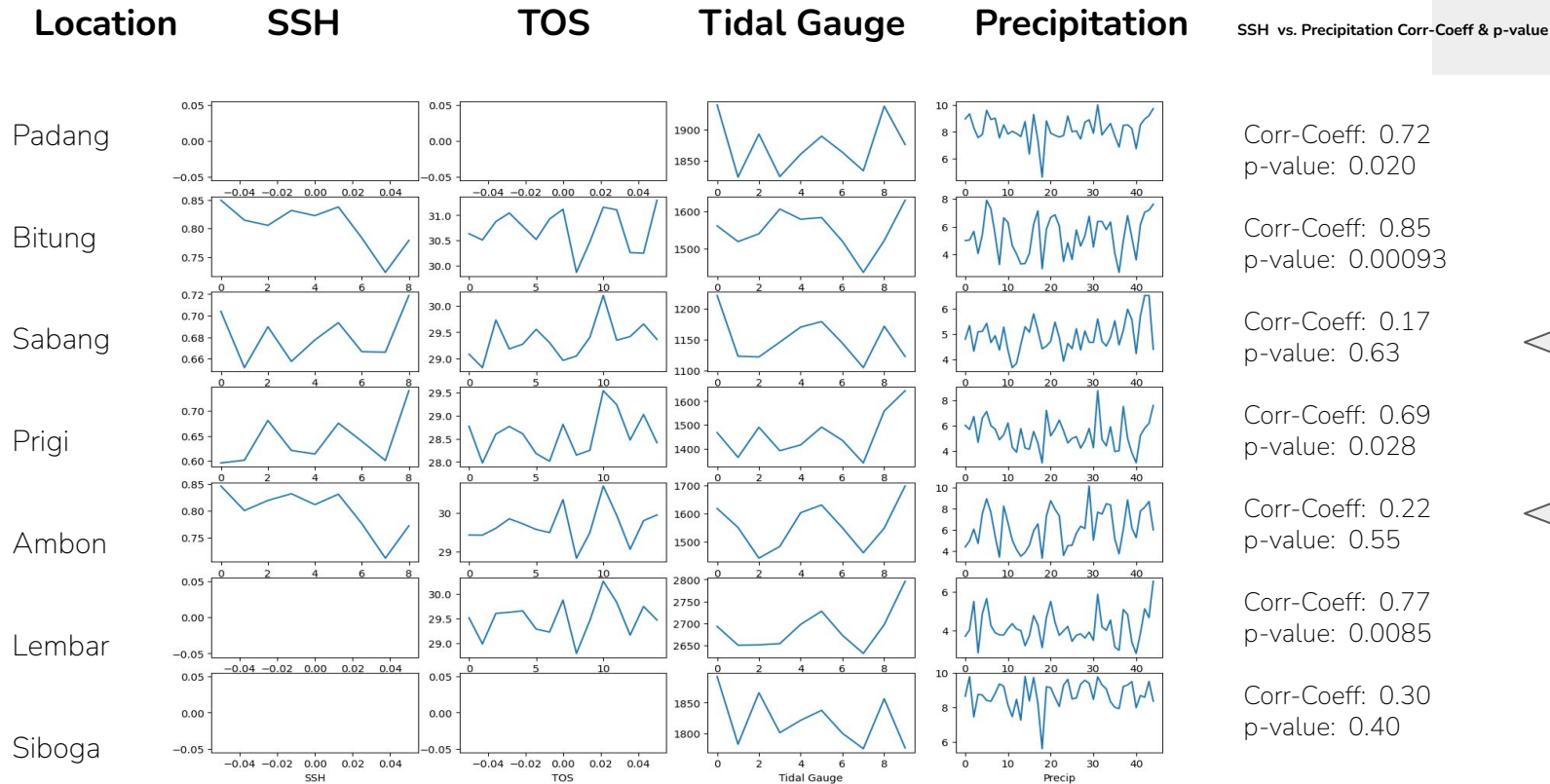


July



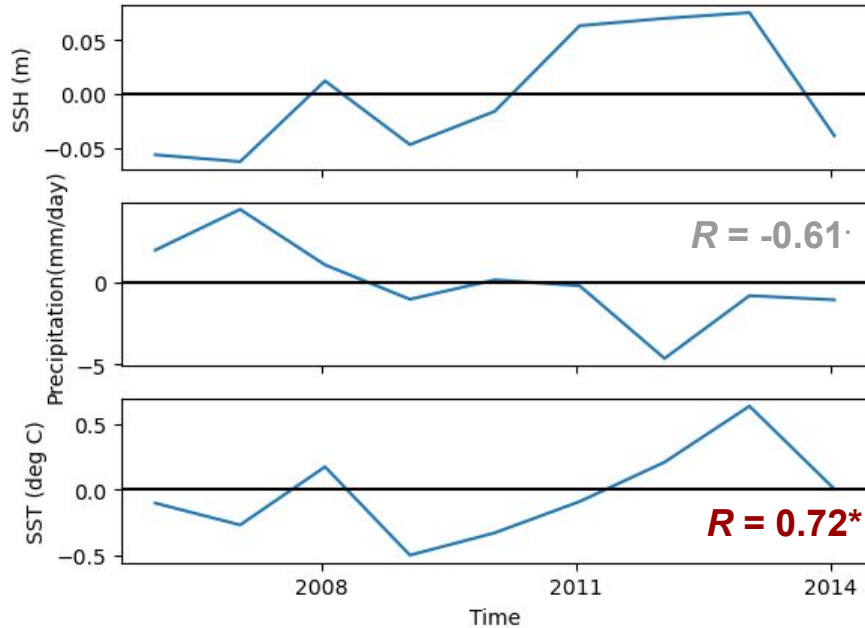
SSH, TOS, Tidal Gauge and Precipitation graphs for all six locations

