

Analysis of Coastal altimeter Products & corrections

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Data Used

- PISTACH Coastal Altimeter products
- Radiosonde Data
- Period : July 2008 – January 2011
- Region : Indian Ocean

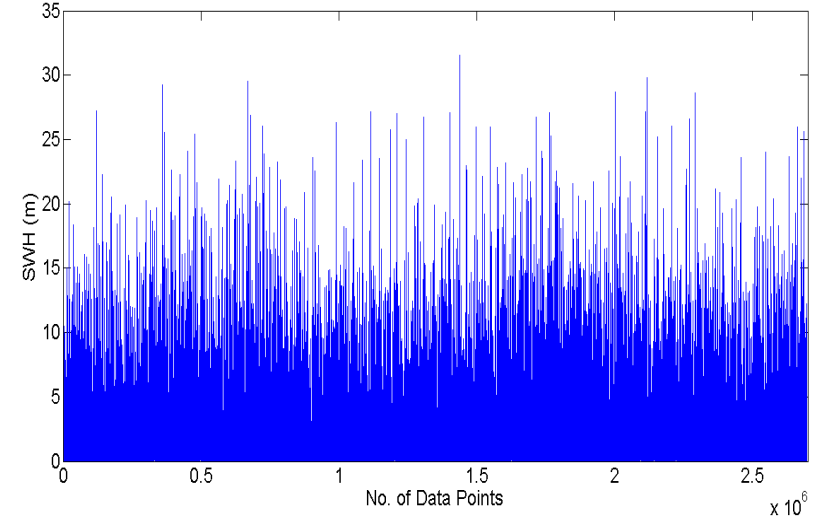
Variation of SWH in the Indian coastal Areas

❑ Coastal SWH measured by Jason-2 are found to be as higher as 20 m particularly in the gulf-region

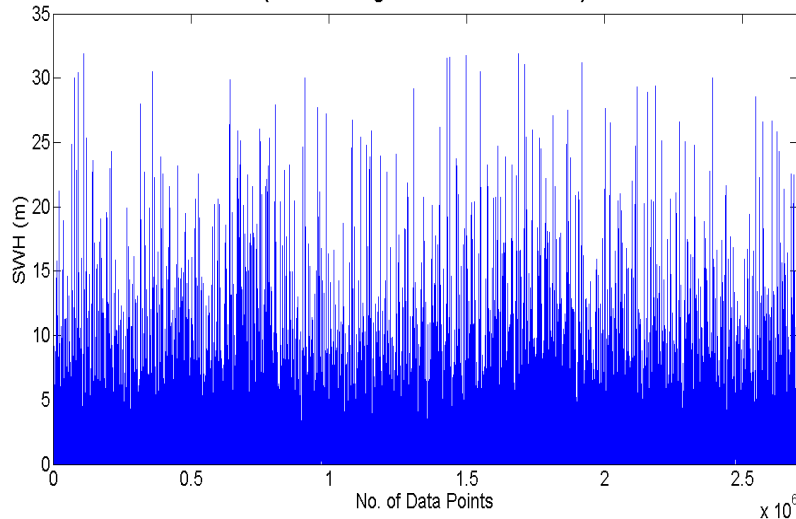
❑ The OCE3 retracking algorithm is slightly overestimating the coastal SWH with missing data for inland water bodies

❑ The RED3 retracking algorithm is found to produce reasonable values for coastal SWH

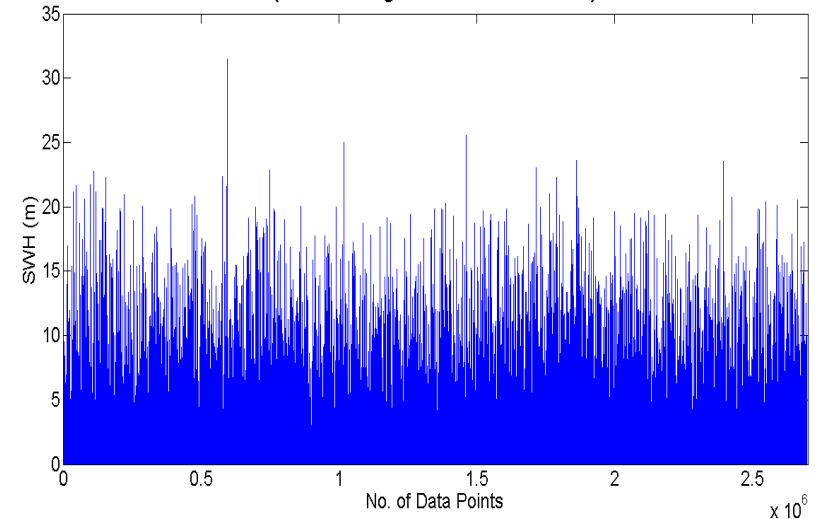
Coastal SWH
(Dist. <= 0.5 deg from Nearest Shoreline)



Coastal SWH (OCE3 Retrack.)
(Dist. <= 0.5 deg. from Nearest Shoreline)



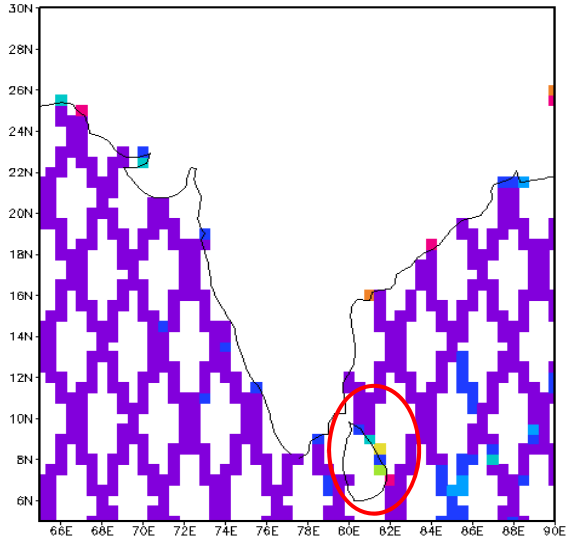
Coastal SWH (RED3 Retrack.)
(Dist. <= 0.5 deg. from Nearest Shoreline)



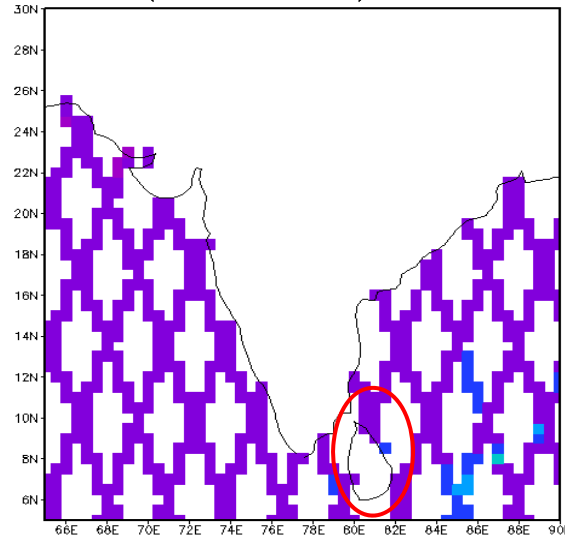
Variation of SWH

SWH: data from Jason-2
SWH (OCE3 Retrack.): data processed by OCE3 retracking method
SWH (RED3 Retrack.): data processed by RED3 retracking method

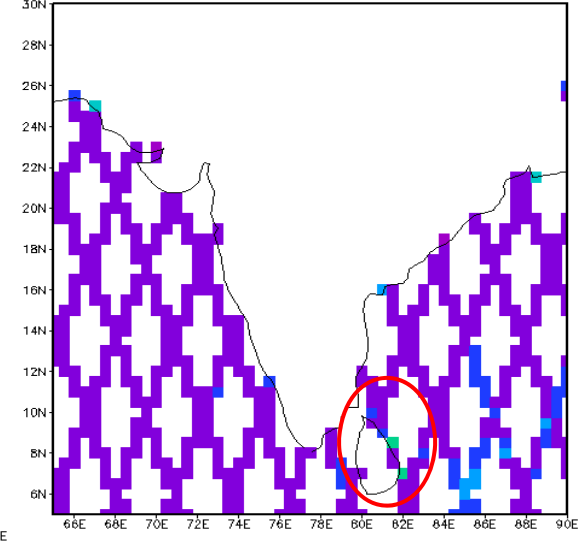
SWH : Jan, 2011



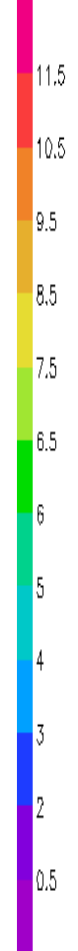
SWH (OCE3 Retrack.): Jan, 2011



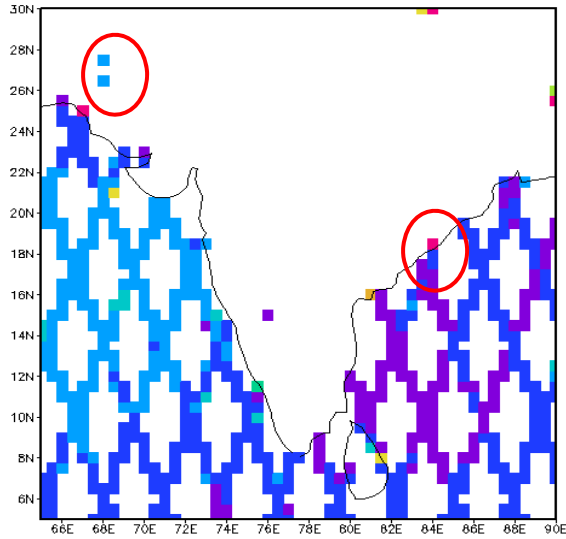
SWH (RED3 Retrack.): Jan, 2011



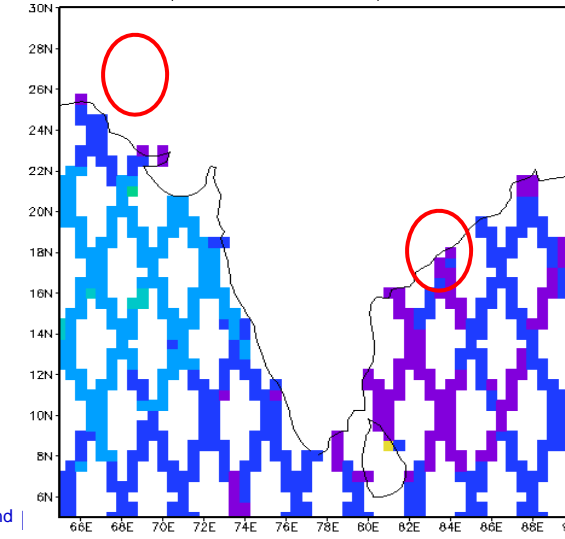
(m)



