

# Trends in Coastal Ocean Primary Production

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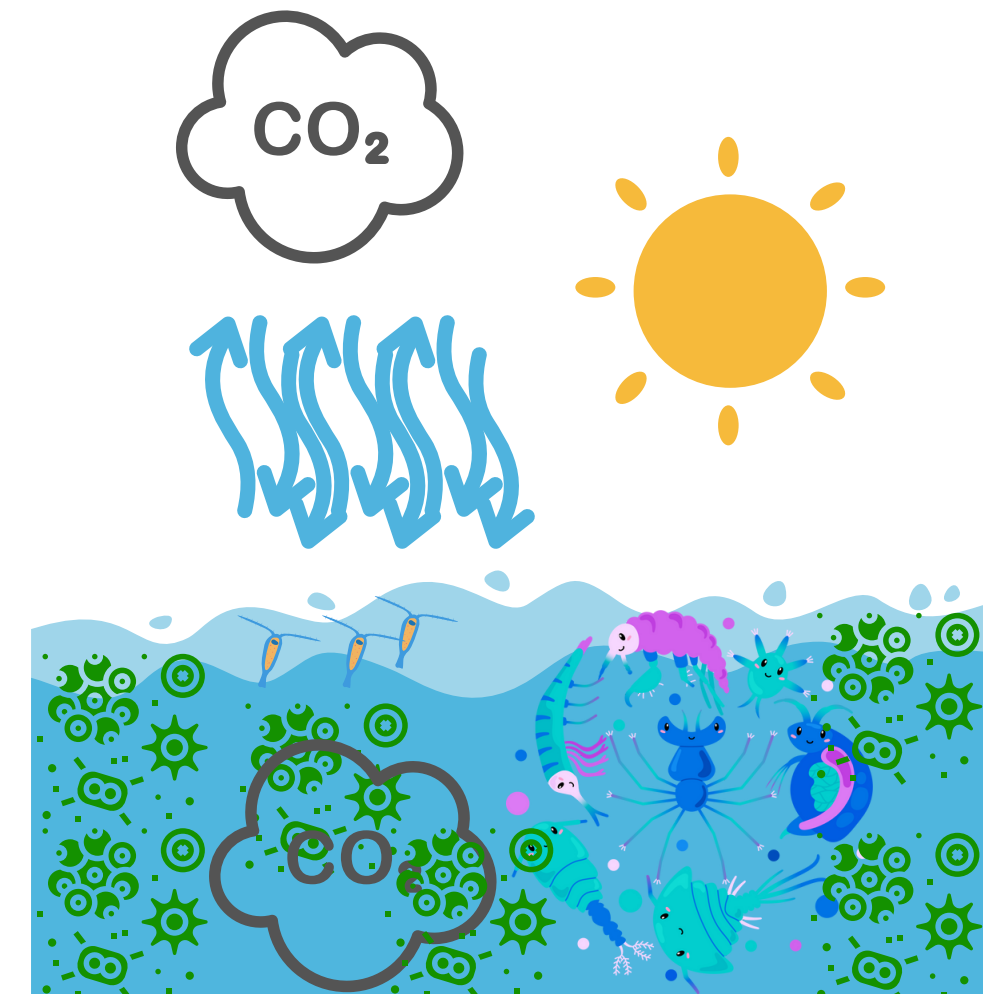
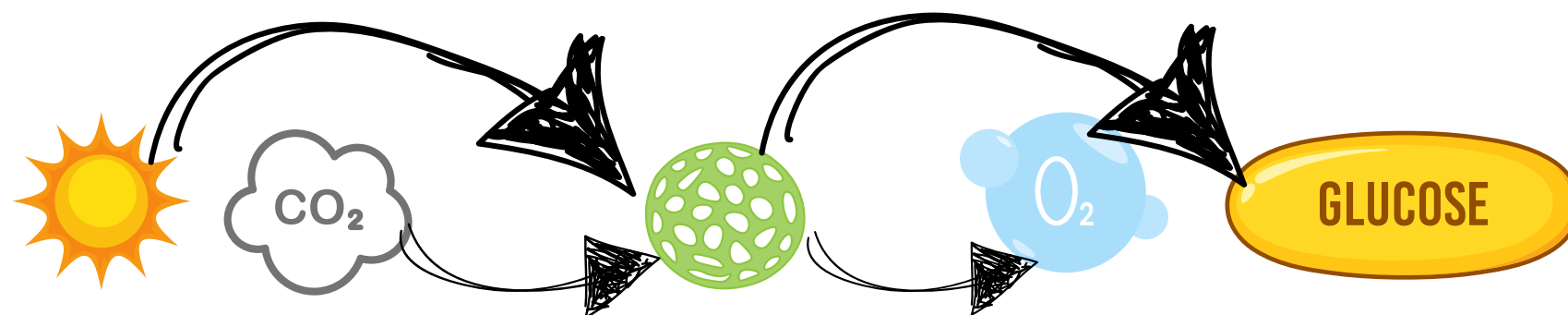
# Importance of coastal Primary Production

The global coastal population is expected to double by 2060, which highlights the necessity for effective management of coastal regions  
(Neumann et al. 2015)



Ocean phytoplankton are responsible for approximately half the global biospheric net primary production (Behrenfeld et al., 2001).

Long -term changes in ocean primary production can potentially have important consequences for the global carbon cycle.



# Research Questions



Do any coastal provinces exhibit statistically significant trends in primary production between 1998 and 2022?



What are the underlying causes of these trends?



Is the aggregation of data into large areas (such as the ecological provinces) suitable for investigating the underlying causes of any observed change in the global coastal ocean?

# What have we done?

## Data

### Primary Production

Gt C/month - mgC/m<sup>2</sup>/day  
from BICEP  
using OC-CCI (version 6.0)

### Sea Surface Temperature (SST)

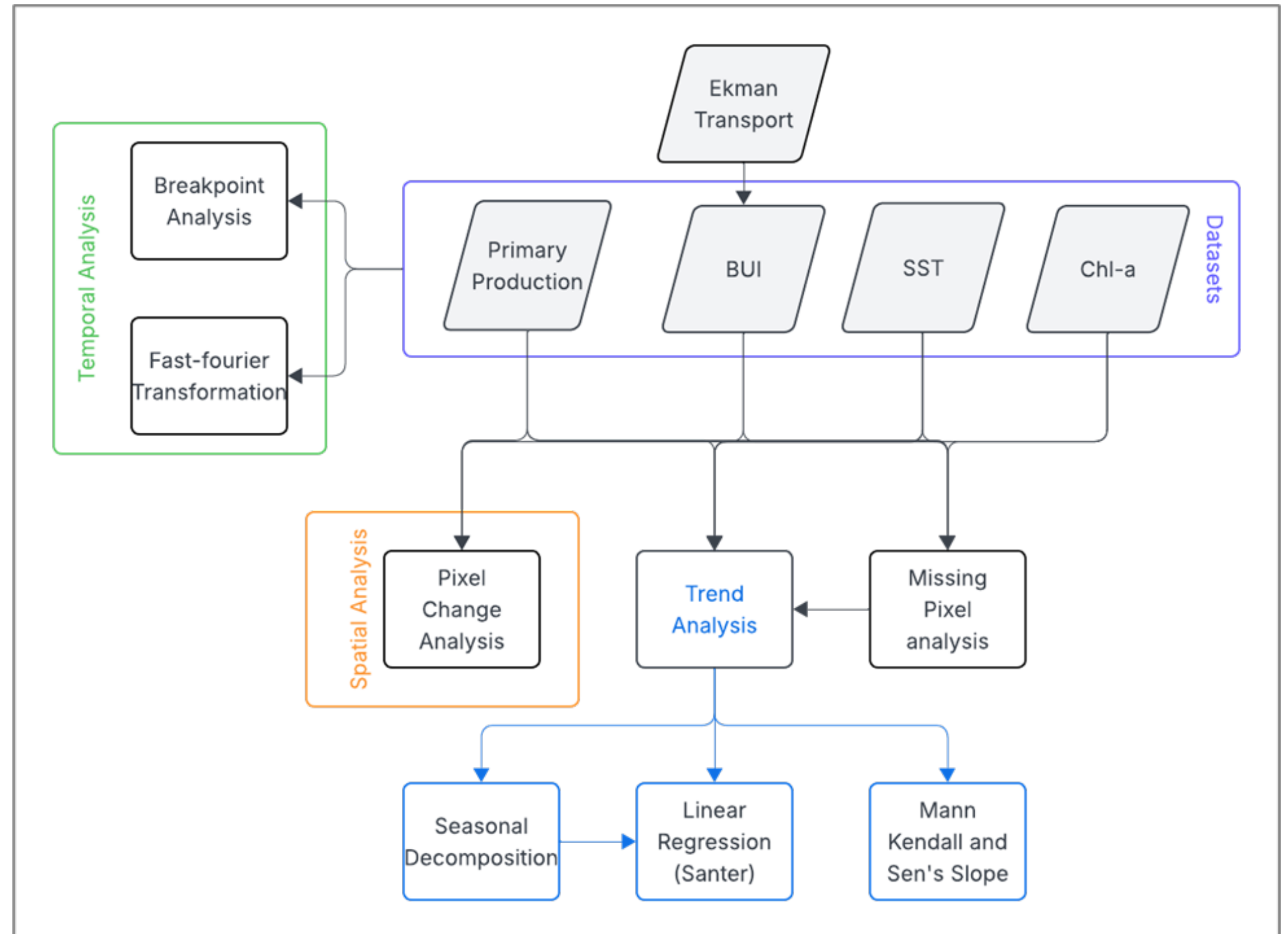
K  
SST-CCI (version 3.0.1)

