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**“To Be or not to Be”. Transitioning (or not) from the Late Bronze Age. Mycenae,
Hattusa and others in the face of Climate and Trading Change**

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**“...this is the way the world ends
not with a bang but a whimper...”***

***TS Eliot, 1925. “The Hollow Men”. Faber & Faber, London.**

Athens 2024

To Gill

1931-2023

In Loving Memory

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INTRODUCTION

To engage in even a cursory glance at the descriptions of the so called “Late Bronze Age Collapse” (“LBA”), is to be confronted with a literary image of an apocalypse. Whether, by virtue of either a historical interest in the Rise and Fall of Civilizations and Empires or, a morbid curiosity for what fate (or combination thereof) may befall the 21st Century, can only draw the unwitting spectator into a realm of varied societal and structural transformations and a myriad of possible explanations therefor affecting notably, the Mycenaean, Hittite, Levantine, Mesopotamian and Egyptian territories and populations in the decades surrounding pre- and post-1200 BCE.

In consulting the Bibliography to this paper, the reader will be confronted with various literary headlines from learned and earnest specialists affirming: “Crisis in Context: The End of the Late Bronze Age in the Early Mediterranean”; “Bronze Age Collapse”; “Megadrought and Collapse”; “Plate Tectonics and Earthquake Storms in the Late Bronze Age and East Mediterranean,” “A ‘Perfect Storm’ in the Collapse of Bronze Age Civilization” and “Decline, Destruction, Aftermath.” In summary, of a scale and intensity, that the years around 1200 BCE represented “...arguably the worst disaster in ancient history, even more calamitous than the collapse of the western Roman Empire.”¹ This learned writing is devoted to a plethora of theories, rationales and causal explanations to the on-set of the LBA Collapse and its consequences, some of which do not benefit from the mark of the latter-day archaeological record and/or scientific data.

Nonetheless, such tomes do have the merit of providing a historic background to alleged events and phenomena of climate change, “seismic storms”, (mass)-population movement, pandemics and disrupted trading networks etc., prevalent within Greek and Eastern Mediterranean Antiquity as the LBA gave way to the Early Iron Age (“EIA”). Events and phenomena which are no stranger to those currently confronting numerous regions and continents of the contemporary World. To wit: Over 2500 migrants lost to crossing the Mediterranean in 2023 - NPR²; Five Earthquakes of at least magnitude 4.2 in Turkey between October 14 and 24, 2023 ³; “the scale of the C-19 Pandemic was accentuated by travelling along existing trade and

¹ Drews 1993,3.

² npr.org <https://www.npr.org> › 2023/09/29 › migrants-mediterranean

³ WorldData.info October 2023.

travel routes.... affecting international supply and demand”.⁴ It is to this background that this paper addresses itself through the combined perspectives of climate change and trade disruption in order to evaluate their place and function in the “collapses” of the Mycenaean palatial system and of the Hittite Empire and whatever of their vestigial remains survived, transformed and even transitioned from LBA to EIA.

Chapter One

I A. The Back Story. What, when and where? (Fig.1)⁵

Taken in the round, these attention retaining headlines do direct us to a period and locations in Antiquity that pitched the “Mediterranean or Small World System”⁶ with its finely tuned network of Aegean and Mediterranean trade routes and supply chains from the Baltic and the Caspian, to the Indus, to the reaches of the southern and northern Levant, the Egyptian Upper Kingdom and beyond, Regal “Gift Exchanges” and Treaty framed diplomatic relations between the “Great Powers”, into the trajectory of the so-called “Dark Ages” of the EIA.

Recent doctrine, or so it appears, provides an overall consensus as to the geographical demarcations relevant to the principal themes of this paper. Hence, by way of guidance, and for no other purposes than for ease of reference and, above all, in order to avoid a polemical debate unsuited to the scope and space of this paper, reference is therefore made to a comparative chronology of the geographical locations discussed hereunder⁷ as well as a chart of trade routes(Fig.2).⁸ A pre-existing definition of the Levant has been adopted -"comprising the modern states of Israel with Palestine, Jordan, Lebanon, Syria, and

⁴ Lancet Planet Health 2021 Feb;5(2). COVID-19 and the collapse of global trade etc.