[Speaker
Zoom
video]

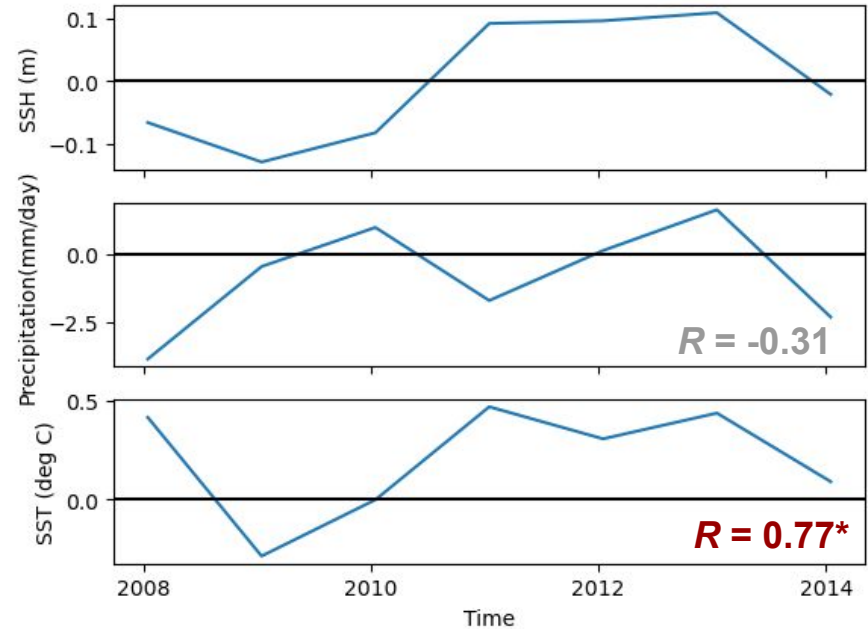


Tidal Gauge Data (UHSLC) ~ SST (CESM2), Precipitation (GPCP)