### Chlorophyll-a (Chl-a)

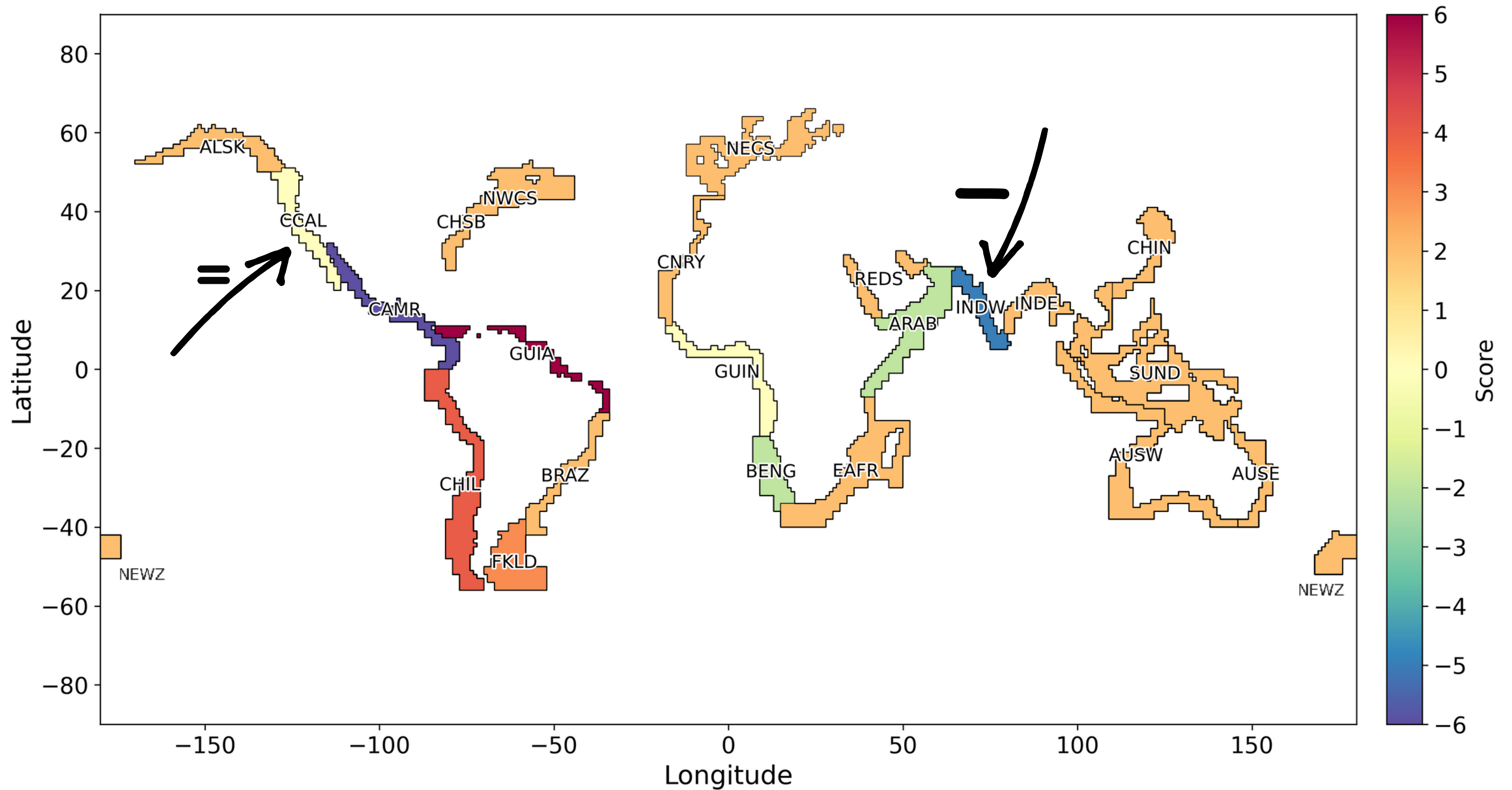
mg/m<sup>3</sup>  
OC-CCI (version 6.0)