⁵ The Late Bronze Age Eastern Mediterranean World.

⁶ Kemp & Cline 2022, 212. “...if one of the civilizations was not in direct contact with one of the others, it was in indirect contact though one or more of the others. If there are less than three such “hops” required to connect all members of the network, then it qualifies as a Small World Network...” ...this was an international and globalized world system, for its time and area”..

⁷ Millek 2023, 2

⁸ Chart of Trade Routes.

Cyprus”⁹- along with a comparative chronology v the cited “Levantine” sites, all derived from the same authoritative source¹⁰.

However, timing is another question. Much learned ink has been spilt on what may, at first, appear as attributing 1200 BCE as a fulcrum year between the LBA, the end of the Bronze Age and the commencement of the next historical phase: the Iron Age, with some proposing that there must have been a “perfect storm”¹¹ of literally calamitous events causing the LBA civilizations to collapse shortly after 1200 BCE. The nuance is that the Systems (socio-economic-political) upon which these civilizations were rooted, probably passed away before the fading and disappearance of all traces of their respective civilizations. But, “destruction “events and trade related events do fall well outside the 1200 BCE benchmark: The destruction of Miletus was dated as around 1200 BCE but, there was a substantial building phase occurring well after that date, 1130-1060 BCE. However, no evidence has been adduced that post- these dates an event causing destruction even occurred.¹² As for trade, the Bronze Age on Cyprus did not end until 1100 BCE with sites such as Kition and Palaepaphos profiting from the decline in their neighbouring commercial rivals, see below. Further examples lie in the timing of the end of the Mycenaean and Cypriot pottery trade in the Southern Levant, to 1250 BCE., before the end of the LBA or 1200 BCE.¹³

One only has to consider the pervasive and volatile nature of environmental climate change, that “earthquake storms” may declare themselves consecutively or many decades apart, (not to mention the biblical “air-burst” theory destroying Dead Sea communities),¹⁴ that juggling with the timelines several decades astride a 1200 BCE date line capturing successive events of climate precarity to appreciate the delicacy of the issue particularly, in terms of attributing them as actual or contributory causal factors to “collapse” occurrences. However, this would not be a reason to stretch the late LBA to inordinate lengths,¹⁵ the particular Cypriot example cited above, notwithstanding.

⁹ Sherratt 2013, 3

¹⁰ Idem. 5

¹¹ Cline 2019. <https://www.worldhistory.org/article/1446/interview-the-mysterious-bronze-age-collapse-with/>

¹² Millek 2022, 4.

¹³ Millek 2022, 23. "The impact of destruction on trade at the end of the Late Bronze Age in the Southern Levant". In Hagemeyer, Felix (ed.). *Jerusalem and the Coastal Plain in the Iron Age and Persian Periods New Studies on Jerusalem's Relations with the Southern Coastal Plain of Israel/Palestine (C. 1200–300 BCE) Research on Israel and Aram in Biblical Times IV*. Tübingen: Mohr Siebeck

¹⁴ Bower, B. 2018. <https://www.worldhistory.org/article/1446/interview-the-mysterious-bronze-age-collapse-with/>

¹⁵ Millek 2022, 24. Citing Finkelstein 2013, 113: “The end of the Late Bronze Age commenced in the middle or second half of the thirteenth century and continued until about 1100 B.C”.