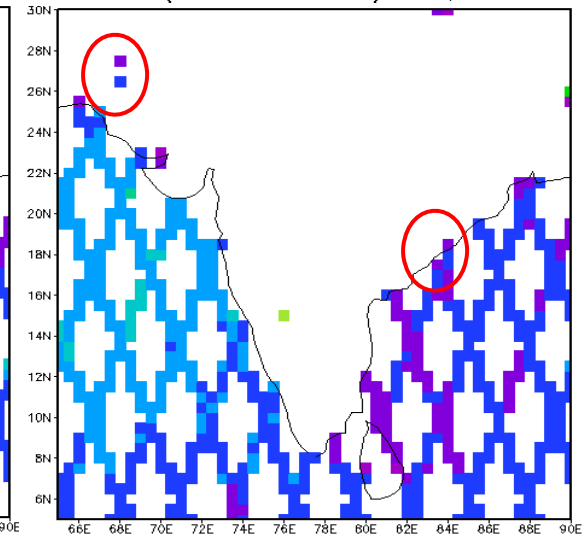
SWH : Jul, 2010



SWH (OCE3 Retrack.): Jul, 2010



SWH (RED3 Retrack.): Jul, 2010



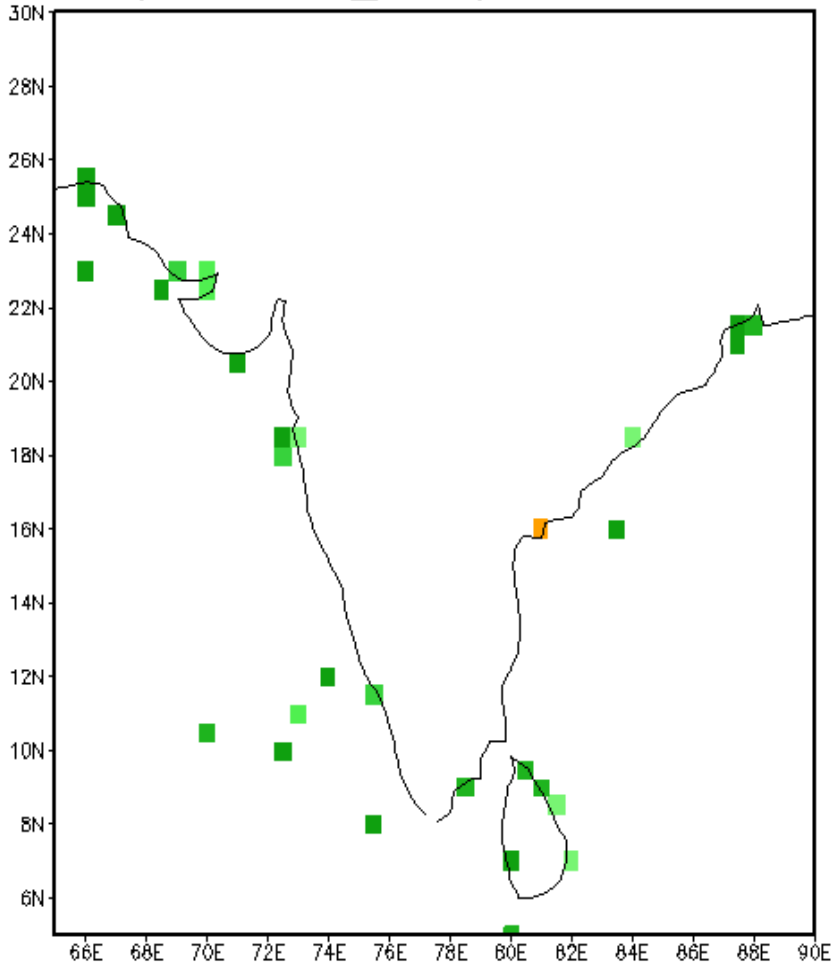
nd |

Relative difference in SWH for 3 data type

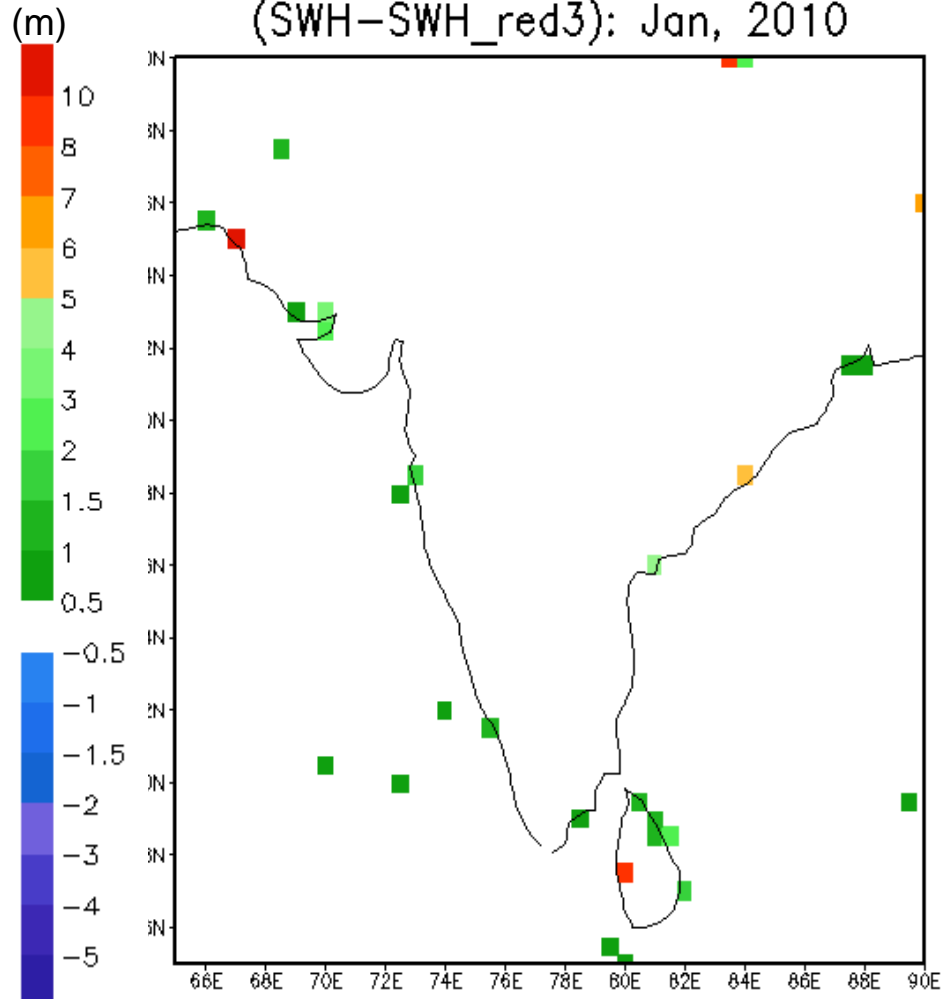
SWH (OCE3 Retracked.) : Highly Overestimated in the Coastal Area

SWH (RED3 Retracked.) : Physically acceptable with minor underestimation in Coastal Area

