Short Term Statistics during ITOP

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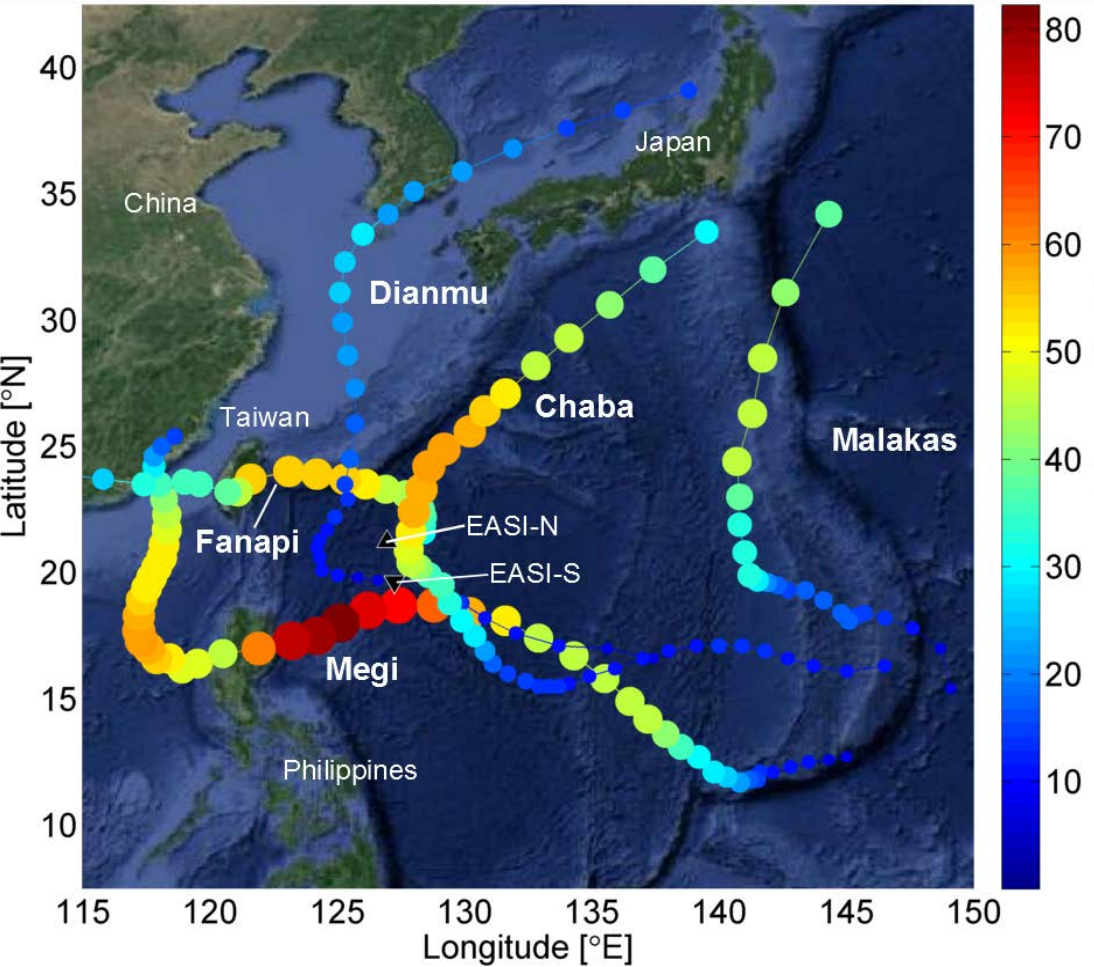
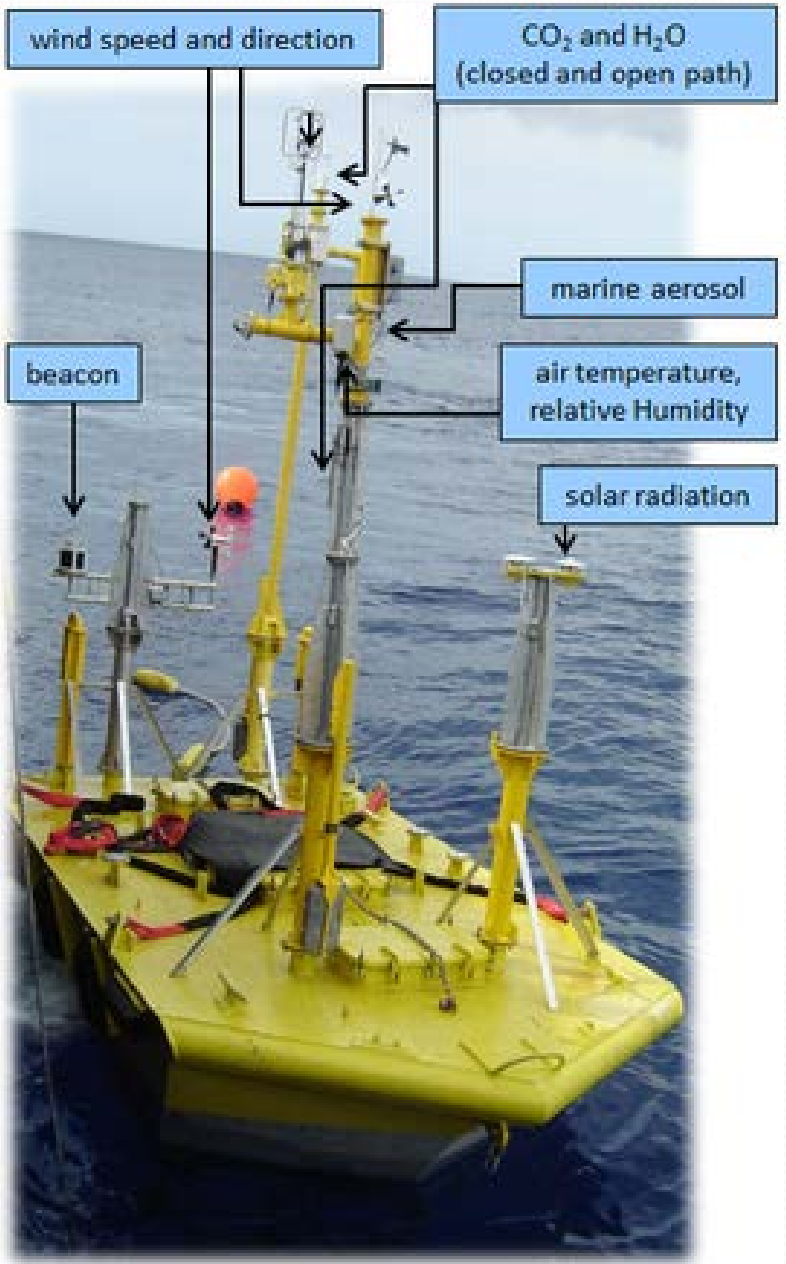
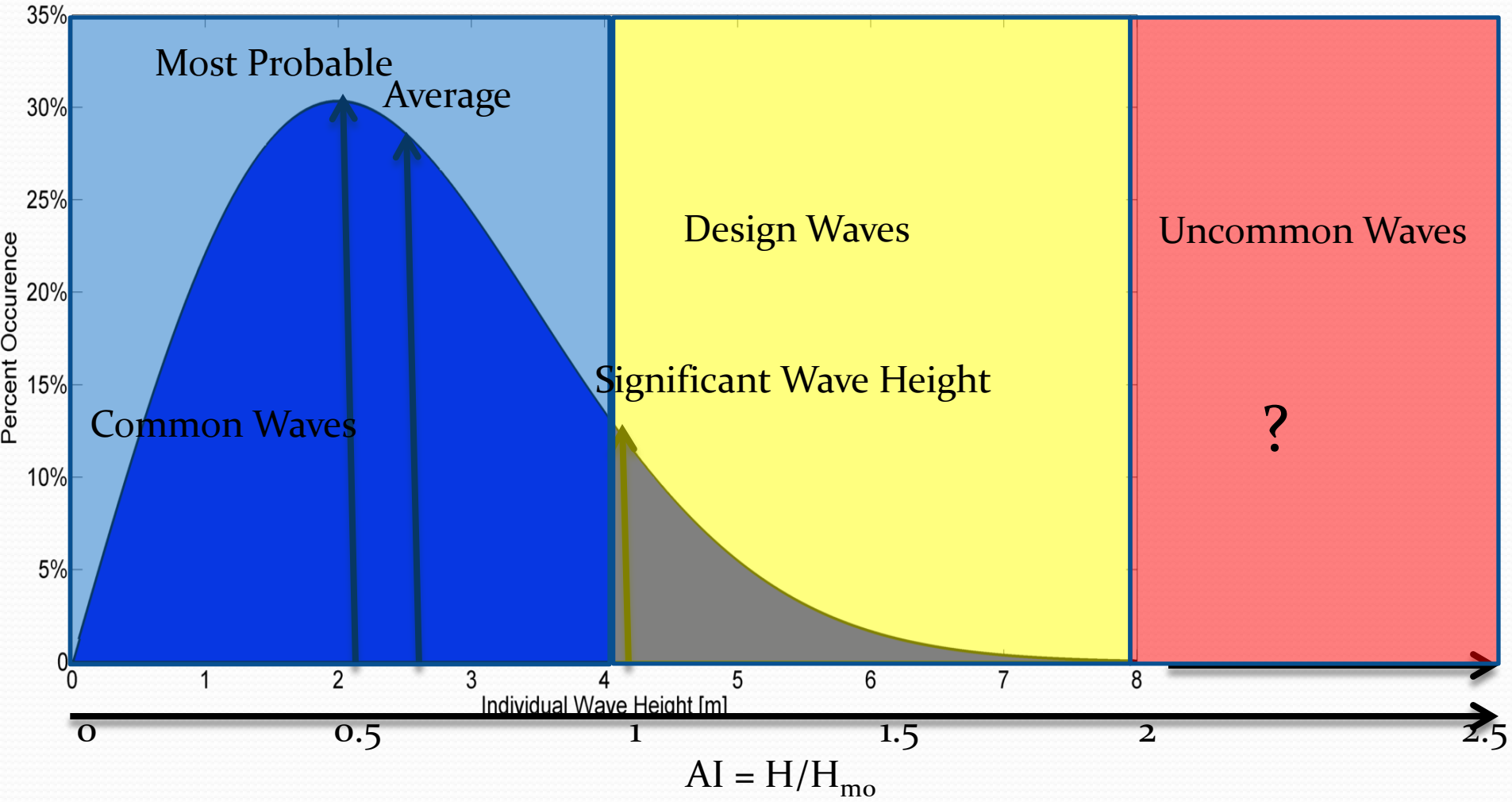
11.09.2015 14th Waves Workshop



