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# The Digital Helike Project in the Early Helladic Period: Further Insights from Archaeological and Geological Data Through Combined Modelling, 3D Reconstruction, and Simulation

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The Helike Project [1] has located an Early Helladic II-III settlement buried 3—3.5m under the coastal plain on the Southwestern shore of the Corinthian Gulf. Evidence for elaborate town planning consists of buildings arranged across cobbled streets including a “Corridor House”. Large amounts of stored domestic accessories and exotic wealth points to the regional importance of the settlement concerning overseas trade in the middle and early second half of the 3<sup>rd</sup> millennium BC [2].

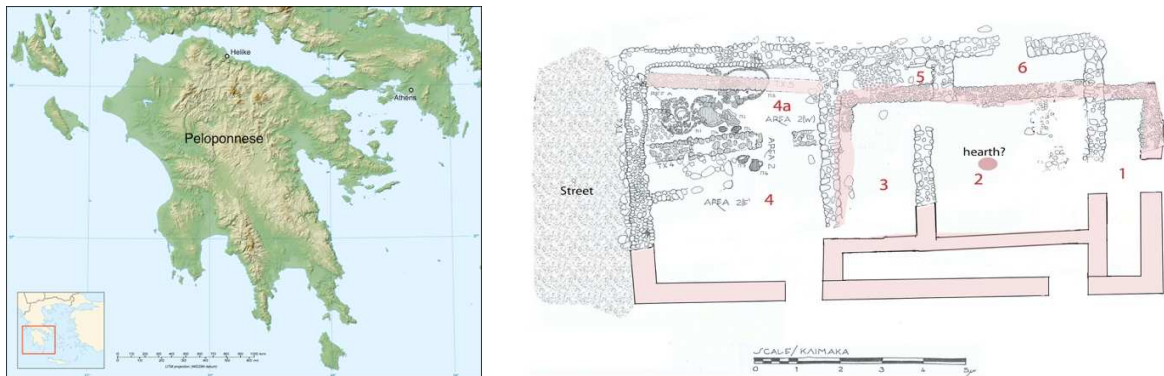
Within this wider context of research, the first phase of the Digital Helike Project focusses on the Helike Corridor House (HCH). Using archaeological and geological data, 3D reconstruction of the HCH was performed followed by structural integrity analysis, an innovative and pioneering engineering technique within archaeology based on Finite Element Analysis. These new methods tested the existence of a second floor and roof structure, addressing conjectures regarding the plan and construction of such houses leading to hypotheses on their social and administrative roles. The research has provided solid evidence for the crucial structural function of the debated long narrow corridors [3]. It also demonstrated that the roof was tiled on the basis of the maximum weight the walls could support [4].

Moreover, GIS-based predictive modelling placed the house in the context of the ancient shoreline based on five landscape variables (sea level rise, deposition, subsidence, tectonic uplift, and pulse tectonic) [5]. The results show that the Early Helladic coastline would be at 170m from the settlement (currently 1km from the shore). The location and proximity to the shore are consistent with data acquired from bore hole drilling in the area and with other contemporaneous Corridor Houses across the Peloponnese.

## References

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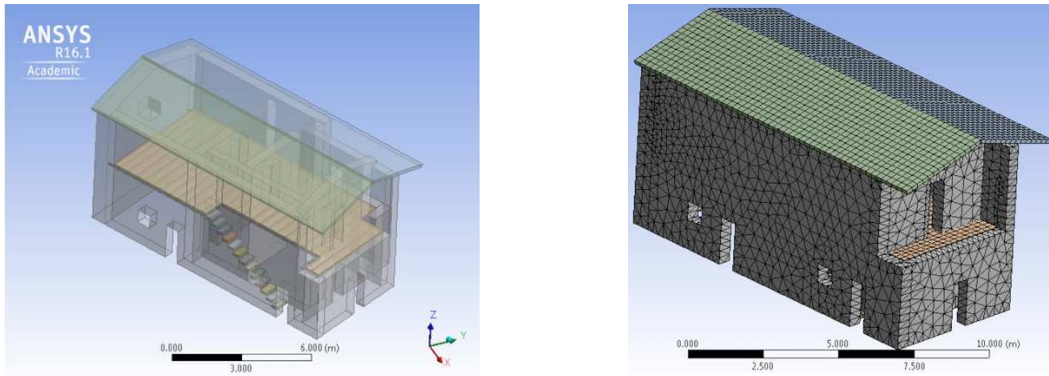
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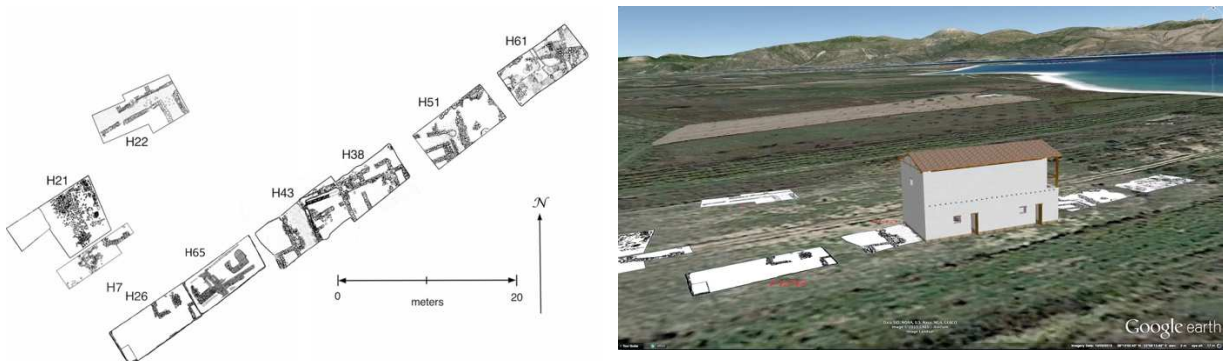
**Figure 1:** Left the location of ancient site of Helike; right, the Helike Corridor House excavated foundations.



**Figure 2:** The 3D reconstruction of the Helike Corridor House.



**Figure 3:** Modelling the Helike Corridor House with ANSYS Finite Element Analysis.



**Figure 4:** Left, the Early Helladic excavated site. Right, GIS based modelling and reconstruction of the ancient shore line registered on Google Earth.

**Paragraph with 100 words:**

The first phase of the Digital Helike Project focusses on the Helike Corridor House (HCH). Using archaeological and geological data, 3D reconstruction of the HCH was performed followed by structural integrity analysis, a pioneering technique within archaeology based on Finite Element Analysis. These new methods tested the existence of a second floor and roof structure, addressing conjectures regarding the plan and construction of such houses leading to hypotheses on their social and administrative roles. GIS-based predictive modelling placed the house in the context of the ancient shoreline based on five landscape variables (sea level rise, deposition, subsidence, tectonic uplift, and pulse tectonic). The location and proximity to the shore are consistent with bore hole data.