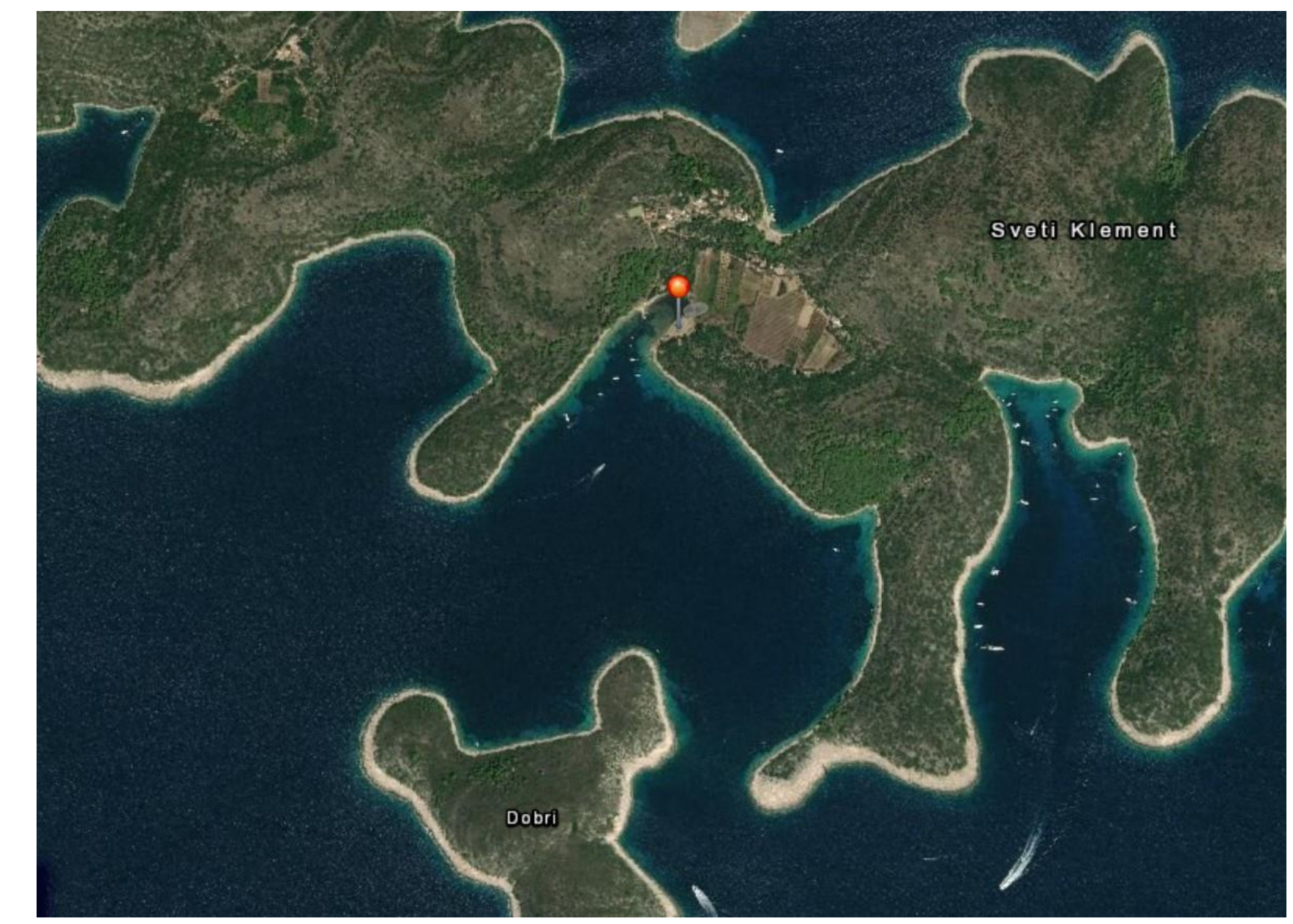




Sea Level Rise in Soline Bay, St. Klement Island, Croatia

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Drone images can be processed with GIS tools to generate predictive maps of sea level changes in the past and the future.