(SWH-SWH_oce3): Jan, 2010



(SWH-SWH_red3): Jan, 2010

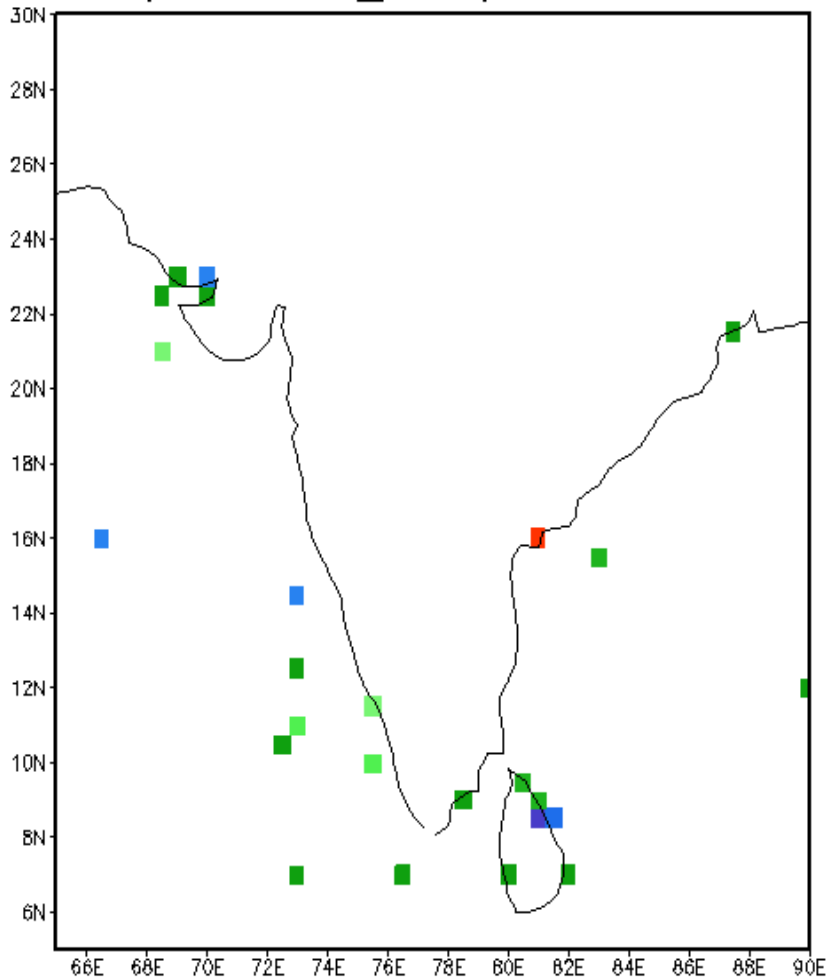


Relative difference in SWH for 3 data type

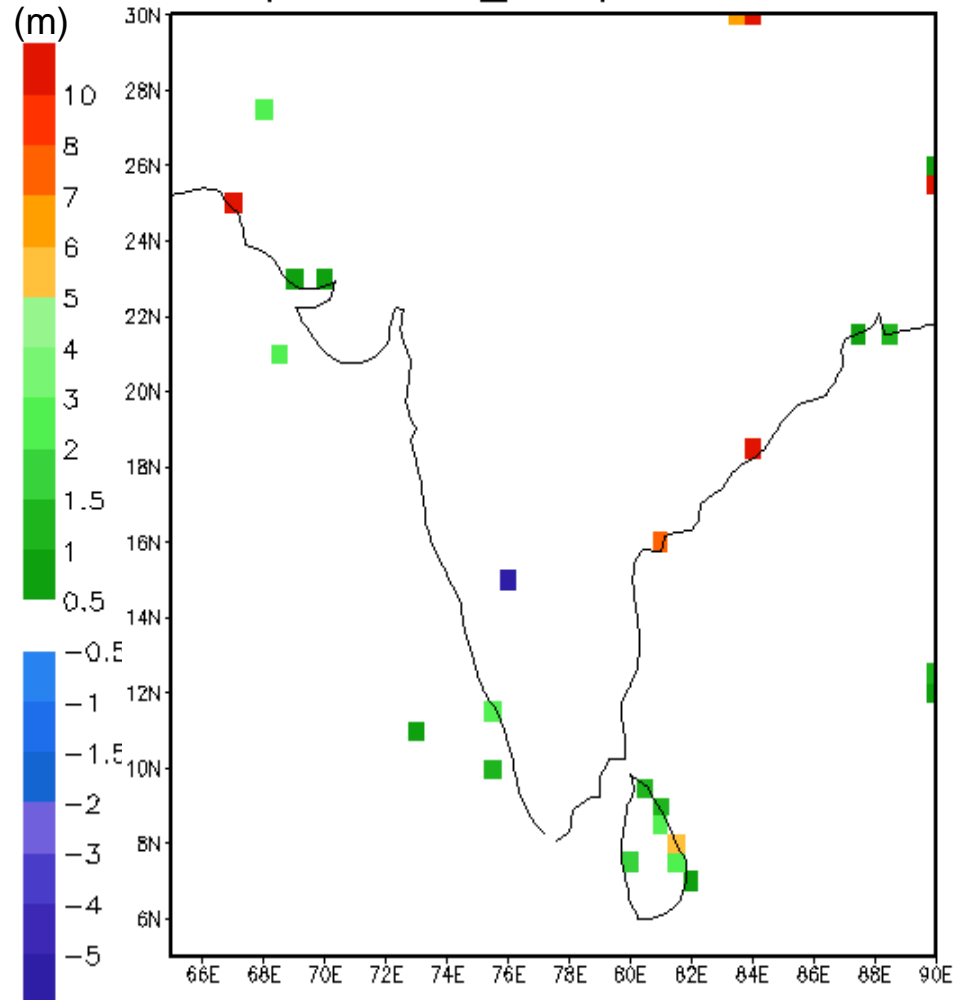
SWH (OCE3 Retracked.) : Highly Overestimated in the Coastal Area

SWH (RED3 Retracked.) : Physically acceptable with minor underestimation in Coastal Area

(SWH-SWH_oce3): Jul, 2010

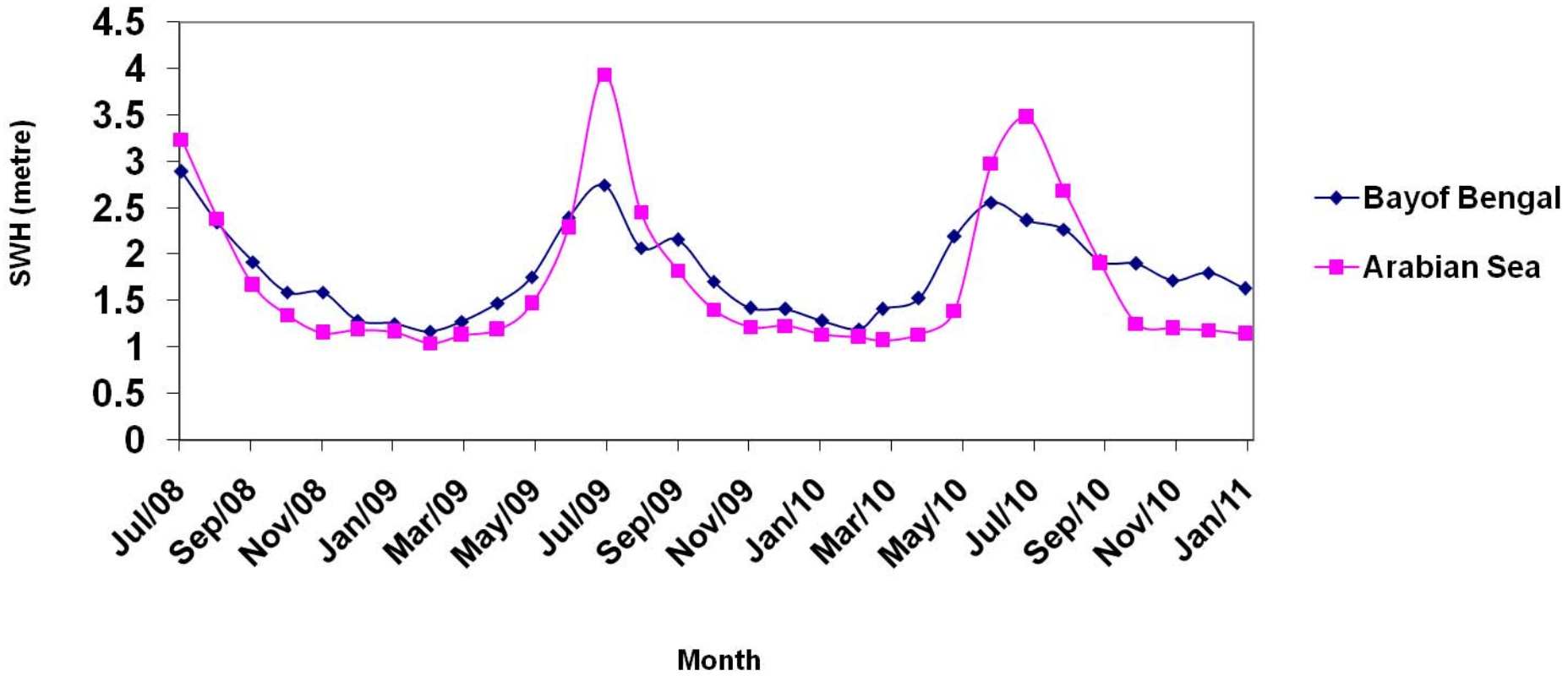


(SWH-SWH_red3): Jul, 2010



Geographical variation of monthly avg SWH

Bay of Bengal (12-22 deg,N; 80-90 deg E)
 Arabian Sea (12-22 deg. N; 65-75 deg E)

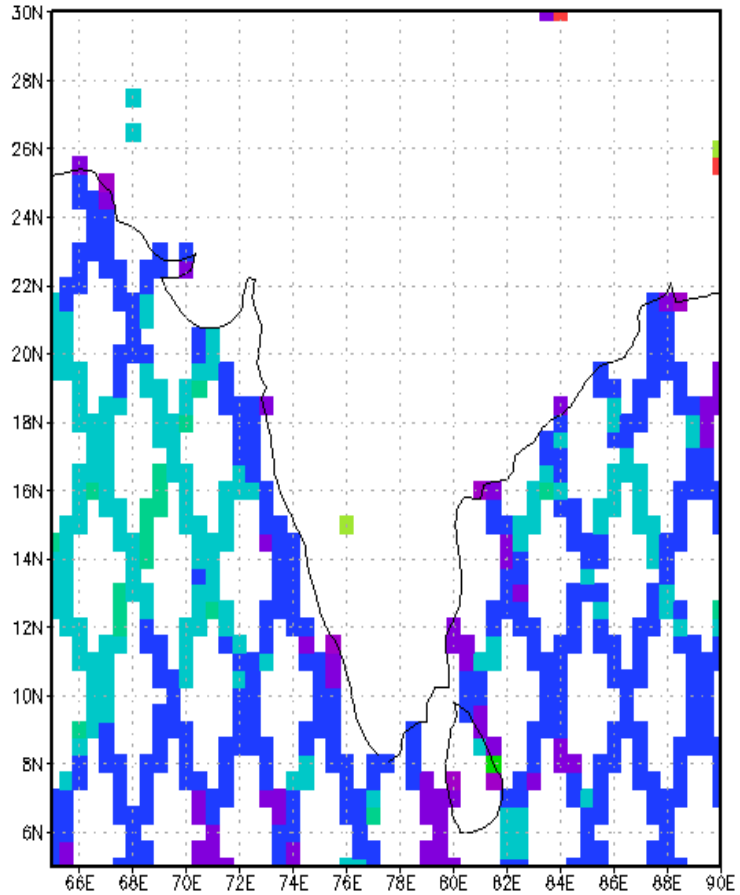


Outcome of SWH Analysis

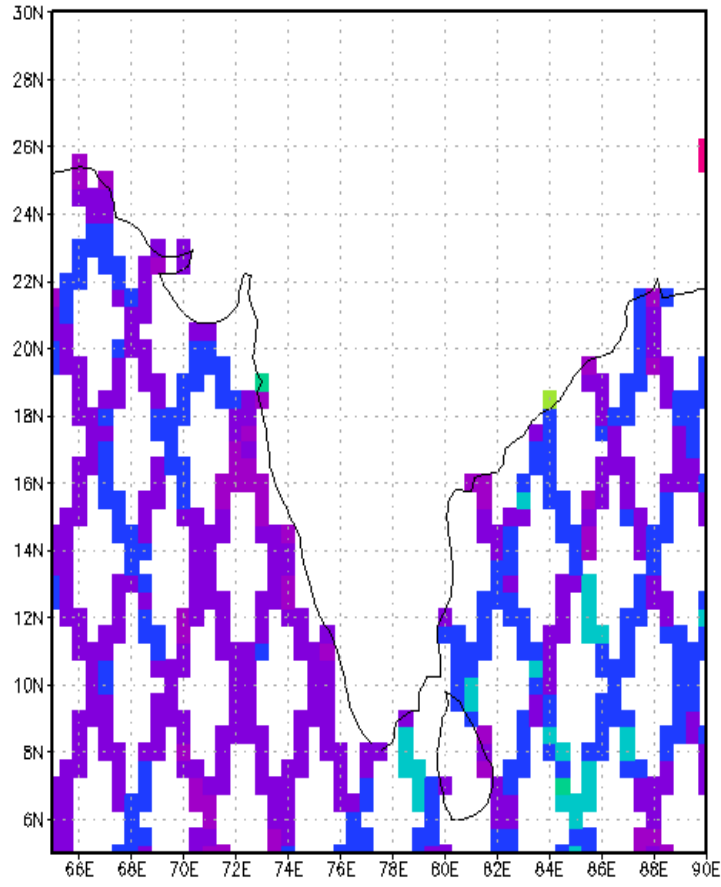
- Coastal Altimetry data (PISTACH) analysed for July,2008 – Jan,2011.
- Jason-2 observations of SWH show max 30m in coasts
- OCE3 retracking algorithm found to overestimate SWH in coastal areas
- The RED3 retracking algorithm found to produce reasonable SWH in Indian coastal region
- The analysis of monthly averaged SWH in coastal areas in Indian Ocean shows normal behavior with peak in June-July months.