### Bakun Upwelling Index (BUI)

Ekman Transport

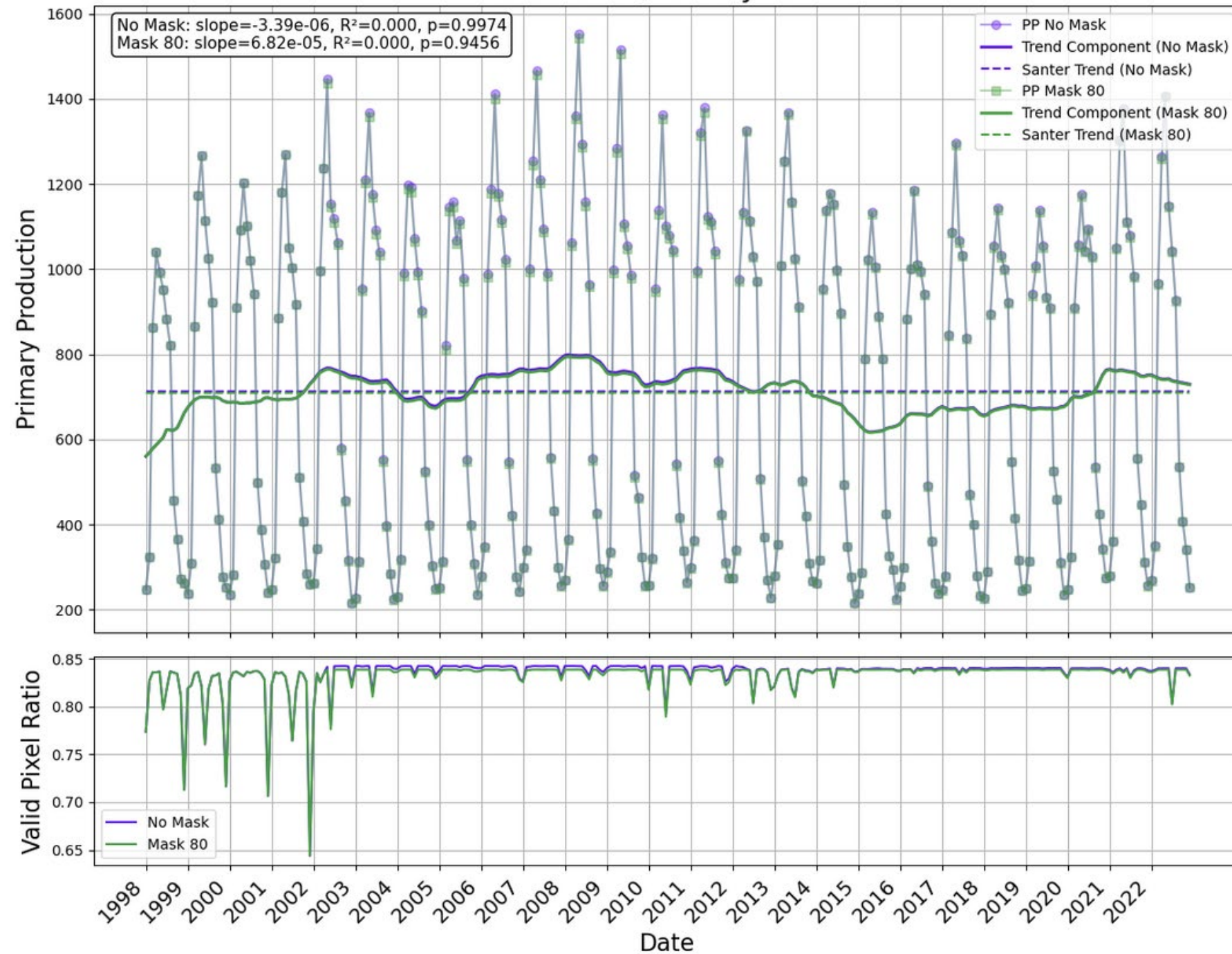


# Trend Analysis



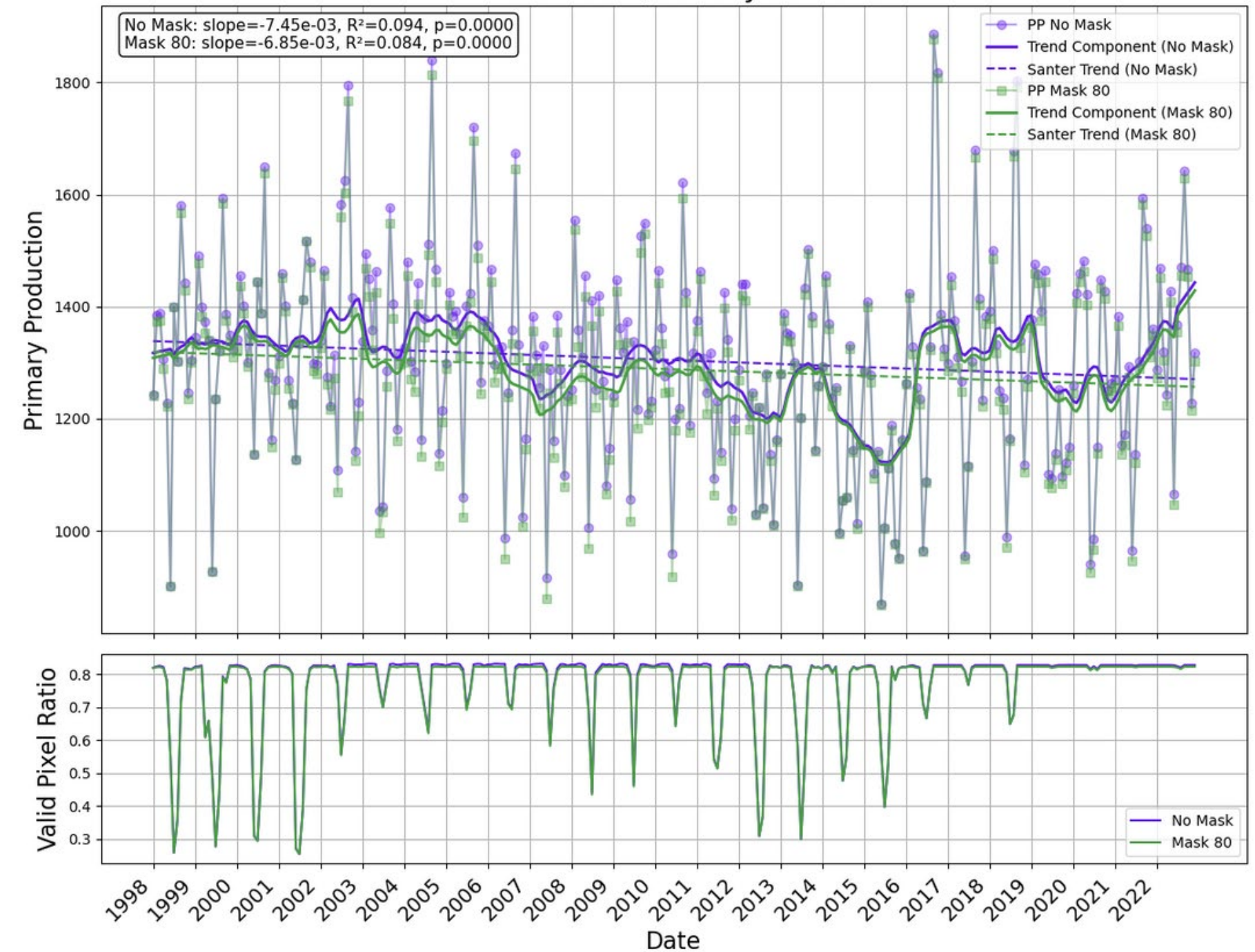
# Trend Analysis

PP Seasonal Decomposition and Santer Trends  
Provnum: 66, Acronym: CCAL



CCAL

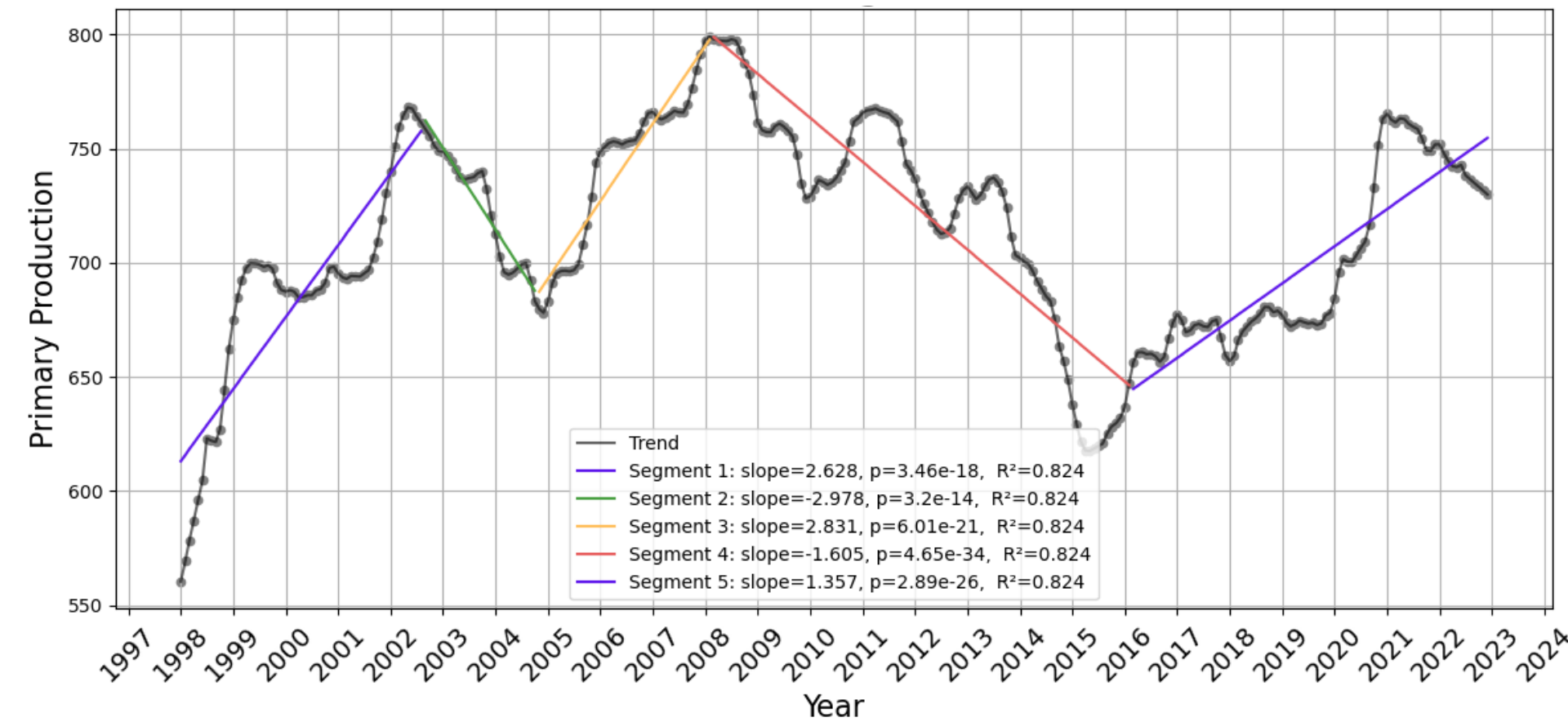
PP Seasonal Decomposition and Santer Trends  
Provnum: 36, Acronym: INDW



