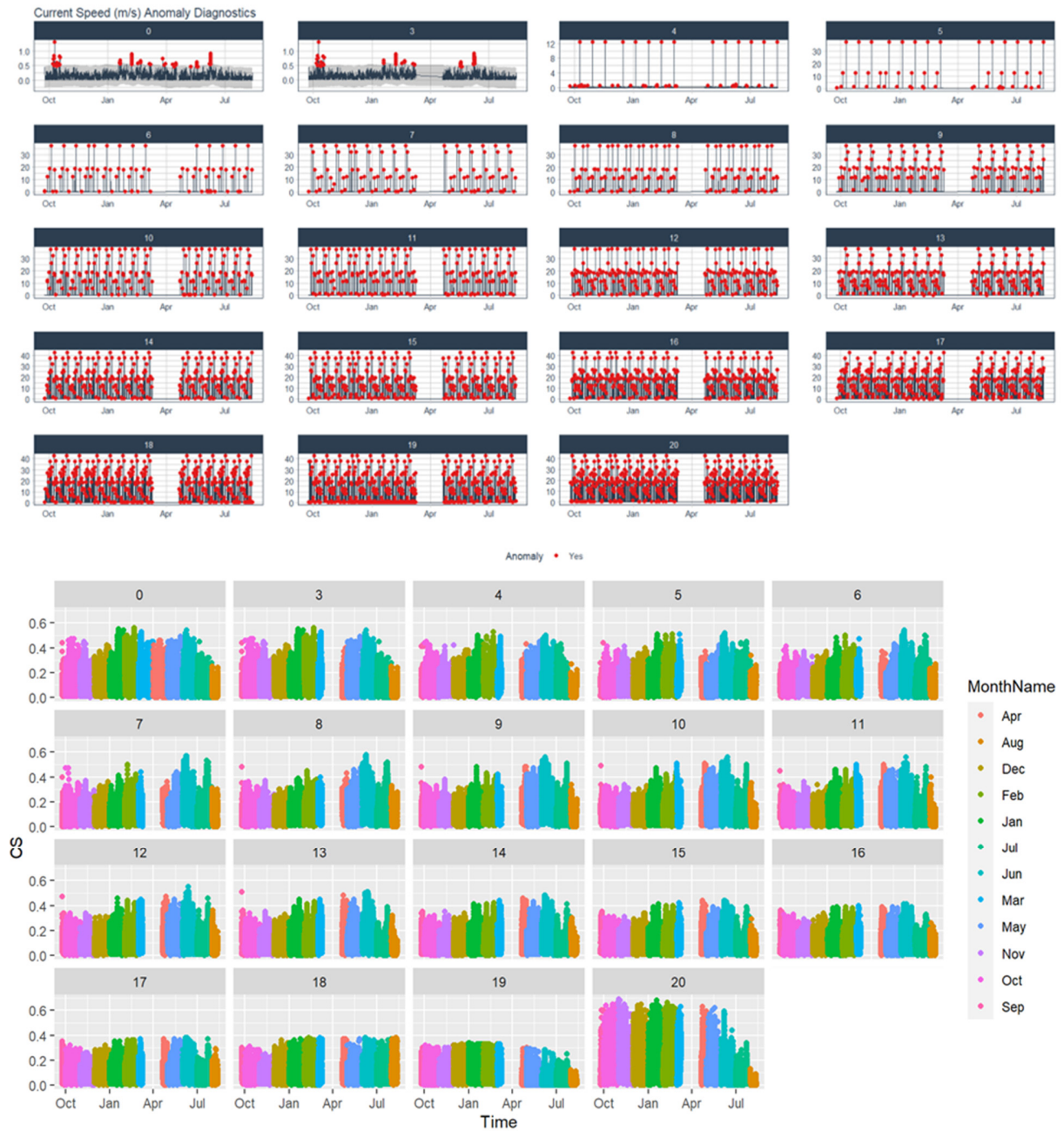
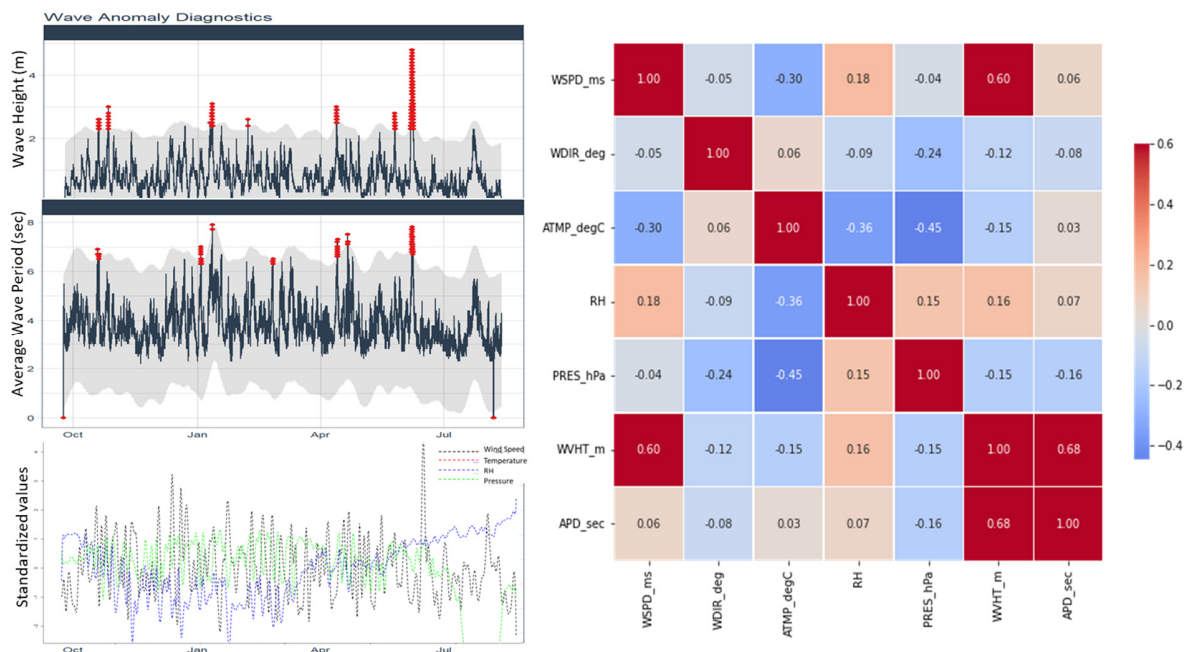