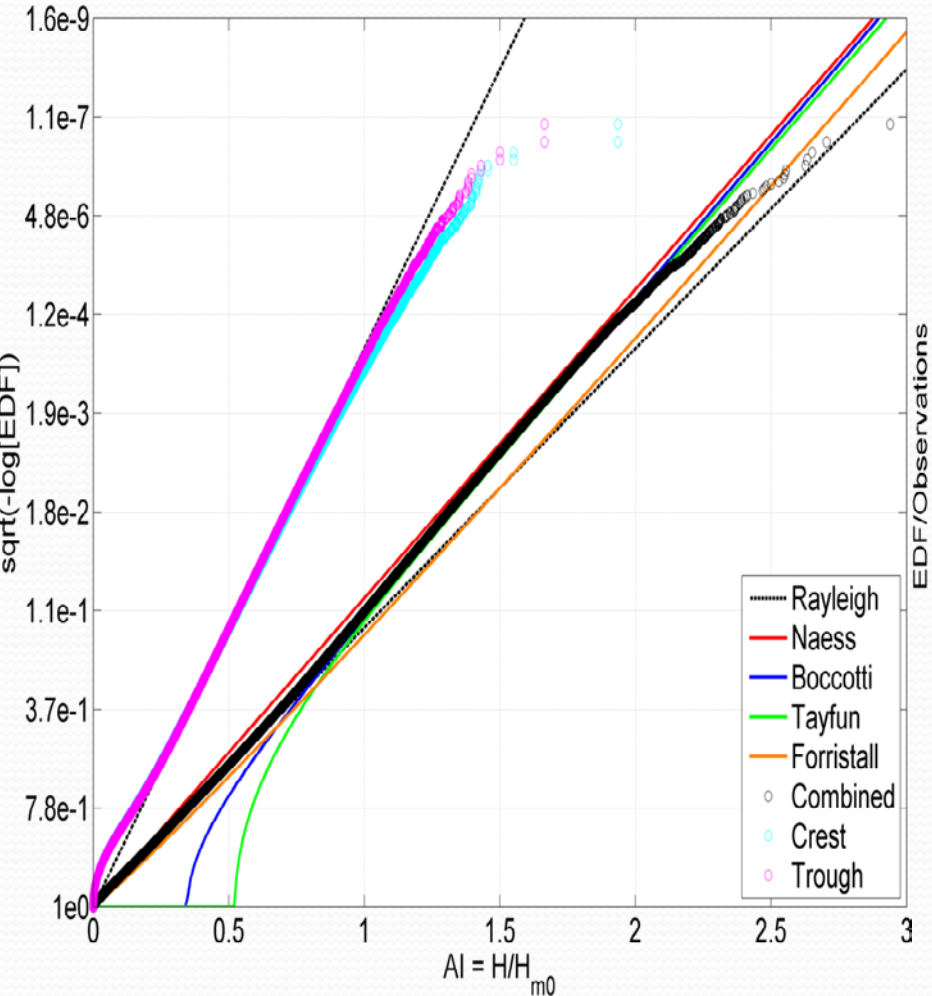


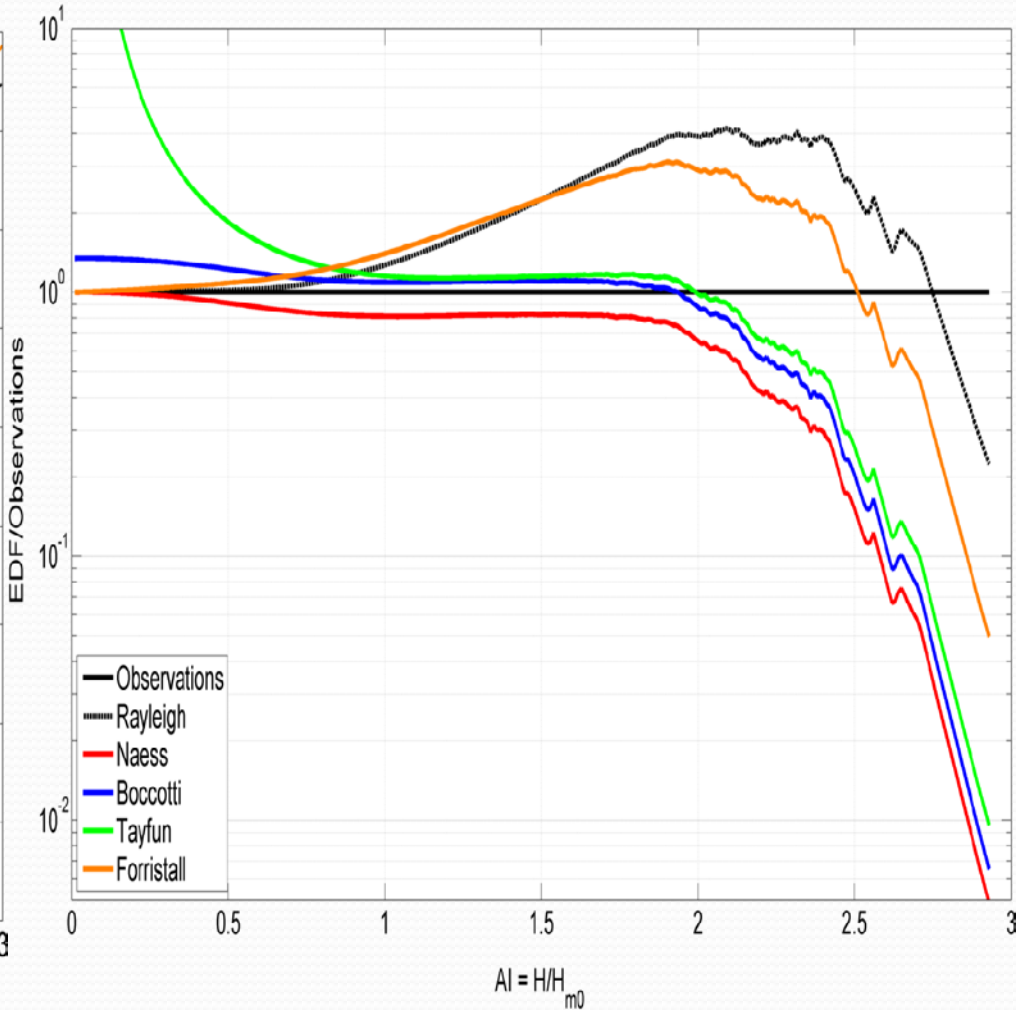
Rayleigh Distribution



$\sqrt{-\log[EDF]}$

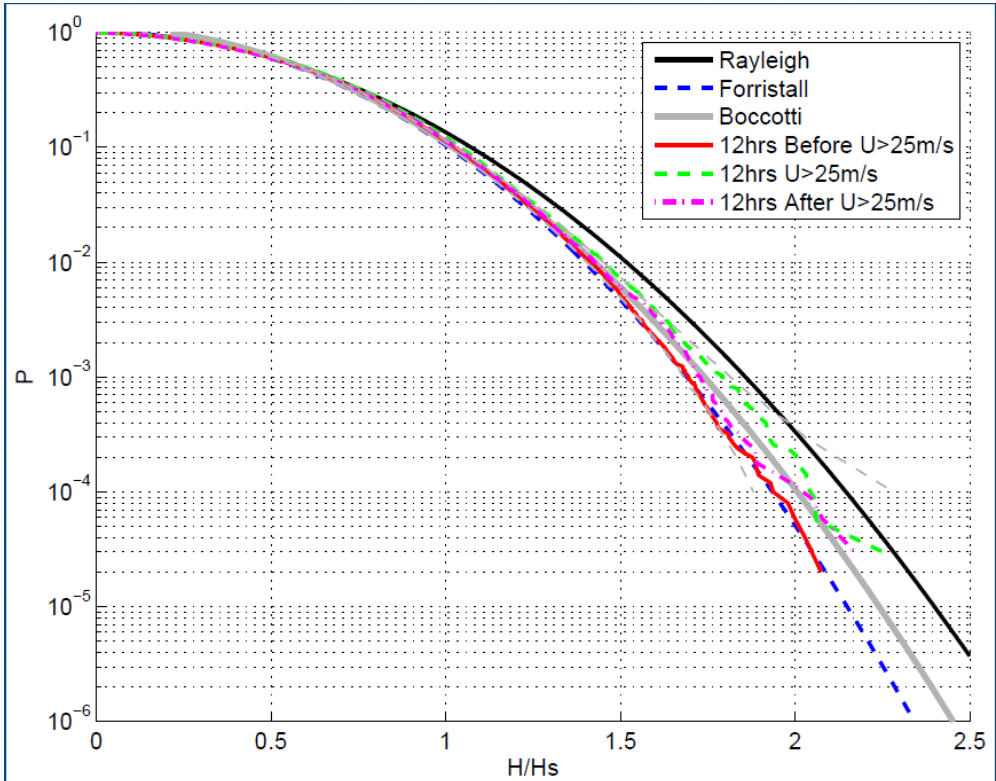
$EDF/Observations$



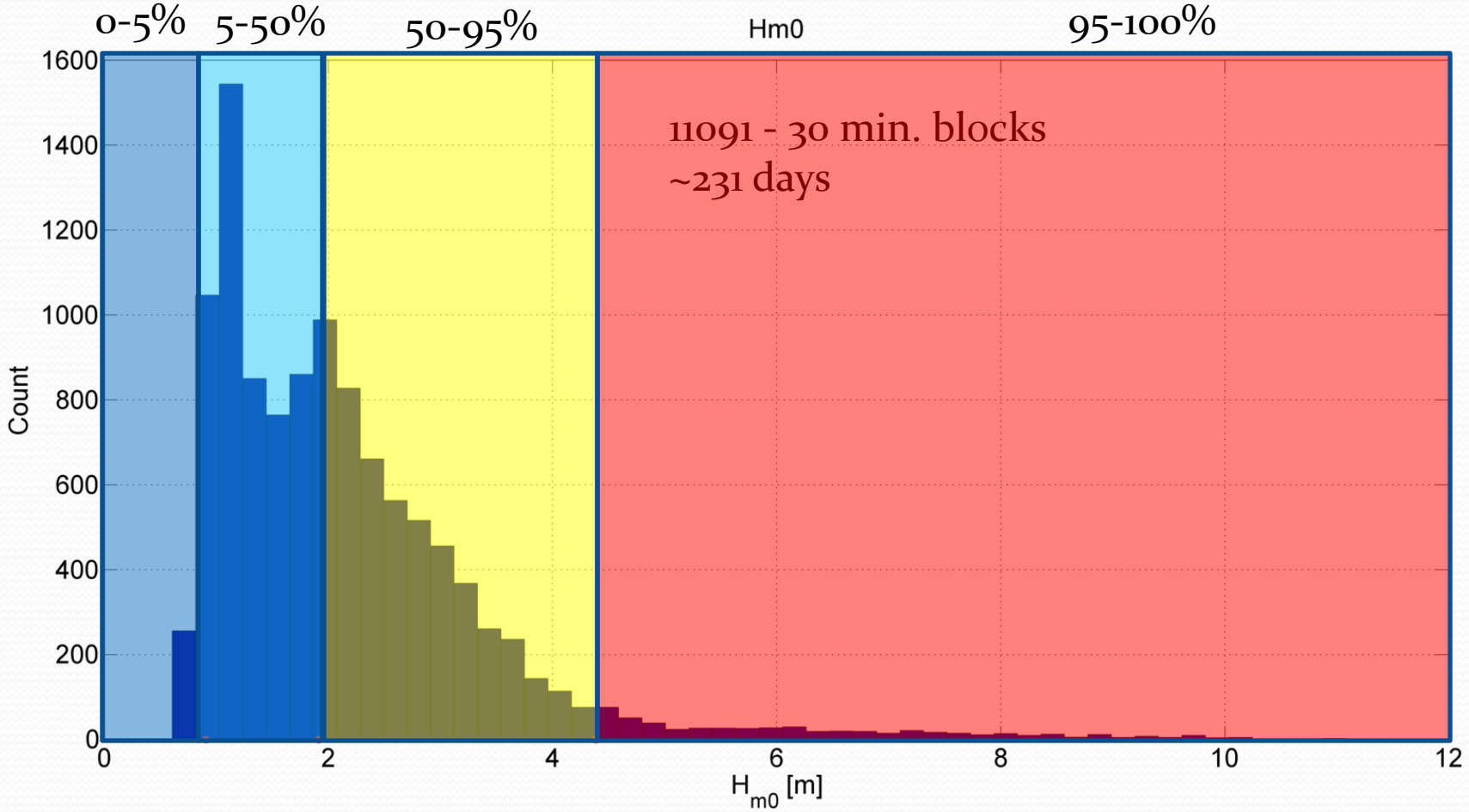


