SYMPOSIUM OP'24 ADVANCING OCEAN PREDICTION SCIENCE FOR SOCIETAL BENEFITS

Strong Tropical Cyclones and Global Ocean Waves Analysis

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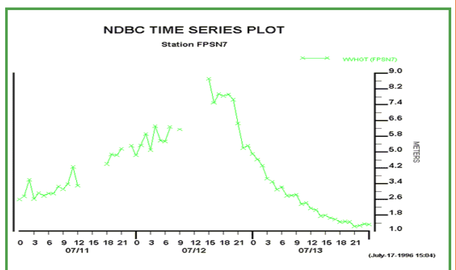
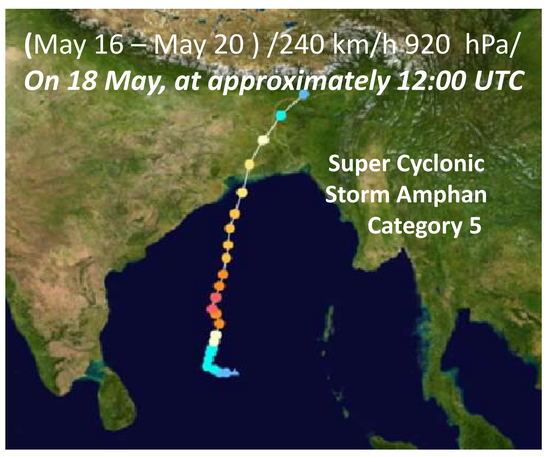
ABSTRACT. **The height of the oceans is an indication of the latent heat below the surface. This information is used by weather forecasters in complex models of the oceans and atmosphere. These can be used for seasonal forecasts of the weather in the months ahead and to predict the track of hurricanes, for example. From other side the height of the ocean must reply under tropical cyclone because it system with low pressure. Height of ocean under tropical cyclone must arise. For analysis we took mostly strong tropical cyclones above different oceans during last years. Our comparison based by pressure and maximal wind. The target is Sea surface wave maximum height. Also our comparison include salinity. We used data of Sea surface wave maximum height from Copernicus Marine Service data. The operational global ocean analysis and forecast system of Meteo-France with a resolution of 1/12 degree is providing daily analyses and 10 days forecasts for the global ocean sea surface waves. This product includes 3-hourly instantaneous fields of integrated wave parameters from the total spectrum (significant height, period, direction, Stokes drift,...etc), as well as the following partitions: the wind wave, the primary and secondary swell waves Than more strong tropical cyclone - more valuable the Sea surface wave maximum height.**

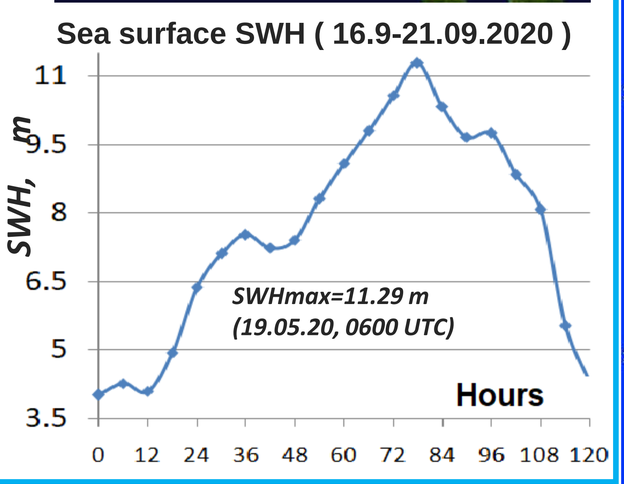
Historical introduction

"Breaking waves are nowhere more evident than in tropical cyclones. With climate models suggesting an increase in the frequency of intense hurricanes [Bender et al., 2007], greater understanding of processes at the ocean-atmosphere interface is urgently required to improve predictions. Breaking waves create white caps, send droplets into the air, generate turbulence and exchange gases with the atmosphere. All these affect the Earth's heat budget, the mixing of the upper ocean, and the concentration of greenhouse gases. Breaking waves are therefore critically important to air-sea interactions and to modelling the Earth's climate" //Wind and waves in extreme hurricanes. J Geophys Res 117:C09003//

