A Study of the Rain Impact Model (RIM) under different wind speed conditions

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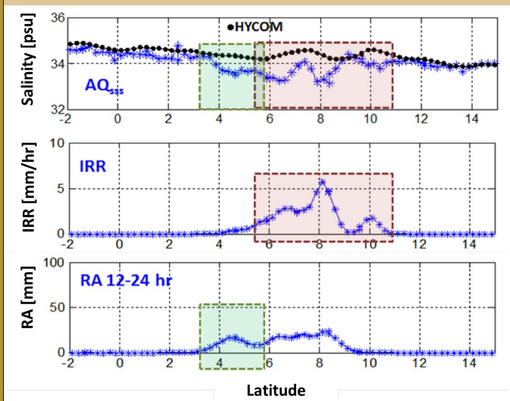
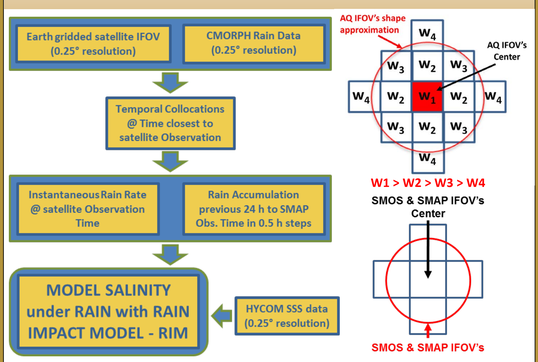
UNC

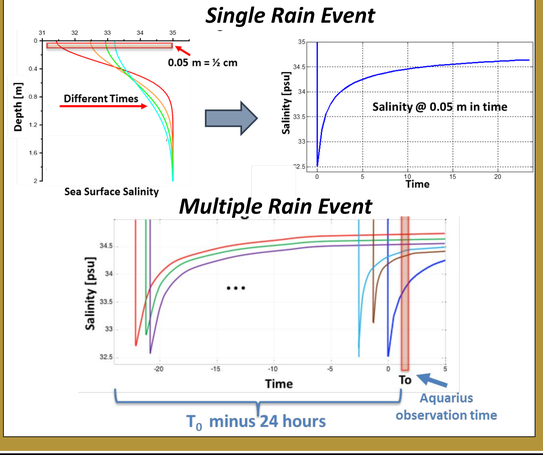
OBSERVATIONS DURING RAIN



METHODOLOGY



APPROACH



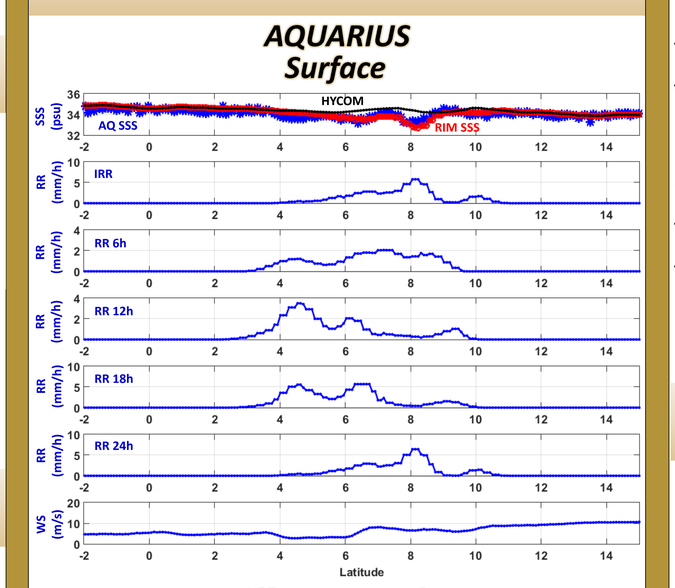
RIM FORMULATION

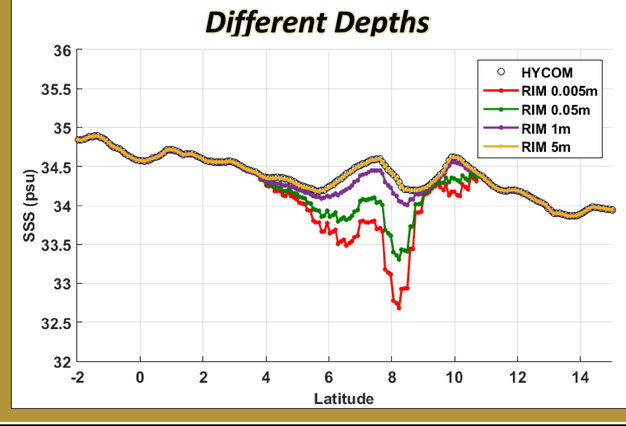
$$RIM_{SSS} = S_0\left[\left(\prod_{i=1}^{n}\left[1+\frac{R_1 t}{\sqrt{K_z * t_i}}e^{(-z^2/4K_z t_i)}\right]\right) * \left[1+\frac{R_2}{\sqrt{K_z * t}}e^{(-z^2/4K_z t)}\right]\right]^{-1}$$

