ERRATA

CORRIGENDA TO VIRTUAL HULL MONITORING: CONTINUOUS FATIGUE ASSESSMENT WITHOUT ADDITIONAL INSTRUMENTATION

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Following publication of this study, work continued to enable more efficient structural response calculations. As part of that effort, two errors were identified and fixed.

The first error is related to how wave hindcast data are selected. In this study, the hindcast time entry was identified by rounding the midpoint of each trial leg to the nearest 3-hour increment. Unfortunately, the algorithm for this approach offset the single trial leg conducted over midnight by 12 hours. The erroneous result was the largest significant wave height outlier over all 75 trial legs. That incorrect entry has a significant wave height (H_s) of 7.85 m, zero-crossing period (T_z) of 8.85 s, and a primary direction (D_p) of 235°. The corrected entry has the following statistics: H_s = 3.93 m, T_p = 8.93 s, and D_p = 227°. The largest H_s outlier is now for a different trial leg; the hindcast estimate is 4.6 m and the wave buoy measured 6.1 m. Table 1 shows the corrected wave statistics for all 75 trial legs. Mean H_s is reduced by 6 cm and its RMS error decreases by 17 cm; the RMS error reduction shows better agreement with wave buoy measurements. Changes to the period and direction statistics are negligible.

Table 1: Comparison of wave data from trial deployed buoy and hindcast for all trial legs after fixing error.

	Mean H_s (m)	RMS Error (m)	Mean T_z (s)	RMS Error (s)	D_p bias (°)	RMS Error (°)
Buoy	2.96	-	6.27	-	-17.8	-
Hindcast	2.93	0.49	6.10	0.82		37.4

The second error is related to an error found in STRUC_R. When using an older version of the operational profile input files, the wave periods were not correctly interpreted. Instead, the software used a default peak period value of 9.7 s. This error affected both wave buoy and wave hindcast calculations. Re-calculated RMS stress and stress zero-crossing frequencies after fixing both errors are shown in Figures 1 and 2, respectively. Table 2 shows the revised summary statistics.

Table 2: Summary of stress spectra best-fit lines after fixing STRUC_R error.

Wave data source	RMS stress		Stress zero-crossing frequency	
	slope	R^2	slope	R^2
Buoy	0.92	0.99	1.00	0.94
Hindcast	0.92	0.96	1.03	0.93

The slopes of the best-fit lines for RMS stress are further from unity than for the erroneous values, but the R^2 values show minor improvements in correlation with stresses derived from measurements. The corrected zero-crossing frequency statistics and Figure 2 show better agreement with measurements for both datasets. Despite better agreement overall, Figure 2 shows several significant outliers that were not present with the original results.

For both stress parameters and both wave datasets, correcting these errors reduces the RMS errors relative to the original values. This indicates agreement with measurements has improved. However, the results calculated using hindcast data are no closer to those using wave buoy data. Among the corrected results, 63% of the hindcast RMS stresses and 77% of the hindcast stress zero-crossing frequencies are within 25% of the corresponding values calculated using buoy data. Also, hindcast results still have more dispersion than wave buoy results. The high dispersion is shown with RMS errors for the stresses and frequencies that are 46% and 11% greater, respectively, than wave buoy results.

Correcting the wave height outlier and revising the calculated stress parameters after a software correction modifies the wave statistics and improves the agreement with strain measurements. Overall, the improvements are small and do not modify the conclusions of the study.

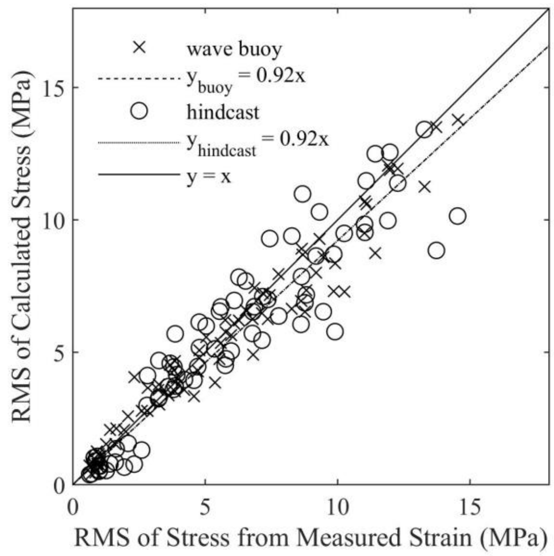

Figure 1: Comparison of RMS stresses calculated with wave buoy and hindcast data against RMS stresses derived from strain gauge measurements.

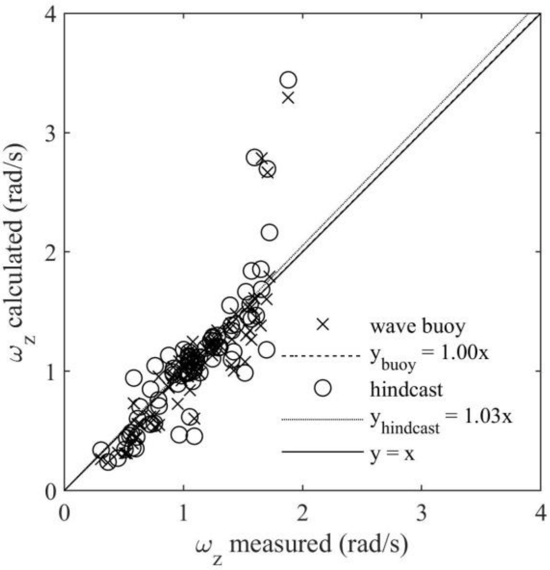

Figure 2: Comparison of stress zero-crossing frequencies calculated with wave buoy and hindcast data against zero-crossing frequencies derived from strain gauge measurements.