Motivation

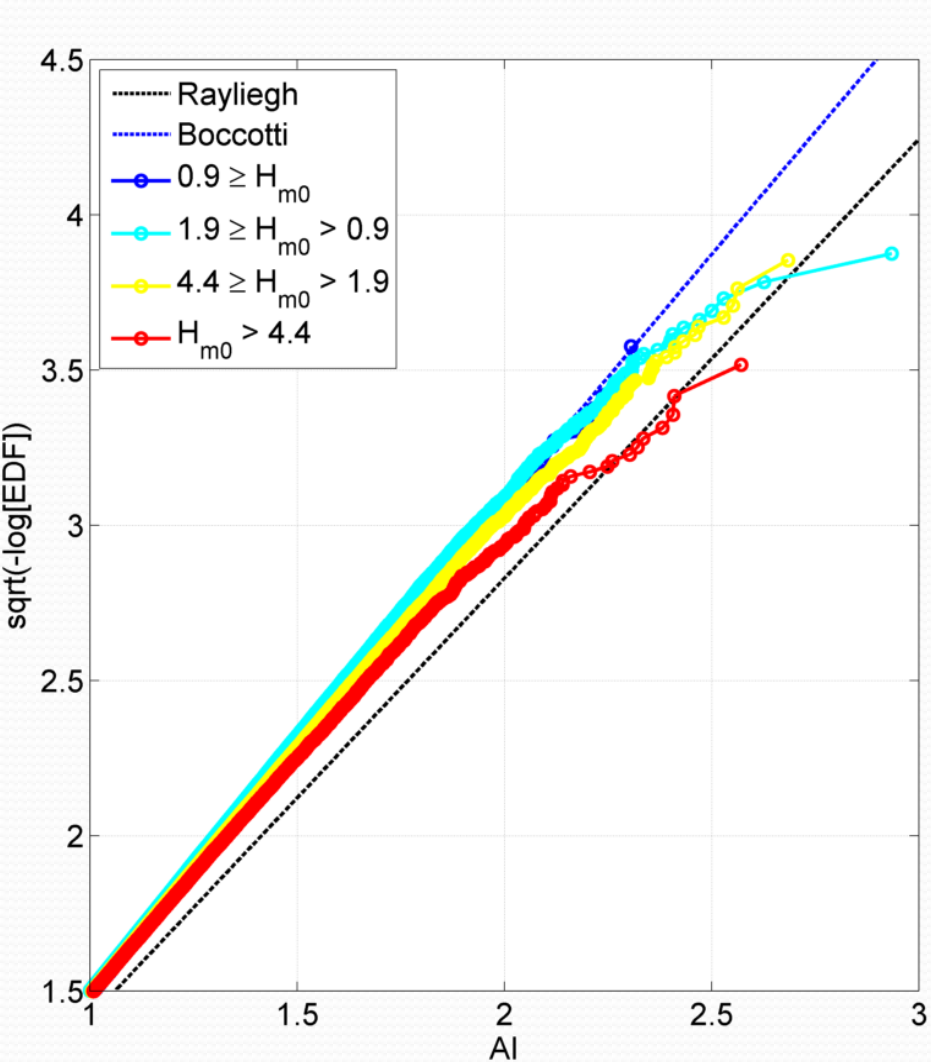
- speculation on EDF environmental dependencies
  - Babanin [2013] “Physics-Based Approach to Wave Statistics and Probability”
- EDF dependence on U
  - Gibson et al. [2014]