Variation of Jason-2 Wind Speed (WS)

WS : Jul, 2010



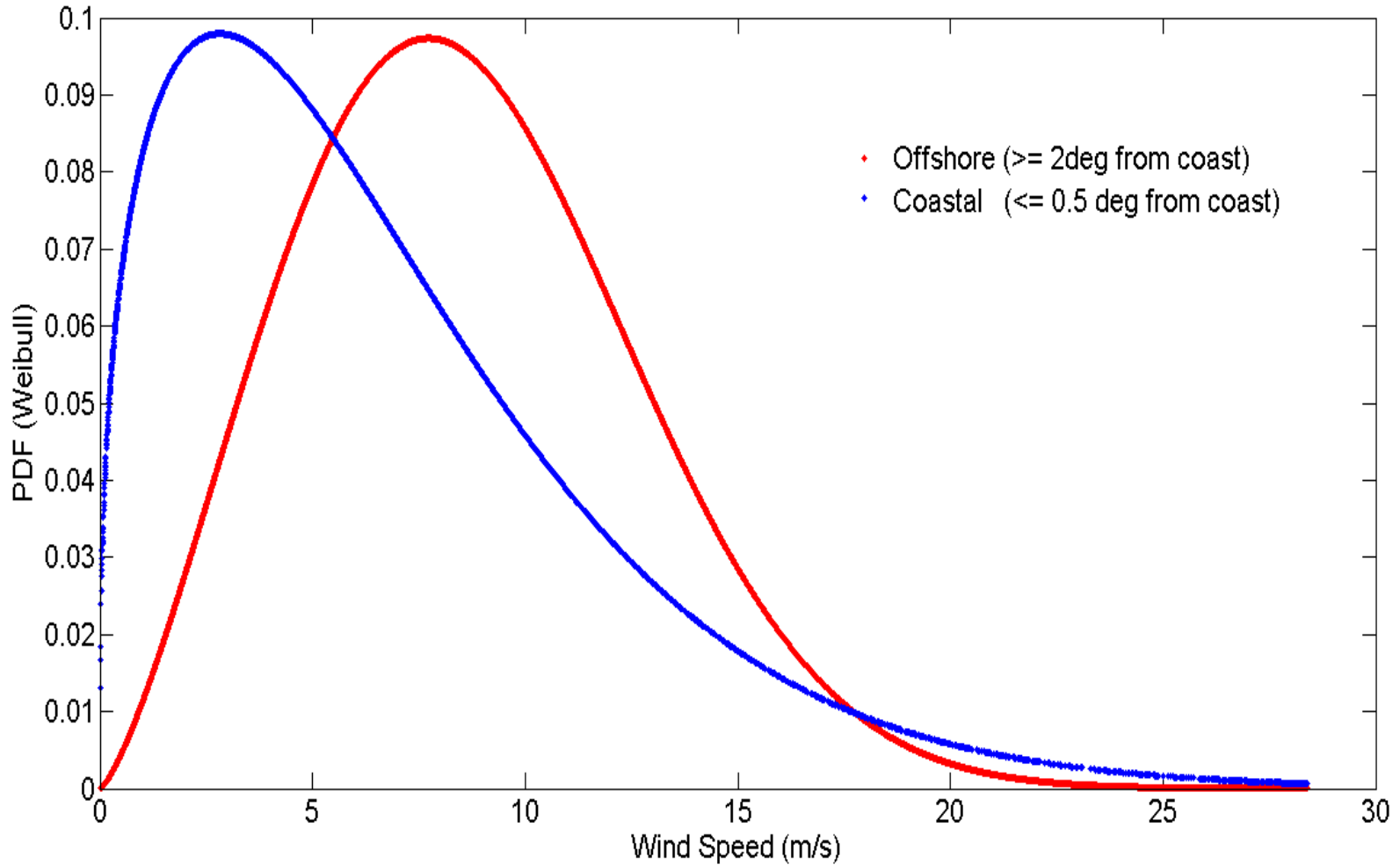
WS : Jan, 2011



Weibull Probability Distribution Function for Wind

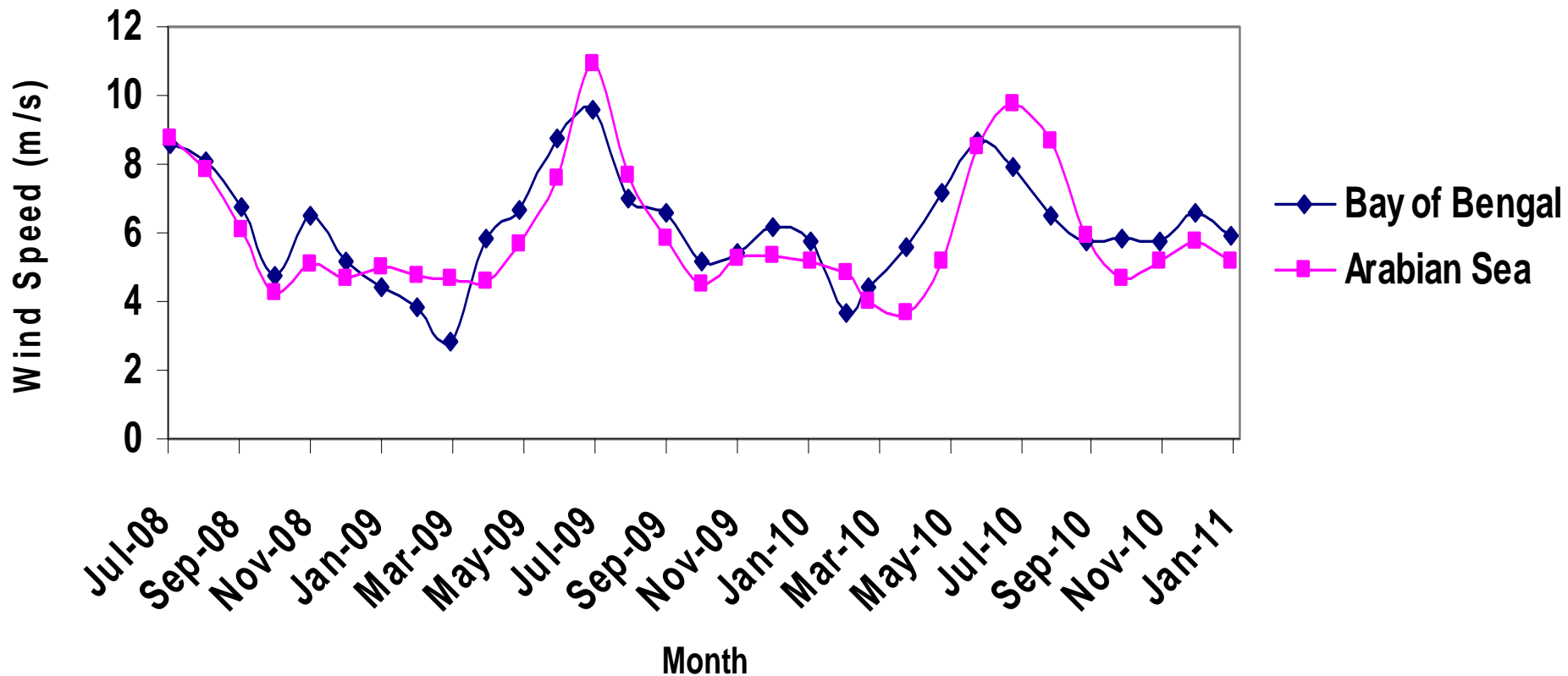
Coastal: Total No. of Points =14,204

Offshore: Total No. of Points =2,25,207



Geographical variation of monthly averaged Wind

Bay of Bengal (12-22 deg,N; 80-90 deg E)
 Arabian Sea (12-22 deg. N; 65-75 deg E)

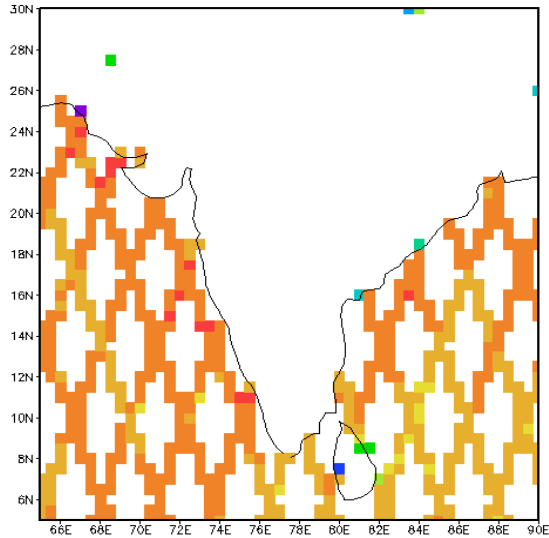


Outcome of Wind Speed Analysis

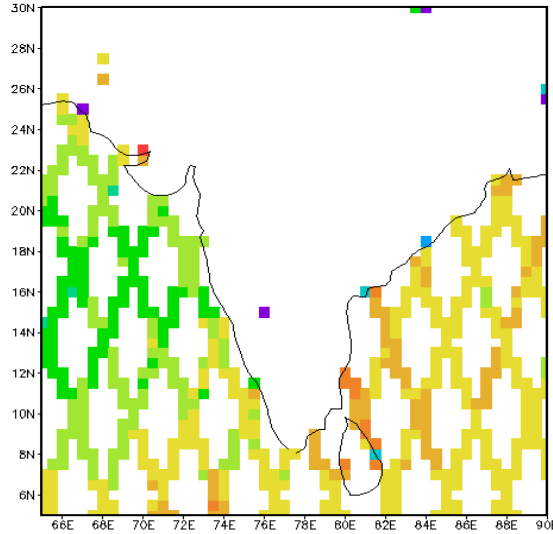
- The peak of PDF for coastal winds occurs for a lower wind speed in comparison to offshore winds.
- The transition of wind data from offshore to coastal is abrupt in July.
- The behavior of monthly averaged wind speeds in both Bay of Bengal and Arabian Sea are similar.

