Analysis of hourly sea level at selected tide gauge stations along the east coast of India

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Objective

Understanding sea level variability (tidal and non-tidal) over the year

Data

Hourly sea level collected using RADAR tide gauge installed by INCOIS
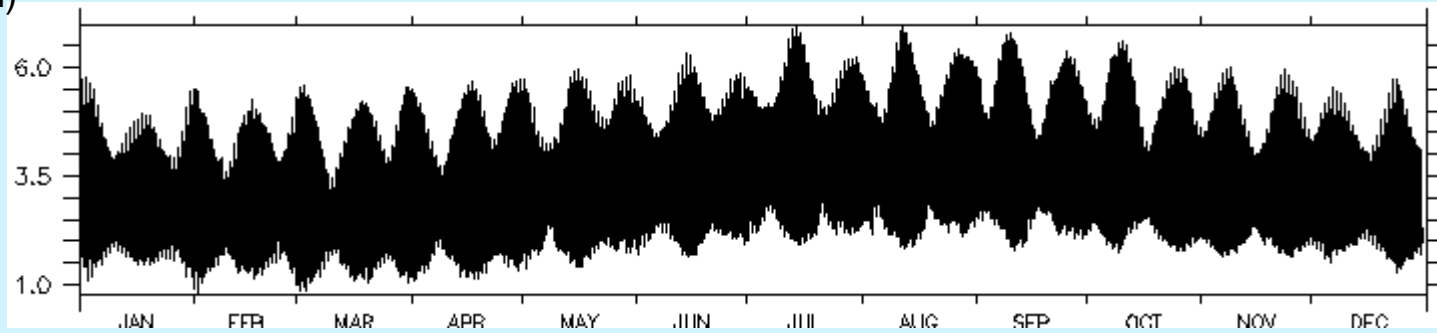
Methodology

Harmonic Analysis (Least Squares Method) using TASK (Tidal Analysis Software Kit 2000 by BODC/PSMSL/POL)

