

# Impact of ENSO on Monsoon onset and the total precipitation in the Maritime Continent during wet seasons

Megaraptor\_pop\_Fortepiano



**Climatematch**  
Academy

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# Scientific background

- The El Nino Southern Oscillation (ENSO) is a major contributor to global climate variability because of its propensity to alter global air circulation, which impacts temperature and precipitation across the world. There are three phases namely, **El nino**, **La nina** and **Neutral**. A special area in Pacific ocean namely, **Nino 3.4 region** (5N-5S, 120W-170W) drives the complete ENSO phenomena.
- The Maritime Continent (MC) refers to the area between the Indian and Pacific Oceans, which includes the archipelagos of Indonesia, Borneo, New Guinea, the Philippine Islands, the Malay Peninsula, and the surrounding seas. Depending on precipitation, it is separated between dry (June-August) and rainy (December-February) seasons.
- By regulating the East Asian winter monsoon and the equatorial bottom easterly winds, ENSO influences the date of the MC monsoon onset. In addition to the monsoon opening, the monsoon retreat will be more heavily influenced than it is currently.



# Knowledge Gap and Research Aim

## Objectives

- To analyze the relationship between ENSO phases and precipitation patterns in the MC regions.
- To perform an Empirical Orthogonal Function (EOF) analysis to understand dominant spatial and temporal patterns of precipitation variability in MC.
- To correlate ENSO phases with monsoon onset delays.

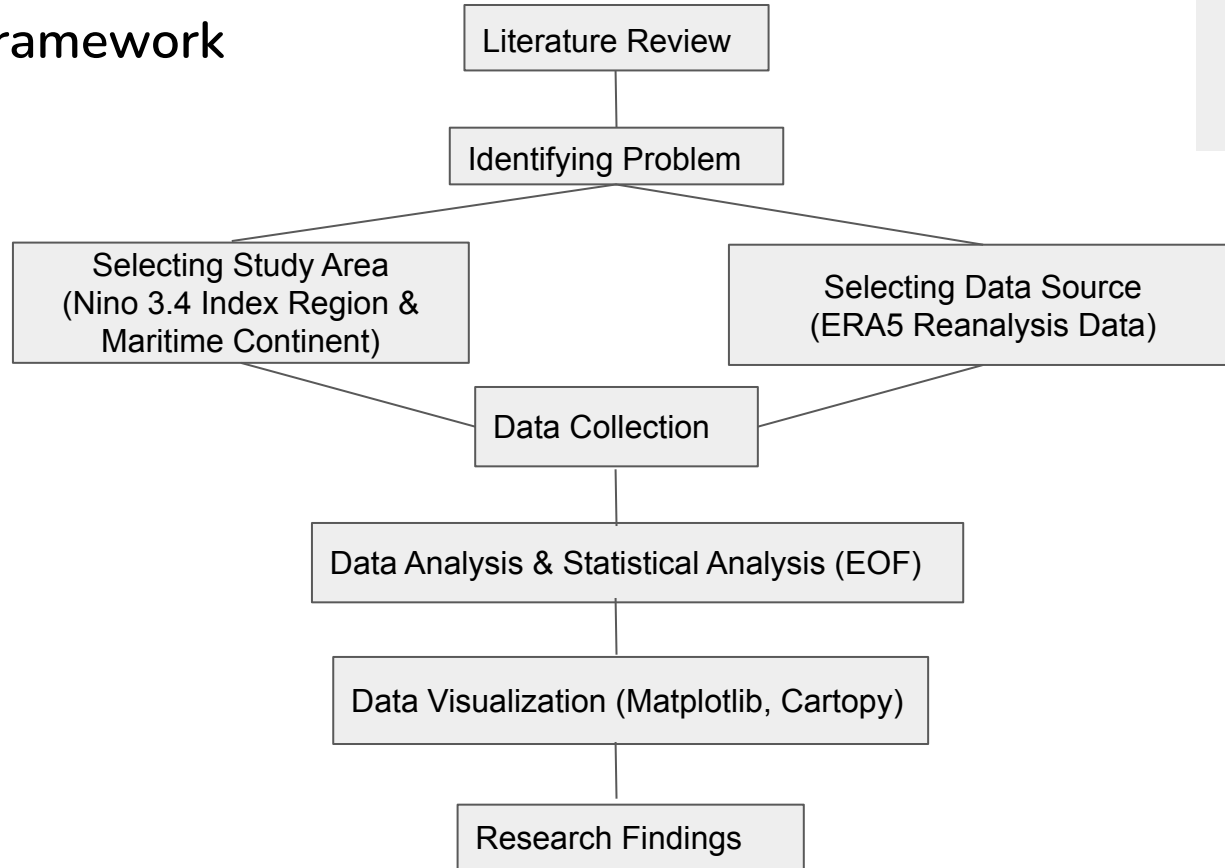
## Implications

- Understanding this relationship in the MC can help to improve early warning systems for extreme weather events.
- Agriculture is a major activity in this region, so improved knowledge of ENSO, Monsoon and precipitation can lead to better management practices and planning of water resources.