Variation of Jason-2 Sea-State-Bias (SSB) and Wet-Troposphere Correction

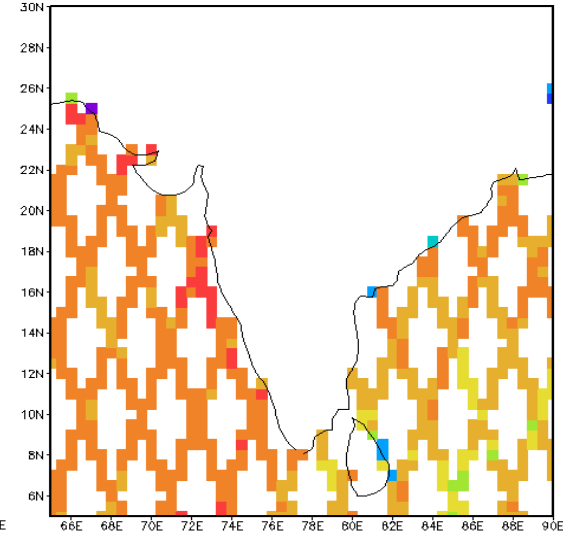
SSB : Jan, 2010



SSB : Jul, 2010



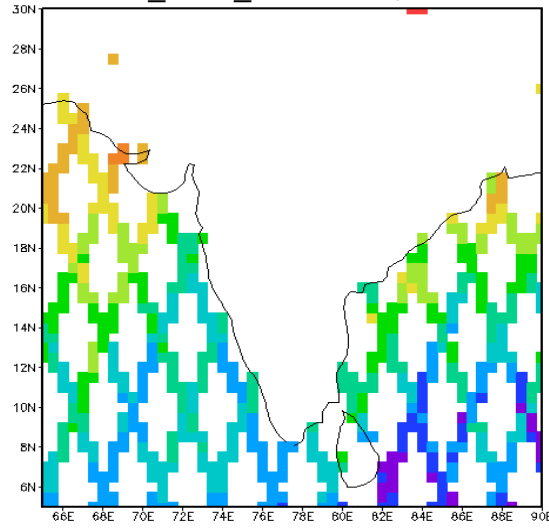
SSB : Jan, 2011



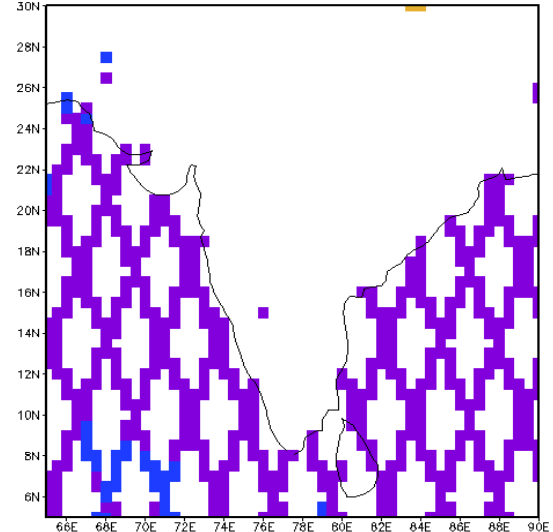
(cm)



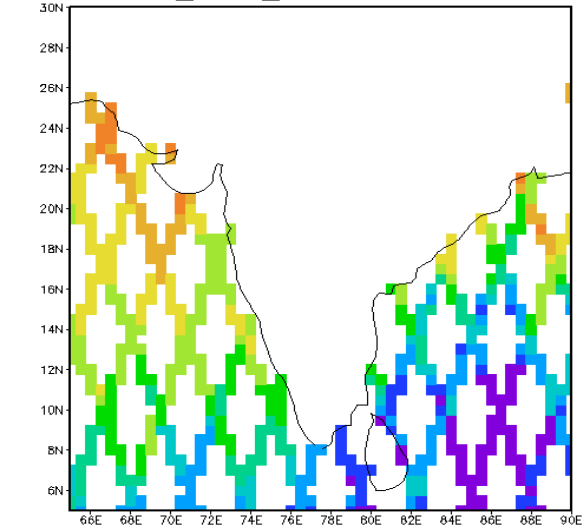
WET_TROP_CORR: Jan, 2010



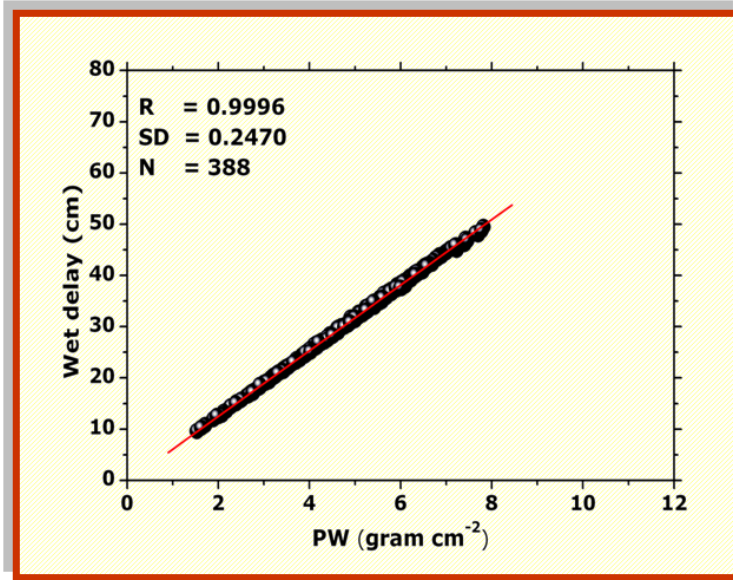
WET_TROP_CORR: Jul, 2010



WET_TROP_CORR: Jan, 2011

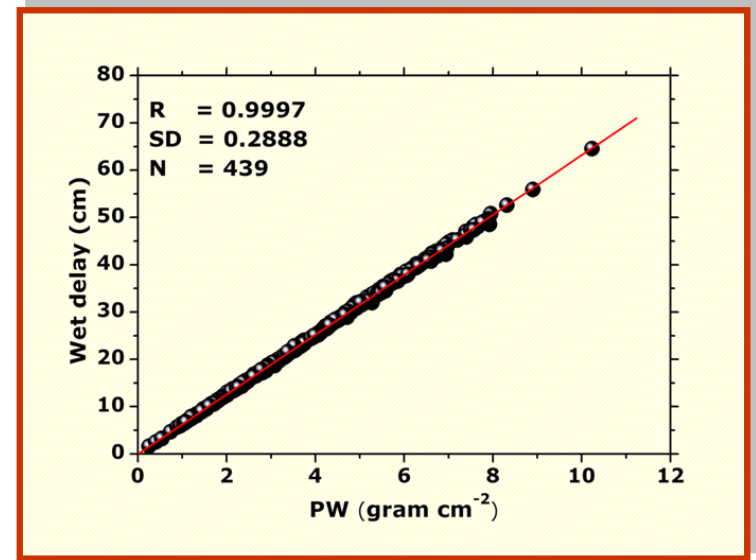


Relation between water vapor and wet delay



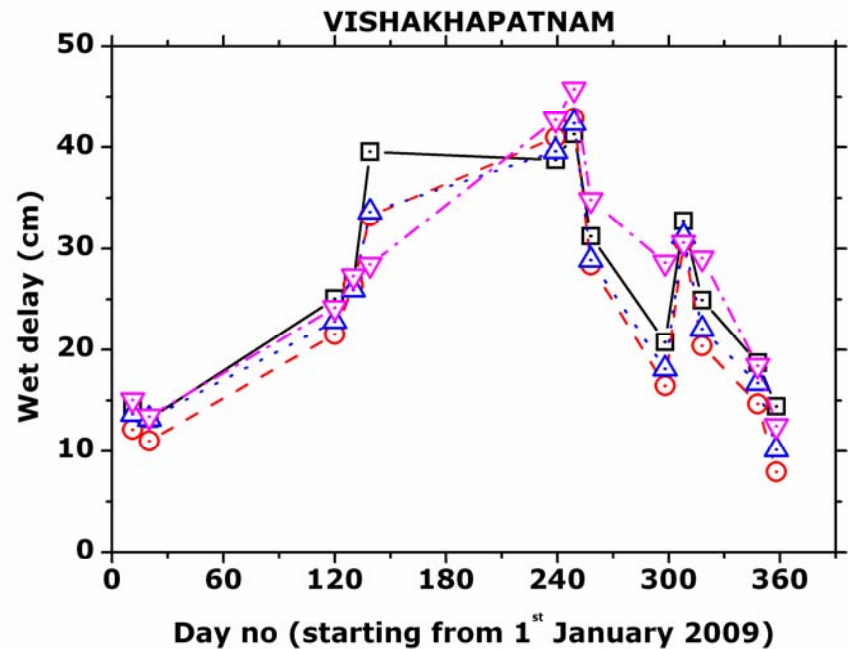
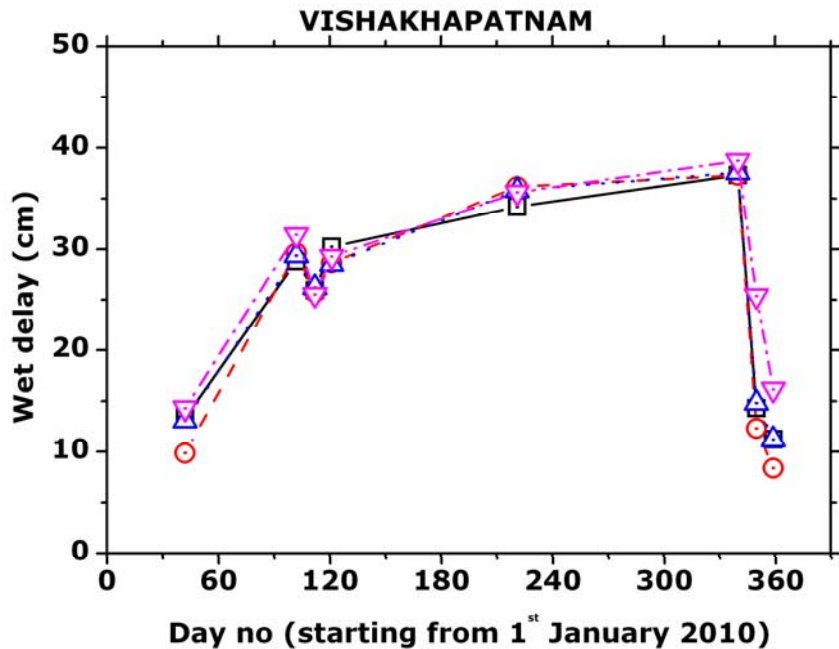
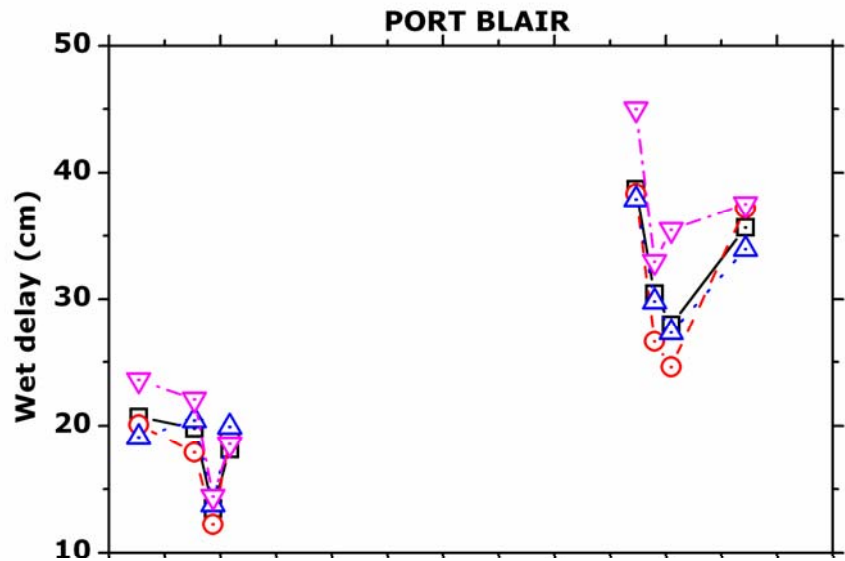
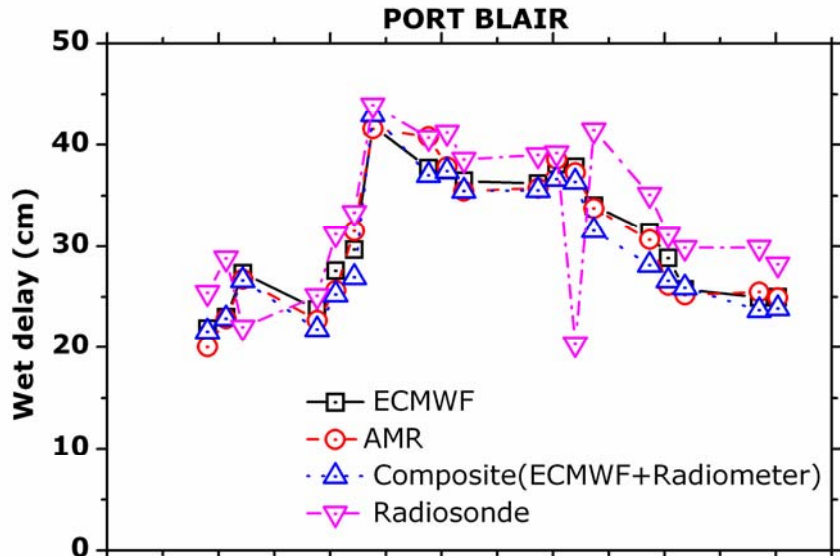
PORT BLAIR