Fast Fourier Analysis of Observed and Residual (i.e. tide removed using 62 constituents) sea level - MATLAB
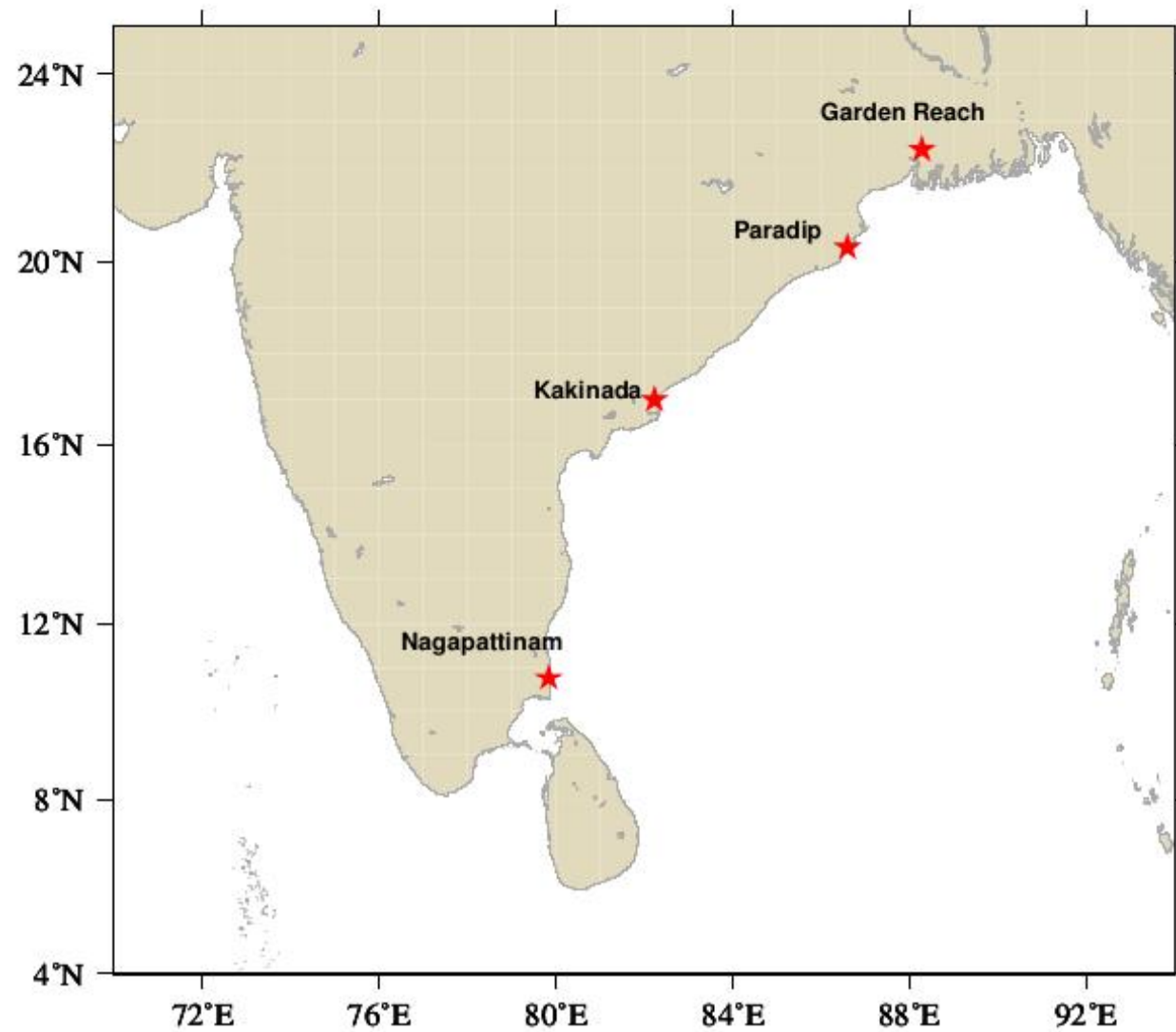