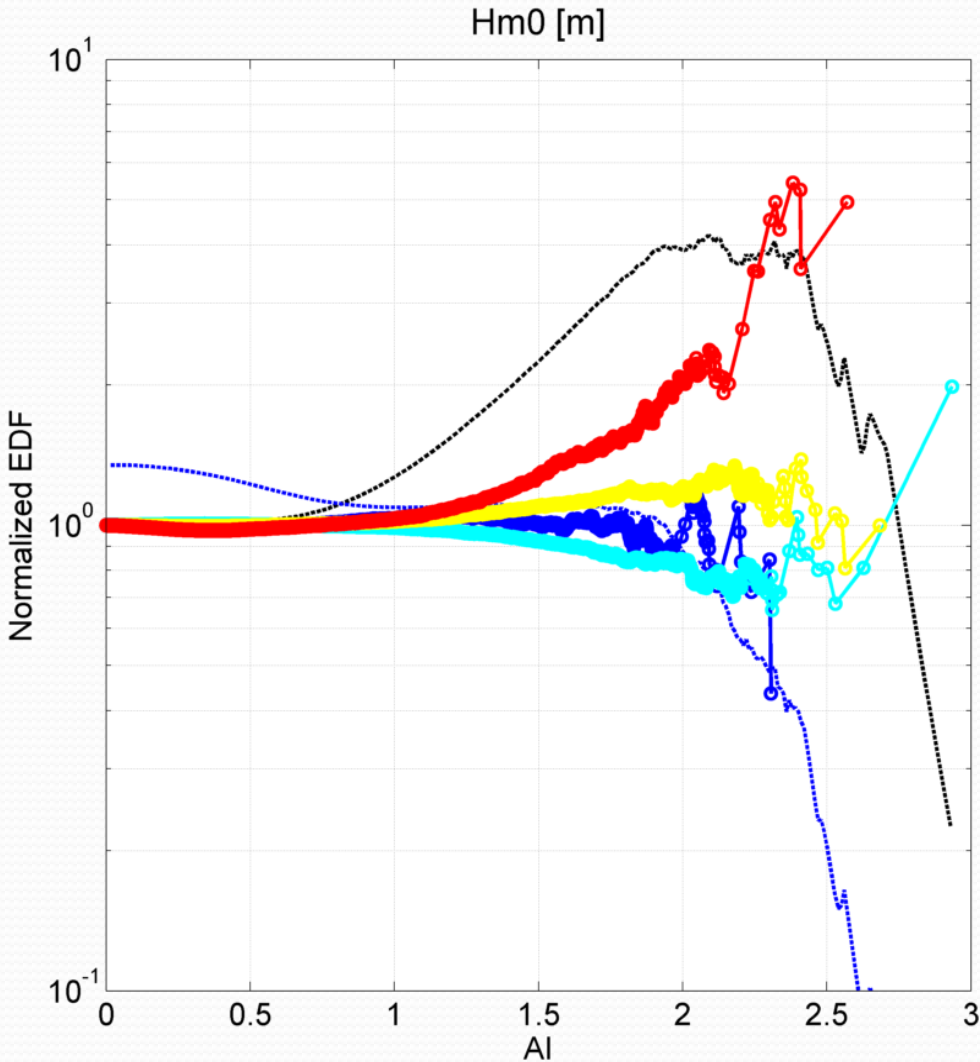


Methodology

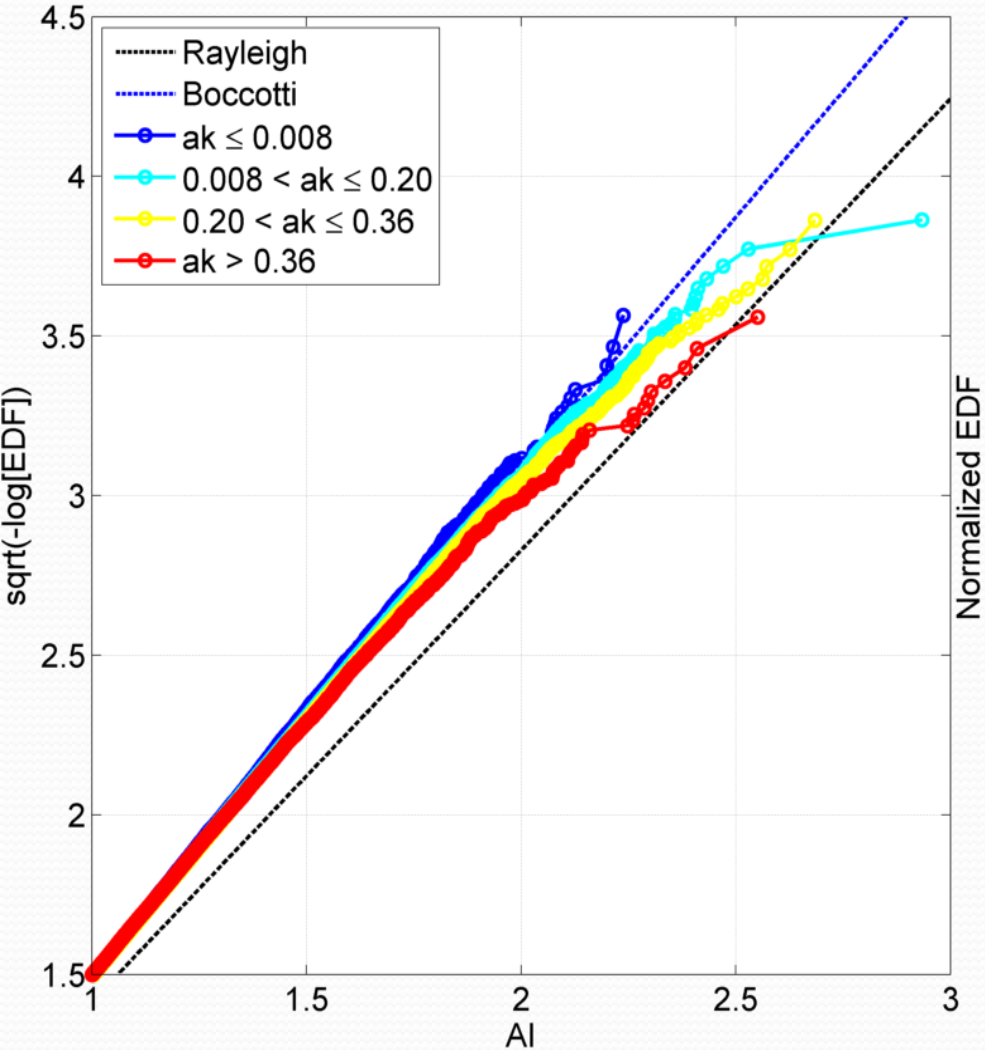


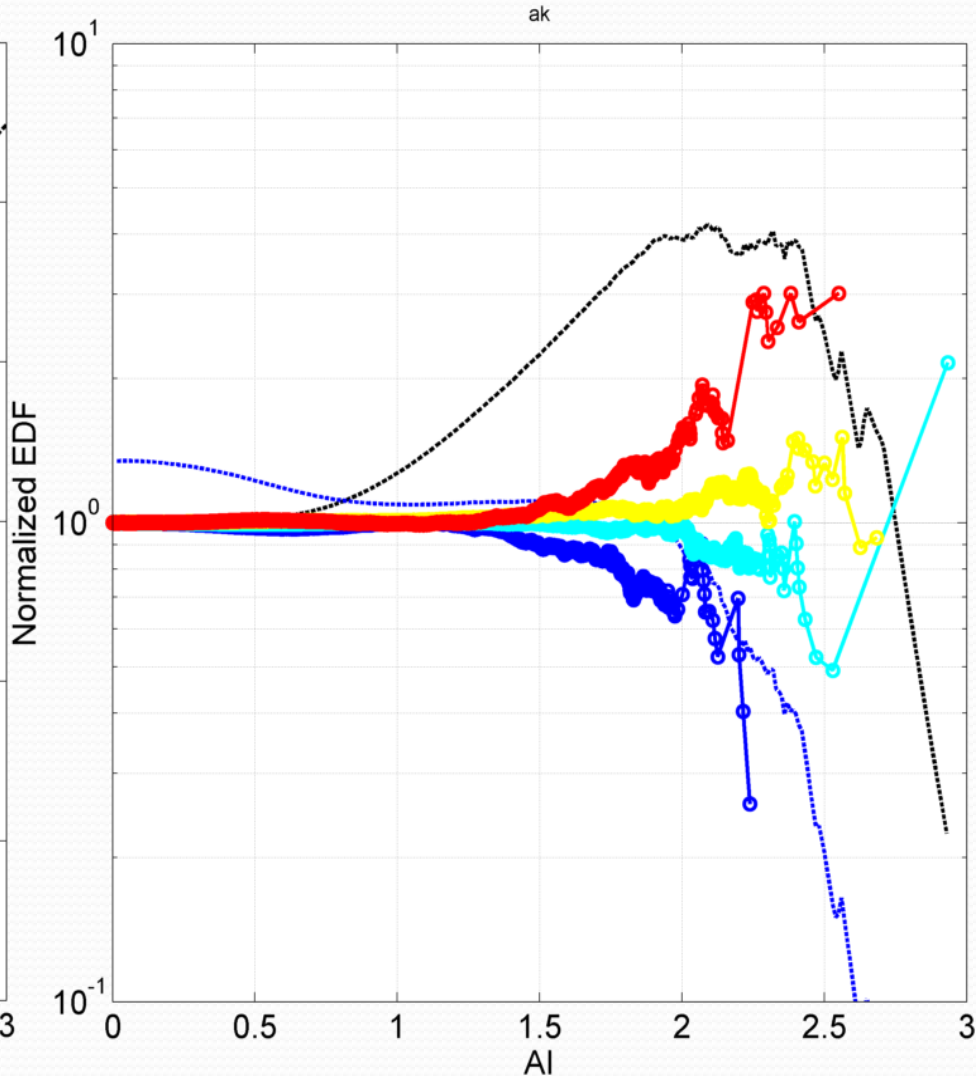
Significant Wave Height



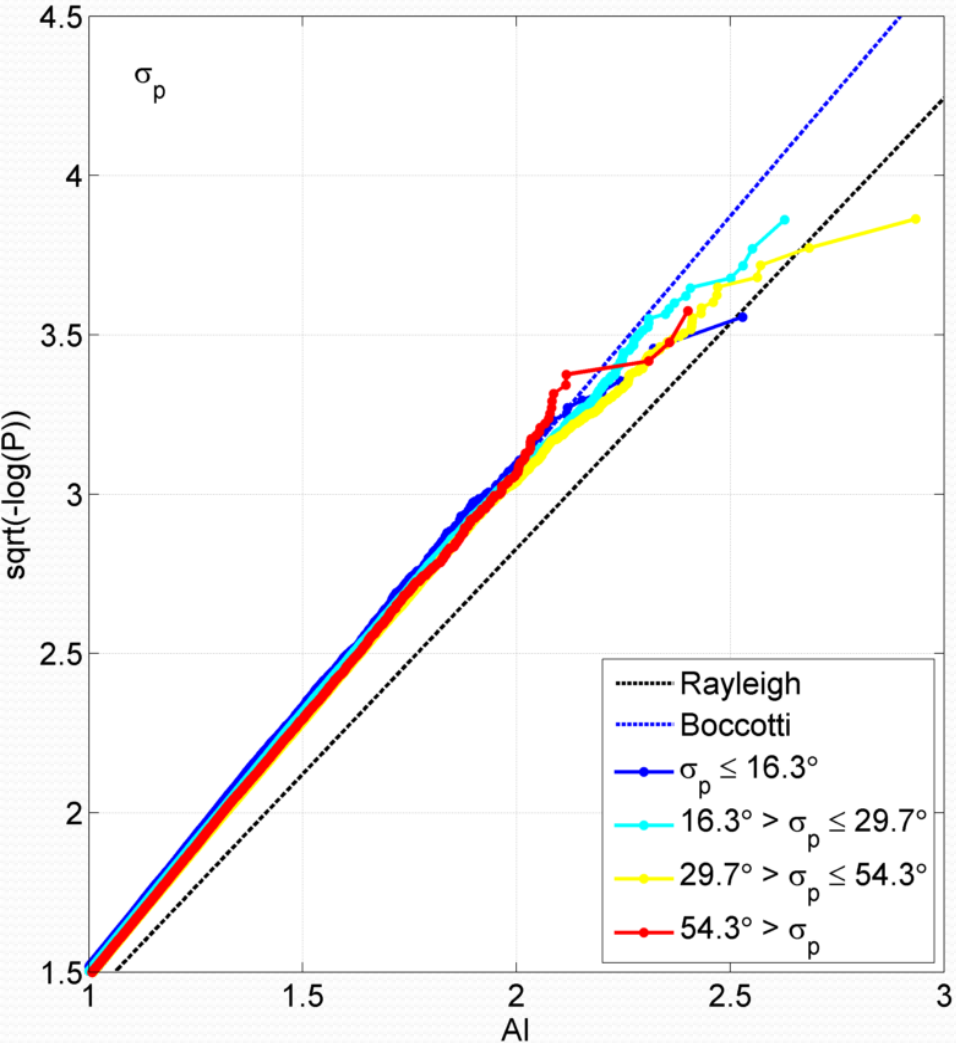