Practically, taken in the round and given that so many events can be tied to the archaeological record around 1200 BCE -inter-alia, collapse of the Hittite Empire, destruction of Ugarit and of the unravelling of the Mycenaean palatial system and the established writing systems of Linear “B” in Greece and cuneiform in Anatolia, 1177 BCE, being used by Cline as the date-stamp of an “Egypto-Sea Peoples” confrontation (8th year of Ramses III reign)- it would seem permissible to stamp late LBA “Collapse” as a span of some quarter century either side, 1225-1175 BCE. In so doing, we move away from the concept of synchronicity in the collapse of the regional Systems but become witnesses to a decline, which it is submitted, was endemic to the very Systems themselves and, one which only became truly patent as they unravelled progressively over a protracted timeline but extending over at least fifty years and culminating in their very collapse.

From the impression so far floated, may not the “catastrophism” of the foregoing paragraphs be just an example of an archaeological misnomer, mis-characterization or misplaced analytical conclusions, (similar to LBA dating), giving rise to a supposed “Armageddon” like terminus of hitherto potent and successful Dynasties and Empires, the like of which may be compromised by, amongst other reasons, the conclusions of recent data and research into variations in relevant climatic conditions and disruptive changes within the practices of the established Aegean-Mediterranean, Small World System trading community?

For, both prudence and rigour have been cautioned to avoid a misinterpretation and, in the absence of probant evidence, an over enthusiastic reliance upon what exists of the frequently paltry archaeological record, literary texts and (infamously misleading) monumental inscriptions, (the “Medinet Habu” Funerary Temple inscriptions of Ramses III and Ramses II Wedding stele at Abu Simbel II in particular), as well as upon out-dated and old- fashioned archaeological principles and doctrine. Above all, not to forsake the use of simple logic and appreciation of innate (and all too enduring) human traits of behaviour and instinct: self and vested interests, hubris, vanity, resistance to change where the existing order is disturbed and compromised, lack of adaptability and over-reliance on supposedly historically “reliable” environmental and meteorological events, such as rates and timing of annual precipitation etc.

By way of example: In addressing the multitude of theories relating to the provenance and identity of the “Sea Peoples”, (used as a paradigm for the intellectual methodology underscoring this paper), Middleton reminds the archaeological community to remain grounded: “When seeking to describe and

explain changes in eastern Mediterranean prehistory, it is important to reign in our imagination, recognize that there is much we cannot see, and avoid the temptation to set up alluring myths as history.”¹⁶ And, in this simple “replique” to just this one “hot” and perennial topic, along with recent calls for a return to sensible, objective appraisals working in conjunction with the conclusions of contemporary scientific data, one may find both comfort and direction.

The allegedly bellicose, marauding “Sea Peoples” invading the Nile Delta with their Libyan allies confronting the Egyptian forces, have not those men, women and children (sic!) been recognized as travelling with their oxen and solid wheeled carts as described by Ramses III? In other words, are the handful of reliefs and brief textual references of Medinet Habu not masquerading boat loads of potentially desperate, last resort “immigrants;” hiding in plain sight and casting them as a hostile, organized and concerted invasion force, a dire threat to the security of the Kingdom? Moreover, “immigrants” capable of demolishing established coastal cities and fortified sea-ports in the Levant -and, even if so, to what practical self-destructive purpose? And what moniker would we give to communities which, having taken to the boats, fleeing over the waters of the Eastern Mediterranean and “en masse” from one set of areas smitten with drought and famine to others, similarly so affected, let alone ones plagued by social discontent, unrest and quite possibly and literally, by contagious disease? Not to mention the comprehensive “guilty as charged” accusations of destruction supposedly wrought by the “Sea Peoples” in the North and South Levant and Cyprus.

The extent of such “destruction” as more particularly detailed below, seriously undermined by recent research demonstrating that no probant evidence exists that the “Sea Peoples” were at the origin of any mass destruction (as did not even actually occur according to one archaeological authority)! ¹⁷ To resume, “Among Aegeanists, the notion of mass migrations has long been rejected, and the Sea Peoples narrative as often given is debatable”.¹⁸ Nevertheless, change was afoot and had befallen notably, the Mycenaean, Hittite, Levantine, Mesopotamian and Egyptian territories and populations in the years around 1200 BCE, the twilight of the Bronze Age and the ushering in of the Iron Age. Society, in due but lengthy and uneven course, was on the way to becoming more heterarchical (as it may well have been before the apotheosis

¹⁶ Middleton 2020,1.

