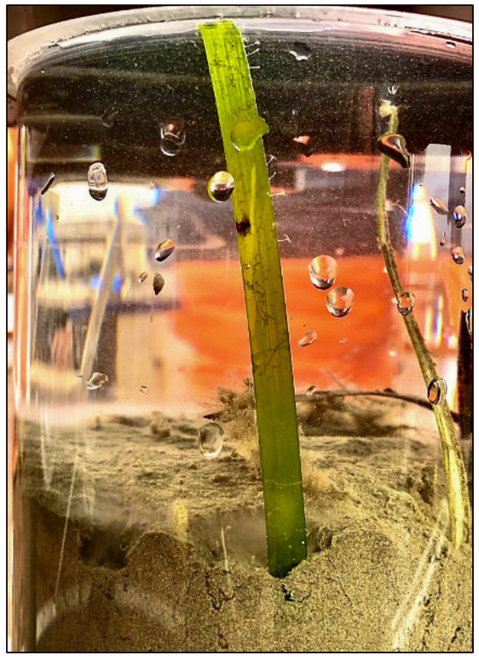
CONVEX SEASCAPE SURVEY

CMS GEOSCIENCE RECENTLY PARTNERED WITH THE BLUE MARINE FOUND ATION, THE UNIVERSITY OF EXETER AND JERSEY MARINE RESOURCES ON A PROJECT TO QUANTIFY BLUE CARBON



The Convex Seascape Survey initiative is a pioneering collaboration to quantify and understand blue carbon stored in the coastal ocean floor, and the effects of marine life upon it. The project will deliver new, reliable open-source data which will educate, inspire and enable informed decisions on ocean use, to harness the power of the sea in the fight against climate change.

The role of CMS's specialised geotechnical team was to collect 55 vibrocores and 8 multicores across various locations in the waters around Jersey. The company collected undisturbed samples of sediment and supernatant water using a multi corer at 8 locations on the south and east of the island. One core from each location was transferred back to shore where the research team could perform eDNA testing.

Dr Richard Tennant established a field molecular laboratory that allowed the team to both extrude and subsample the cores, as well as purify and sequence the DNA in Jersey. This data was then taken back to Exeter to investigate which flora and fauna are contributing to carbon stocks and determine how they have formed over the past two centuries.

As the survey team were able to conduct on-site analysis, the data they generated can be validated once the other cores have been received in Exeter, to better understand the impacts of storage and/or transportation.

The project also looked at how protection from trawling and dredging activities might affect the capacity of the seabed to accumulate and store organic carbon.

Researchers had a particular interest in how this protection affects the biodiversity of seabed habitats, as it is likely that the animals that live around jersey may play an important role in the flux of carbon through these environments.

The CMS team collected cores both inside and outside of the Jersey Marine Protected Area where mobile fishing gear is prohibited. This will allow academics to compare the differences in seabed organic carbon content and biodiversity according to different levels of seabed disturbance. The samples they cored will be analysed alongside short sediment cores of 30-60cm that they survey team gathered by hand using SCUBA.

Researcher, Dr Ben Harris, utilised a range of techniques to measure differences in biodiversity. Baited Remote Underwater Video Systems (BRUVS) were deployed to collect information on the abundance and body size of different fish and highly mobile invertebrate species such as crabs or lobsters.

ROV and photo-quadrants were used to quantify the density and species diversity of less mobile animals living on-top of the seabed, these include sponges, ascidians and hydrozoans. The third approach was collecting sediment grabs for counting the biodiversity of animals, like worms and bivalves, living within the sediment itself.

CMS GeoScience worked with Anna Smith and the Convex team to design this survey. Jersey is a challenging place to operate, having the third-largest tidal range in the world with a range of >10m and 5-6 knots. Looking at sediment types as well as potential obstructions and limitations, CMS advised on sample locations to ensure that the needs of the project were met.

With more interest in the top layers of sediment, it was decided that the HPC corer would be deployed in 3m mode, with a smaller corer aiming to help mitigate some of the tidal restrictions. After consultation, the project scope was defined as 55 vibrocores, predominantly around the south and east of the island.