Fig 1. Maritime Continent

# Research Framework



# Analysis and Visualization

Fig. 1. Monsoon onset date over the Maritime Continent region, Based on Andrew (2009) Definition

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	...	2013	2014	2015
onset date	1979-11-28	1980-12-08	1981-11-18	1982-12-12	1983-11-15	1984-11-25	1985-11-15	1986-11-07	1987-12-10	1988-11-22	...	2013-11-19	2014-12-04	2016-01-25

Normalized Niño3.4 Index and Days of Monsoon Delay

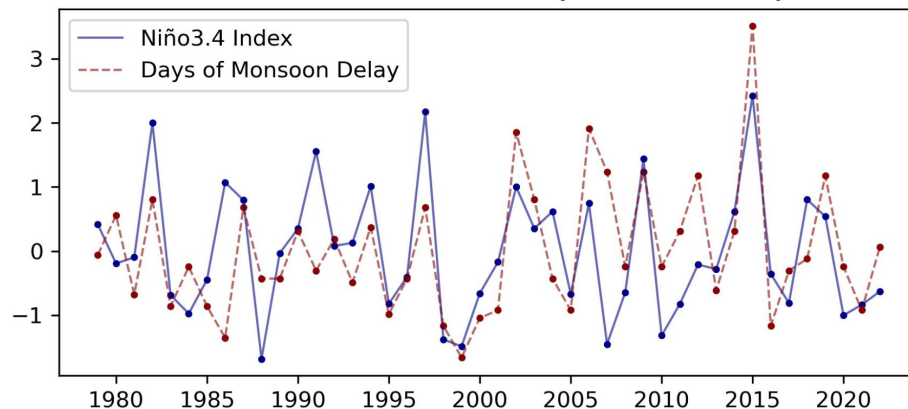


Fig. 2. Normalized Niño 3.4 index and days of monsoon delay (relative to 10th, Dec) over the MC Region. The correlation coefficient between them is 0.57, with  $p$  value =  $6e-5 < 0.05$ .

# Analysis and Visualization

Furthermore, by identifying El Niño and La Niña events over the past 45 years, we can do more fascinating analysis:

Fig. 3. ENSO Teleconnections on Precipitation in MC region

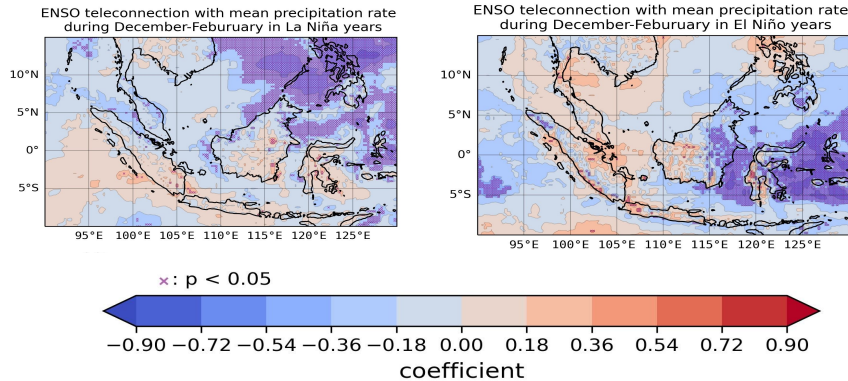
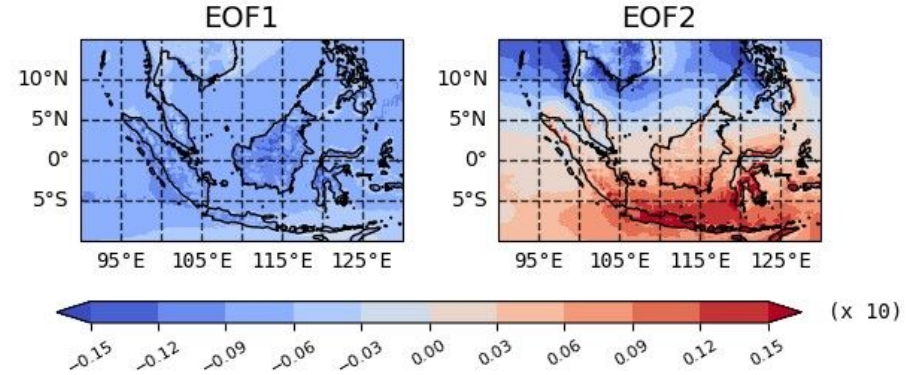


Fig. 4. Empirical Orthogonal Functions of Precipitation in MC Region



Further research will require more time to delve deeper into these finding...

# Conclusion and Recommendation

Indonesia plants rice in October. Moreover, from survey done is 2012 in Indonesia, 84 percent of land under cultivation uses various irrigation systems but the rest of the land (16 percent) depends entirely on rainfall.