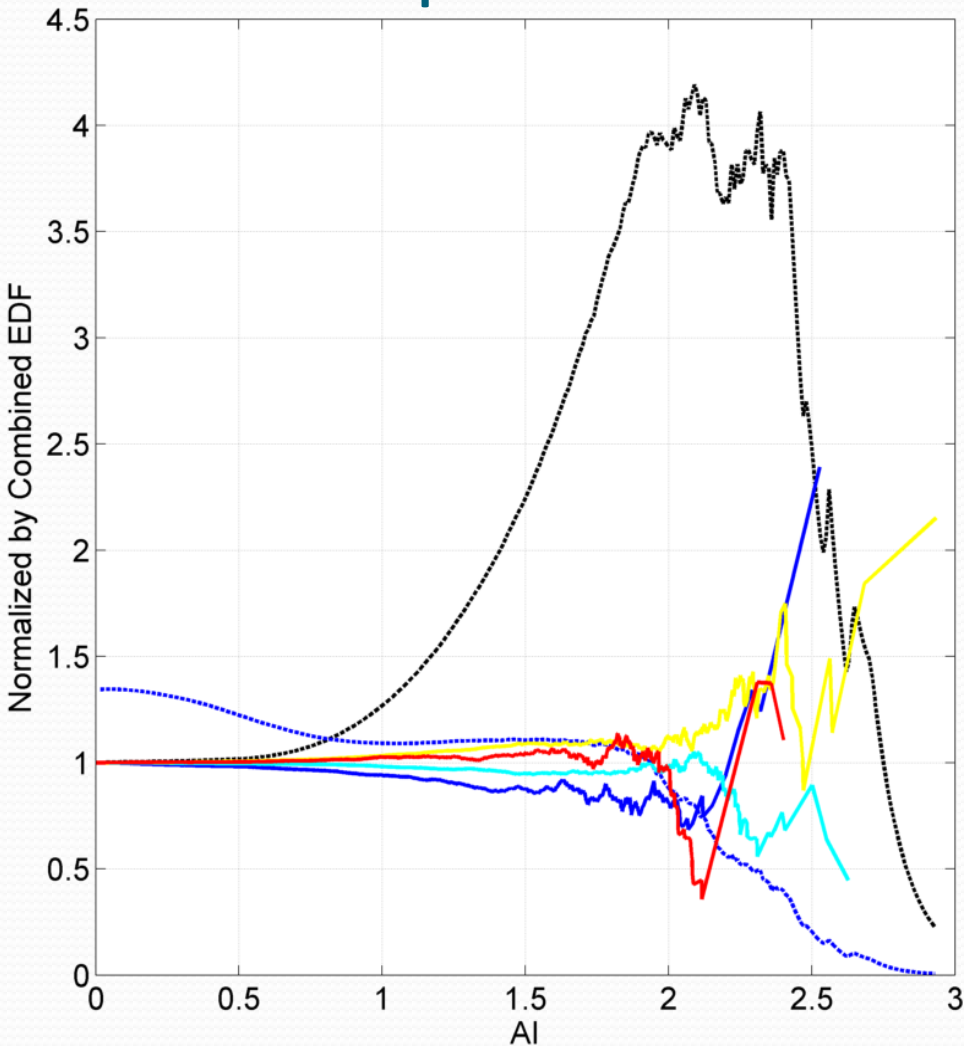
Steepness - ak



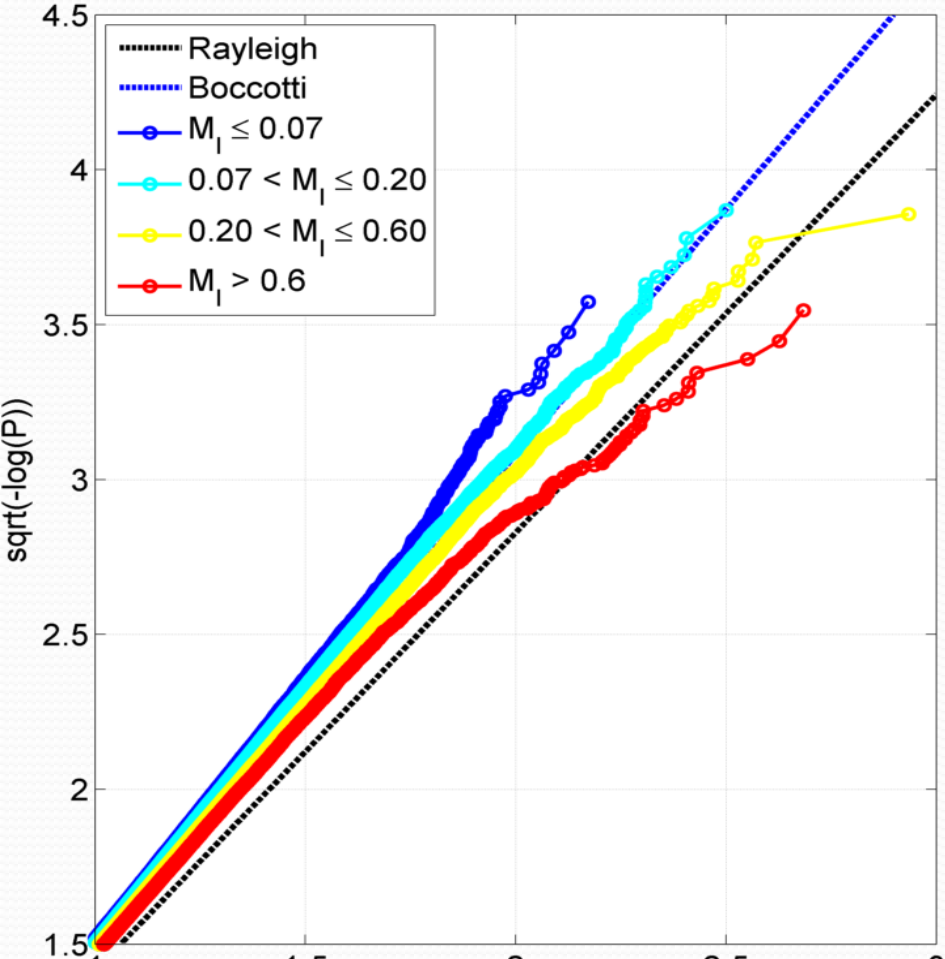


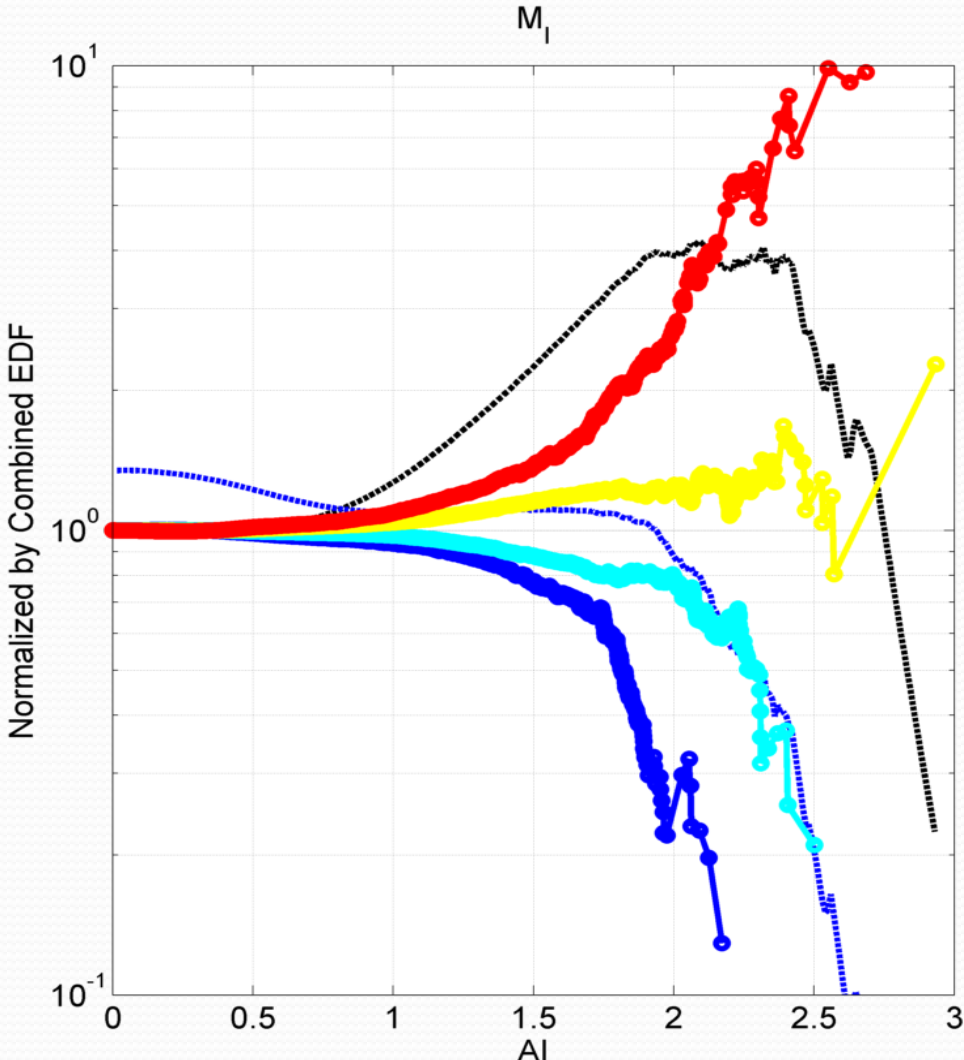
Directional Spread – $\sigma(f_p)$ [°]