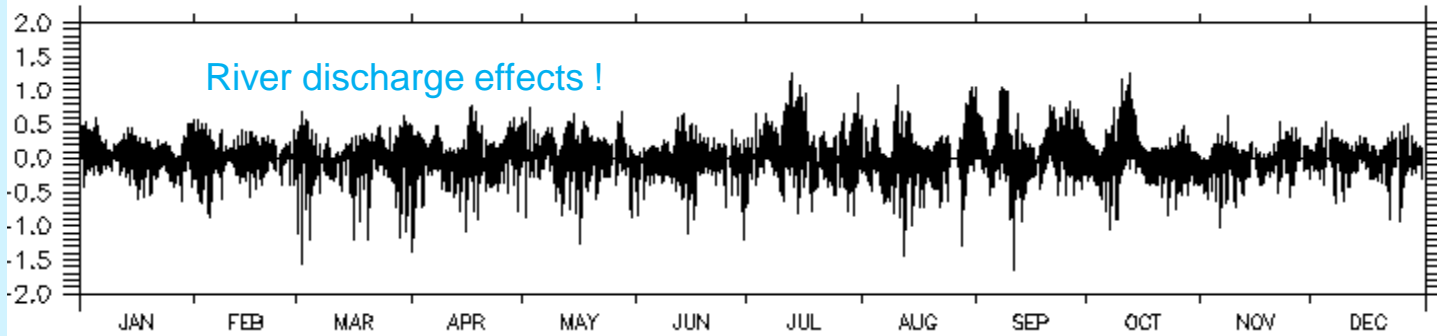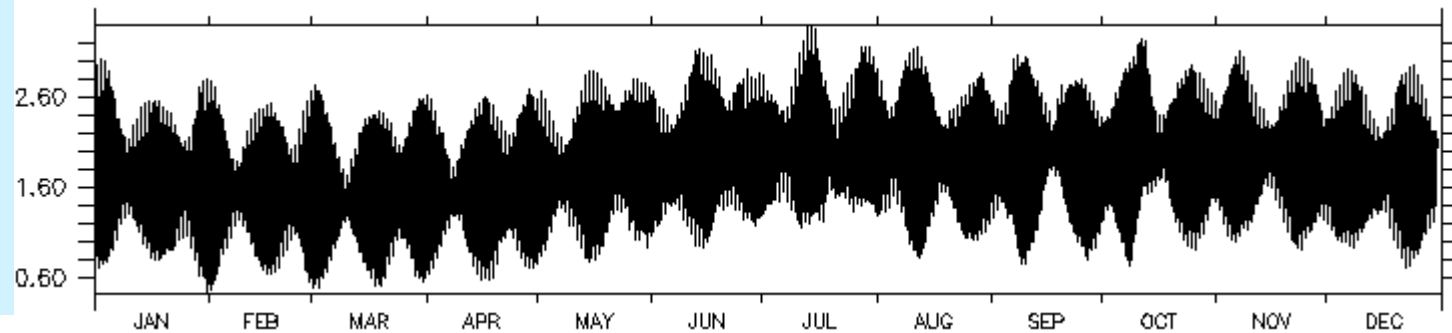
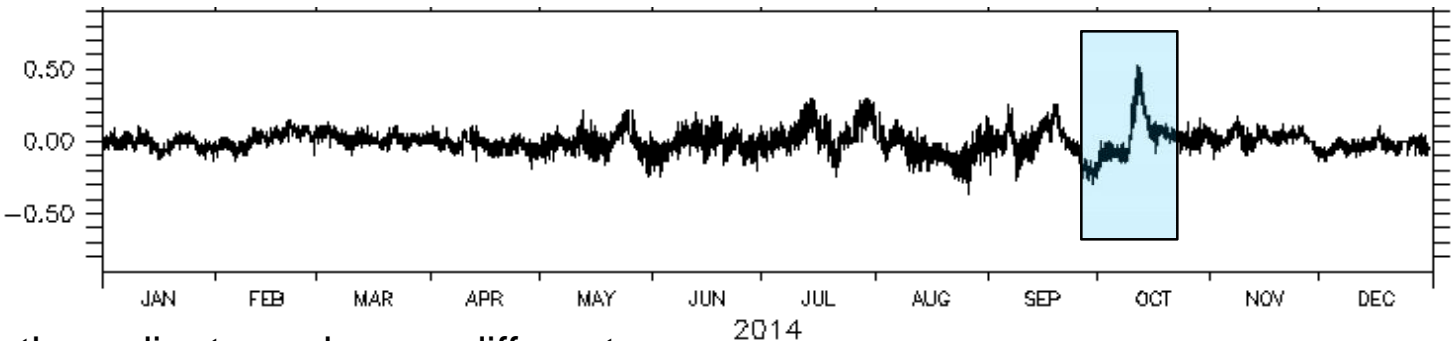Location map

