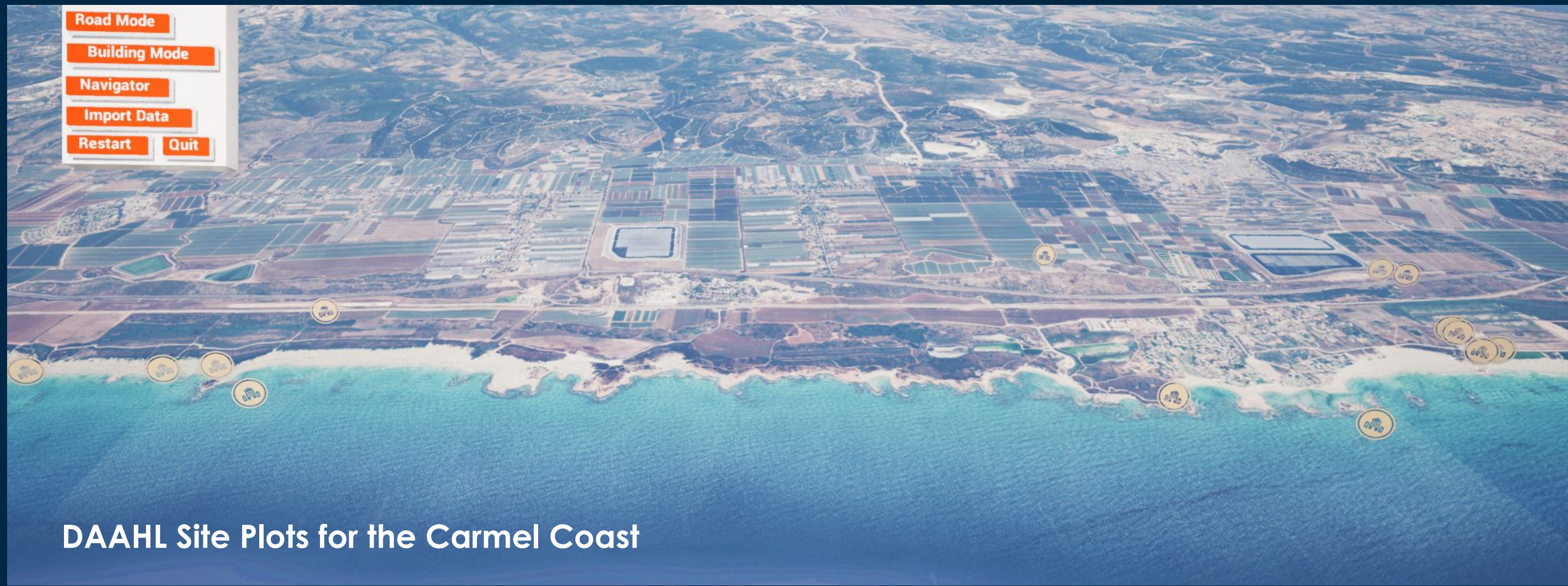


# CyberArchWarehouse Big Data Store – DAAHL and Marine Archaeology on the Carmel Coast, Israel

Haoyang Guo, Sandy Vo, Sofia Barrows, Kaustubh Paliwal, Mabel Szeto, Shuyang Zhang, Giovanni Vindiola, Gilad Shtienberg, Assaf Yasur-Landau, Thomas Levy, Neil Smith