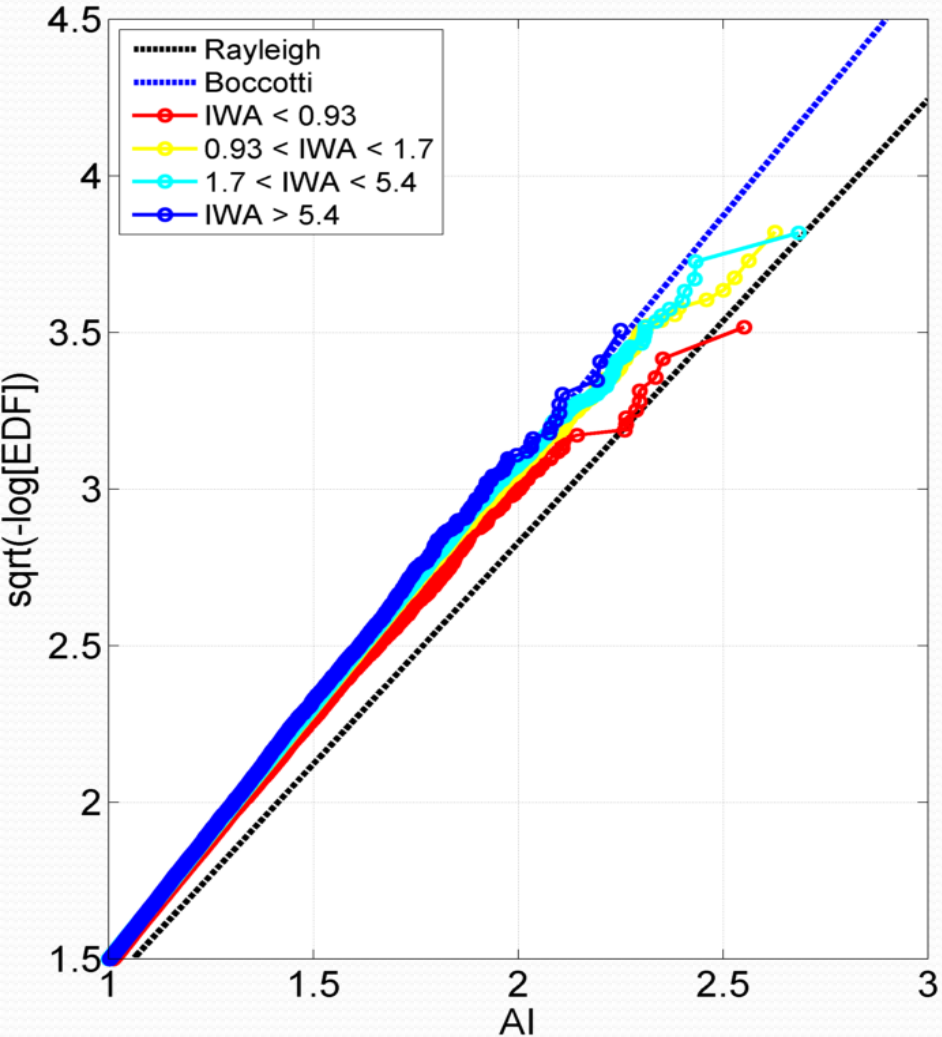


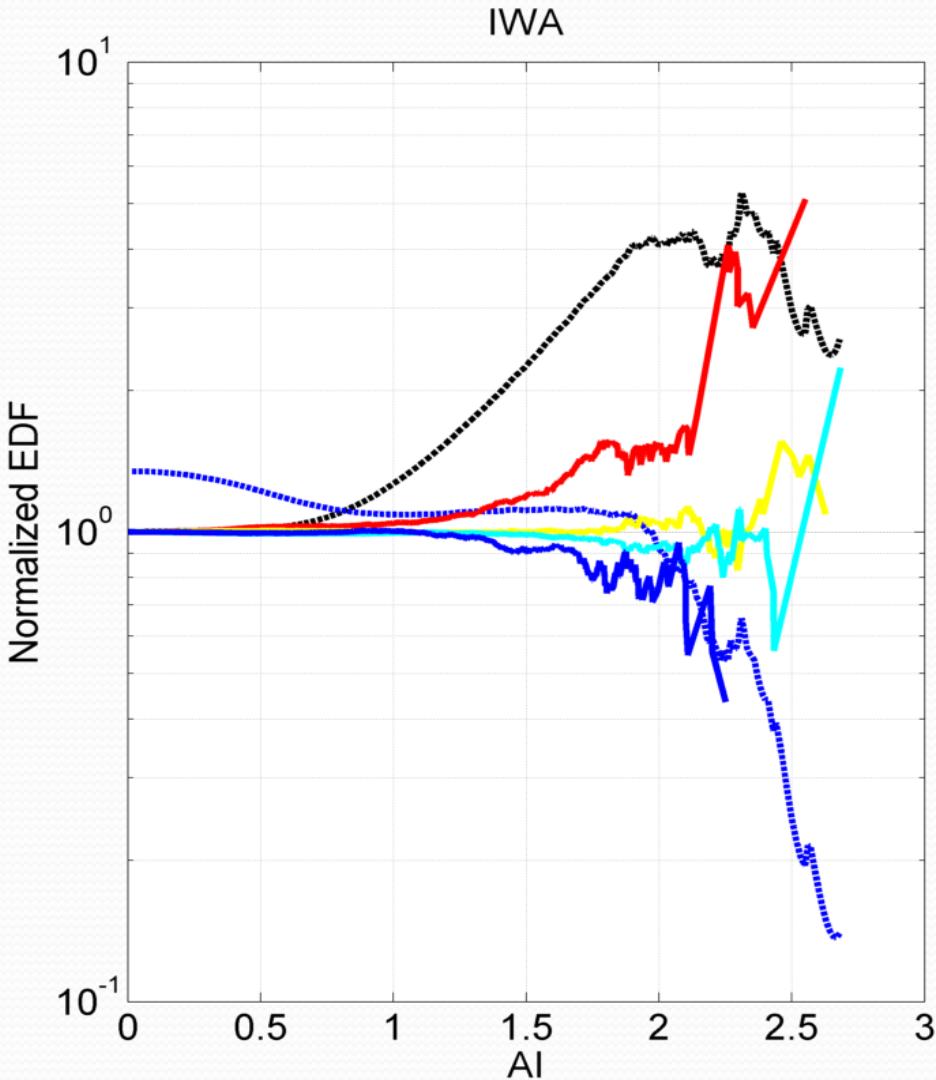
Benjamin-Feir Index



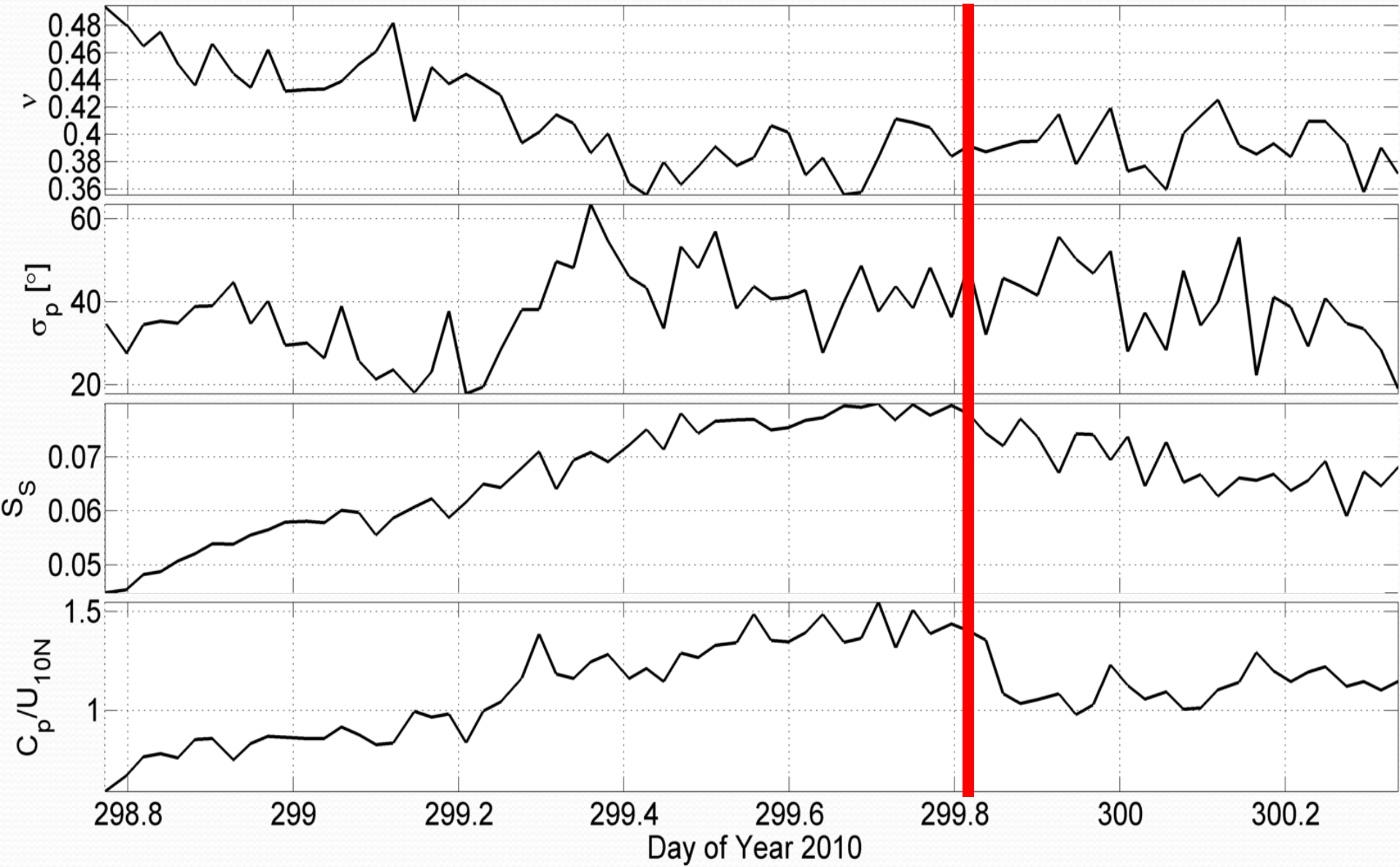


Wave Age – C_p/U