Sea Level (m)

Garden Reach
Observed

River discharge effects !

Garden Reach
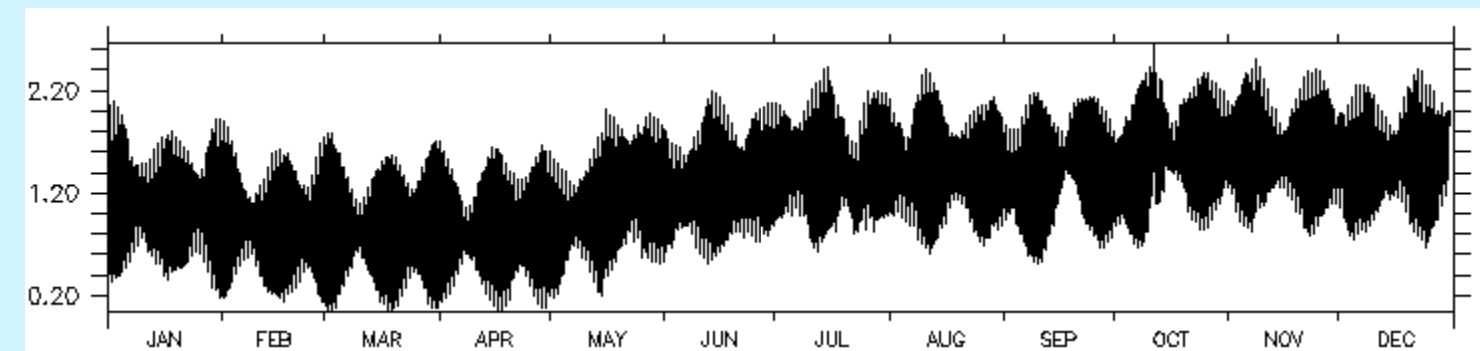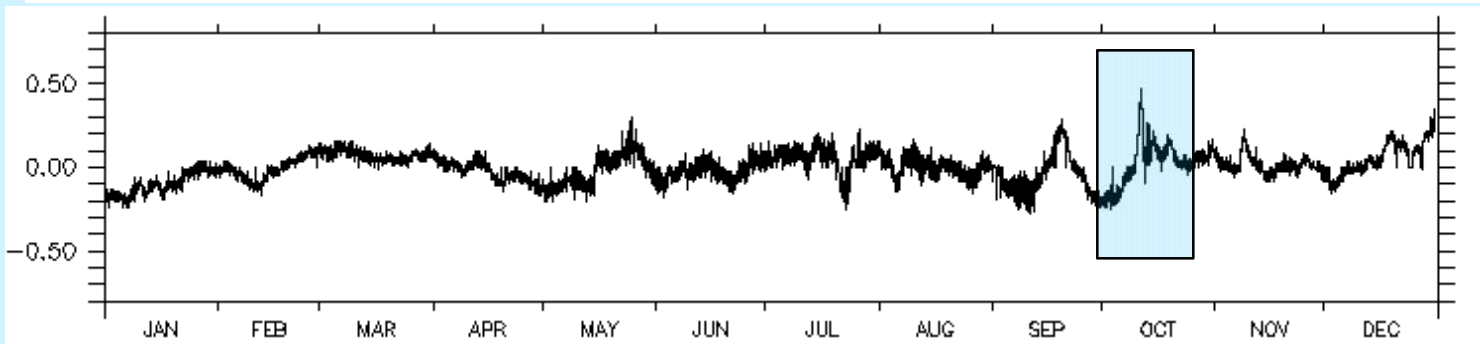Residual