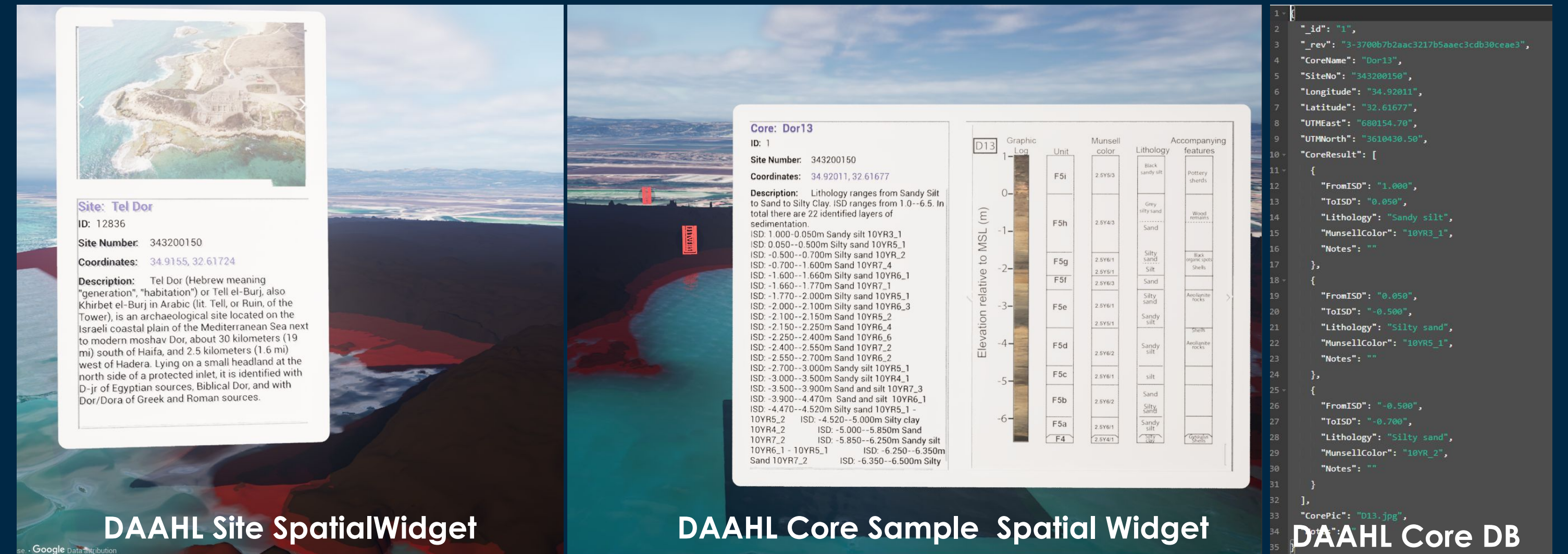
DAAHL Site Plots for the Carmel Coast

## Introduction

The Digital Archaeology Atlas of the Holy Land (DAAHL) has been around for over 20 years. However, it lacked a marine archaeology and paleoenvironmental database. To make it a more sustainable research solution for data curation we have permanently housed it in the National Research Platform (NRP) (<https://nationalresearchplatform.org/>), a partnership of more than 50 institutions that facilitates high-speed data access for science and computation. NRP is funded through NSF and other institutions guaranteeing its longevity for decades to come. As part of the NRP, we can now access DAAHL directly through the CyberArchWarehouse, rather than a website.