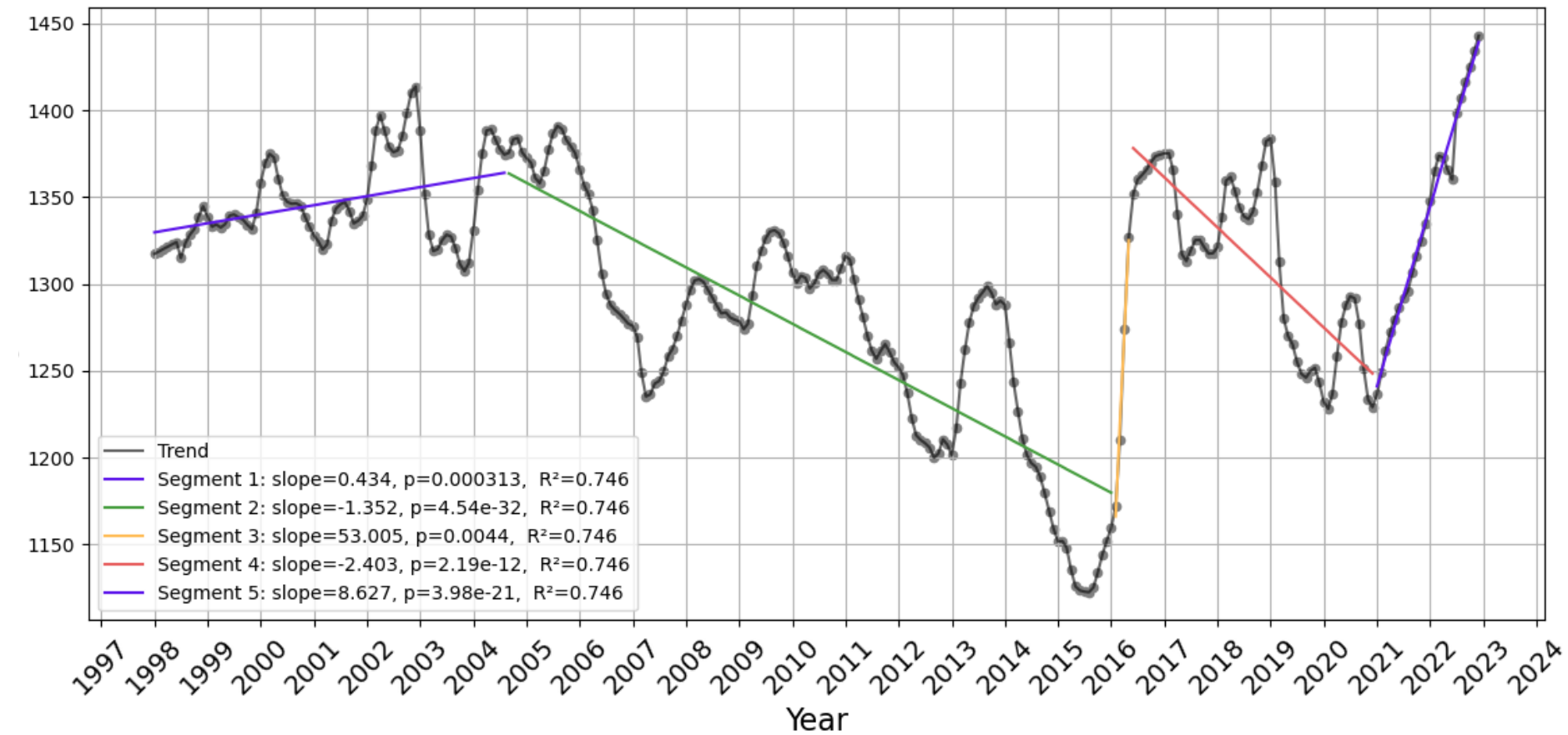
INDW

# Temporal analysis

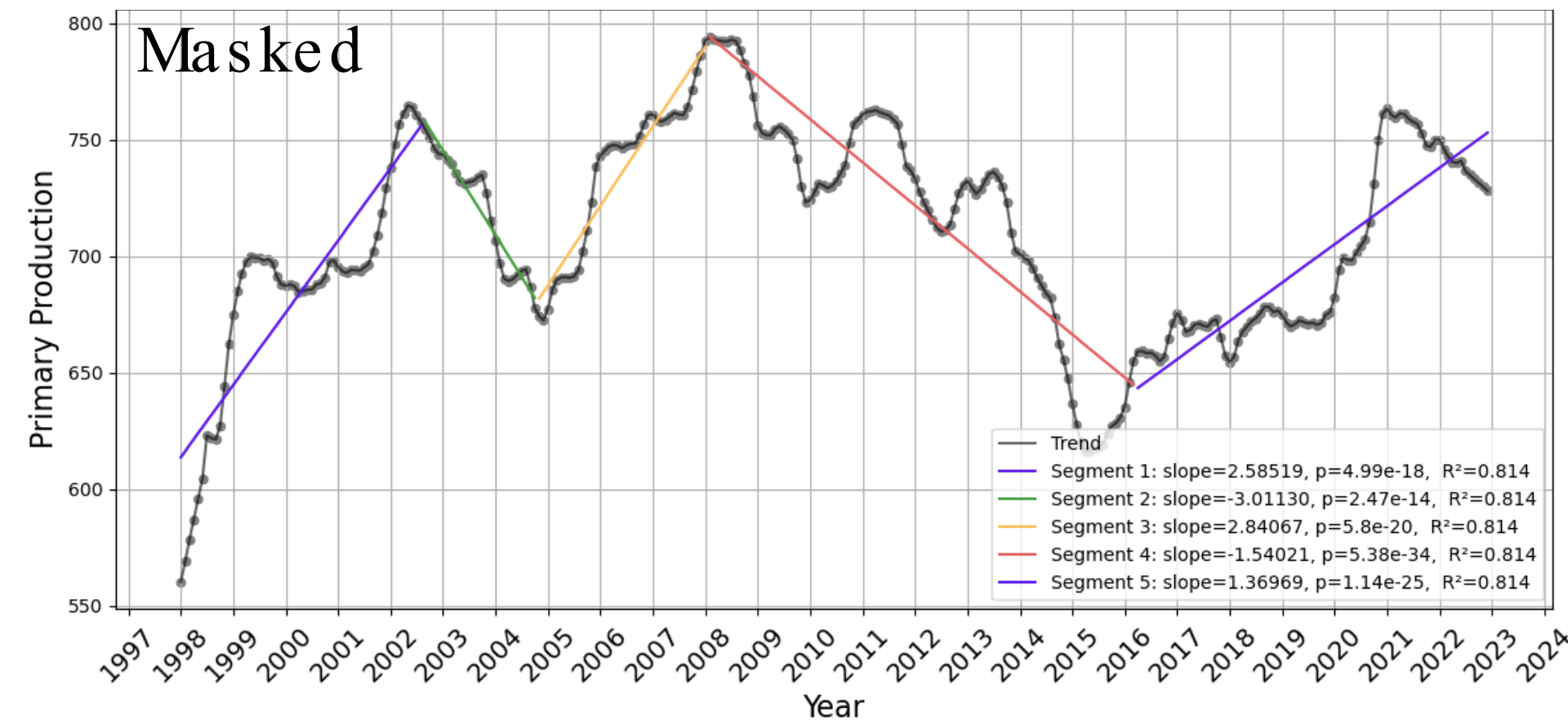
## CCAL



