The Preliminary Analysis for the Cause of Rapid Sea Level Rise near JeJu Island

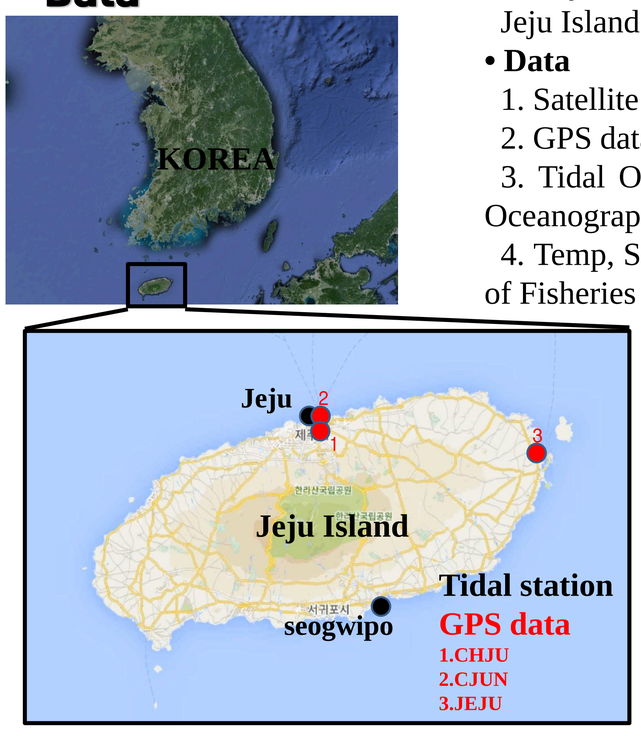
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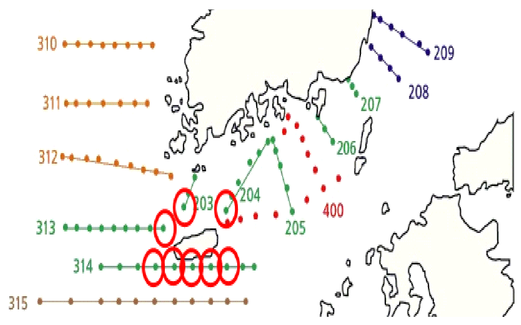
Introduction

- **We investigate the reason why the rate of sea level rise in Jeju island is particularly higher than the other area in Korea**
- **According to a report from Korea Hydrographic and Oceanographic Agency (KHOA, 2013), the rate of sea level rise in Jeju (6.33 mm/yr) is almost three times larger than the rate of Korea south coast (2.46 mm/yr)**
- **We aims to study the cause of this phenomena by checking 3 categories: Firstly, GPS data, Secondly, Satellite data and Thirdly Tidal Observation data and Temp, Salt Observation data**

Study Area and Data

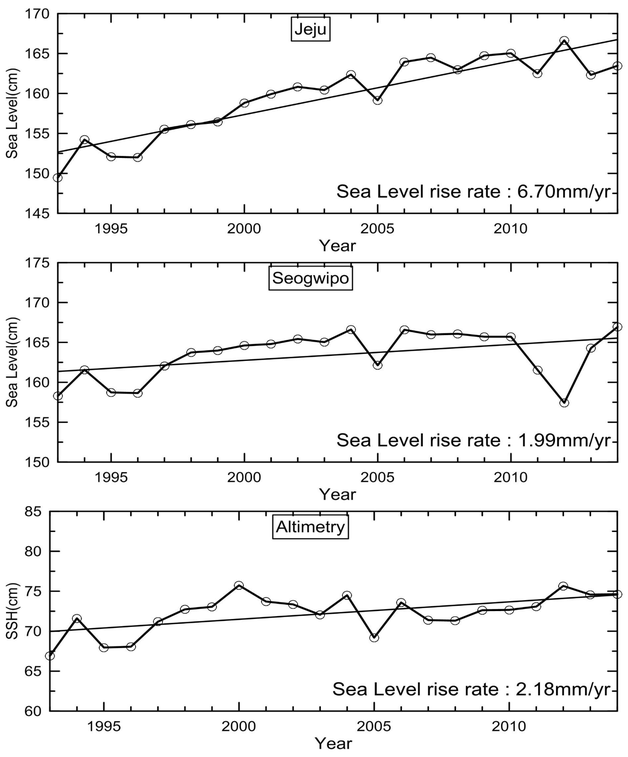


- **Study area**
  Jeju Island
- **Data**
  1. Satellite data : TOPEX/Poseidon Track data
  2. GPS data
  3. Tidal Observation data : Korea Hydrographic and Oceanographic Agency(KHOA),
  4. Temp, Salinity Observation data : National Institude of Fisheries Sciences(NIFS) data



