6. The system of claim **5**, wherein the wave processing system computes statistics including one or more of mean, maximum, minimum, and standard deviation of time series measurements.

7. The system of claim **2**, wherein the at least one accelerometer comprises one accelerometer aligned with the buoy's vertical axis.

8. The system of claim **2**, wherein the telecommunications relay system is a satellite communications system.

9. The system of claim **2** wherein the at least one accelerometer comprises three accelerometers, each aligned respectively with the buoy's vertical axis and two horizontal axes.

10. A method for measuring spectra of surface ocean waves in near real-time from a discus-shaped buoy floating at the ocean surface and moored to the seafloor, the discus-shaped buoy moving in response to wave action, the method comprising the steps of:

measuring acceleration and angular rate of the buoy using buoy motion sensors, mounted to the buoy;

converting, in a wave processing system coupled to the buoy motion sensors, acceleration and angular rate vertical acceleration and pitch and roll measurements of the buoy and generating wave spectral data from vertical acceleration and pitch and roll measurements of the buoy, correcting, in the wave processing system, vertical acceleration measurements to compensate for pitch and roll of the buoy:

transmitting, using a telecommunications relay system coupled to the wave processing system, wave spectral data to a shoreside processing system;

processing, at the shoreside processing system, the wave spectral data to remove noise from the wave spectral data; and

disseminating, from the shoreside processing system, processed wave spectral data to users,

wherein the step of processing at the shoreside processing system further comprises correcting noise for at least one frequency band, where:

C11M(f(n)) is the acceleration spectral density for a frequency, f(n), where n presents the index of the frequency band; and

The Noise Correction for each frequency band (NC(f(n))) is computed as follows:

$$NC(f(n))=20*C11M(f(n=0))*(f(n)-0.18),\ \text{for}\ NC(f(n))>=0;$$

$$NC(f(n))=0,\ \text{for}\ NC(f(n))<0;\ \text{and}$$

NC(f(n)) is then subtracted from each C11M(f(n)) and if a result of the subtraction is less than zero, then the result of the subtraction is set to zero.

11. A method for measuring spectra of surface ocean waves in near real-time from a discus-shaped buoy floating at the ocean surface and moored to the seafloor, the discus-shaped buoy moving in response to wave action, the method comprising the steps of:

measuring acceleration and angular rate of the buoy using buoy motion sensors, mounted to the buoy;

converting, in a wave processing system coupled to the buoy motion sensors, acceleration and angular rate vertical acceleration and pitch and roll measurements of the buoy and generating wave spectral data from vertical acceleration and pitch and roll measurements of the buoy,

correcting, in the wave processing system, vertical acceleration measurements to compensate for pitch and roll of the buoy;

transmitting, using a telecommunications relay system coupled to the wave processing system, wave spectral data to a shoreside processing system;

processing, at the shoreside processing system, the wave spectral data to remove noise from the wave spectral data;

disseminating, from the shoreside processing system, processed wave spectral data to users;

determining buoy orientation with respect to True North from measurements of Earth's Magnetic flux by the three orthogonal magnetometers, pitch and roll information from the angular rate sensors, corrections for the buoy's hull and electronic effects, and the magnetic declination at the buoy's location; and

determining wave direction from pitch and roll data relative to buoy orientation with respect to True North,

wherein the buoy motion sensors comprise at least one accelerometer aligned with the buoy's vertical axis, three orthogonal angular rate sensors, and three orthogonal magnetometers.

12. The method of claim **11**, wherein the step of converting further comprises using Fast Fourier Transforms (FFTs) to transform the acceleration and angular rate data time domain into the frequency domain providing Fourier coefficients at discrete frequencies.

13. The method of claim **12**, wherein the step of converting further comprises band averaging the Fourier coefficients of adjacent discrete frequencies of the wave spectrum to reduce data transmitted to the shoreside processing system.

14. The method of claim **13**, wherein the step of converting further comprises transforming band-averaged Fourier coefficients into a set of directional wave parameters in terms of spectral density, directions, and spreading functions of the waves using a predetermined algorithm.

15. The method of claim **14**, wherein the step of converting further comprises computing statistics including one or more of mean, maximum, minimum, and standard deviation of time series measurements.

16. The method of claim **11**, wherein the at least one accelerometer comprises one accelerometer aligned with the buoy's vertical axis.

17. The method claim **11**, wherein the telecommunications relay system is a satellite communications system.

18. The method of claim **11**, wherein the at least one accelerometer comprises three accelerometers, each aligned respectively with the buoy's vertical axis and two horizontal axes.

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