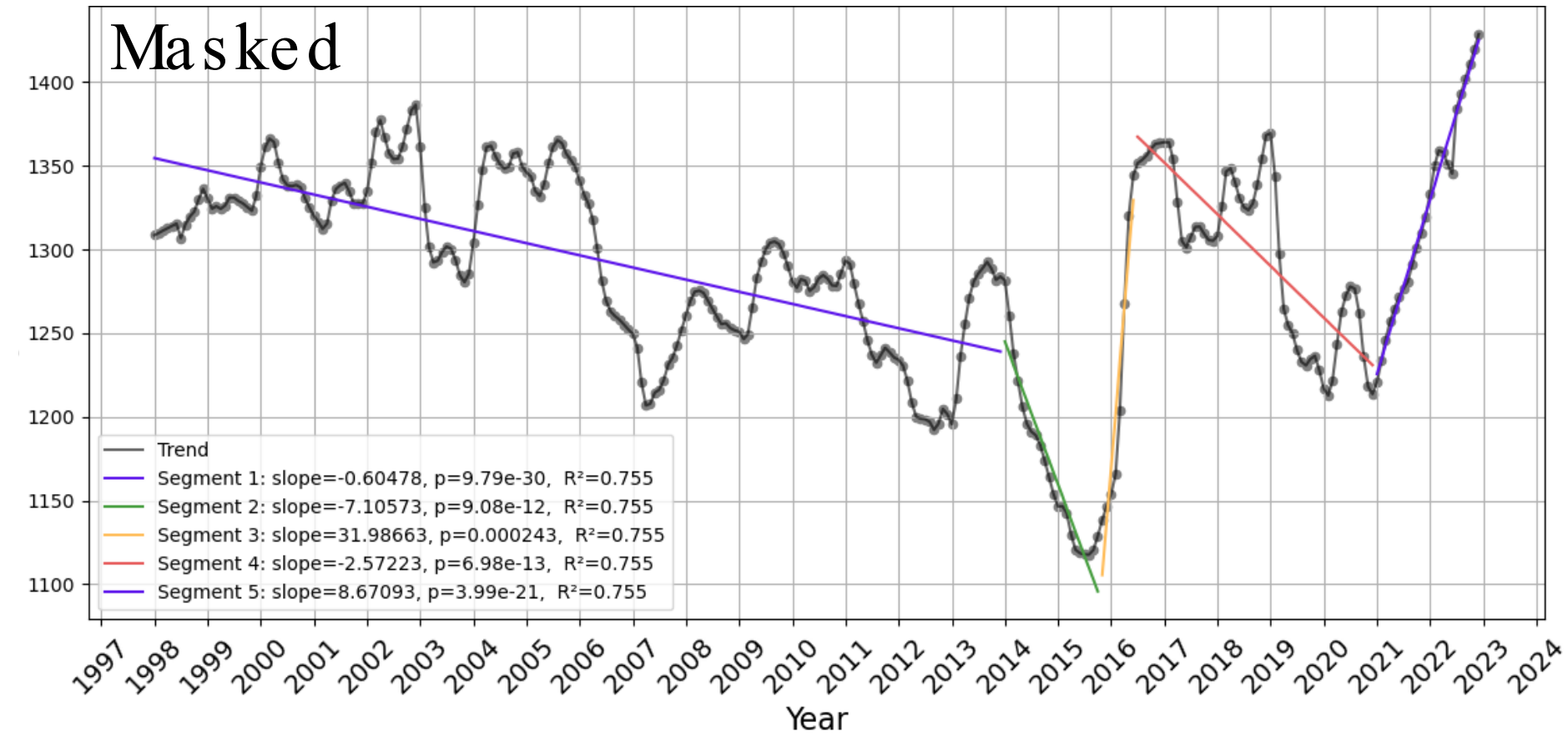
## INDW



## Masked

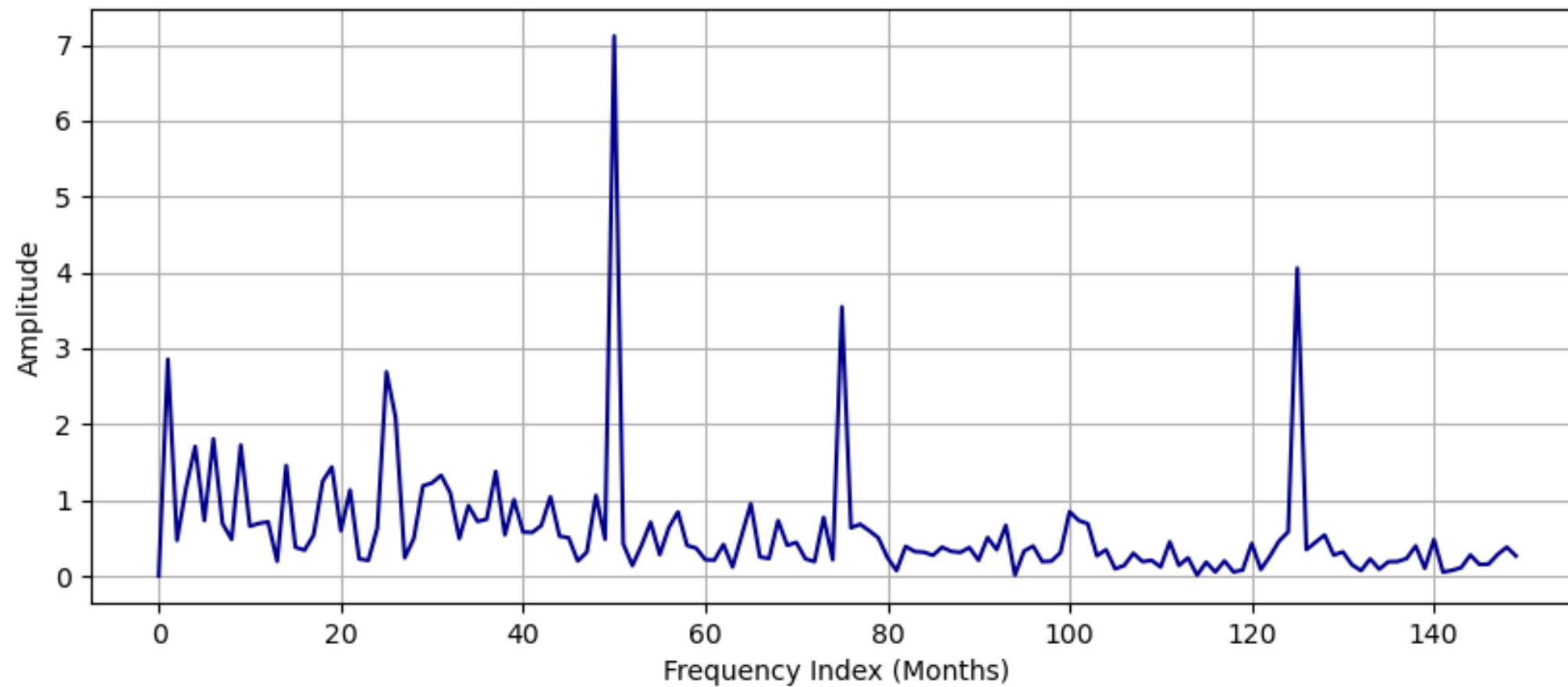
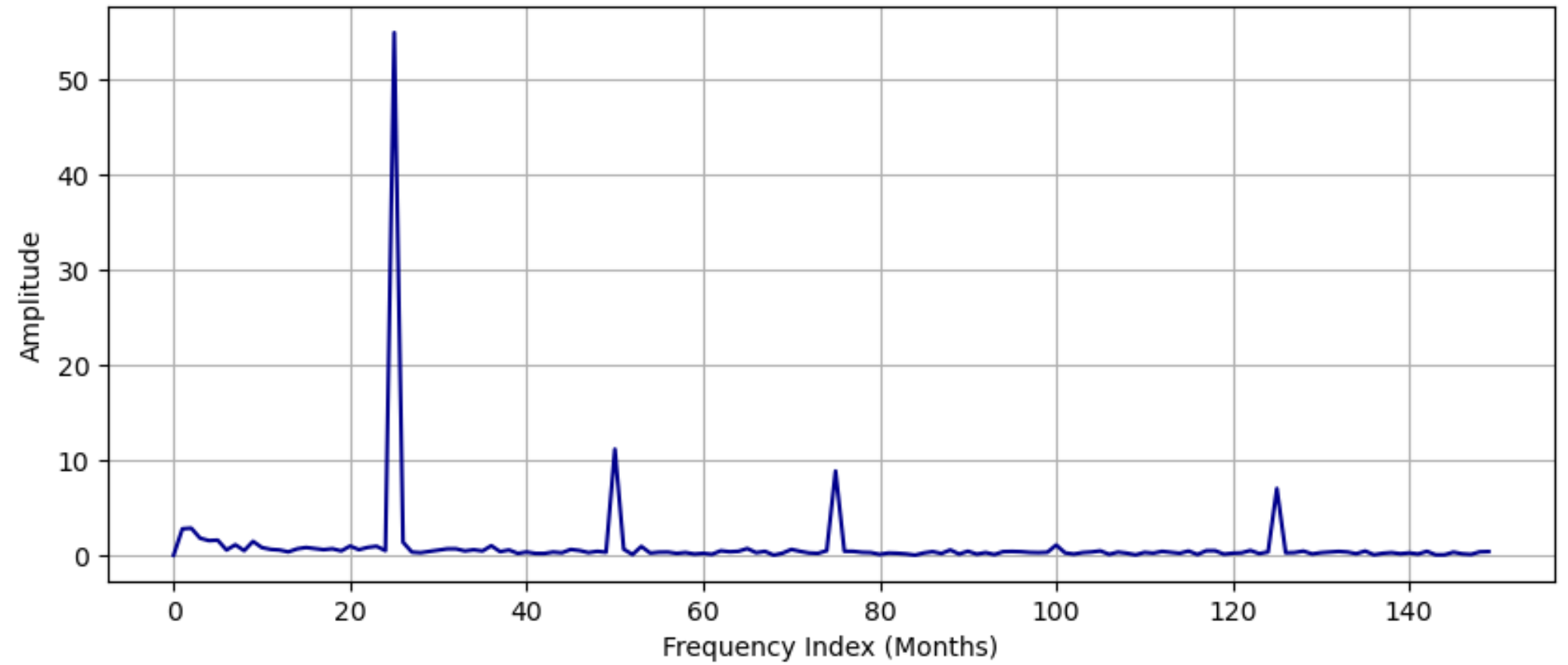