Paradip
Observed

Paradip
Residual

2014

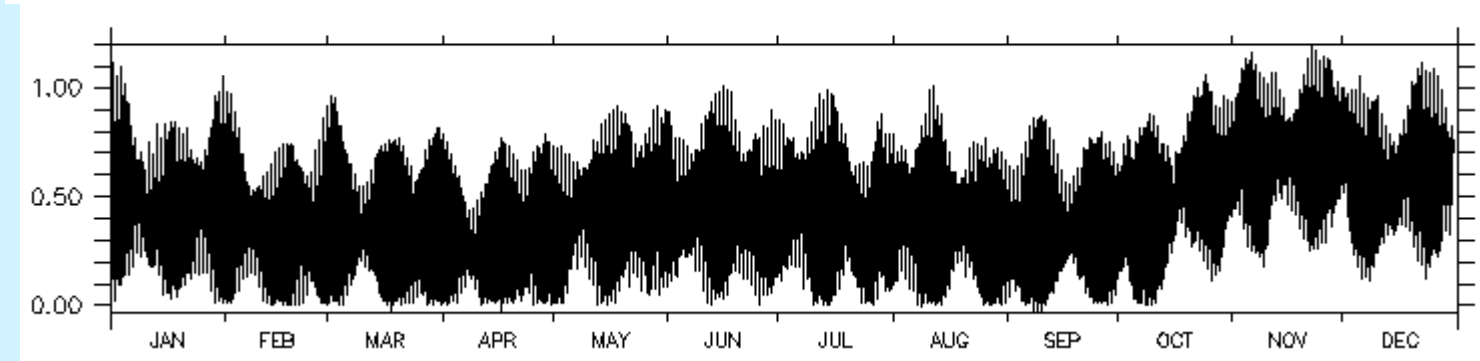Pl. note: the ordinate scales are different
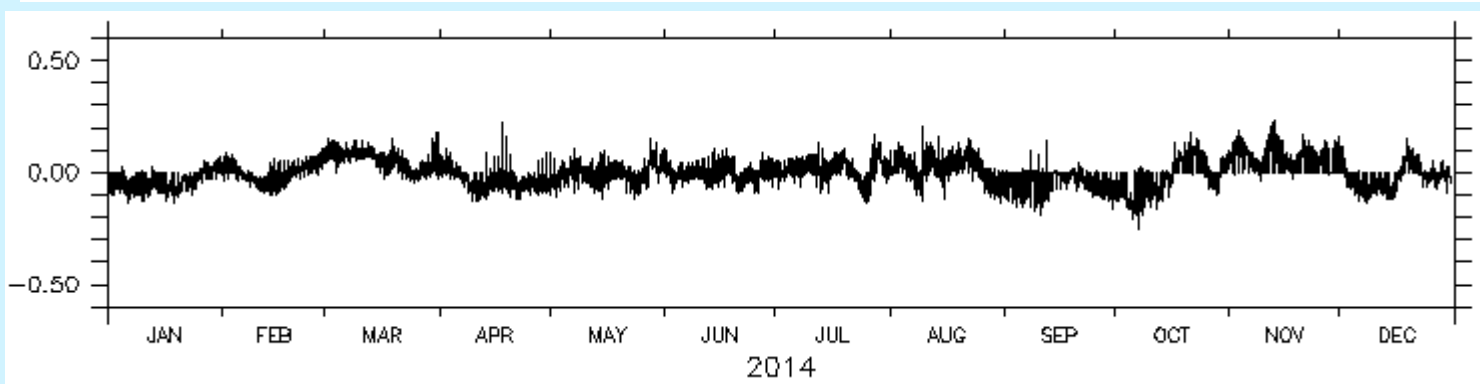
Sea Level (m)