Temp, Salinity data

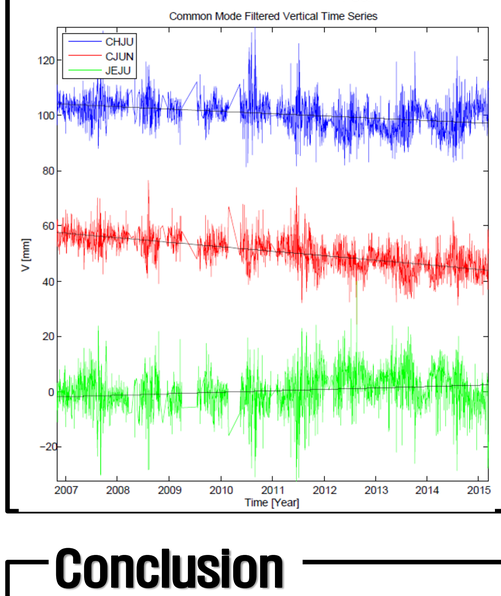
Change of Sea level – Altemety data(satellite) & Tidal data & GPS data



- Sea level rise 1993 to 2014
- Jeju and Seogwipo data is tidal observation data
- Altemety data is track data near Jeju Island
- Annual average of sea level data

- Sea level rise of Jeju is 6.79mm/yr and Seogwipo is 1.99mm/yr
- Sea level rise of satellite data passing through the near Jeju Island is 2.18mm / yr

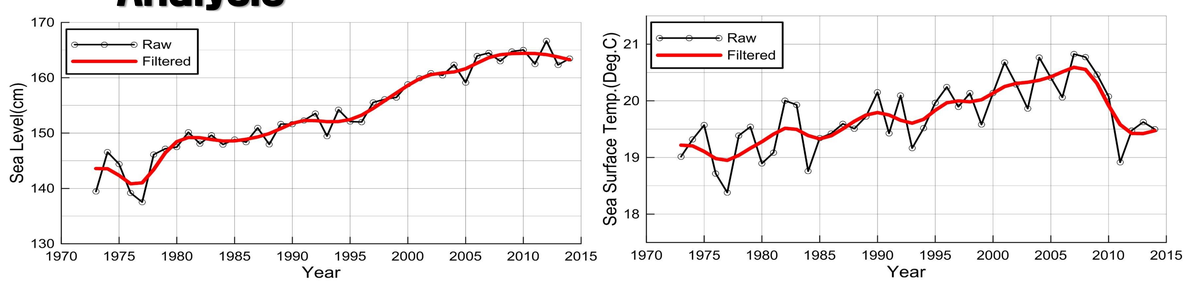
- Jeju tidal station data of sea level rise is higher than in other regions



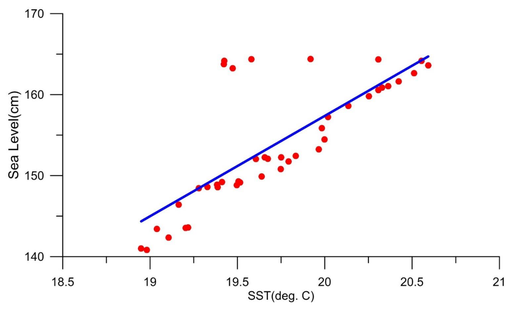
- Used the GPS data (3point) on Jeju Island
- Jeju tidal station(CJUN, red), near Jeju tidal station(CHJU, blue) and esat of Jeju Island(JEJU, green)
- Near Jeju tidal station(CJUN and CHJU) data is singking of ground
- Specially, Jeju tidal staion(CJUN) data is more rapidly sinking of ground
- East of Jeju Island is rising of ground
- One of reasons for rapidly sea level rise of Jeju is sinking of ground