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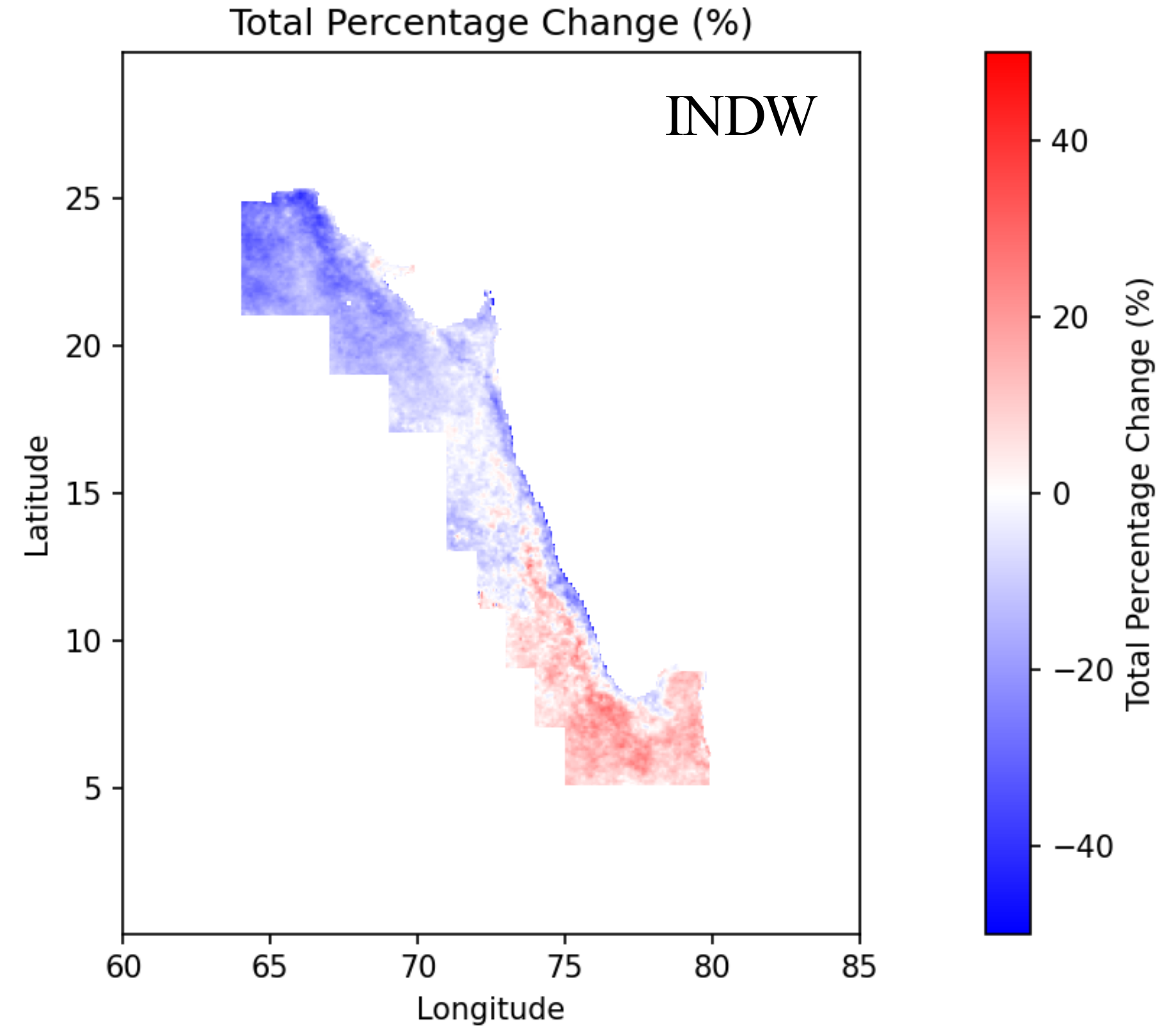
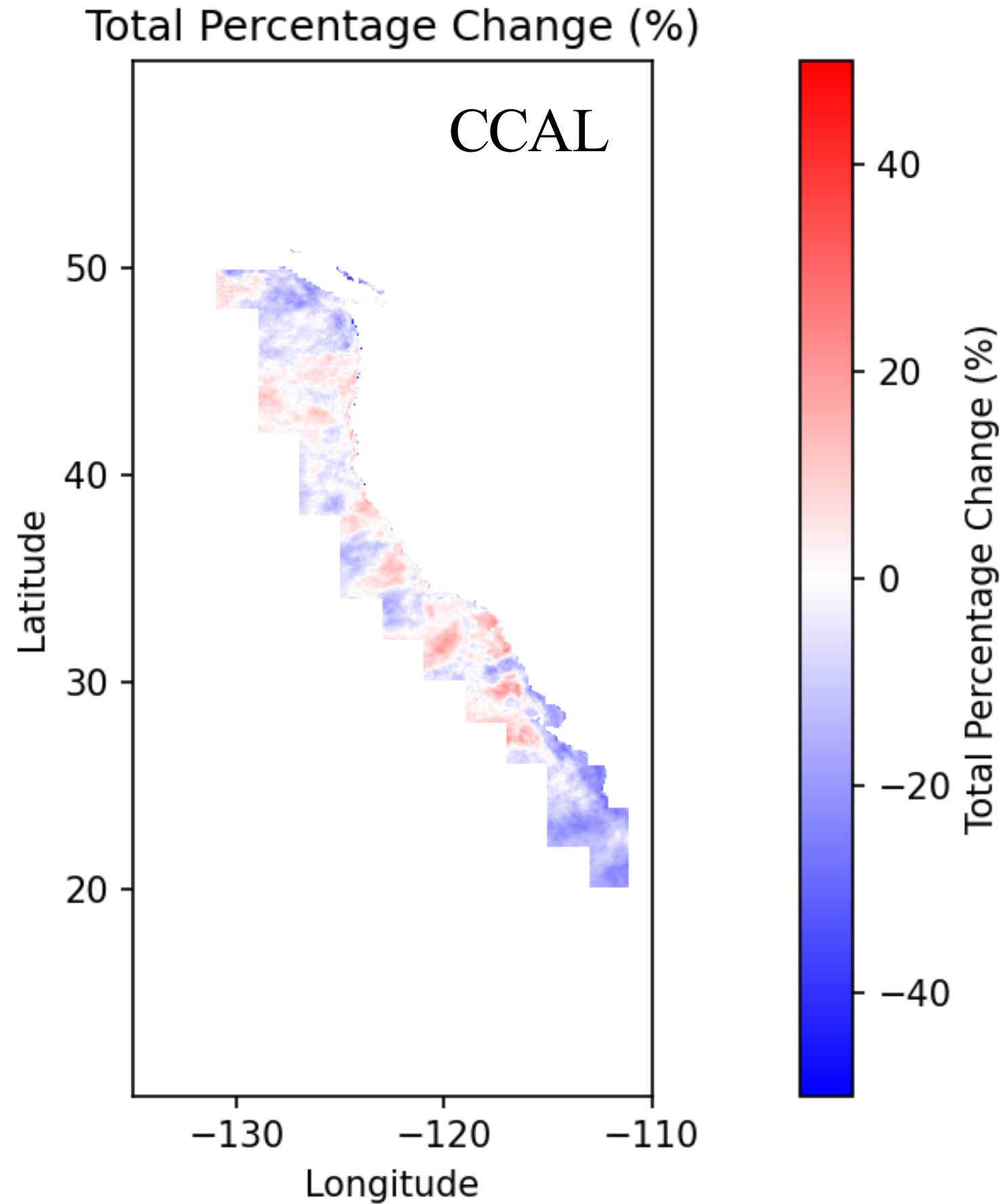
# Temporal analysis

