SEVAN Driller Voyage to Brazil CASE STUDY – RIG MOVE

Project background

The SEVAN Driller is the world's first cylindrical drilling and storage unit (MODSU). It is designed to include the most advanced drilling capabilities in the industry and is based on SEVAN's own patented technology. The unit has a capacity of drilling of wells up to 40,000 feet in water depths of up to 12,500 feet and is equipped with an internal storage capacity of up to 150,000 barrels of oil.

In November 2009, the SEVAN Driller was delivered from the Cosco Qidong shipyard in China. After completing sea trials, it started its voyage from Shanghai to Rio de Janeiro where it will operate for Petrobras off the Brazilian coastline for a 6-year contract. Brazil pre-salt areas indeed represent one of the world's most promising oil reserves, and Petrobras has initiated major investments for their development. The use of cutting-edge technology such as the SEVAN Driller is a key part of this strategy to increase deep and ultra-deep water production.

SAT-OCEAN involvement

SAT-OCEAN was selected by SEVAN Drilling to provide routing support during the rig mobilization, delivering, in addition to usual weather information, advanced routing services based on high resolution currents.

"On such a long voyage, time spent in rough weather does not exceed 30% to 40% of total time. In addition, the impact of currents is magnified at constrained speed, so we felt the influence of ocean currents on vessel speed would be quite significant throughout the journey. Overall, we wanted to make sure that we selected not only a safe route, but also the most rapid and cost-effective one. The innovative "current aware" routing service from SAT-OCEAN clearly fitted that picture."" explains Billy Glover, SEVAN Drilling Rig Manager.

Operationally, SAT-OCEAN delivered a daily report including general weather forecast, ocean current forecast maps and a suggested route plan for next voyage leg. The route recommendation was computed on the basis of updated current, winds and waves forecasts. The forecasts and route advice were both sent by email to the rig and released on a web site for all involved parties to access.

Route analysis and results

By computing virtual rig positions along the initially planned route and the Great Circle route and comparing them with actual positions of the rig, an assessment of the time savings enabled by SAT-OCEAN routing service was performed.

For the leg between Cape Town and Rio de Janeiro, a route plan was in the first place defined based on pilot charts. The initial idea was to follow the coast route towards Walvis Bay to pick the coastal current and then set course to Rio taking a route northern of Great Circle (see “planned route” on figure 1). Based on simulations performed by SAT-OCEAN, this proposed route, although better than the Great Circle route, proved suboptimal. While both routes indeed benefit from similar downwind conditions (favorable inline current & wind), the SAT-OCEAN route is more economical as a result of the shorter distance sailed.

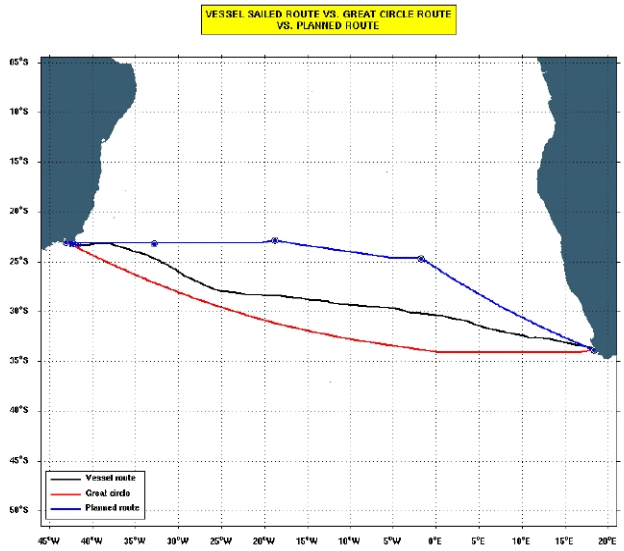

Figure 1: Compared route overview

After further analysis of the simulations and exchanges between SEVAN Marine and SAT-OCEAN, choice was then made to follow a course south of the Great Circle. For that specific leg, it was afterwards calculated that the SAT-OCEAN route had enabled a saving of one day and 3 hours by comparison to the Great Circle route, and 19 hours compared to the planned route.

Statistics along	**Vessel route**	**Great circle**	**Planned route**
Mean Velocity	+5.33 kts	+5.00kts (0.3 kt gained)	+5.38kt (0.0 kt gained)
Distance difference	-	139nm shorter than sailed	252nm longer than sailed
Duration	26 days 1 Hr	27 days 5 Hrs (1 day 3 Hrs saved)	26 days 21 Hrs (19 Hrs saved)

Solution benefits

From Shanghai to Singapore, the rig saved more than 2 days compared to the Great Circle route. SAT-OCEAN routing service proved just as valuable during the second leg between Singapore and Cape Town where another 2 days were saved by negotiating an optimal passage through the Equatorial currents.

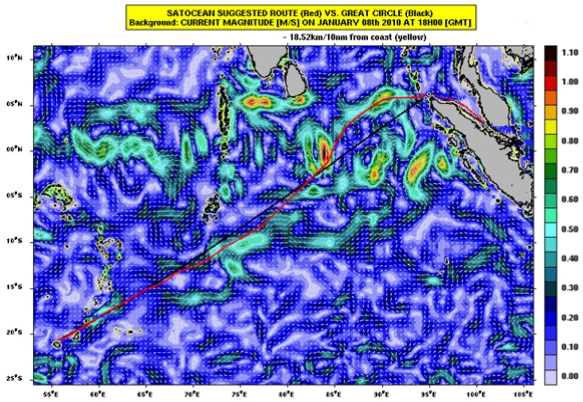

Figure 2: SAT-OCEAN suggested route in Equatorial currents

"By following SAT-OCEAN route recommendation to take advantage of favorable currents and winds, we have been able to save more than four days from the estimated voyage duration. SAT-OCEAN team was very reliable and reactive throughout the project in delivering quality daily forecasts and advices." says Pascal Busch, SEVAN Drilling. "As we will start preparing for the mobilization of our second drilling unit, also for Petrobras, we will definitely turn to SAT-OCEAN for routing advice".

Figure 3: The SEVAN Driller in Rio waters – Copyrights Somafoto LTDA, Rio, Brazil