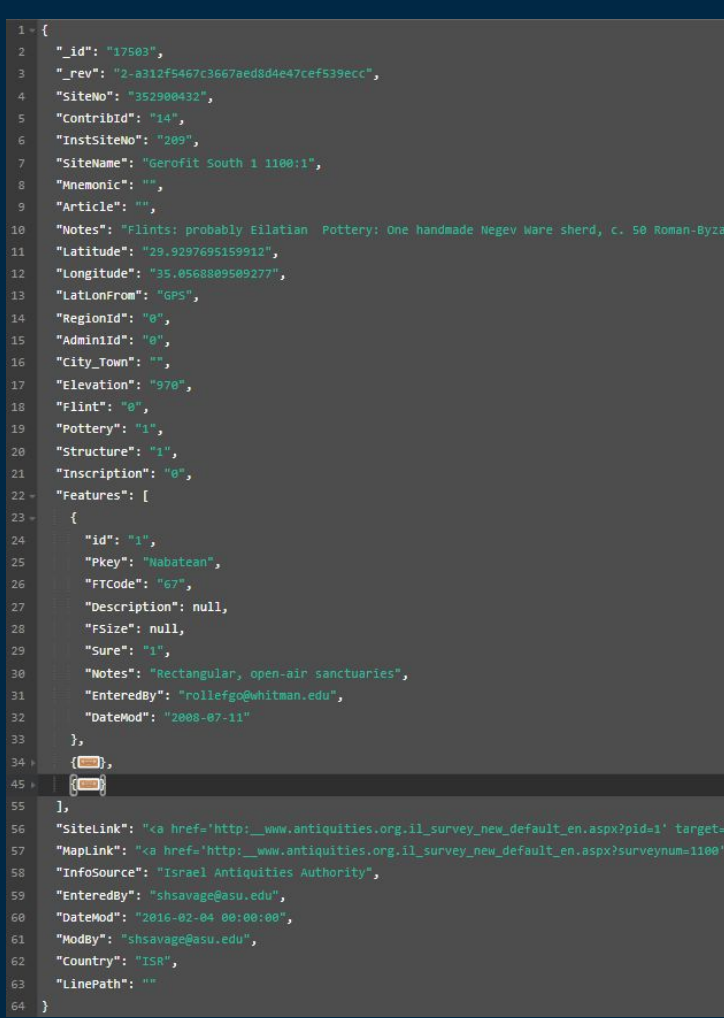
The CyberArchWarehouse is an immersive collaborative environment built on top of Unreal Engine 5 in which researchers can come together, analyze and study digitized assets from the archaeological record. It consists of a front-end powered by UE5 that enables dynamic visualization of archaeological data and a back-end data store consisting of an authentication api layer and CouchDB noSQL database. We chose to organize the storage of data using CouchDB over SQL systems since it can mirror the nested recording of archaeological data and the folder file storage common to archaeological digitization. Here we demonstrate the new DAAHL functionality using the recent University of Haifa – UC San Diego underwater excavation data from Tel Dor on Israel's Carmel coast.

The CyberArchWarehouse is designed to be highly modular allowing for very different types of applications and analyses to be explored. On the top left side of the poster we present figures of the DAAHL sites integrated into the project. The original DAAHL database was created using MySQL. As a relational database the central table listed the main details and spatial location of an archaeological site with additional tables on features, periods, site types etc. Using a NoSQL database we are able to imbed all these auxiliary tables into a single document for each site. In total there are 48,630 site entries and 183,954 features that can be queried within the CyberArchWarehouse and plotted in 3D as shown in the figures. When a user clicks on a placemark a spatial widget appears showing pertinent details on the site, including associated pictures (See middle figures). Besides archaeological sites we can now query spatial core samples database and display the unique analytical data and core image profiles within the popup widgets. The bottom figures show the spatial display of the core samples along with the digital elevation model of the bathymetry.