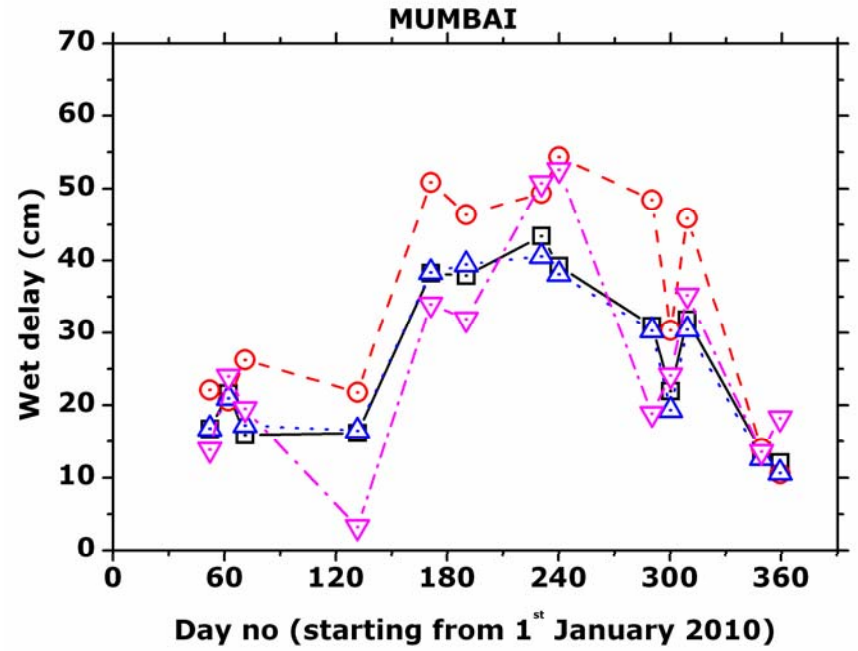
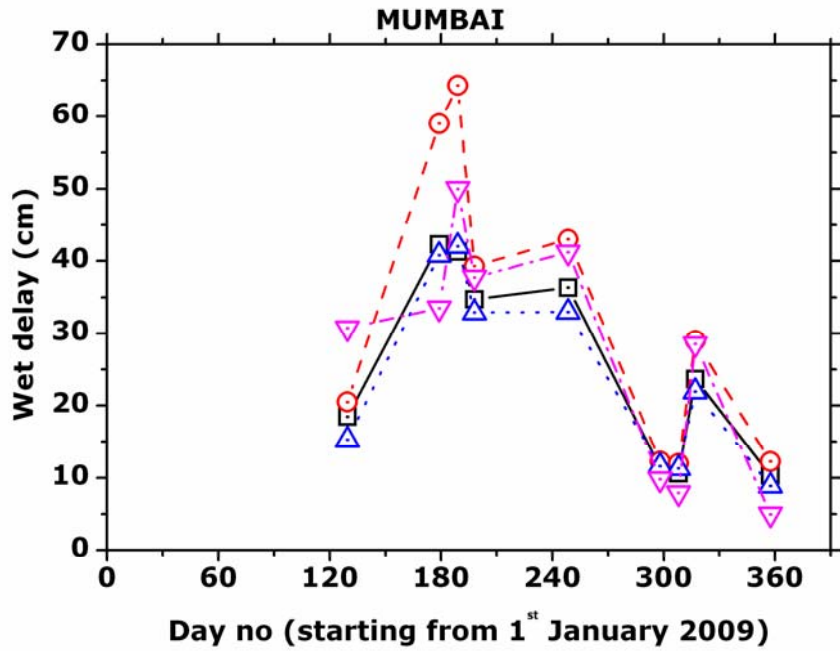
2010



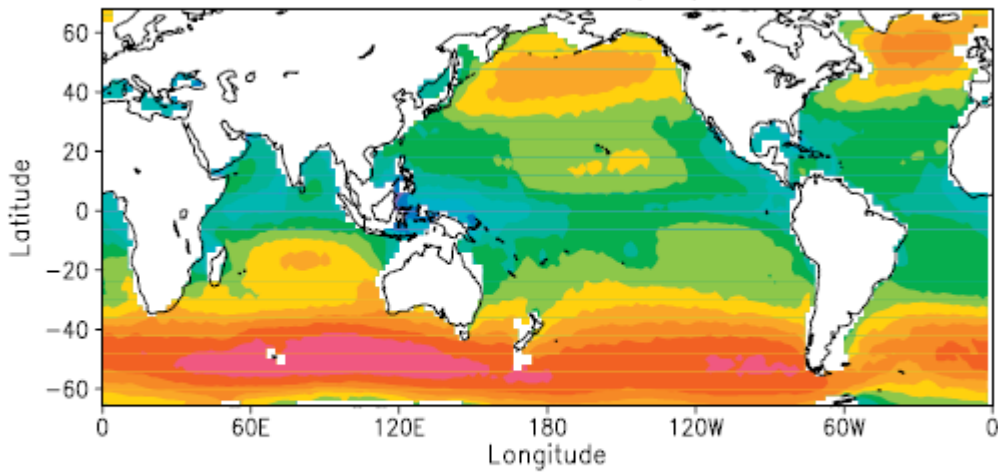
MUMBAI

Comparison of wet tropospheric delays between radiosonde and JASON-2 COASTALT near coastal regions

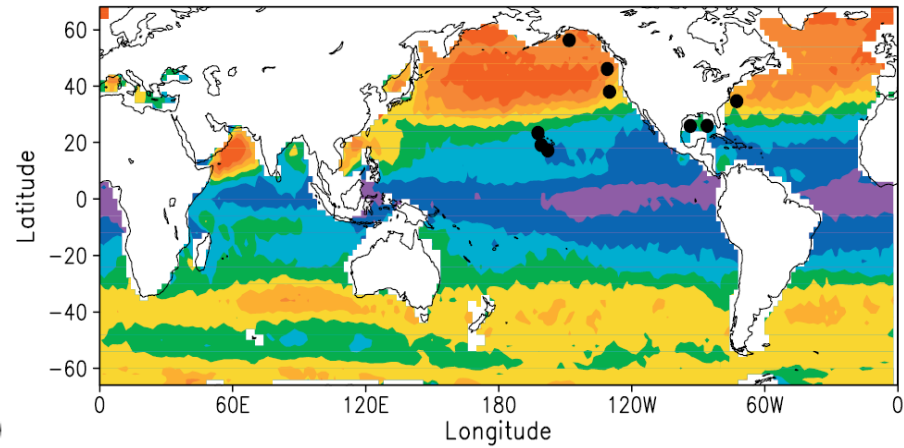




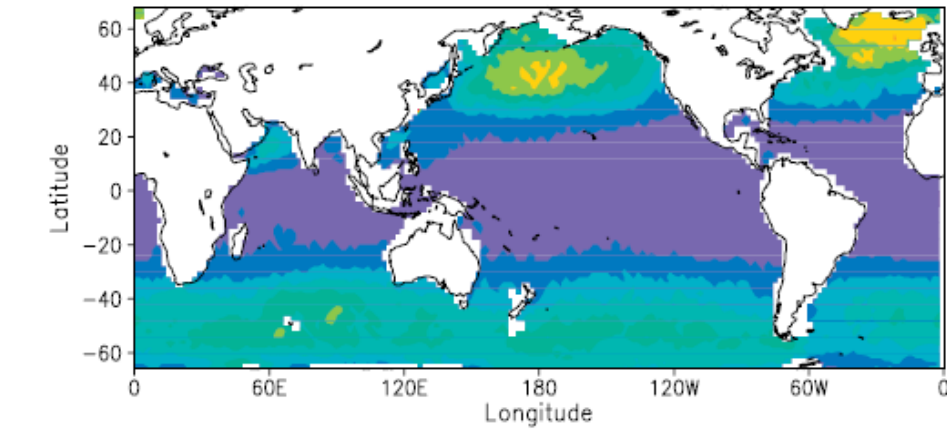
Mean EM Bias (cm)



