



Geoarchaeological evolution of Tel Akko's ancient harbour (Israel)☆



Christophe Morhange^{a,b,c,*}, Matthieu Giaime^a, Nick Marriner^d, Amani abu Hamid^c, H       Bruneton^a, Anasthasie Honnorat^a, David Kaniewski^{e,b}, Fr       Magnin^f, Alexei V. Porotov^g, J       Wante^a, Dov Zviely^{c,h}, Michal Artzy^c

^a Aix-Marseille University, CEREGE, Europ     de l'Arbois BP80, F 13545 Aix-en-Provence, France

^b IUF, 103 boulevard Saint Michel, F 13005 Paris, France

^c University of Haifa, Hatter Laboratory, Leon Recanati Institute for Maritime Studies, Mount Carmel, Haifa 3190501, Israel

^d CNRS, Laboratoire Chrono-environnement, UMR CNRS 6249, MSHE USR 3124, Univ. Bourgogne Franche-Comt  , 25000 Besan    , France

^e Universit     Paul Sabatier-Toulouse 3, EcoLab, IUF, B         4R1, 118 Route de Narbonne, 31062, Toulouse cedex 9, France

^f CNRS, IMBE, Aix-Marseille University, Europ     de l'Arbois BP80, 13545 Aix-en-Provence, France

^g Lomonosov State University, Geographical Faculty, Moscow, Lininskie Gori, 119991 Moscow, Russia

^h School for Marine Sciences, Ruppin Academic Center, Michmoret, Israel

ARTICLE INFO

Article history:

Received 16 December 2015

Received in revised form 21 March 2016

Accepted 24 March 2016

Available online xxxx

Keywords:

Geoarchaeology

Akko

Ancient harbour

Israel

Levant

Mediterranean

Coast

Geomorphology

ABSTRACT

Archaeological excavations at Tel Akko, northern Israel, located some 1.5 km east of the present ancient city, have revealed imported artefacts and evidence for maritime trade dating from the early part of the 2nd millennium BC onwards (Dothan, 1993). These findings strongly support the existence of a harbour (or anchorage) at the site, although its exact location and associated facilities have yet to be elucidated. Sedimentological and palaeontological analyses, together with ¹⁴C dates of cores drilled around Tel Akko, provide new palaeo-environmental information to help to reconstruct shoreline changes during the last ca. 4000 years. First, we propose that the southern facade of the tell constituted the harbour environment, characterised by marine environments until ca. 2800 years BP; the site was protected by a natural rocky breakwater and a sandbar which were silted-up and transformed into a fresh-water marsh. This environment might have been used as an anchorage by the tell's inhabitants before the early-1st millennium BC. Secondly, it seems that the eastern side of the tell was flanked by a sandy coast, that had prograded, offering an open anchorage until the Late Persian/Hellenistic period in the southwestern area of the tell. These results are being cross-checked by geophysical surveys, rescue archaeology and should be validated by further archaeological excavations.

       2016 Elsevier Ltd. All rights reserved.

1. Introduction

Beginning in the 1980s, a series of geoarchaeological projects have focused on different ancient harbours and coastal sites of Israel, namely at Caesarea (Raban and Hohlfelder, 1981; Nir and Eldar, 1987; Raban, 1992; Reinhardt and Raban, 1994; Reinhardt and Raban, 1999; Reinhardt et al., 1994,2006; Sivan et al., 2001,2004; Shtienberg et al., 2014 among many others), Dor (Wachsmann and Raveh, 1984; Raban, 1987b; Kingsley and Raveh, 1996), the Atlit sites (Galili and Nir, 1993; Galili et al., 1993; Haggi and Artzy, 2007 for the Phoenician basin), Haifa Bay (Zviely et al., 2006, 2007, 2009; Porat et al., 2008), Akko (Galili et al., 2010; Rosen et al., 2012) Nami (Artzy, 2006; Salmon 2014) and Magdala harbour on the banks of

the Kinneret (Galilee) Sea (Raban, 1988; De Luca, 2012; Lena, 2012; Sarti et al., 2013; Rossi et al., 2014; De Luca and Lena, 2014). Paradoxically, the evolution of the major harbour sites of Tel Akko has been neglected.