Introduction

- The Mediterranean region was under the control of the Roman Empire during classical antiquity from about one hundred years B.C. through the fifth century A.D.
- The archaeological site of Soline Bay on St. Klement Island has been under excavation since 2007 under Dr. Ivančica Schrunk of the University of St. Thomas
- Sea level (SL) rise has caused substantial changes to the profile of Soline Bay which are discoverable via archaeological findings, climate change research, drones, and GIS technology

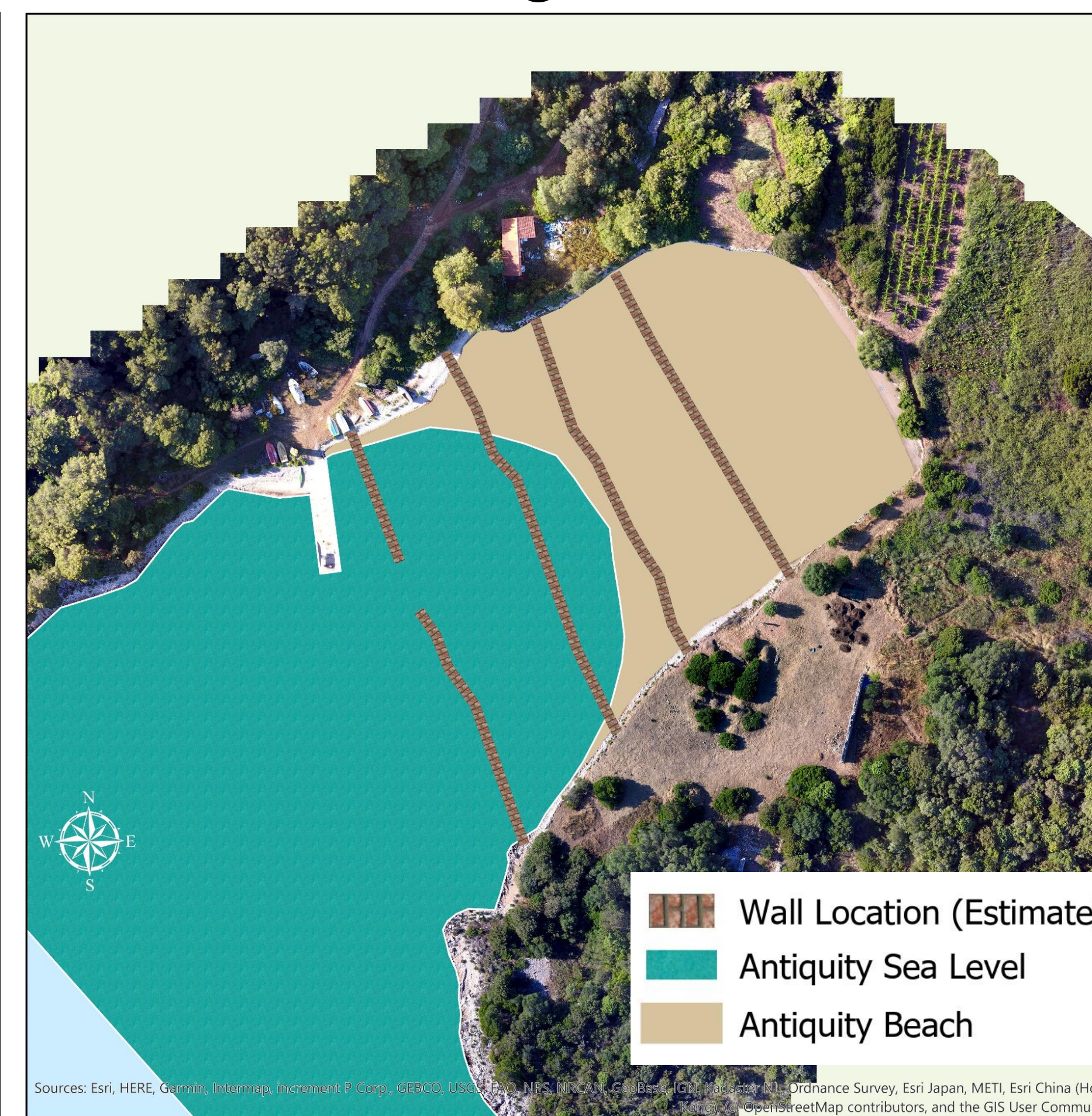
Research Question

- Research on SL suggests close to 2 meters of rise has occurred at Soline
- Underwater salt pans at the site provide insights into SL rise, as they would have been built according to SL at the time
- Dr. Schrunk and her team found that the salt pans were ~2 meters below SL
- With an understanding of these ancient structures' function and location, **where was the shoreline at Soline Bay during antiquity when the Romans built on the land?**
- Storm surges have already proved to temporarily increase SL by 1 meter, and research has provided predictions for SL rise to come by the year 2100 near Soline Bay
- Using current climate models, **what could coastal inundation look like for Soline Bay in by the year 2100?**