CCAL

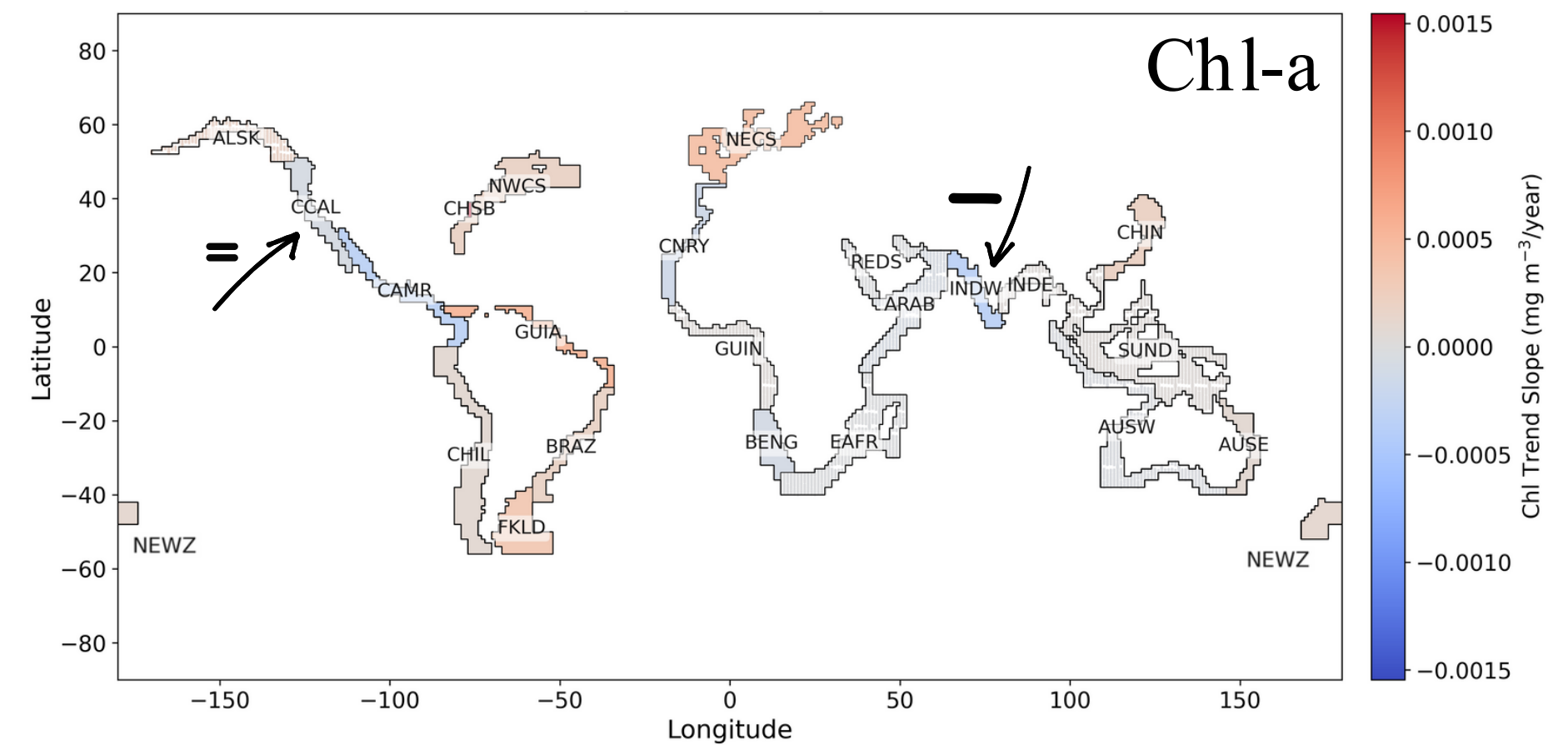
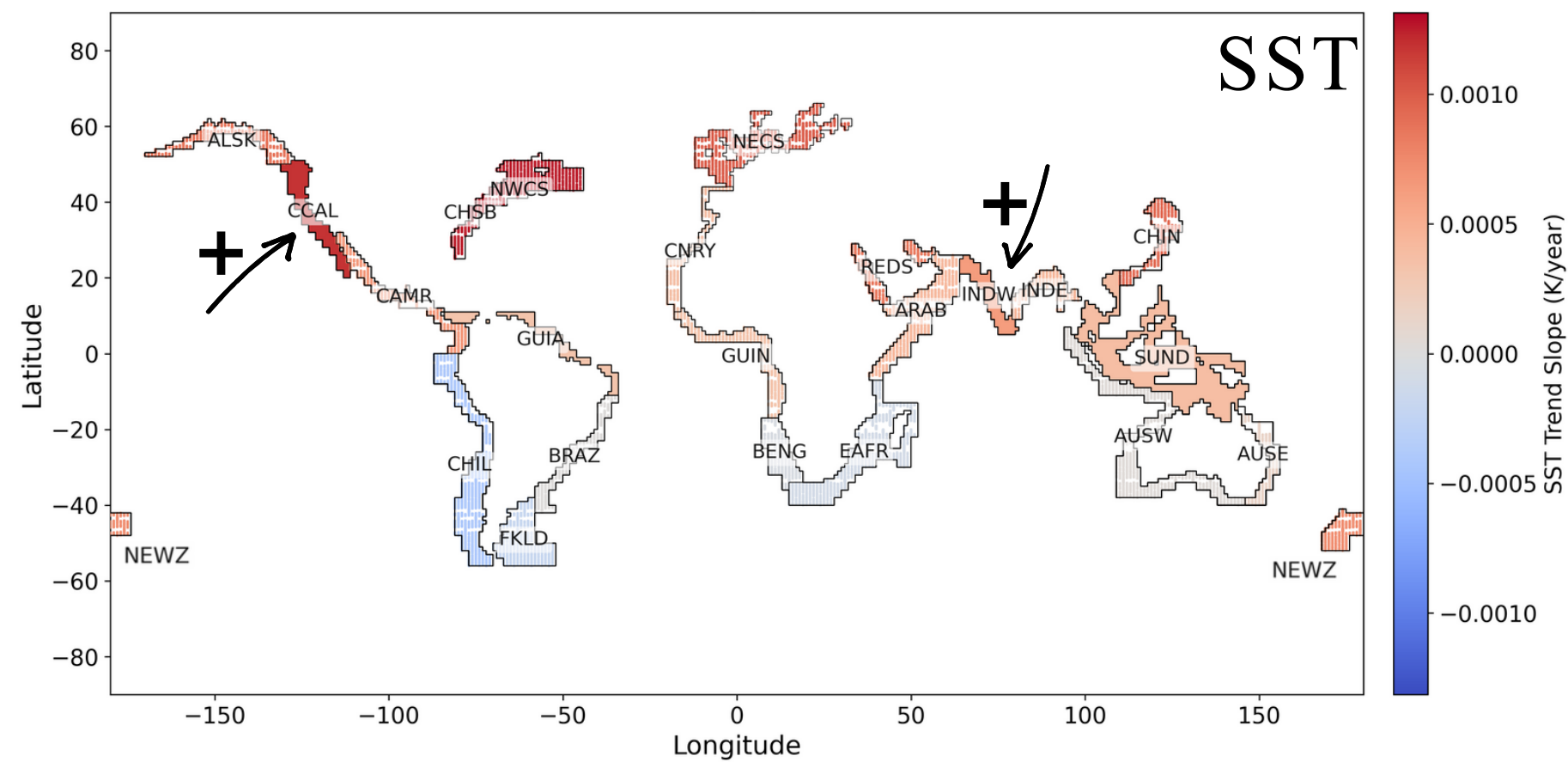
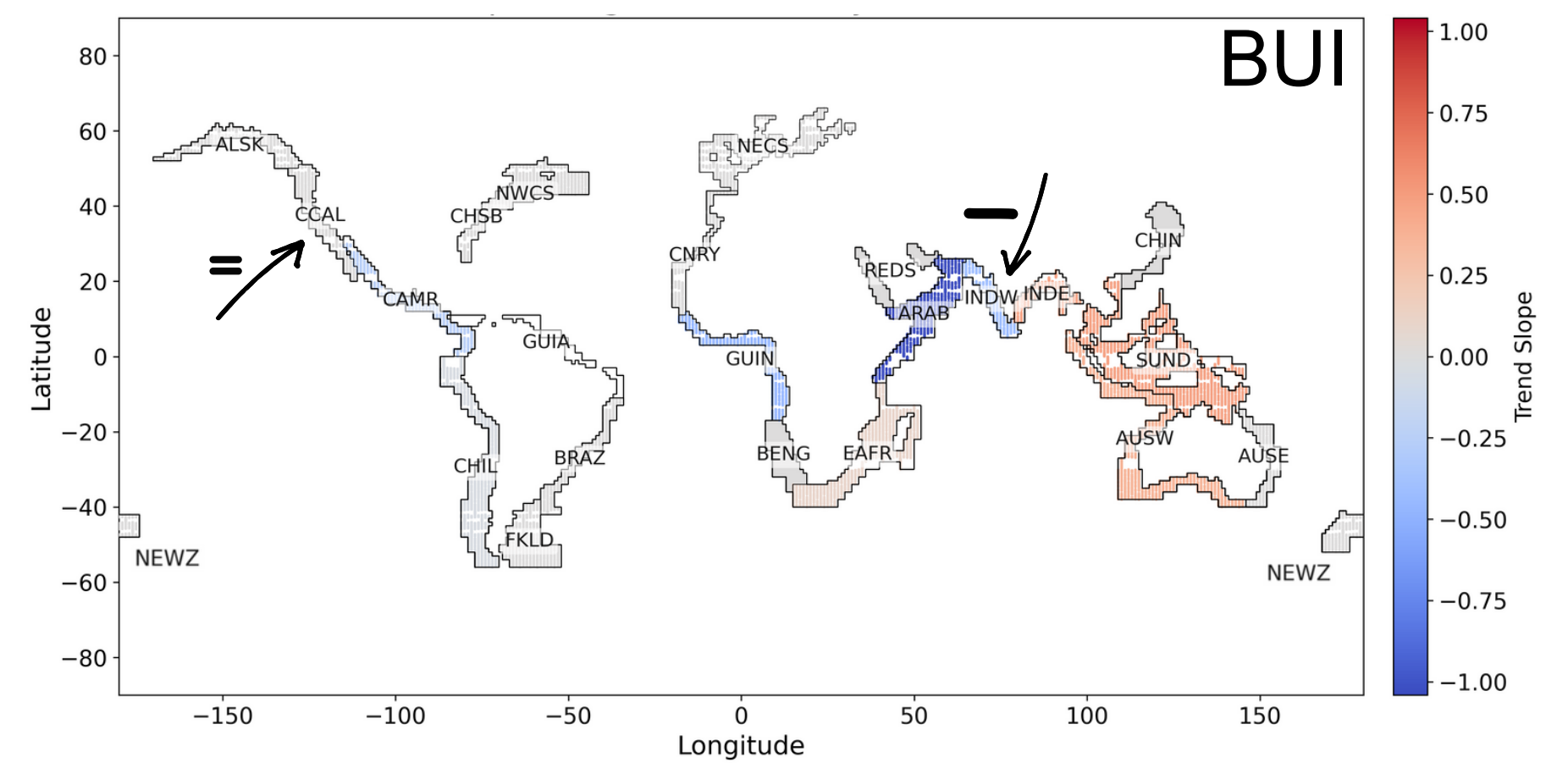
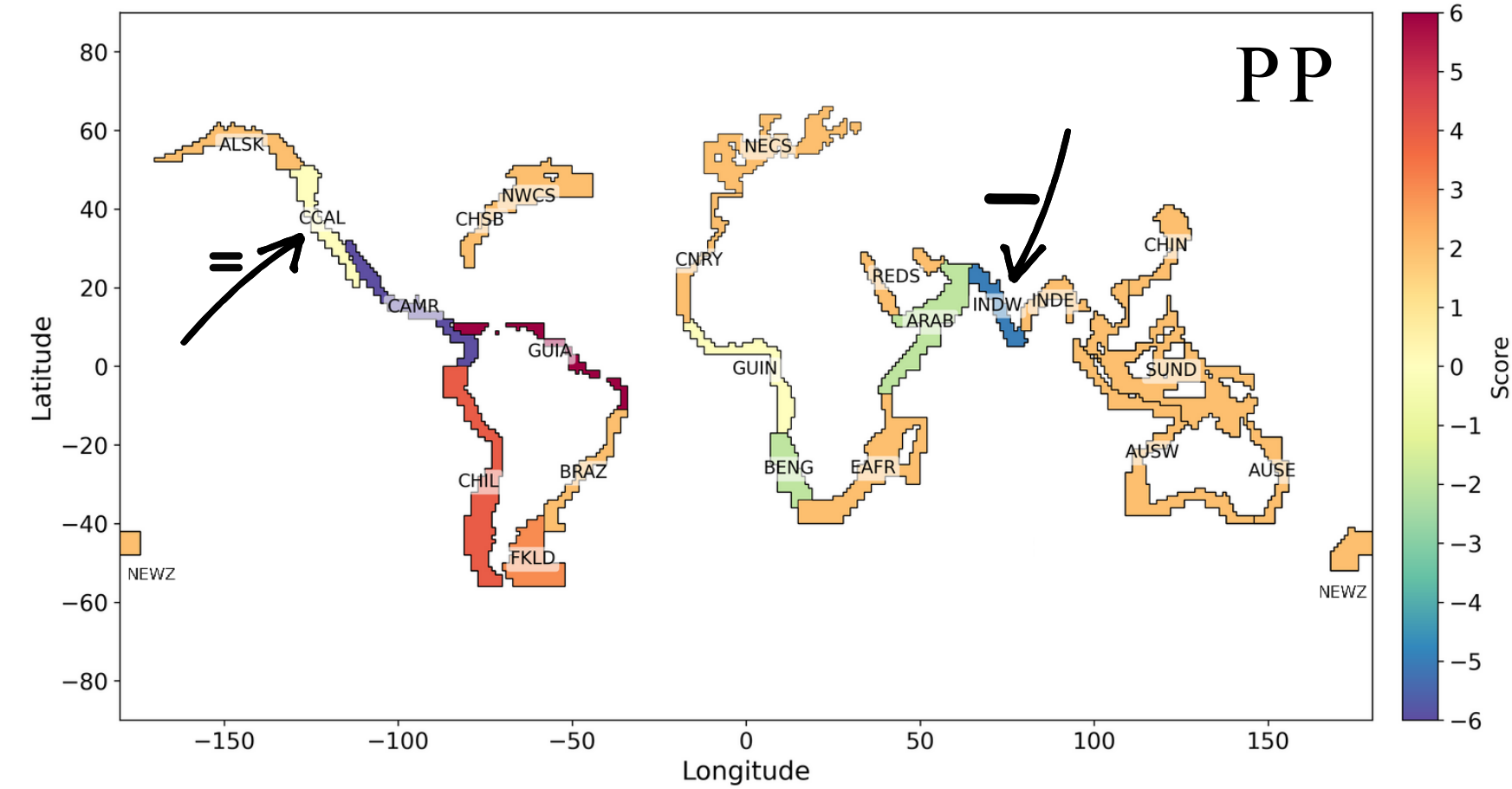