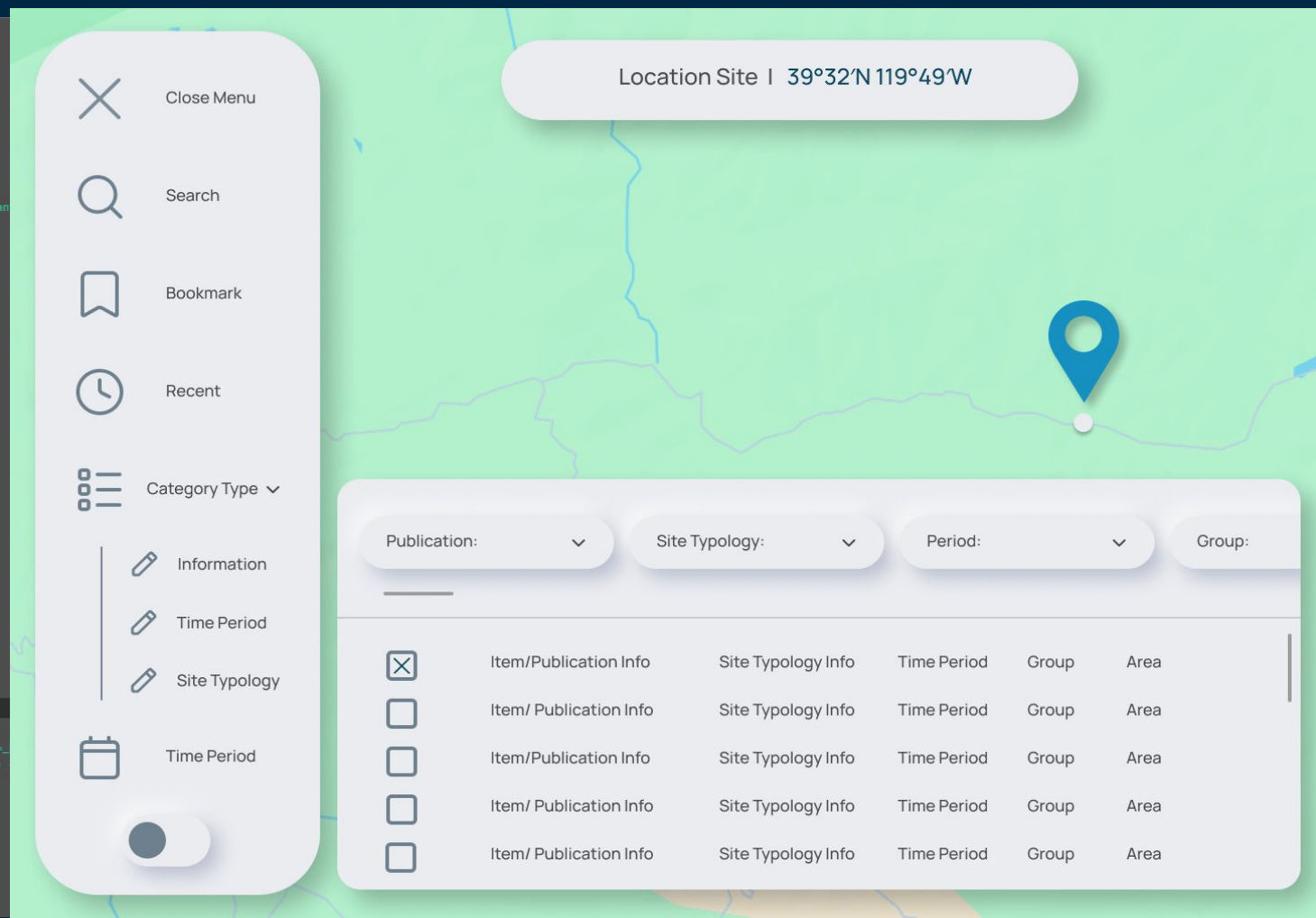


## Carmel Coast Case Study and Future Work

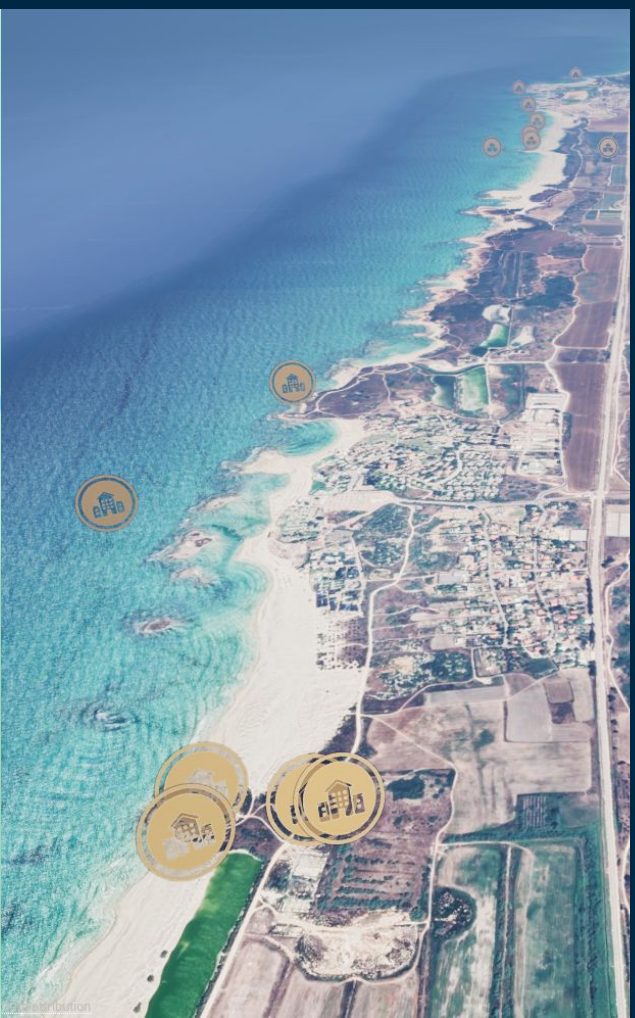
Since 2017, the University of Haifa Recanati Institute for Maritime Studies and UC San Diego have partnered in a deep-time study of climate, environmental and cultural change along Israel's Carmel Coast focusing on the Holocene (the +/- past 12,000 years). Using underwater archaeological surveys and excavations, coupled with intensive sediment coring along the coast, a new and robust paleoenvironmental and cultural record has been established. Sharing, curating, and analyzing these varied and large databases is a challenge. The CyberArchWarehouse and 3D visualization tools offer new ways of solving these problems. We are at the initial stage of expanding the power of archaeological visualizations to include the Eastern Mediterranean so that cultural and historical reconstructions can be made, including ancient trade networks using Unreal Engine 5.