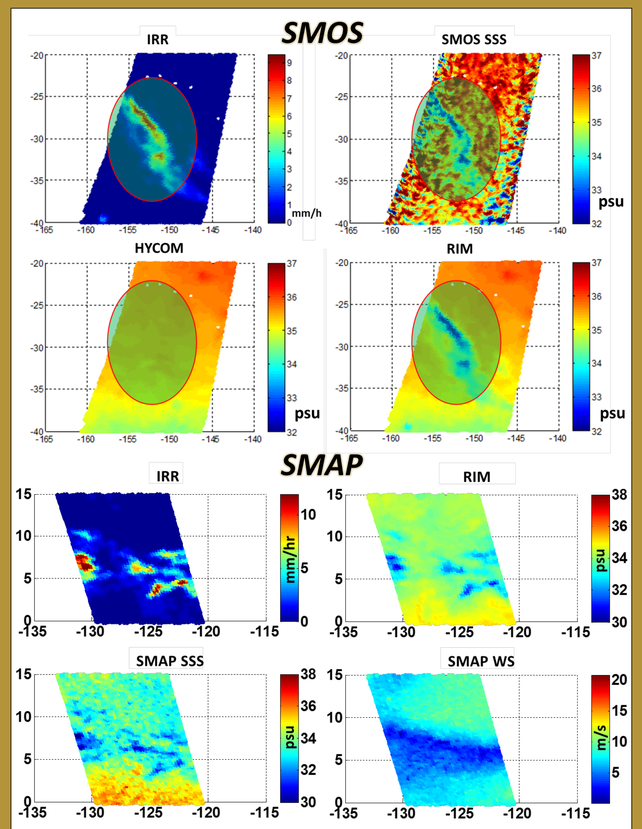
Rain Impulses @ 30 min samples (i = 1:48)

S_0 = HYCOM Salinity (psu)	K_z = vertical eddy diffusivity (m^2/s)
z = depth (m)	t = time (s)
R = rain impulse function (m)	$R_{1i} = c_2 * f(RR_i)$ $R_2 = c_1 * f(IRR)$ c_1 & c_2 empirical weighting coeff.

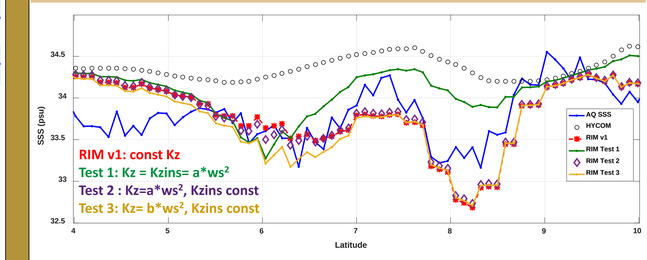
FIRST RESULTS: CONSTANT Kz

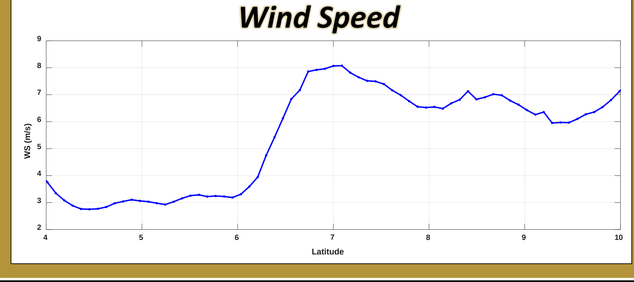


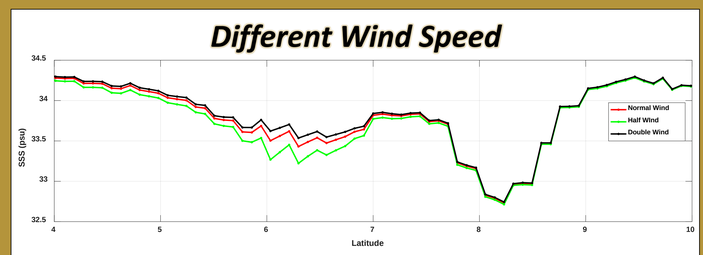




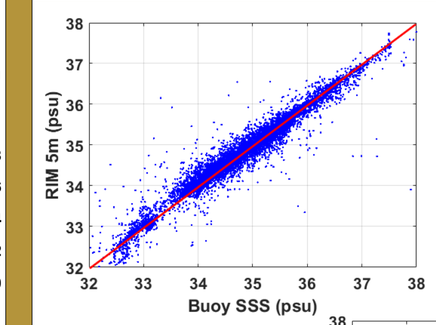
VARIABLE DIFFUSIVITY





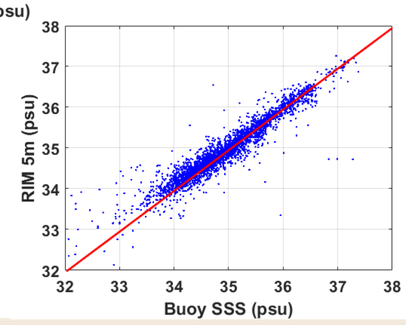


BUOYS COMPARISONS



-60 ≤ Lat ≤ 60

-20 ≤ Lat ≤ 20



SUMMARY

- Rain stratifies the ocean, creating a fresh layer near the ocean surface
  - This layer mixes laterally and vertically over a few hours
- The rain-affected surface layer will be fresher than seawater from directly below
  - Satellite-measured salinities would be fresher than in-situ measurements (5 m - 10 m depth)
- RIM has been demonstrated to work for Aquarius, SMAP & SMOS
- RIM-predicted SSS agrees well with surface salinity retrieved from satellites
  - RIM provides a robust quality flag for identification of salinity stratification