Padang - January

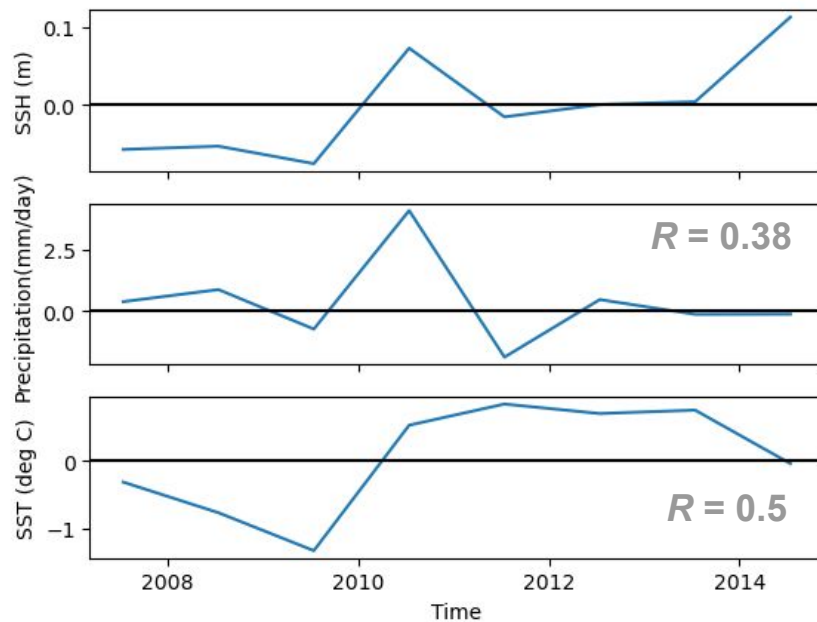


Prigi - January

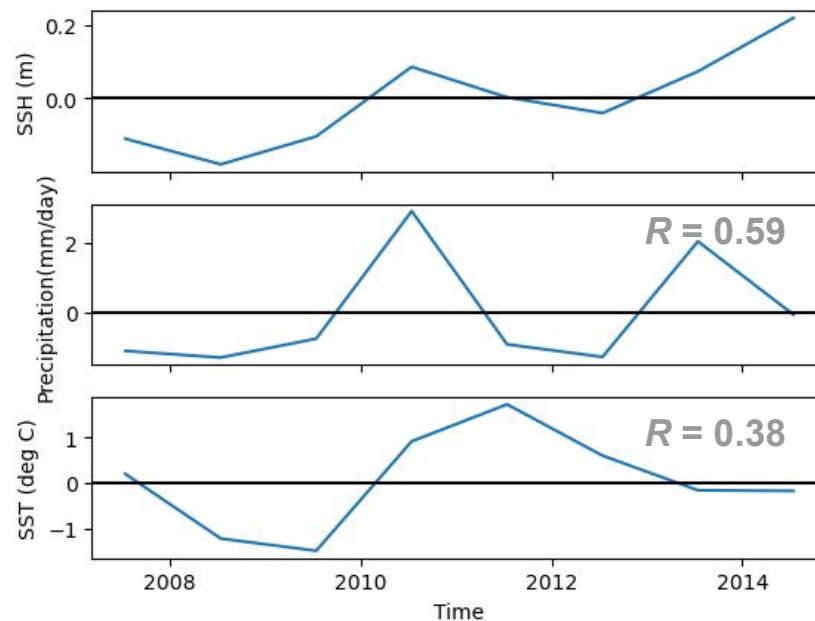


Tidal Gauge Data (UHSLC) ~ SST (CESM2), Precipitation (GPCP)