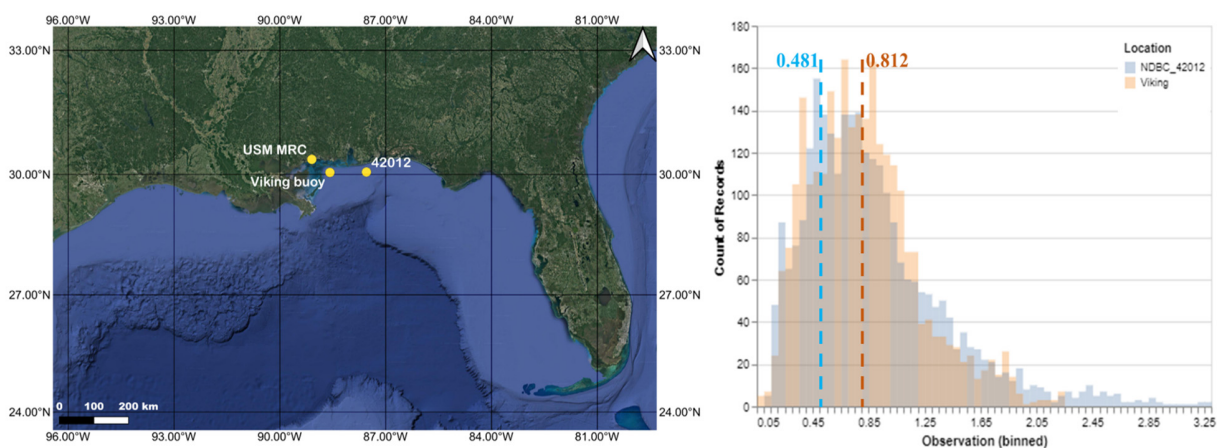
Supplementary Figure S1. Available instruments on the Viking buoy are shown in the image (source: <http://www.multi-electronique.com/buoy.html>), which are integrated and deployed per user requirement. The list of specific instrument measurements includes conductivity and temperature, oceanographic pH, biogeochemical, acoustic doppler current profiler (ACDP), radiometer, fluorometer, water salinity, water temperature and wavemeter (wave height and period), global positioning, weather (temperature, wind, humidity, rain, atmospheric pressure) wind, light, oceanographic pCO₂, radar reflector, automatic CTD profiler (for observing conductivity and temperature from depth). The buoy comes with its own software, designed to help the researcher interpret information from the buoy. This information is sent to a land station via cellular modem or satellite or a combination of cellular and Internet, at user-defined time intervals. Here, Iridium satellite uplink was leveraged to receive data every 15 minutes. For easier deployment using a small boat, the buoy uses only one anchor. Details provided here are sourced from http://www.multi-electronique.com/files/Buoy_specification.pdf.



Supplementary Figure S1. Illustration of the anomalies present in raw current speed data (top), identified using the seasonal and trend decomposition using Loess (locally weighted smoothing) anomaly diagnostic method, and comparison with outlier removed time series for each depth level (bottom). The anomalies identified in the raw data represented sensor noise that amplified with increase in water depth, which were removed to obtain current speeds within a realistic range of 0.6m/s.



Supplementary Figure S2. Wave anomaly diagnostics plotted (L) with respect to the normalized values of wind speed, temperature, pressure and relative humidity, and the correlations between each pair of the surface characteristics are illustrated (R).



	0.25 QUANTILE		MEAN		0.75 QUANTILE		MAXIMUM	
	42012	Viking	42012	Viking	42012	Viking	42012	Viking
WSPD (m/s)	3.50	3.99	5.20	5.17	7.18	6.53	31.95	13.63
WDIR (°)	89.75	113.00	158.50	155.00	245.00	208.00	360.00	332.00
ATMP (°C)	18.30	16.41	22.80	21.05	27.35	26.34	32.90	35.35
RH (%)	60.41	58.41	74.07	71.79	86.46	83.44	138.87	98.49
PRES (hPa)	1014.70	1015.10	1016.95	1017.60	1020.20	1020.80	1041.00	1033.8
WVHT (m)	0.42	0.40	0.66	0.70	0.99	1.00	8.19	4.88
APD (sec)	3.49	3.20	3.96	3.70	4.55	4.30	10.58	7.90

Supplementary Figure S3. Comparison of Viking meteorological and wave data with respect to the nearest NDBC buoy data from station 42012.