NEW ZEALAND OIL & GAS

ENGINEERING FOR THE SOUTHERN OCEAN

You asked us:

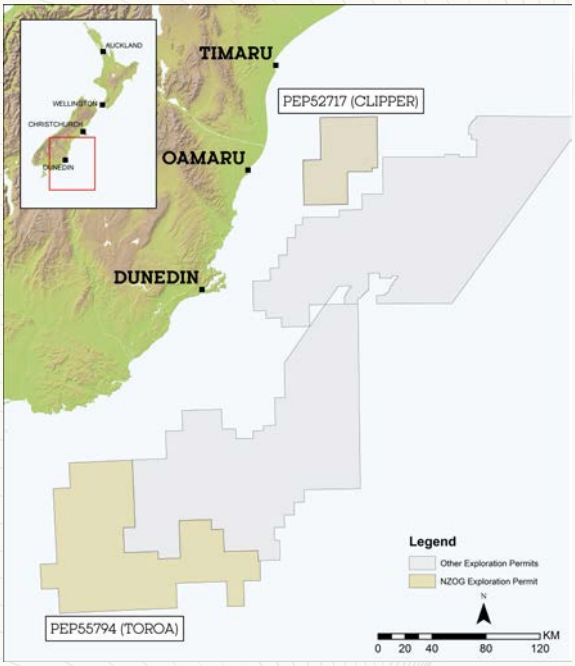
- What about the size of the seas out here?
- What risks do the big seas of the Southern Ocean pose?
- How do they compare to other operations (eg the North Sea)?

OUR RESEARCH

We have looked at sea-states relating to both the permits we hold: Toroa off the Bluff coast, and Clipper off the north Otago coast.

We commissioned the National Institute of Water & Atmospheric Research Ltd (NIWA) to undertake a preliminary study of ocean conditions in the Canterbury Basin (i.e. the location of the Clipper permit), in 2017. The study also looked at the expected conditions for the Toroa permit, off the Bluff coast.

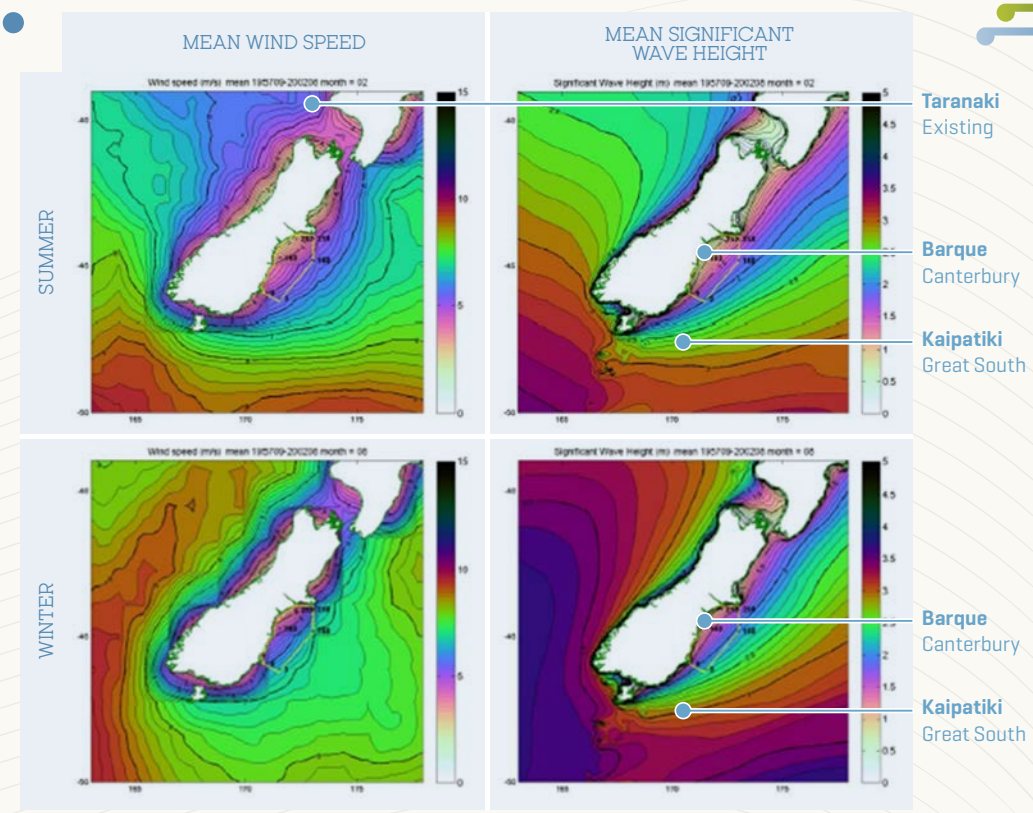
We also considered published papers, and research commissioned by other exploration companies with permits in the Southern Ocean, such as Woodside's independent metocean study for the Toroa permit. This research gives us a picture of the sea-state in the Southern Ocean, which allows us to anticipate likely 'WoW' (waiting on weather downtime) and engineering responses required to safely design for local conditions. We can also then compare with other similar producing basins, including offshore Taranaki, the Great Australian Bight and West of Shetlands.



Evidence suggests that the sea-state at the Clipper permit location is broadly more benign than both Taranaki (where there are many industry offshore installations) and seas at Toroa. Toroa is similar to, or slightly better than, the Great Australian Bight (offshore South Australia) and West of Shetland (UK). This leads us to conclude that the sea states for the Clipper and Toroa permits are both within the parameters of well-established off-shore fields around the world.

CONDITIONS AT CLIPPER

- Metocean conditions are better than those in the producing Taranaki Basin
- Mean significant wave height <2m throughout the year
- Minimal seasonal variation
- Wind speed
  - Mean ~13kts
  - Vector averaged ~6kts
- Tidal range ~3m
- 45 year numerical hind-cast model conducted by the National Institute for Water & Atmospheric research (NIWA) predicts less than 5% operational down-time due to weather
- NIWA's existing wave-hindcast model (i.e. based on historic data, ~45 years) is used to define probability distributions of wave height and period. The model predicts the swell and sea-wave climate but cannot assess the likelihood of tropical cyclones



WHAT ABOUT EXPECTED STORM SURGES DUE TO CLIMATE CHANGE, HOW DO YOU PLAN FOR THOSE?

Modelling has shown historic patterns of significant fluctuations in wave height and storms. While these may increase in frequency and severity, current industry design parameters accommodate this range (i.e. 100 year wave or a 1 in 1000 year storm in combination with associated wind and current criteria). The forecasts themselves include several observation buoys located within the greater region and help to calibrate the models.

There are no known examples of major storm damage affecting the structural integrity of fixed platforms in the North Sea. While Hurricanes Hilda and Betsy destroyed some fixed offshore structures in the Gulf of Mexico in the 1960s, there have been no recorded platform losses due to storms since a revision of the design code (CASOCA, 1981).

However, the industry recognises that a pattern of increase in significant wave height will place greater stresses on structures and designs for this. Once structures are operational, additional protection is afforded by remote condition monitoring systems and by regular inspection and maintenance. The facilities themselves also provide useful metrological observation data that are used to update forecasts and designs.

CONCLUSIONS

The conditions of the Southern oceans are manageable and comparable, or better than, other producing basins such as Taranaki, Great Australian Bight and West of Shetlands. This means the engineering requirements are known and can be managed safely.

For more information about
New Zealand Oil & Gas, please contact us

Phone +64 4 495 2424
Email enquiries@nzog.com