Hayley Santer, the Senior Surveyor on the project, spoke about the level of preparation needed:
'To maintain efficiency, and with several tidal locations spread in various bays around Jersey, it was crucial that we worked to minimise time spent waiting on

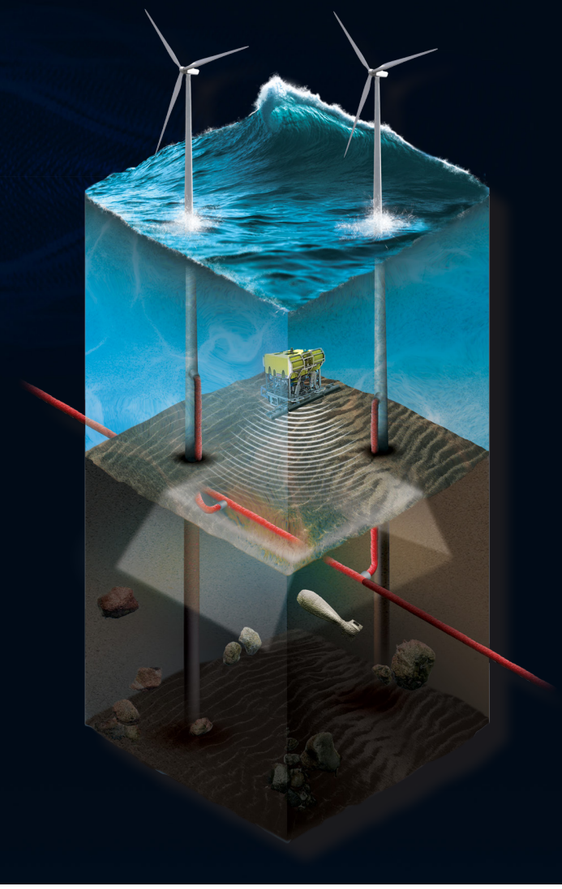
the tide when trying to access more shallow locations.

In addition to significant tidal ranges and rocky coastline, many of the reefs were poorly charted. With the team finding that there were large discrepancies in the data, it was important for us to take the additional time to capitalise on rising tides as well as note and mark a safe route into shoal areas, paying particular attention to locations that, while technically deep enough, were enclosed behind prominent, sometimes awash, rock.

Using these proven routes, and ensuring we received regularly updated tidal information, enabled real-time assessment of the observed depths both on approach and when were deployed at each location. This also allowed us to establish what depths we could expect on completion of the sampling. We were often operating within busy shipping routes, and St Helier VTW and the Jersey Coastguard were instrumental in reminding other vessels of the requirements of space and safe passing. To add to the intricacies of this project, our team were working over a number of weekends which meant that the increase in recreational club activities added to the difficulties of working in an area where marine traffic was already saturated.

Our choice of a smaller, more compact vessel enabled us to work alongside these clubs and societies and we were able to complete the campaign safely with minimal disruption to us and the public'.

The geology around Jersey also presented a specific challenge to the team, with rocky outcrops being exposed



by the high tidal range. Extensive planning using tidal and weather forecasts, as well as water depths, enabled the team to maximise working windows.

Owing to the unique tidal movements around the island, Rory Bardner, CMS Marine Geologist, found it interesting to discover such variation in the geology sampled throughout the campaign:
'Cores recovered deposits ranging from silty sands to coarse gravels, often in proximity, and igneous bedrock was samples in many cases. Using the multi corer to recover undisturbed samples of the shallow seabed gave a real insight into the sediments, marine life and seagrass below us.

Due to the testing required, the cores had to remain at a constant temperature of between 4-5 degrees, which was made more difficult as many of the locations were >4-hour steam away from harbour. A solution was found which allowed for onboard chilling facilities, as well as a space to safely operate the vibrocoring system, the multi corer and other equipment.

Mechanical Design Engineer, Jack Foll, reported on the difficulty in operating the geotechnical systems and the performance of the team overall:
'There was a great deal of preparation in anticipation for this campaign as we knew we would be working within a demanding environment. The waters in which the team were deployed experiences a tidal height of up to 12m, and this meant that our HPC corer had to operate in 3m to compensate for the strength of the tide. As well as this, we experienced unseasonably inclement weather throughout our time on the island which meant the team had to work within tight windows of opportunity, adding even more to the complexity of the project.