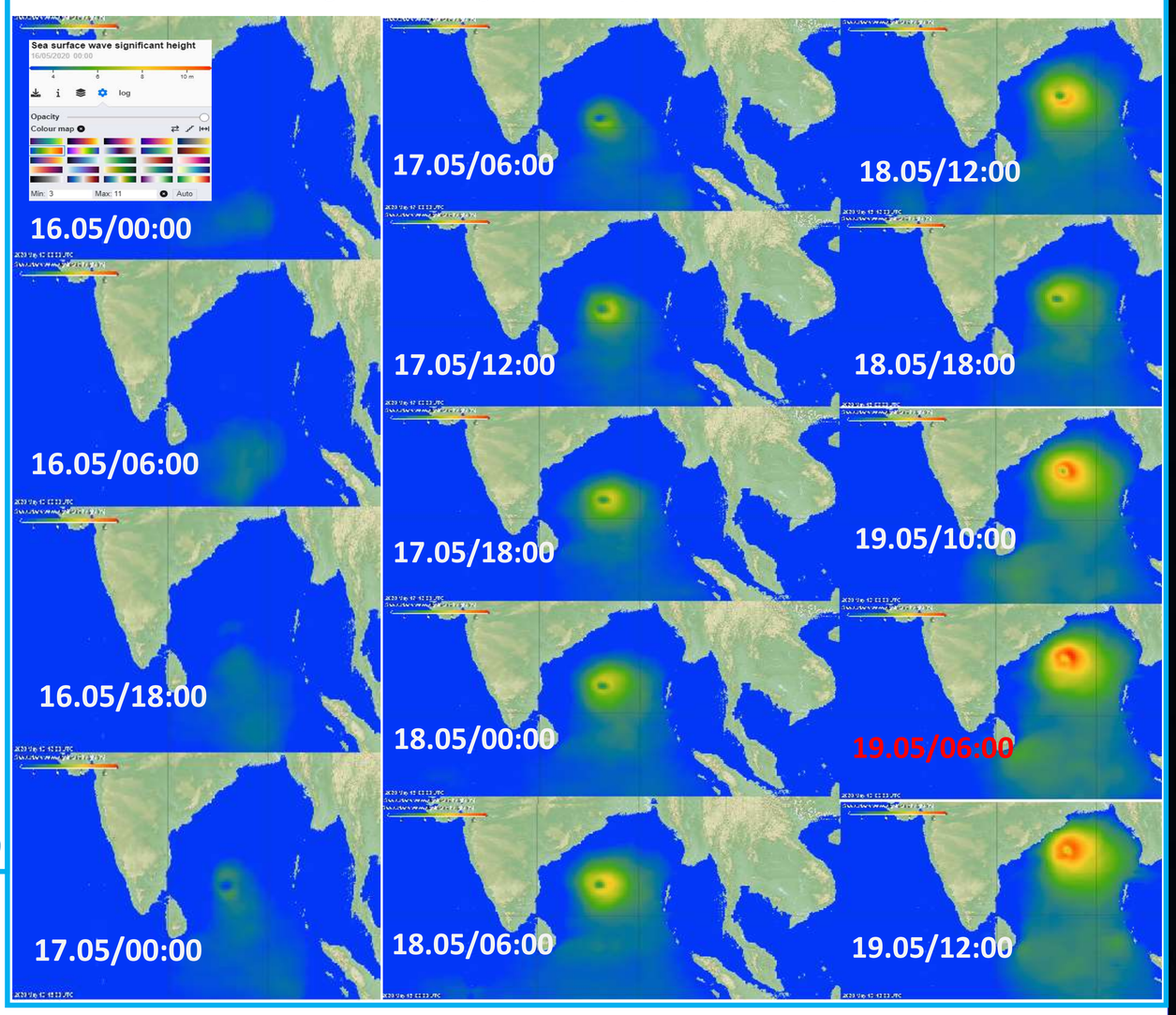


"This figure shows a plot of the significant wave height measured at Station FPSN7 – Frying Pan Shoals, North Carolina during Hurricane Bertha in July 1996. Significant wave height is defined as the average of the highest one-third of the waves. So, this plot shows the average of the highest one-third of the wave heights for each hour." https://www.ndbc.noaa.gov/education/waves_ans.shtml