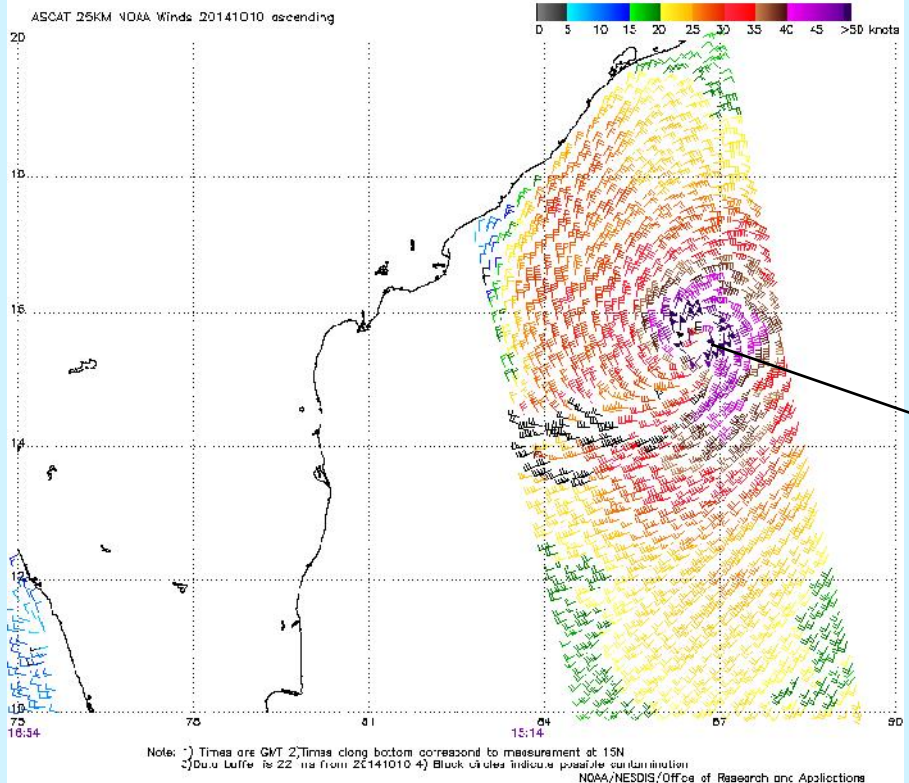Kakinada Observed

Kakinada Residual

Nagapattinam Observed

Nagapattinam Residual
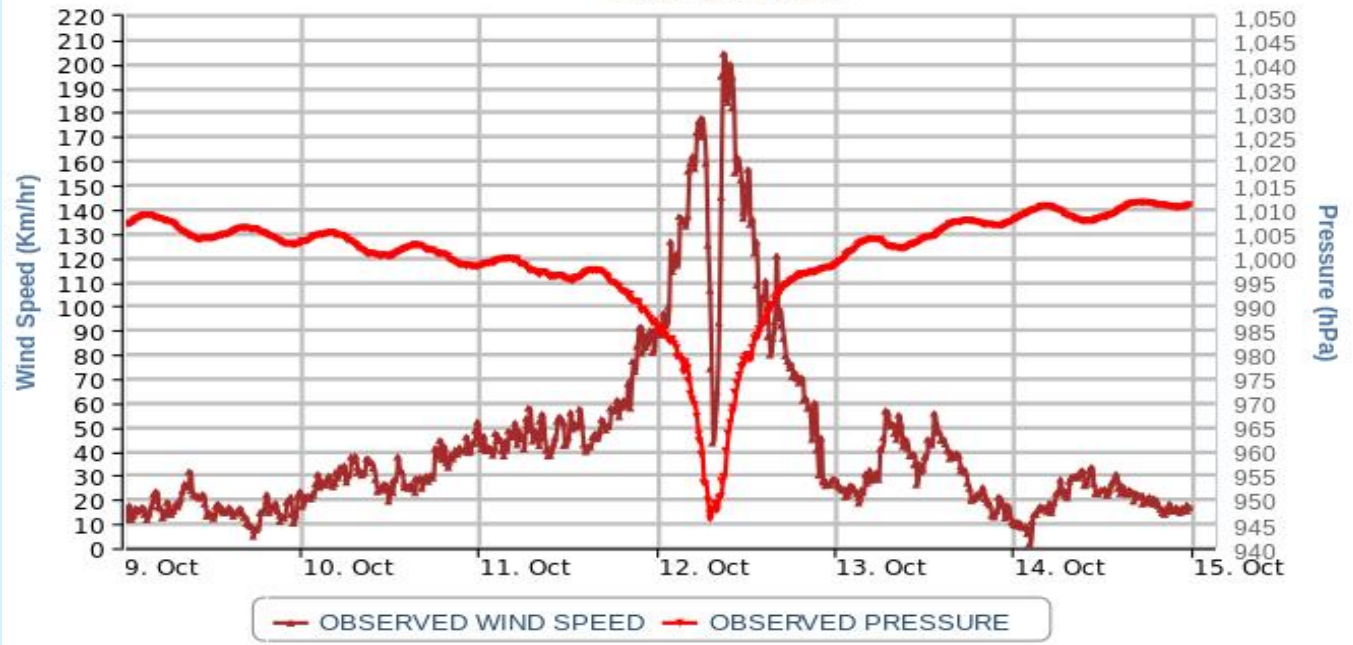
2014

Pl. note the ordinate scales are different

ASCAT 25KM NOAA Winds 20141010 ascending

Hudhud Cyclone
October 8-14, 2014

➢ Greater than 50 knots
➢ On 10-10-2014 !