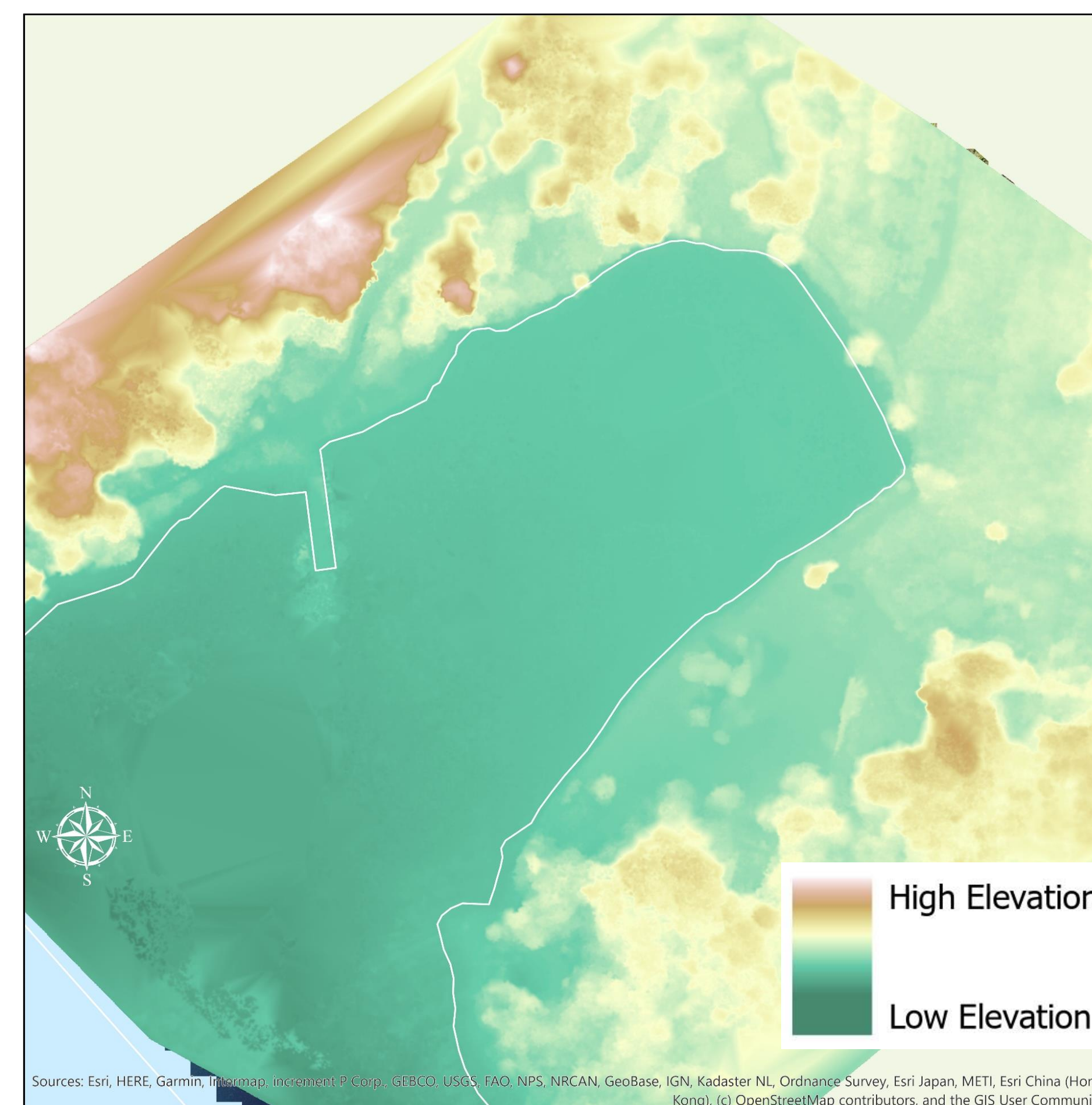
Site Layout



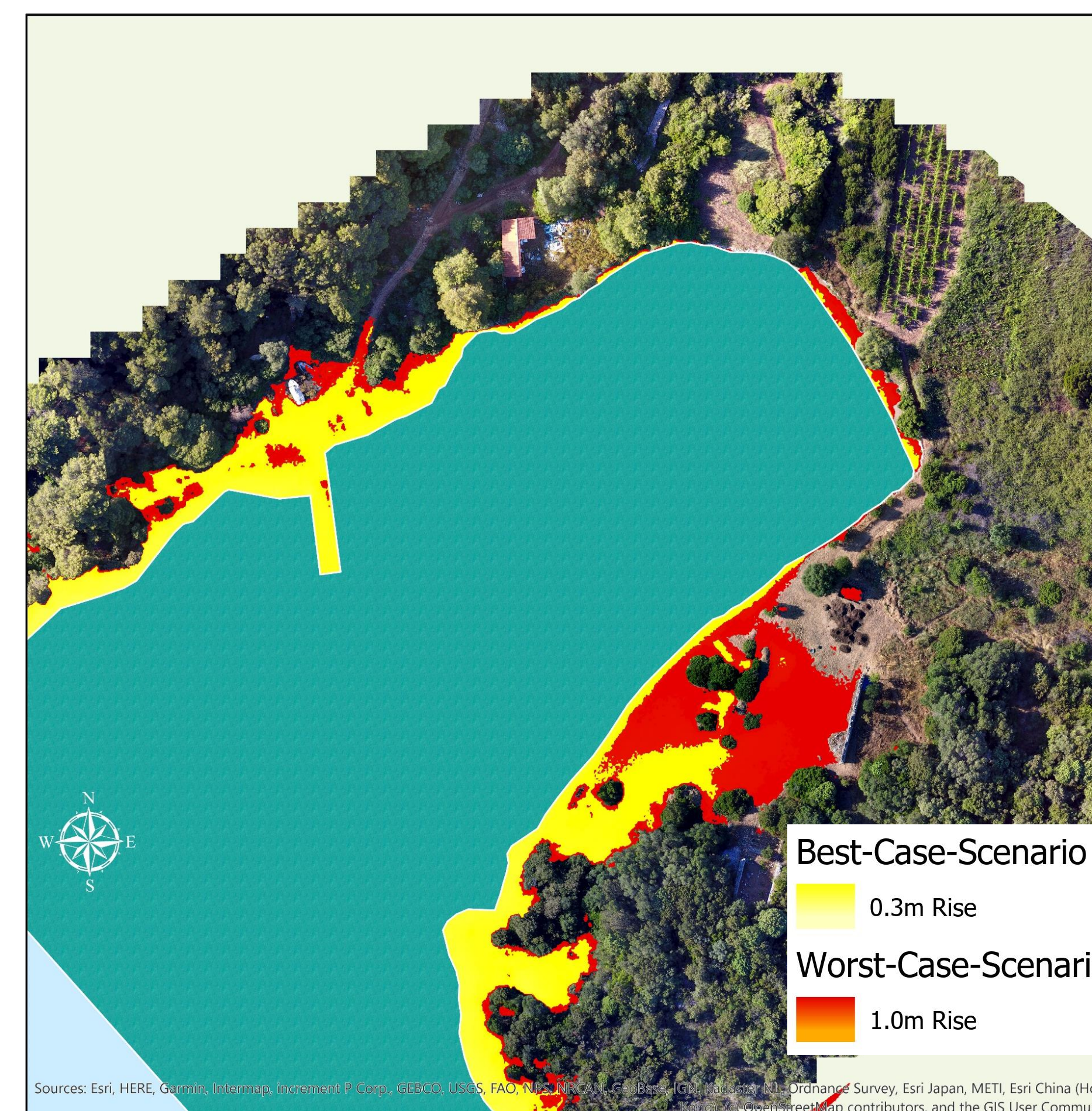
1st Century B.C. – 5th Century A.D. (Figure 1)



Digital Surface Model



Inundation by 2100 (Figure 2)



Results

- An orthomosaic (Site Layout) and a DSM (Digital Surface Model) were generated in ArcGIS Pro using a collection of drone images taken at the site in 2018
- The orthomosaic is a high-quality image of the entire site and the DSM models elevation
- Figure 1 shows the shoreline at antiquity, and the estimated location of the salt pan walls
- Figure 2 shows the best-case-scenario and worst-case-scenario/storm surge for sea level rise by the year 2100
- The dig site is the most vulnerable to the worst potential flooding

Conclusion

- It's possible to use drone images to ultimately generate maps displaying sea level change
- The use of drone technology paired with powerful GIS software proved itself valuable for the ongoing research at Soline Bay
- Whether Soline Bay sees the best-case-scenario or the worst-case-scenario, there will eventually come a time when excavating the site is no longer a possibility
- Coastal inundation at archaeological sites is happening now and is going to become more challenging and more problematic into the future as climate change continues
- As more time is spent researching the site of Soline Bay, more history can be revealed through GIS processes

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