Use of offshore energy facilities as deepwater ocean observing platforms

Dr. Pak Leung[1*], Dr. Ruth Mullins Perry[2], Dr. Jeff Morin[3], Eoin Howlett[4], Armen-Sjur Minassian[5], Rudy Poulos[5]
[1)] Shell Global Solutions (US), Houston, TX
[2)] Shell Exploration and Production Company, Houston, TX
[3)] RPS - Ocean Science Division, Houston, TX
[4)] RPS- Ocean Science Division South Kingstown, RI 02879
[5)] Miros AS, Asker, Norway

1. Introduction

Wave measurement is one of the major components for any ocean observation program, however, it is also the most challenging one due to its complexity. For Oil & Gas community, wave data is often used for platform stability calculation, operational decision making, structure fatigue analysis, and engineering design criteria.

2. Microwave Wave Radar

Shell Exploration & Production Co. has recently expanded their MetOcean (meteorology and oceanography) observation capacity on oil and gas platforms to include microwave wave radars to the marine instrumentation suite. Radar measurements waves through both image processing of radar return and direct derivation through radar-wave interaction. Such techniques allow far field wave observation and eliminate data contamination from traditional upward/horizontal-looking acoustic measurements deployed in close proximity to the structures. When compare to wave buoys, wave radars reduce the deployment complexities and expense of deepwater moorings.

3. Hurricane Nate

For the first time, a hurricane was observed by wave radars on offshore platforms in the Gulf of Mexico with the passing of Nate on October 7th, 2017. Wave measurements were obtained on the Tension Leg Platforms (TLPs) Olympus and Ursa throughout the northward movement of Hurricane Nate through the Mississippi Canyon region of the Gulf of Mexico. The two platforms are separated by several miles and are oriented on an east-west axis in terms of the approach of Hurricane Nate. Wave model data are compared with Miros radar data collected from both platforms. An investigation was performed to derive explanations for variable environmental conditions observed during the hurricane event.

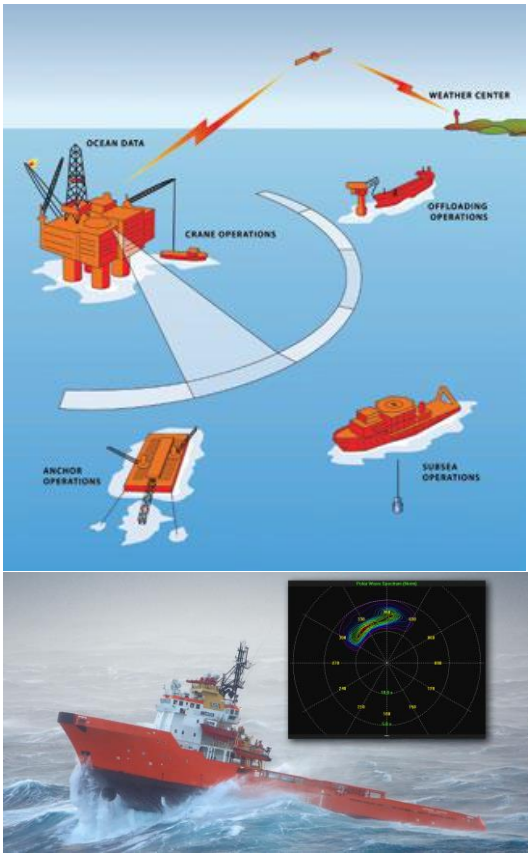

Figure 1. MIROS wave radar providing directional wave spectra and current data .

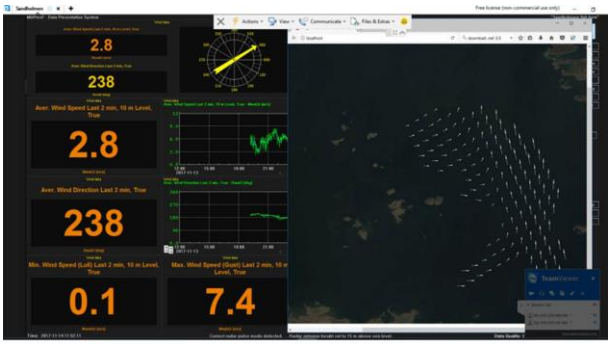

Figure 2. Radar providing real-time surface current measurements on the Norwegian coast.