Note: 1) Times are GMT 2) Times along bottom correspond to measurement at 15N
2) Data cutoff is 22 hrs from 20141010 4) Black circles indicate possible contamination
NOAA/NESDIS/Office of Research and Applications

Real Time Validation (Forecast vs Observation) : RVS Kausthub
Wind Speed (Km/hr)

— OBSERVED WIND SPEED — OBSERVED PRESSURE
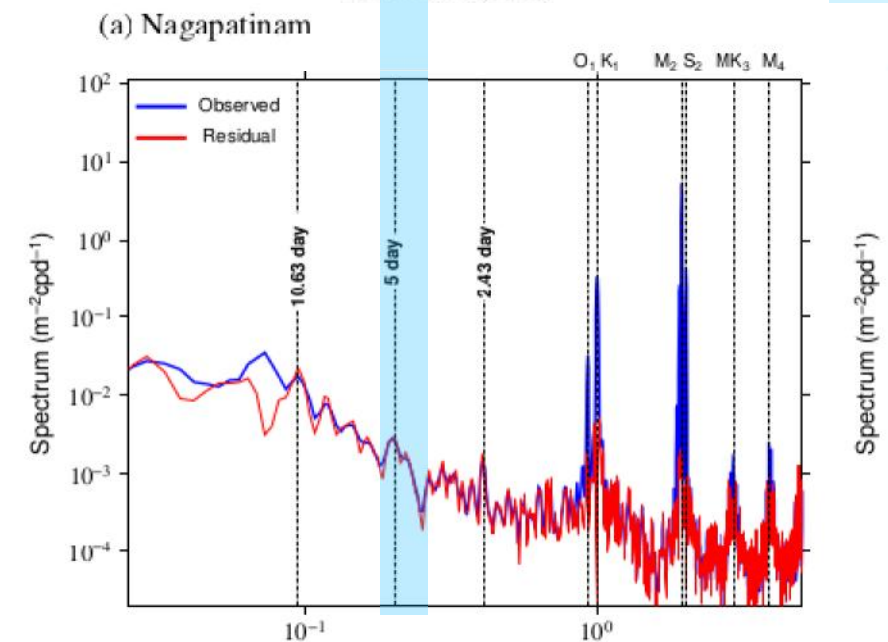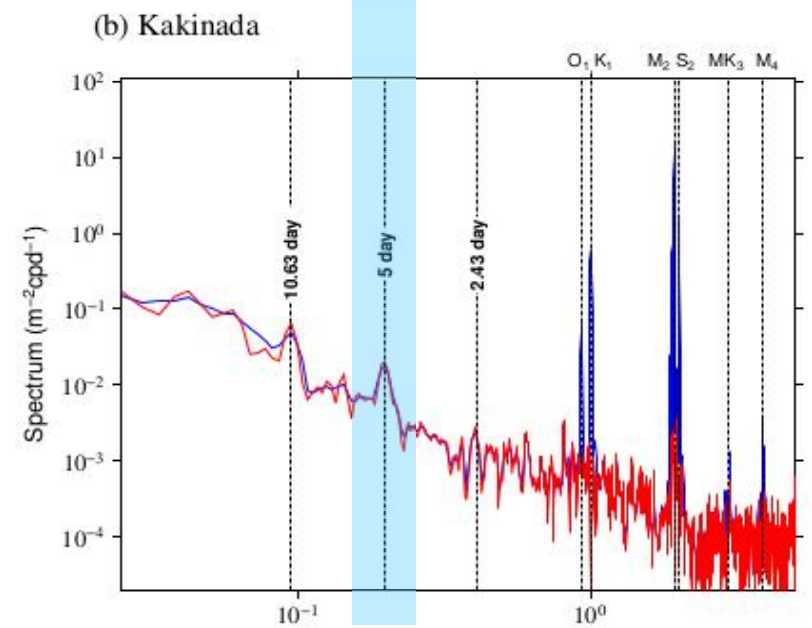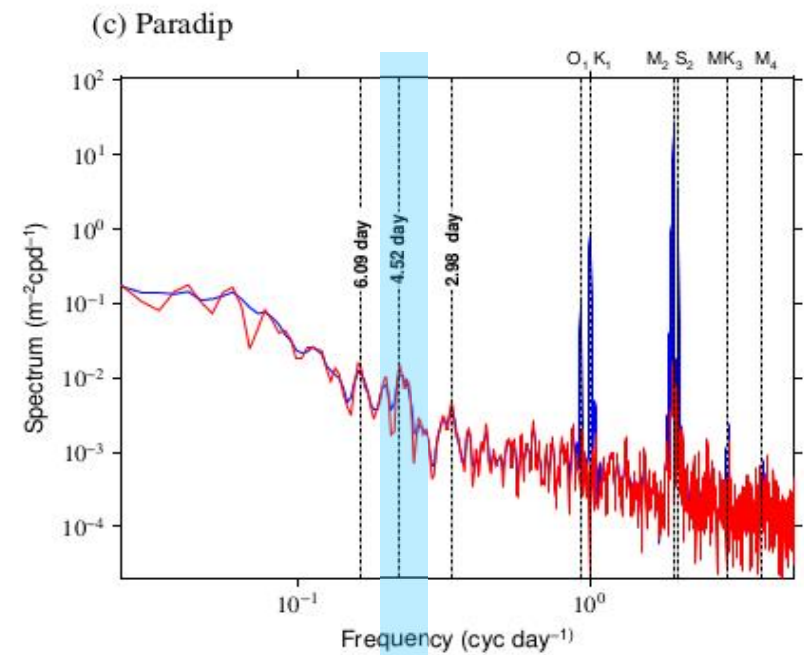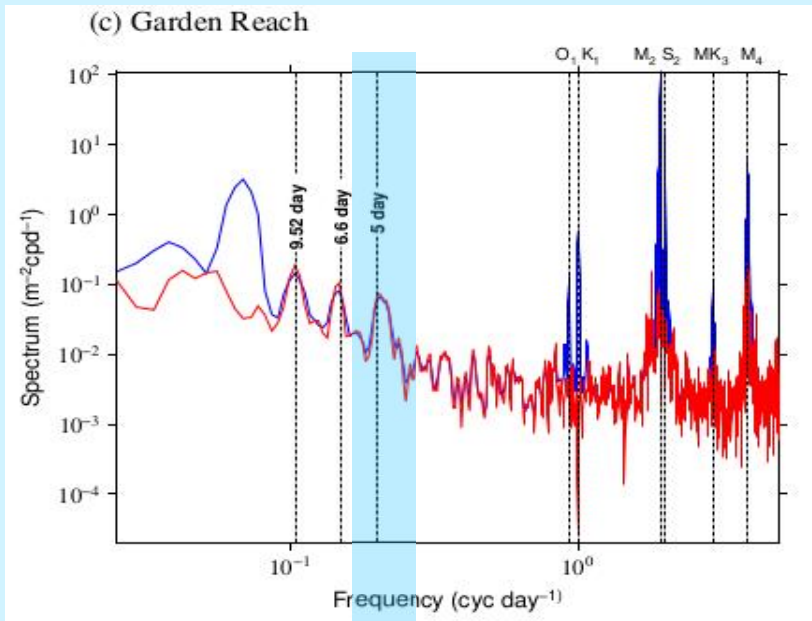
Semi-diurnal constituents heavily dominate over the diurnal constituents
presence of 5 day period waves (preliminary results !)

Principal tidal constiuent amplitudes

location	O1 (m)	K1 (m)	M2 (m)	S2 (m)	M4 (m)	M4/ M2 (%)
Garden Reach	0.06	0.12	1.28	0.54	0.27	21
Paradip	0.05	0.12	0.61	0.27	0.01	2
Kakinada	0.04	0.11	0.46	0.20	0.01	2
Nagapattinam	0.03	0.08	0.27	0.10	0.01	4

Results

Tide is the most important forcing on the sea level at all the stations

Semi-diurnal tides dominate the diurnal constituents at all the stations

Garden Reach is dominated by shallow water components as compared to the other 3 stations (M4/M2)

The signature of Hudhud cyclone is reflected at Paradip and Kakinada stations.

Thank you