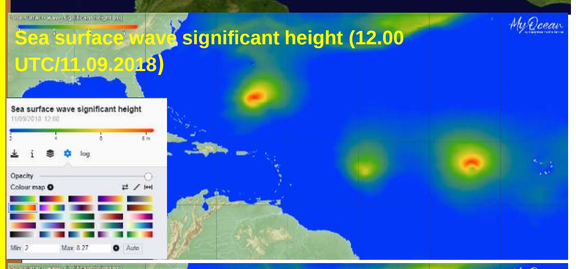


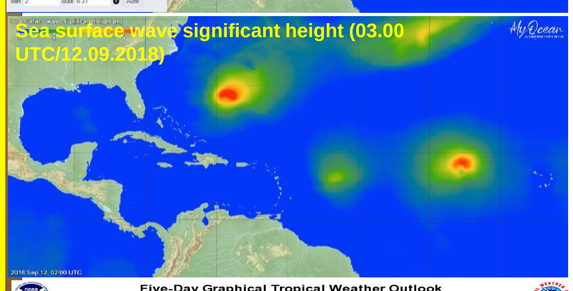


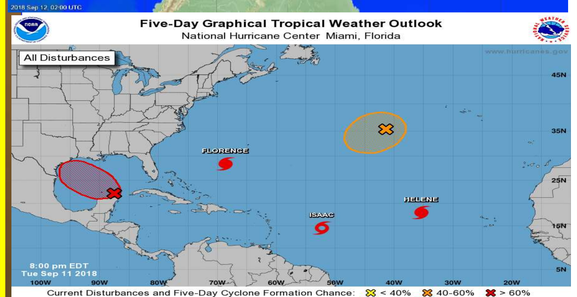
Sea surface wave significant Height (16 May(00.00) - 19 May (12.00))

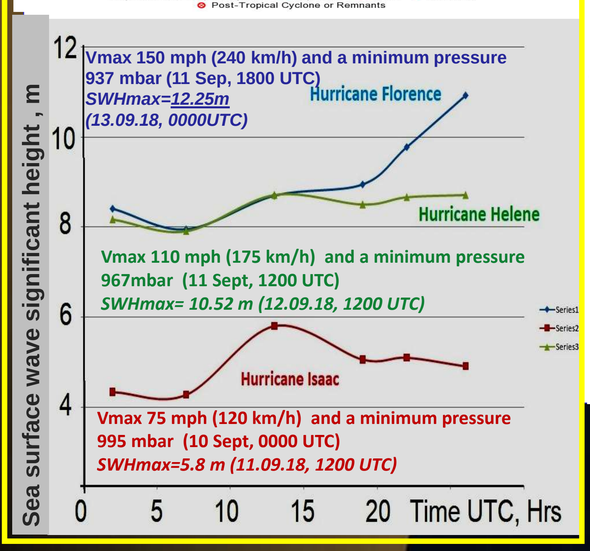


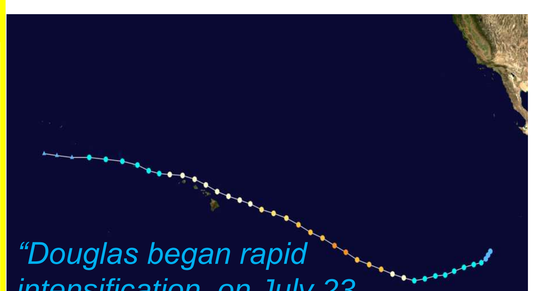
SWH dependence on time during 11.09.2018