Tel Akko is one of the oldest coastal settlements of the Mediterranean world (2000–1750 years BC) (Artzy, 2012; Fig. 1). It is situated near the Na'aman (Belos) River (Zviely et al., 2006; Lichter et al., 2009). It has, therefore, been affected by important environmental changes at various temporal and spatial scales (Artzy, 2012). Unresolved archaeological questions relate to the location of Akko's landlocked anchorages (Dothan and Raban, 1980). Inbar and Sivan (1984) and Zviely et al. (2006) investigated geological issues, especially in the northwestern area close to the tell. However, these studies did not elucidate the coastal changes in relation to the position of the ancient anchorages.

By reconstructing the coastal topography of the ancient city and its palaeo-environmental context since the Bronze Age, our results shed new light on the environmental evolution of the Tel Akko area. In addition, we have investigated the locations of ancient anchorages, which is a topic directly linked to the geomorphological

       To the memory of Joseph Treidel (1876–1929) in recognition of the exceptional maps he produced of the Akko area between 1925 and 1926.

* Corresponding author at: Aix-Marseille University, CEREGE, Europ     de l'Arbois BP80, F 13545 Aix-en-Provence, France.

E-mail address: morhange@cerège.fr (C. Morhange).

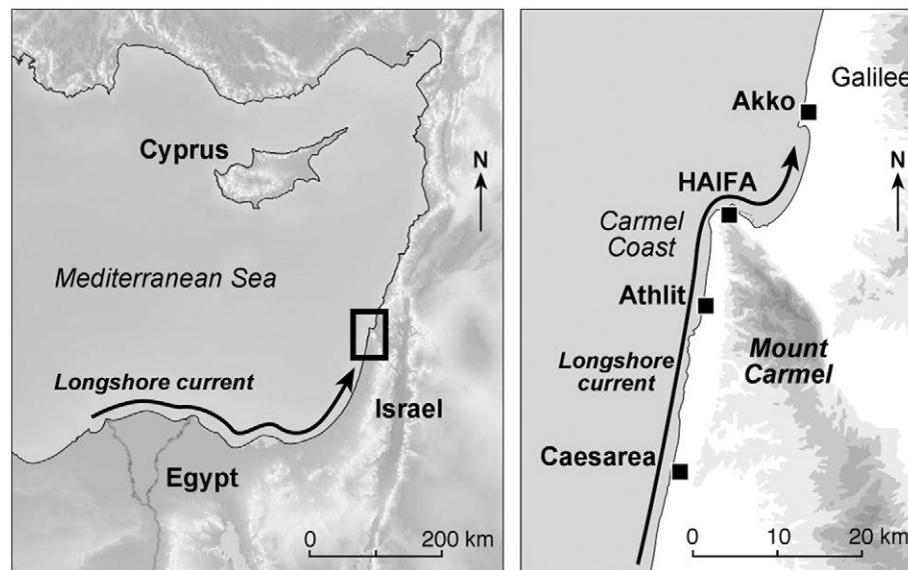


Fig. 1. Location map. Akko (Northern Israel) in the Eastern Mediterranean basin.

processes in action, e.g.: (1) relative sea-level changes; (2) regional shoreline fluctuations of Haifa Bay (Zviely et al., 2006, 2007, 2009); and (3) local environmental changes in the Na'aman estuary (Lichter et al., 2009, 2010, 2011).

Our aims are to answer the two following questions at a variety of temporal and spatial scales, including:

- to reconstruct shoreline changes and the evolution of anchorage potentialities (natural harbour, land-locking processes related to positive sedimentary budgets sensu Anthony et al., 2014). Where were the ancient harbours located from the Middle Bronze Age onwards?
- to elucidate the relationships between the settlement pattern and the coastal landscape, in parallel with the archaeological excavations carried out on the tell. What were the coastal environments of Tel Akko like during different periods, and when and how did these evolve (Marriner et al., 2014)?