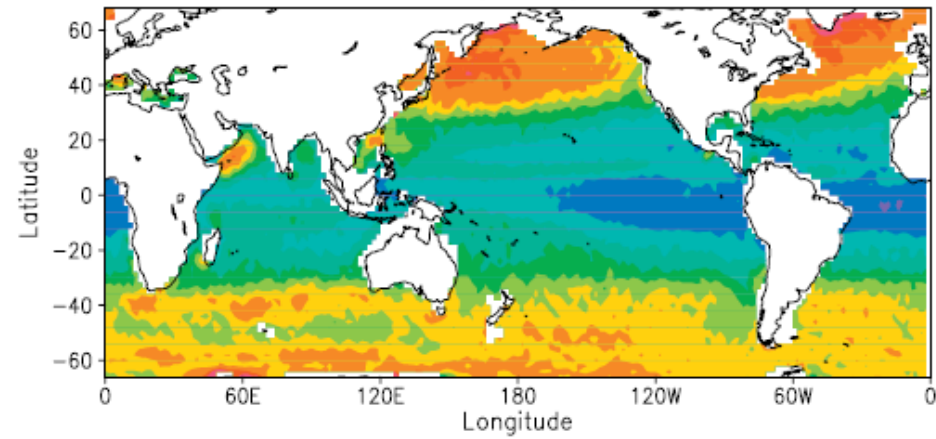
Var EM Bias (cm²)



var wave height (m \angle)



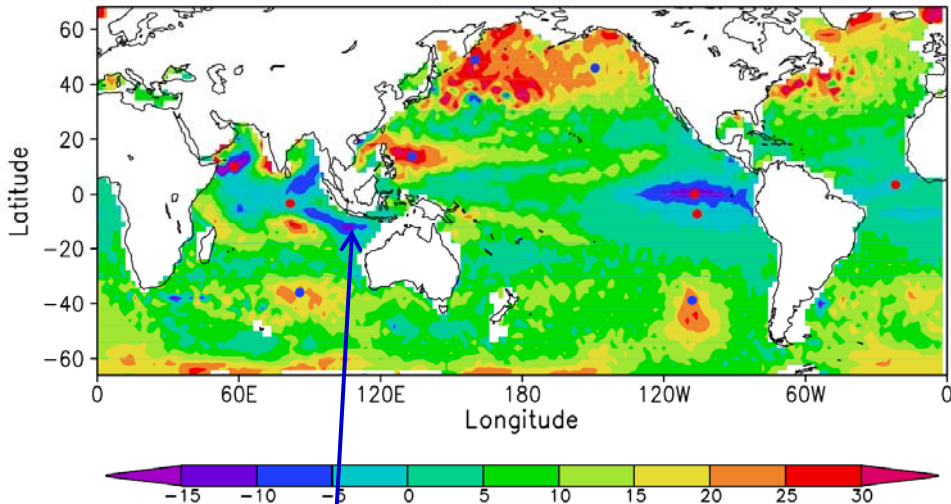
Var Wind Speed (m²/s²)



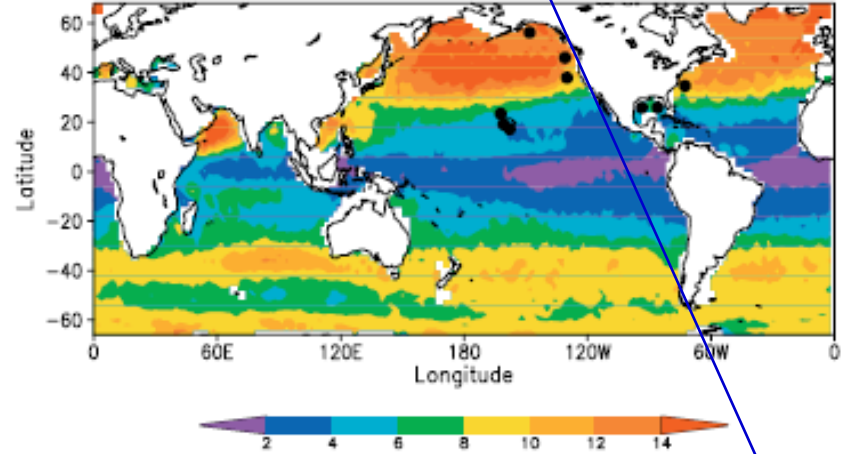
$$\eta = \eta_t + \eta_{em}$$

$$\langle \eta^2 \rangle - \langle \eta_t^2 \rangle = \langle \eta_{em}^2 \rangle + 2 \langle \eta_t \eta_{em} \rangle$$

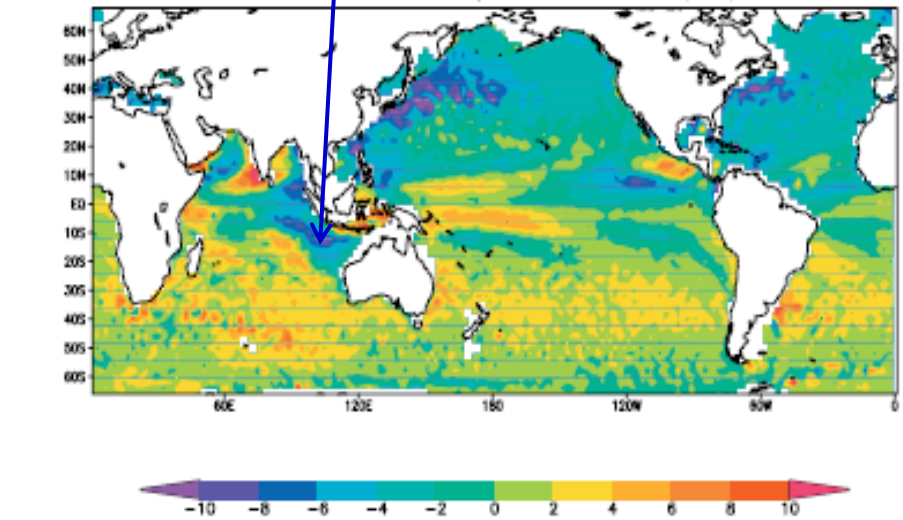
Var(Uncorr SSH) - Var(Corr SSH) (cm²)



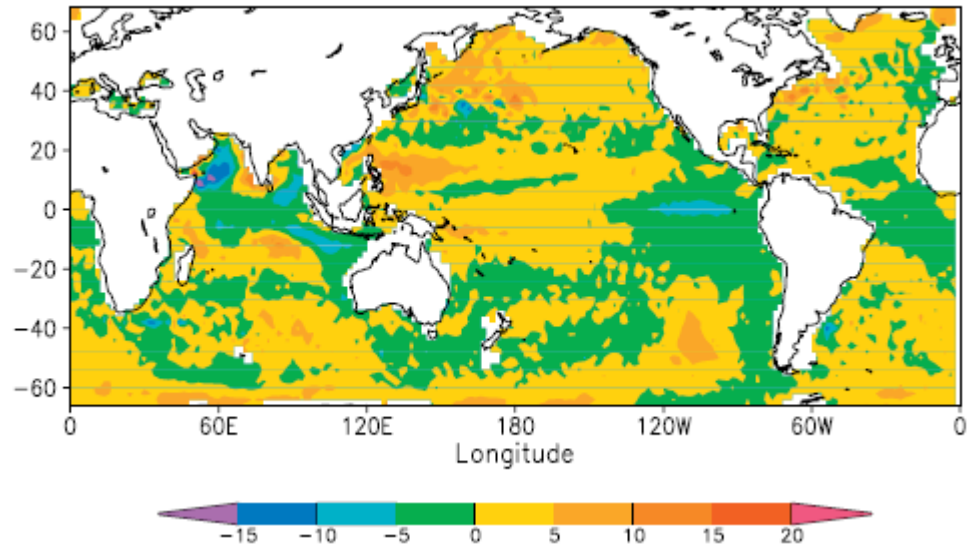
Var EM Bias (cm²)