GPS station	CHJU	CJUN	JEJU
Sinking(rate)	-0.85mm/yr	-1.64mm/yr	+0.52mm/yr

SEA LEVEL & SST Analysis

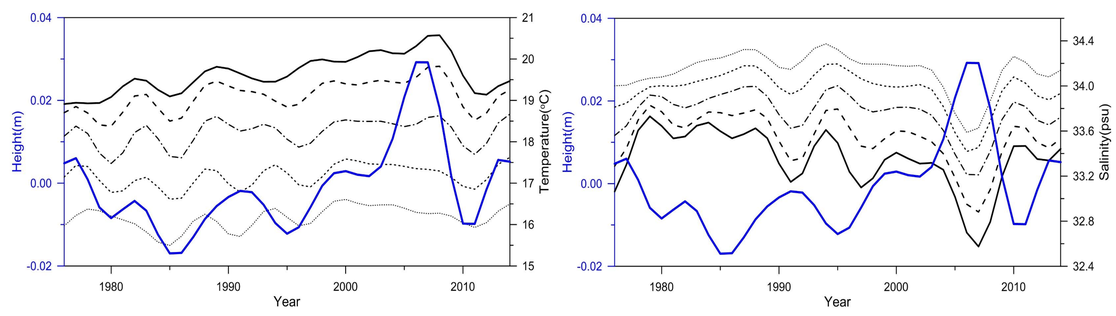


- Data analyzed by Jeju sea level (left, Jeju tidal sation data) and SST data (right, NIFS data)
- Black line is annual mean and Red line is low pass filter
- Sea level trend is rising, but the trend changed in around 2007yr
- Also SST trend changed in around 2007yr
- Sea level and SST trend change to decrease around 2007yr



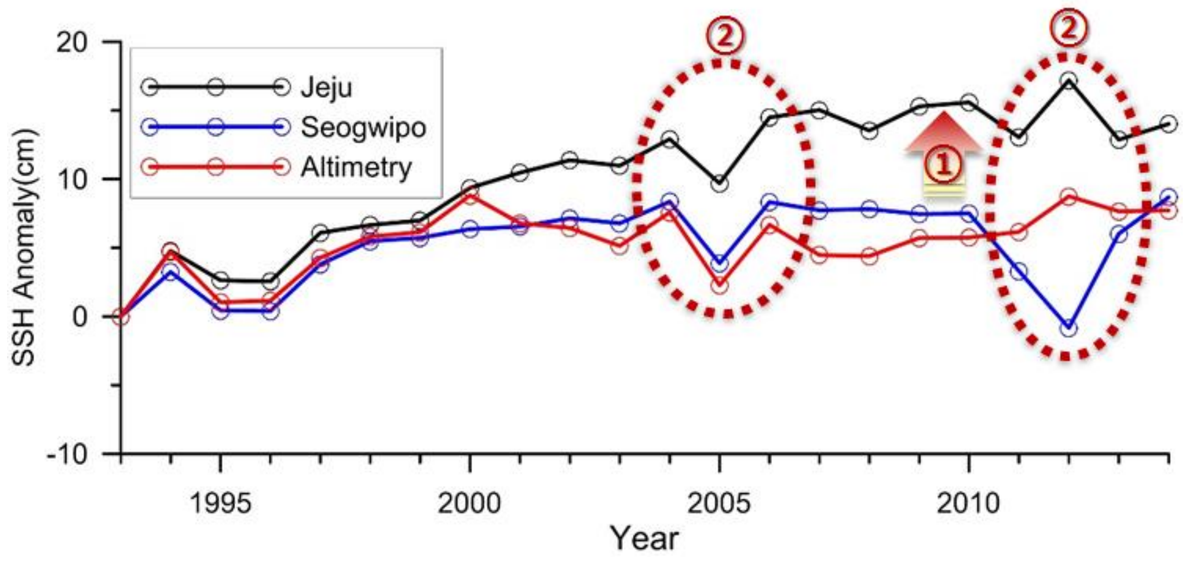
- x : SST
- y : Sea Level
- Sea level and SST have a strong correleation
- But due to a trend change around 2007yr, correlation was counterintuitive

Steric Hegith



- Temp and salinity data use near Jeju
- Calculated according to depth of the steric height
- Blue line is steric height, Black line is according to depth of temp and salinity
- Around 2007yr, rapid change of steric height was due to the low salinity water mass
- During period, due to steric sea level rise was 0.42 mm/yr

Result



- SSH Anomaly of Jeju tadal data, Seogwipo tidal data and Alitimetry data
- Seogwipo tidal data and Alitimetry data trend Similarly changed, but Jeju tidal data trend was rapid change
- Comprehensively analyzes, rapid sea level changes in Jeju is caused by three factors :
  1. Sinking ground, 2. change of temp and salinity, 3. Change of Yangtze river runoff, ellow sea bottom water and Tsushima warm current etc.
- Sinking of near Jeju tidal staion ground Cause overestimate sea level change (① in figure)
- Escape the trend that ② in figure, this reason are temp and salinity irregular change
- Further research is needed to rapid sea level rise

Conclusion

- Jeju tidal station in Jeju island appears rapid sea level rise than other area in Jeju island
- This research use data, 1. Altemety 2.GPS data 3.Tidal data 4.Temp and salinuty
- reason of rapid sea level change :

1. Sinking of ground
2. Temp and salinity irregular change
3. Change of Yangtze river runoff, yellow sea bottom water and Tsushima warm current etc.