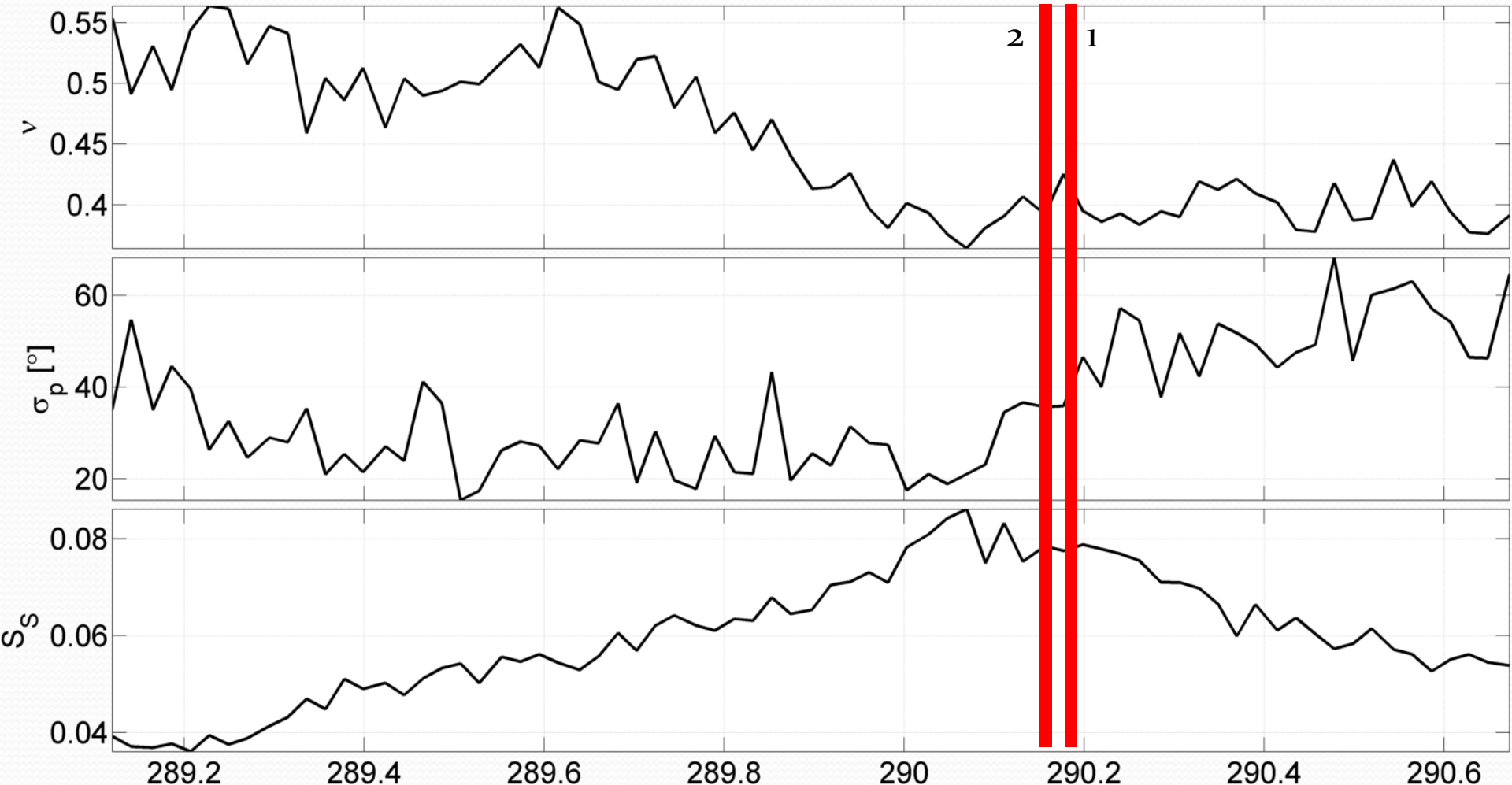

Rayleigh
Boccotti
IWA < 0.93
0.93 < IWA < 1.7
1.7 < IWA < 5.4
IWA > 5.4
sqrt(-log[EDF])
AI
4.5
4
3.5
3
2.5
2
1.5
1
1.5
2
2.5
3