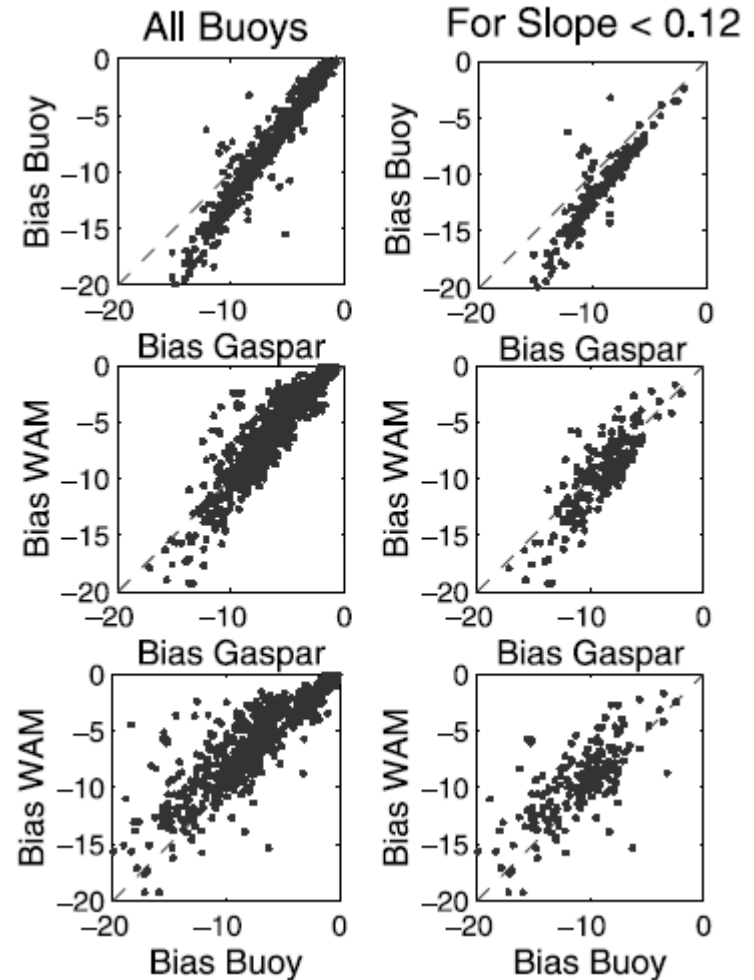
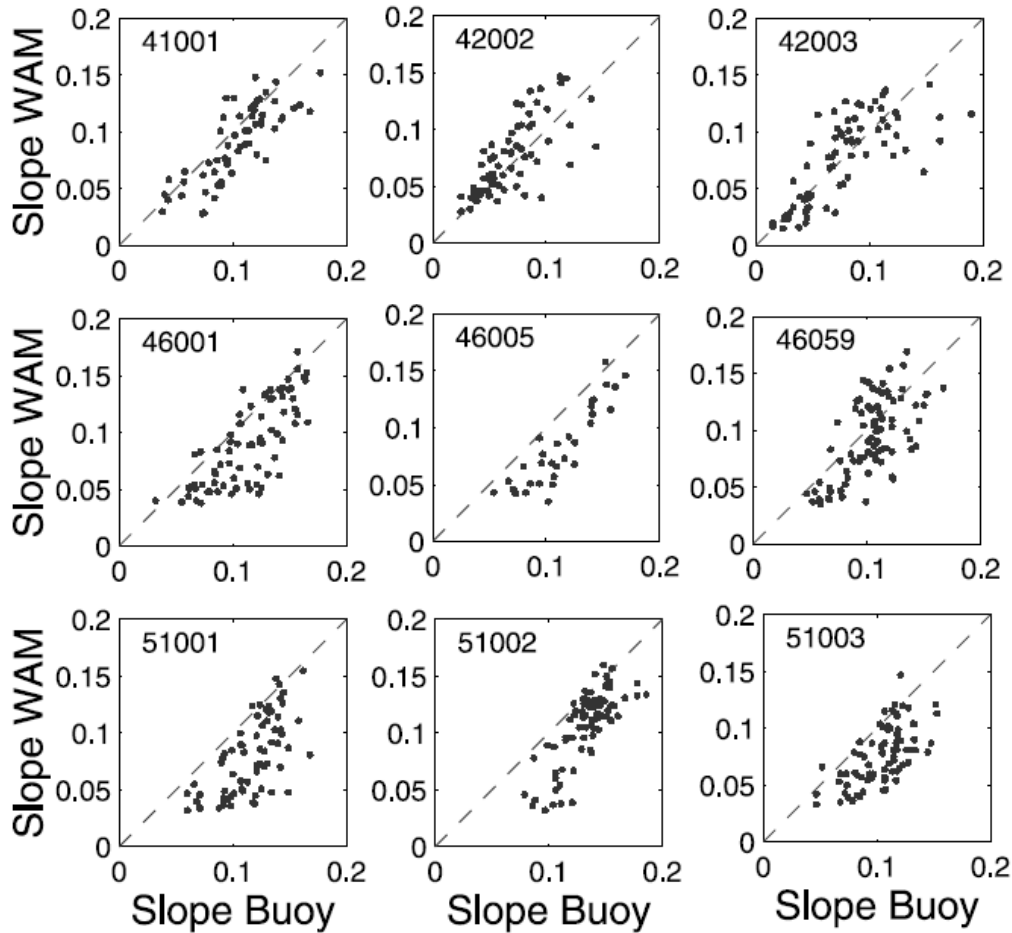


Sea Level Anomaly for Jan-Mar (cm)



Cov(SSH Corr, EMB)

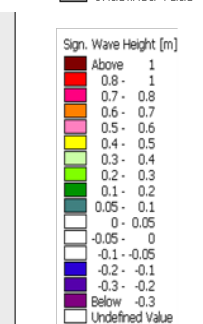
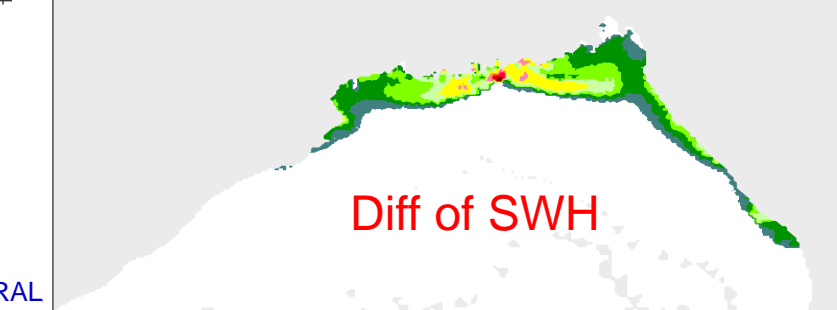
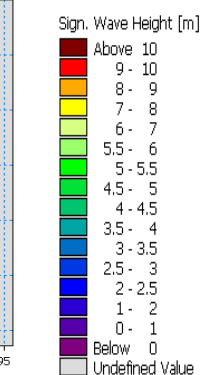
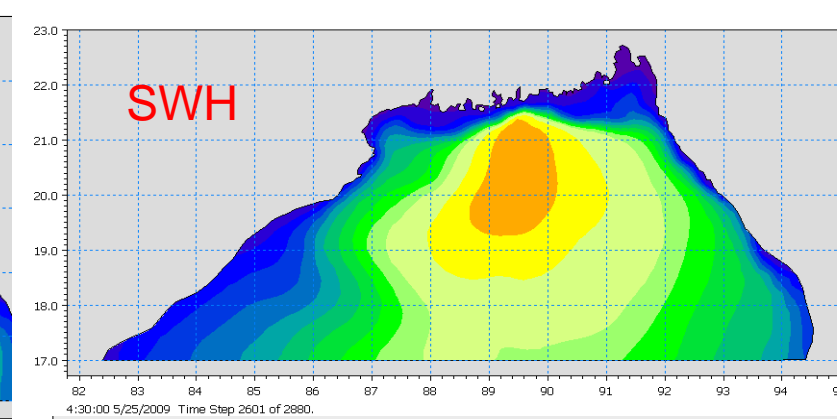
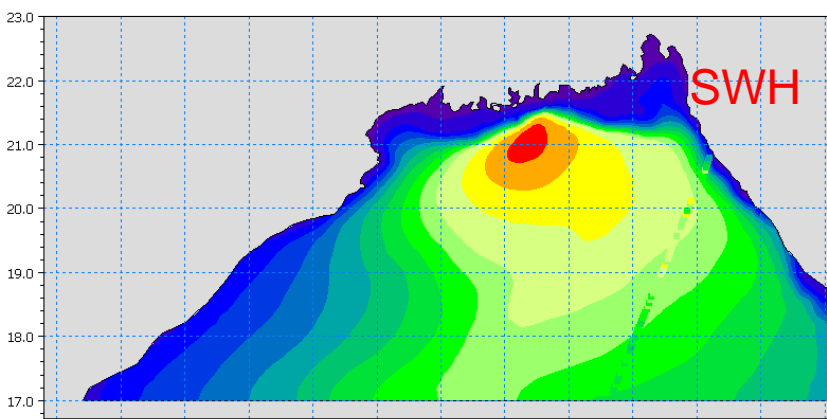
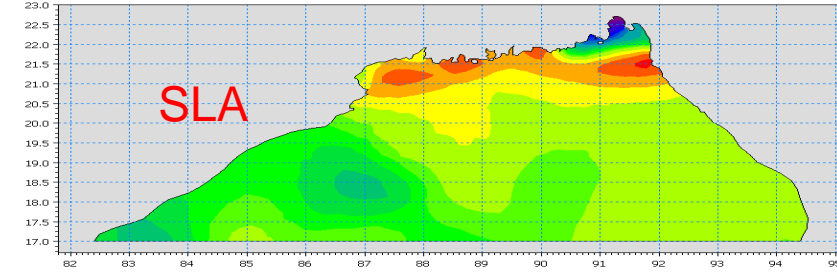
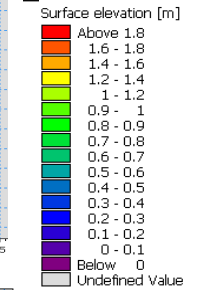
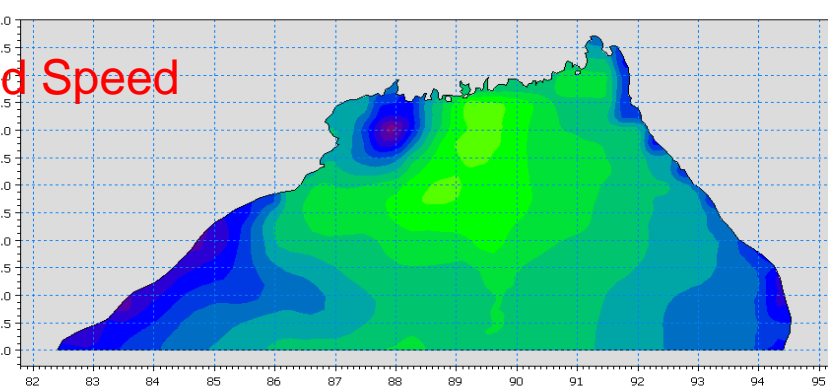
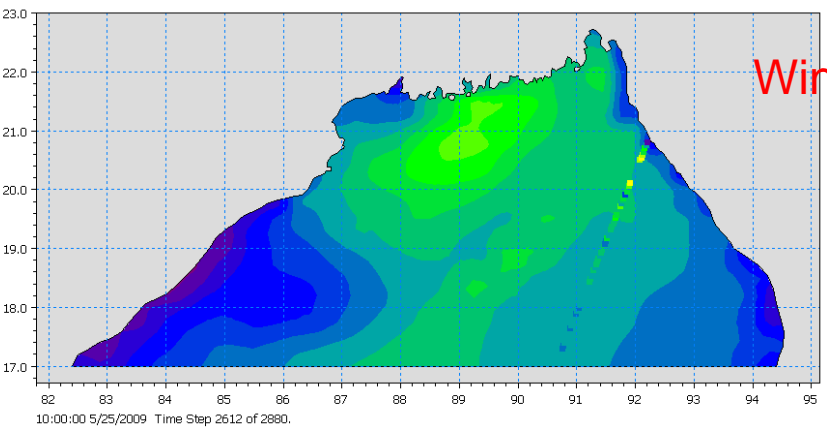
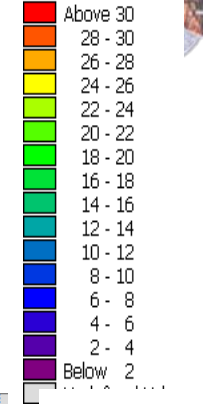




EM Bias correction based on Wave Slope derived from Wave model can be explored



Wind speed (m/s)



Thanks