NoSQL Site Document



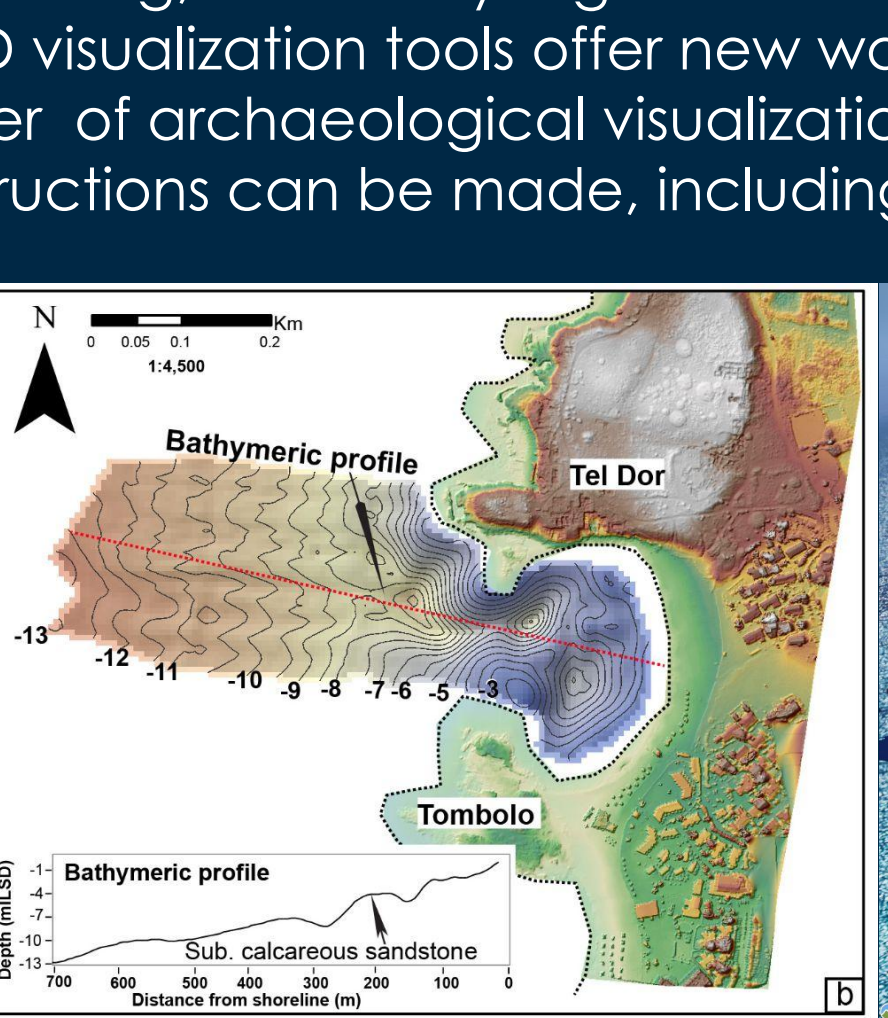
Figma UI/UX of the Current Query System



DAAHL Site Plots



DAAHL Core Plots



GIS 2D DEM Dor South Bay



3D perspective of DEM inside CyberArchWarehouse

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