INDW

# Spatial analysis



# What are the causes of these trends?

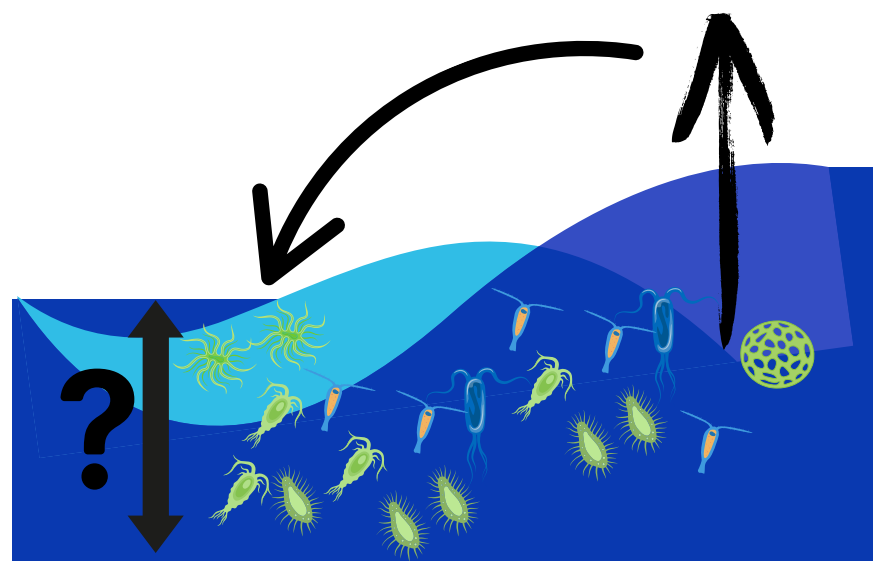


# Where are we now?



In which coastal provinces does primary production undergo significant changes?

Every province is different, no globally consistent trends  
Different trend analysis indicate different magnitude of trend results



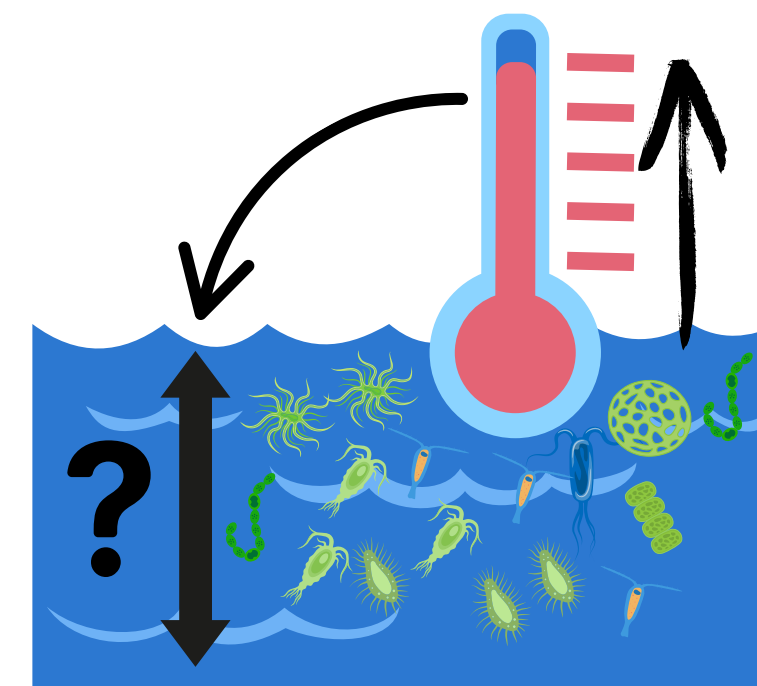
What are the underlying causes of these changes?

SST increasing is not impacting PP trends on a global scale  
Upwelling and PP trends do not always exhibit the same trend

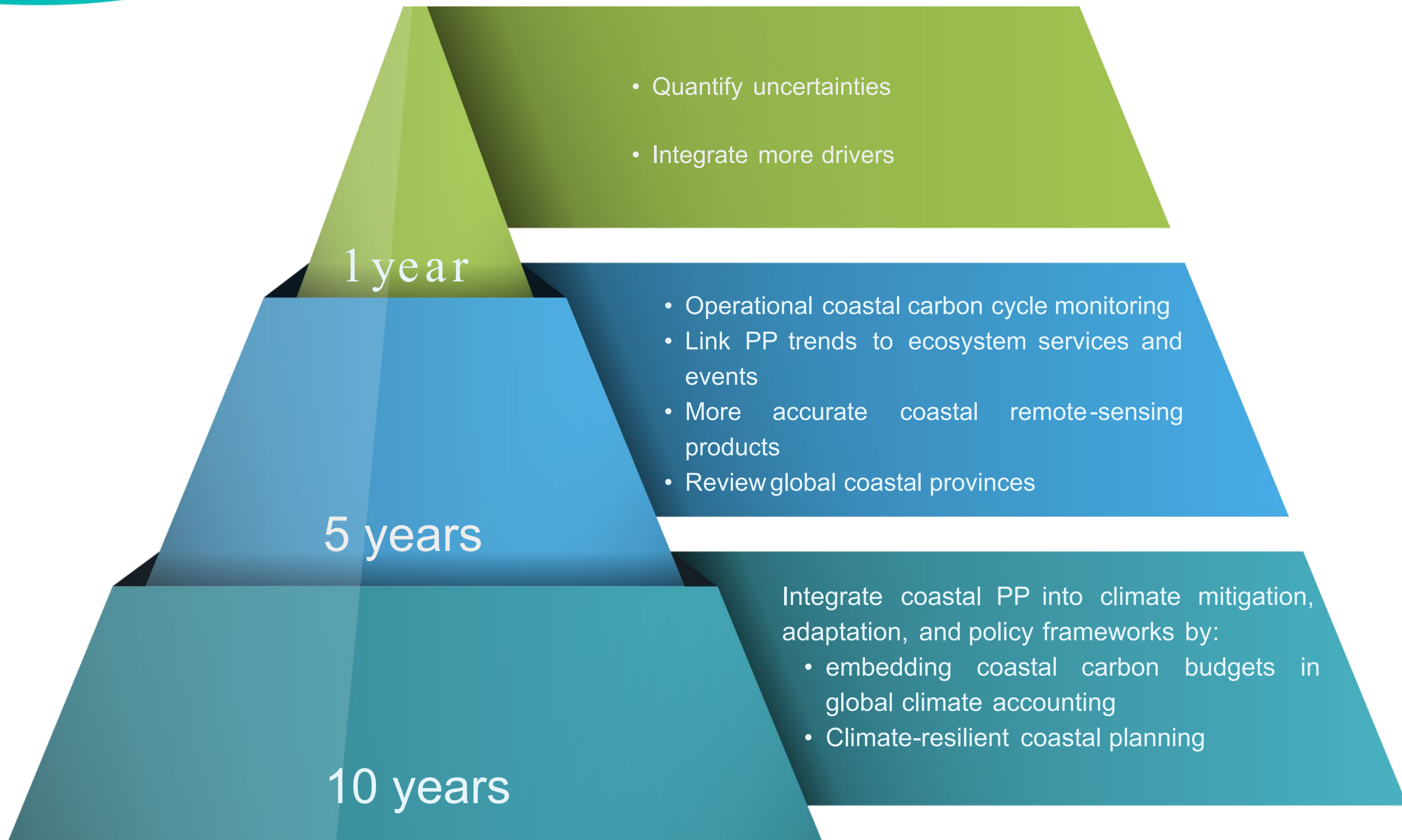


Is the aggregation of data into large areas (such as the ecological provinces) suitable for investigating the underlying causes of any observed change in the global coastal ocean?

Scale does matter! Mean cannot capture the spatial variation within  
Missing data and how we aggregate data impacts the trend



# What are our next priorities?



# Thank You

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