

Weather Window Statistical Analysis for Offshore Marine Operations

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ABSTRACT

Successful marine operations are crucial for all offshore E&P projects and almost all marine operations are, to a greater or lesser degree, weather-sensitive. Marine operations, especially in deepwater areas, are particularly at risk from unacceptable motions caused by severe environment. Therefore, statistical analysis of historical weather data is very useful in the planning and scheduling of marine operations. This paper presents a statistical approach for analyzing the weather window of marine operation based on more than 30 years of observed data of Gulf of Mexico from National Data Buoy Center.

KEY WORDS: Weather window; marine operation; met-ocean criteria; offshore platform.

INTRODUCTION

With oil and gas exploration and production go “deep”, the weather in those frontier areas becomes more and more unpredictable. Successful marine operations are essential in all offshore projects and almost all marine operations are at the mercy of the weather. These operations are particularly at risk from unacceptable motions initiated by waves, currents and winds. Marine operations benefit from accurate weather information. Advanced knowledge of the wind, wave and current conditions leads to safer, more efficient operations and potentially massive cost savings running into millions of dollars.

For weather sensitive marine operations, it is very useful to know the probability of experiencing acceptable weather conditions and the waiting time (or downtime) distribution for such a condition. If the likelihood of experiencing a good weather window is too small and the expected waiting time is long, the operation plan and schedule may need to be reviewed to see if it is practical to 1) alter the design or the selection of installation vessel/equipment to allow the operation to take place in more severe weather or 2) alter the schedule to a period which has greater chance of experiencing a good weather window.

Although the decisions for operation are normally based on the weather forecast, the statistical information from historical observed weather data is important for proper planning of budgets, schedules and contingencies of operations.

This paper presents a statistical approach for analyzing the weather window of marine operation based on more than 30 years of observed data of Gulf of Mexico.

DATA SELECTION

Buoy Station Selection

The U.S. government maintains a number of buoys in the Gulf of Mexico that measure metocean conditions such as wind speed/direction, wave height/period, temperature, pressure, etc. Recently, some of the buoys have also started measuring current profiles. The measured data has been archived and is available to public via the website for the National Data Buoy Center (NDBC, <http://www.ndbc.noaa.gov/>). Most of the deepwater platforms are located in the western GOM (north of 20°N and west of 85°W). Figure 1 shows the locations of the buoys in the western GOM.

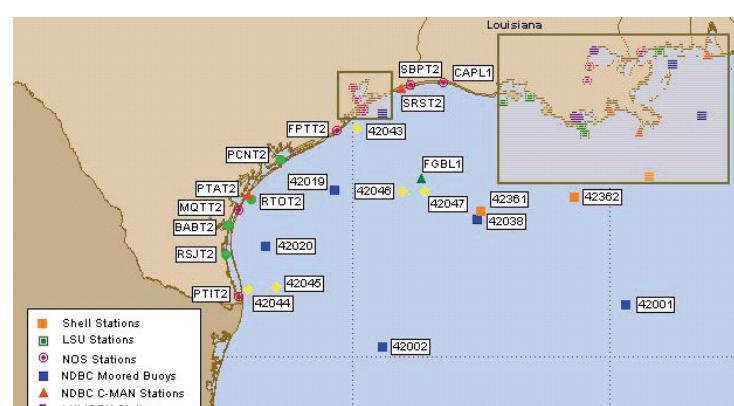


Figure 1. Buoy stations in the western Gulf of Mexico