Padang - July

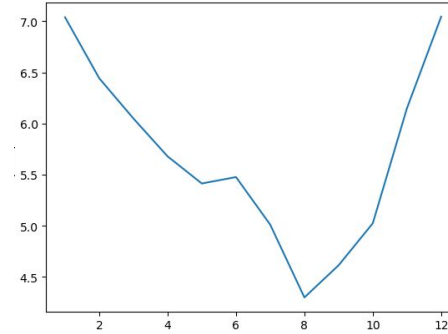
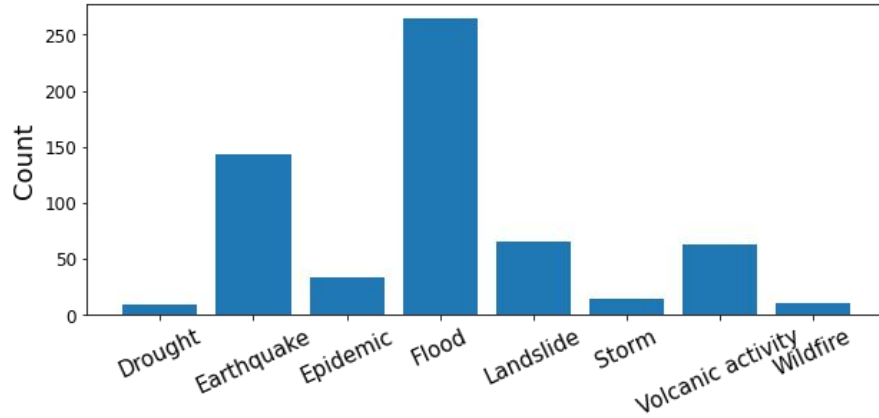


Prigi - July

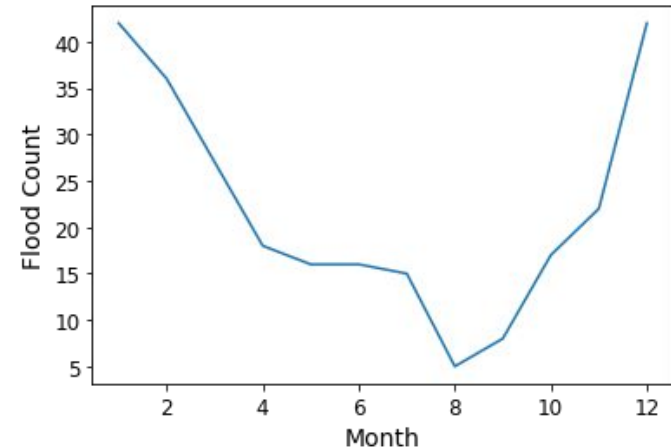
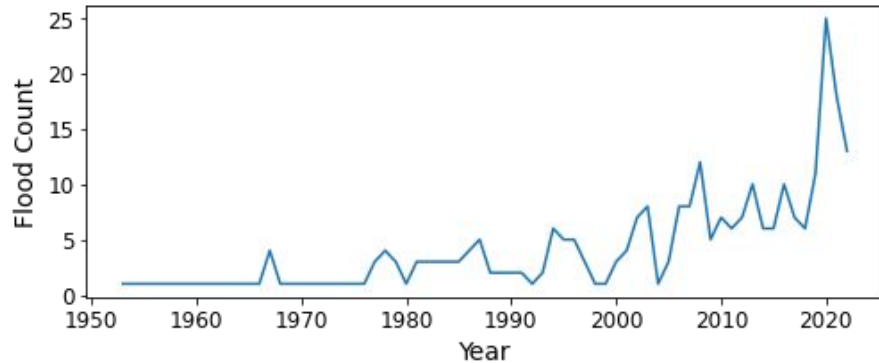


Natural disasters and extreme events in Indonesia

[Speaker
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video]



← Monthly Precipitation
(mm/day)



Results overview

Correlation	SST - 1 deg	Precipitation - 2.5 deg
SSH (ECCO) - 0.5 deg	No Significant Correlation	Positive Correlation for Jan and July: ~0.5**
SSH (Tidal Gauge)	Positive Correlation for Jan and July in Padang and Prigi ~0.75*	Positive Correlation for annual data: ~0.8* No Correlation for monthly data in January and July

Conclusions

Relationships are dependent on spatio-temporal resolution of data

Sea level rise is associated with precipitation, which may increase flood events in Indonesia.

[Speaker
Zoom
video]

Thank you!

Any Questions?