1.1. Geomorphological context and harbour location

The ancient site of Tel Akko (Fig. 1) is located some 1.5 km east of the old city of Akko (Acre). Today's local inhabitants often refer to the mound as Tell el-Fukhar (the tell of the sherds) or "Napoleon's Hill", although both the tell and the modern site of Akko have undergone several name changes over the centuries (Artzy, 2015). During the Hellenistic period, the construction of an artificial harbour in what is today known as the 'Old City' renamed Ptolemais and, later, Saint Jean d'Acre, the capital of the Crusader Kingdom, led to a migration of the population from the tell to the western coastal area (Galili et al., 2007 and 2010; Artzy, 2012; Gambash, 2014). The tell is situated on a fertile agricultural coastal plain, with plentiful water supply from natural springs and rivers (Artzy and Beeri, 2010). The best-protected natural anchorages along the south-eastern Levant coast are found in this area (Raban, 1991). Furthermore, its advantageous position, at the intersection between maritime and terrestrial routes leading eastwards to the Jordan Valley and the State of Jordan, encouraged trade. Akko was an important Eastern Mediterranean harbour for nearly 4000 years, from the Middle Bronze IIa, at the beginning of the 2nd millennium BC, to the British mandate. The Na'aman River mouth is located in Haifa Bay, at the northern end of the Nile littoral cell of Israel's Mediterranean coast (Figs. 1 and 2; Zviely et al., 2007). Lichter et al. (2009) have documented the morphological changes around the river's mouth

based on historical maps from the last 200 years as well as a series of aerial photographs taken since 1945. The spatio-temporal evolution of the Na'aman River mouth has been characterised by rapid lateral modifications (Fig. 3). For example, the mouth migrated 1.5 km, both north and south, along the coast during the last 200 years, more or less equally in either direction (Lichter et al., 2009). Recently, anthropogenic intervention and an increase in vegetation cover have restricted the migration of the channel.

Research relating to relative sea-level changes in Akko is abundant. These data show a stabilization during the last millennia (Sivan et al., 2001, 2004, 2010; Toker et al., 2012). During the last 7000 years the level has risen by about 7 ± 1 m and remained below its present level until about 3000–2000 years BP. Neotectonic activity appears to be marginal during the Late Holocene in the area of Akko (Sivan et al., 1999).

1.2. Historical and archaeological contexts

The name Akko first appeared in the Ebla texts, dating to ca. 2400–2250 years BC. It is one of the cities mentioned in the early second millennium Egyptian Execration Texts and appears in the Amarna texts, and again in the military texts of the Pharaohs of the 19th dynasty. It was also mentioned in the Ugaritic texts, the Bible and later in the Annals of the Assyrian kings, Sennacherib and Esarhaddon (Artzy and Beeri, 2010).

Excavations at Tel Akko, first headed by Dothan (1976), unearthed a rampart, reaching a height of 22 m and 60 m width, a fortress on the summit of the tell and a massive gate all dating to the early 2nd millennium BC. Imports from the Lebanese coast as well as from Cyprus underscore the importance of the anchorage and the trade network (Artzy and Beeri, 2010). During the first part of the 1st millennium BC, the site experienced a reduction in population, whereas the habitation pattern increased after ca. 700–600 years BC, the period in which Phoenicians, Persians and Greeks were present (Gambash, 2014). In 332 BC, Akko fell to Alexander the Great. Ptolemy II changed the city's name to Ptolemais. Remains dating to the Roman period have been found, mainly north of the Peninsula (Abu Hamid, 2012). Part of a Roman road, probably connecting the city with Damascus was noted (Finkelsztejn, 2007) as well as a large Roman cemetery on the northwestern foothill of the tell (Tepper, 2010). On Tel Akko itself no Roman period settlement was noted. The tell was abandoned in the first part of the 2nd century BC,

Download English Version:

<https://daneshyari.com/en/article/7446183>

Download Persian Version:

<https://daneshyari.com/article/7446183>

[Daneshyari.com](https://daneshyari.com)