the discovery of evidence for at least three shipwrecks, in addition to evident changes in the geomorphology of the coast line since antiquity. Hence this paper will present the MBRP and its most recent achievements and discoveries.

## 23. Coastline, River Changes and their Effects on Anchorages / Harbours and Habitation Patterns: Akko (Israel) as an Example

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Changes in shoreline and river course dictate anchorage/harbour positions, which, in turn, influence the habitation patterns of a coastal settlement. A model case study is that of Tel Akko/Acre and its vicinity. Upon analysis of previously gathered data as well as the newer results obtained for the 'Total Archaeology Project', the establishment of localized areas of some of the settlement areas and thus, the patterns, was possible. Since the first archaeological excavations undertaken in the 1970s, Tel Akko is known to have been an important trade city from the early second millennium BC onwards. Maritime connections are in evidence at the site from the Middle Bronze IIa period (early second millennium BC), although the locations of its anchorages/proto-harbours or harbours and their facilities have yet to be established.

The unusual banana/crescent shape of Tel Akko necessitated a renewed study of the foothills of the tell, especially its southern and south-western borders. A previous assumption that an inner anchorage based on the Na'aman River was checked, as was the area assumed to have been the river estuary.

Studies such as ERT (electrical resistivity tomography) and GPR (ground-penetrating radar) were carried out in the past and contributed to our understanding of the area; however, only in a recent study was a reconstruction of the evolution of the tell's coastline since the Bronze Age determined, as well as the possible location of the ancient anchorages. This research is based on

the study of new sediment cores drilled at the base of the tell and in the Old City of Akko (Saint Jean d'Acre) 1500m west of the tell.
We propose that the southern anchorage was situated in the outer marine-dominated estuary of the Na'aman River until the Early Persian period. This anchorage possibly shifted to the western open coast of the tell during the Late Persian period, before its subsequent relocation to the Akko promontory (Saint-Jean-d'Acre) in late Hellenistic time. On the basis of this historical information, we attempted to locate the Hellenistic harbour of Akko by coring in the Old City, in proximity to the modern harbour. Here we found more than 4m of marine sands deposited in part during Hellenistic times. These results are being corroborated by the archaeological data gathered thus far.
A salvage excavation carried out in 2010, as well as a probe in the summer season of 2016, further demonstrate the coastal and river changes, and possible anchorages, which, in turn, influenced the habitation pattern on the tell and the Akko/Acre area.

## 24. Inundated Neolithic Villages on the Carmel Coast, Israel

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The Neolithic period witnessed a major revolution in human existence: the transition from a nomadic way of life (hunting and gathering), to a food-producing economy based on domestication of plants and animals, and residence in permanent settlements. Since the 1960s researchers in Israel have developed methods for identifying, excavating, documenting and researching submerged prehistoric settlements.
Six inundated sites dated to the Neolithic period have been discovered along the Carmel coast. The Atlit-Yam site dates to the Pre-Pottery Neolithic (ca. 9200-8500 years BC), while several sites date to the Pottery Neolithic period (ca. 8000-6500 years BC). These settlements shed light on the economy, material culture and lifestyle of the coastal Neolithic inhabitance of the Eastern Mediterranean. They show how the ancient populations dealt with environmental changes, sea-level rise, the flooding of the coastal area, and how they reacted to sea-level rise. The research provided evidence on the invention and development of water wells, the extraction of olive oil and the evolution of the Mediterranean subsistence and diet. It also demonstrates the potential effects of future sea-level rise and flooding of coastal plains.
Sea-level rise occurred during the Neolithic period, and may occur in the future due to global warming. A rise of more than one meter in the twenty-first century, as predicted by some specialists, will necessitate costly human adaptation and heavy investment in coastal protections, as in Venice and The Netherlands. At some point in the future, sea-level rise may cause an inevitable population transfer, abandonment of settlements and removal of valuable assets inland, as practiced by the Neolithic populations of the Carmel coast.