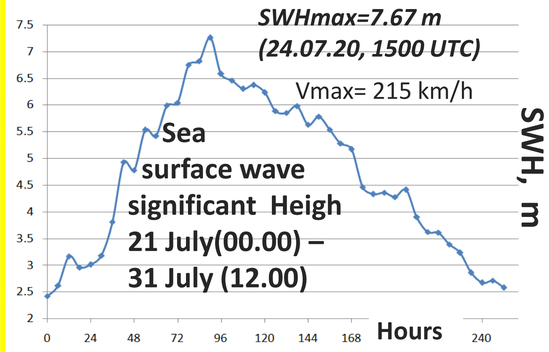


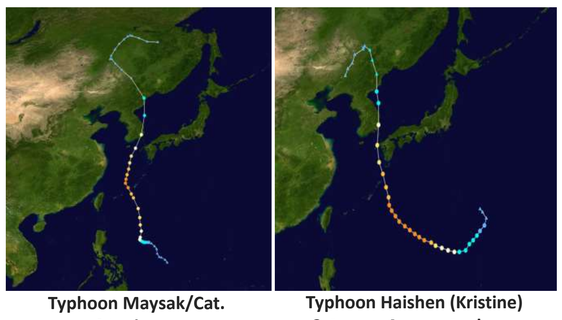


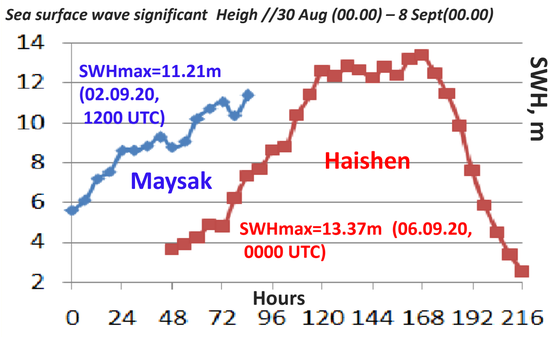




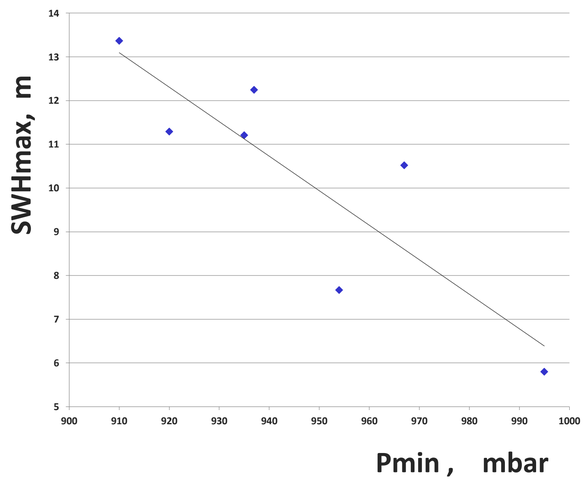


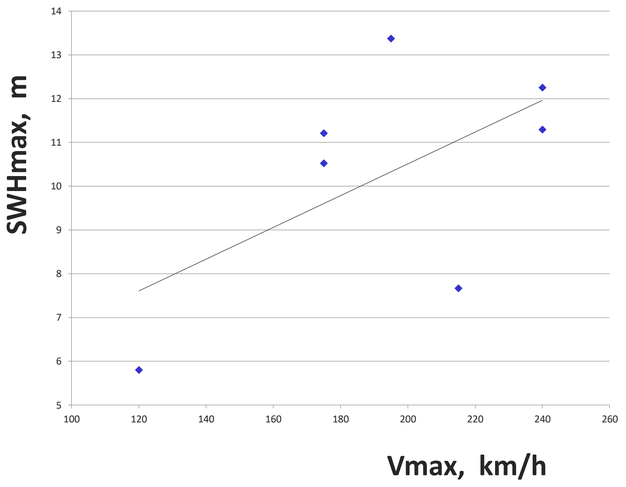






Summary





In this presentation we used data of seven strong (*Isaac (2018)*), very strong (*Helena (2018), Maysak (2020), Haishen (2020)*) and very powerful tropical cyclones (*Florence (2018), Amphan (2020) , Douglas (2020)*) from different location around the world.

Using these data we can conclud:

1)The stronger the tropical cyclone (TC) - the higher the waves (wave significant Heigh) on the underlying sea surface.

2)The max wave height has strong correlation with minimum of TC's Pressure.

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