IWA
Normalized EDF
AI
10^1
10^0
10^{-1}
0
0.5
1
1.5
2
2.5
3

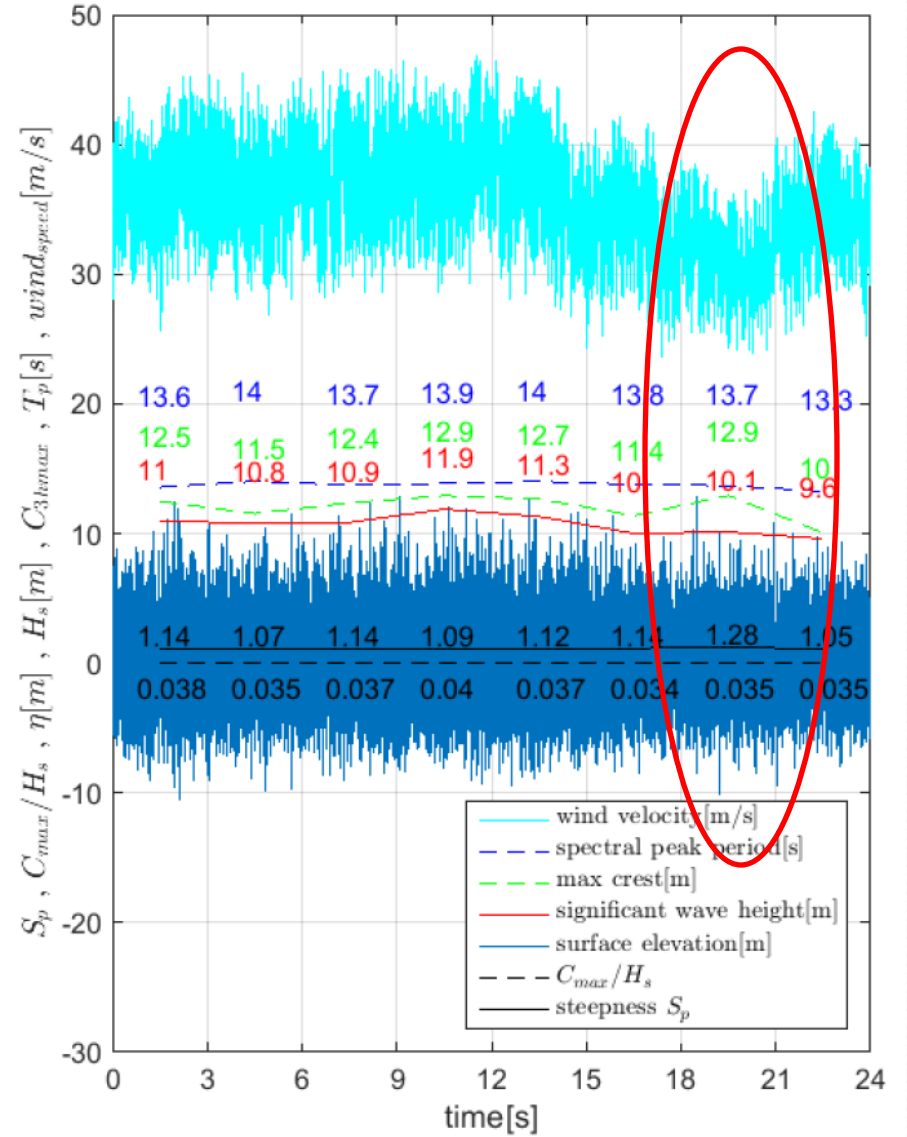
Platform	H [m]	H_{mo} [m]	H_c (H_t)	H/H_{mo}	H_c/H_{mo}	Date	Storm	Location
EASI N (1)	20.7	9.2	11.8 (9.0)	2.26	1.28	299.82	Chaba	PS



Platform	H [m]	H_{mo} [m]	H_c (H_t)	H/H_{mo}	H_c/H_{mo}	Date	Storm	Location
EASI S (2)	21.2	8.9	13.8 (7.4)	2.37	1.55	290.16	Megi	PS
EASI S (1)	17.6	8.5	8.4 (9.2)	2.07	0.98(1.08)	290.11	Megi	PS



Lian and Haver [2015] – this conference!

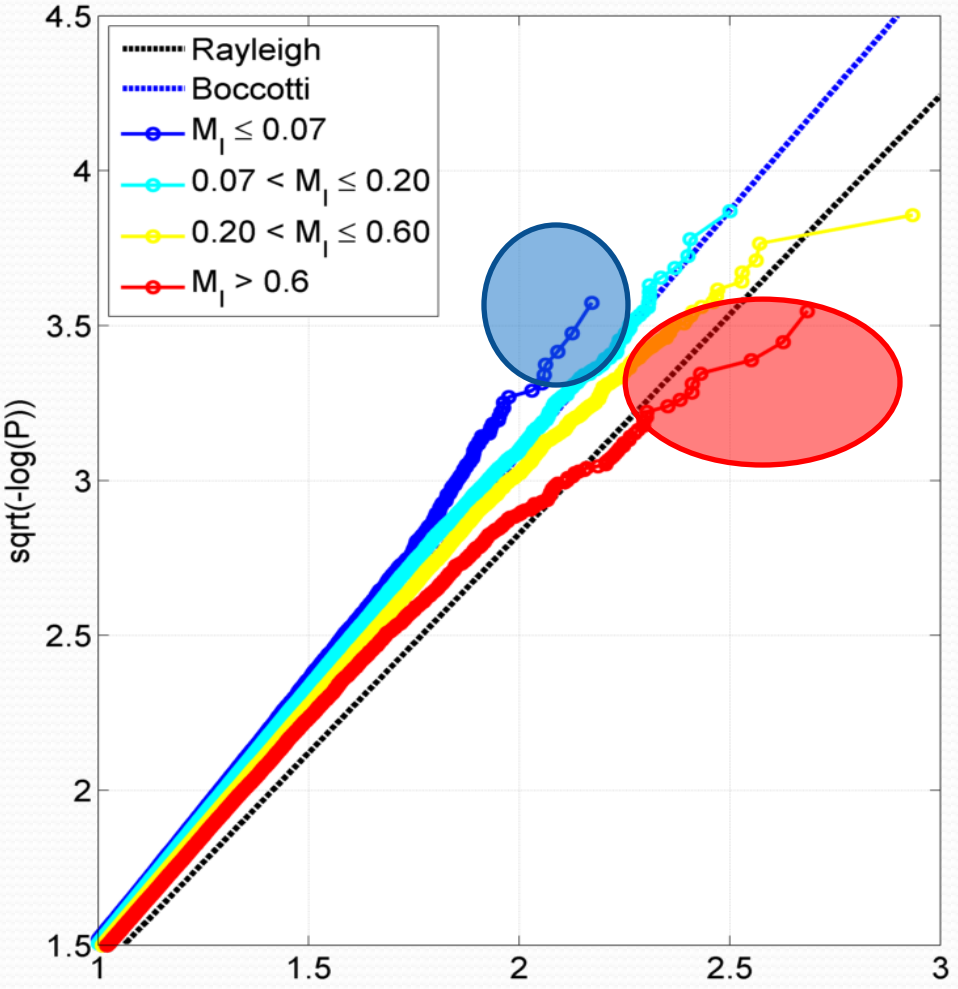


Why?

- Reduced breaking strength
- PC Liu [2015] “Babanin-Rogers Conjecture” based on Babanin and Rogers [2014]
  - Wind is supporting high frequency energy which increases breaking, limiting wave height, once the wind is suppressed, the breaking reduces and wave height is less limited
- Delay due to dynamic time scale
  - $O\left(\frac{1}{(k_p m_0)^2 f_p}\right)$ ~ 30 mins

Follow up

- Do uncommon waves from different populations have different shapes?
- Compare with HOSM



Conclusions

- EDFs most sensitive to BFI
- Wind speed/wave age important
- Absolute values of parameters not the whole story
- Large, extreme waves tend to occur after the min/max events in parameter space

Thank you for your attention
Questions?