¹⁷ Millek 2021,66. “Taken all together, there is in fact no reliable historical source which claims the Sea Peoples caused any kind of destruction toward the end of the LBA”.

¹⁸ Middleton 2017,40.

of the Elite Mycenaean Palatial System), and the politico-economic foundations being laid for a less “elitist”, dynastic dominated, wealth accumulative form of societal hierarchy and structure. With the advent of the increased use of iron ore, a commonly found raw material and which, whilst not displacing bronze in prestige nor usage but obviating the need to purchase and assure a supply of copper and tin, would serve to create, once the “carbonization” process of hardening the ore with steel mastered, a new and more prolific “strata” of citizen smith, in a societal and economic structure far less constrained by and confined to the ruling “elite” and the workshops of the by now abandoned or destroyed vast majority of palatial centres.

It would be tempting to draw an analogy with the manner and the scale in which the “Industrial Revolution” as of mid- 18th Century England impacted social, rural and urban landscapes. Would the wealth accumulative and status conscious palatial “Great Powers”, straddling extensive international land and maritime trade routes bear comparison with the Empire builders of the Industrial Revolution? Those exceptional individuals with their entrepreneurial and internationalist spirit, spawning an affluent middle class and an ever-wealthier landed upper class yet leaving the other orders to be labelled the “working class”, a predominantly new, urban (ex-agrarian) proletariat pressed into and left in dire employment and living conditions for the ultimate benefit of their masters and landlords? Arguably, the analogy supports some comparison.

To revert to the prose of our specialist authors. Some,¹⁹ presage one or more events putting either an abrupt and unexpected “destruction” or a gradually irreversible end to entire palatial systems and trans-mediterranean commercial enterprises in the Greek mainland notably, the Mycenaean Argolid, with its far-flung Eastern Mediterranean, Cypriot and Dodecanese, (Miletus, Kos, Rhodes to Troy), trading network carried over from the Minoans(Fig.2).²⁰ And yet, simulacres of the Mycenaean “elite” palatial structure, including architecture, were to be found as enclaves in Cyprus, after the fall of the mainland system²¹, notwithstanding that significant administrative centres from the 13th Century such as Alassa and Kalavassos-Agios Dimitrios were abandoned. What to make of the ashlar masonry adorning the

¹⁹ For example, Middleton, 2019. “Destruction”. “Destructions in Greece...were near contemporary, taking place within a few decades at most...”

²⁰LBA Trade Routes. Eastern Mediterranean.

²¹ Georgiou 2014, 208-217. Ref: Paphos Region & Maa-Paleokastro Settlement.

architectural structures at Palaepaphos and Kition into the 12th Century and their own economic prosperity extending well past 1200 BCE,²² leading to a century wide gap between the end of the Cypriot LBA and that of the broader LBA as now generally accepted as pivoting around 1200 BCE?²³ Others,²⁴ describe nothing less than the complete disappearance of the militarily dominant, civilly and diplomatically astute Hittite Empire, conceiver of a Code of Laws, (Fig.3)²⁵ as proselytized as that of the Mesopotamian Hammurabi (Fig.4)²⁶; creator of the cordon of vassal states protecting the central Anatolian region with its capital Hattusa as, in particular, Suppiluliuma I created Hittite geo-political dominion and permanence over North Syria through his annexation of Carchemish and “victory” at Qadesh (Fig.5).²⁷

A complex society, albeit feudal and “dry-crop/rain-fed” agrarian, administered through what might be equated to a “command and control” centralized administration from Hattusa, its core in central Anatolia. The Hittites, proposer and first signatory to the “Silver-Eternal Treaty” in 1296 BCE with Ramses II, ending on-going hostilities post-Kadesh and securing Hittite territorial gains in North Syria and the Levant, including Ugarit and as far as Aleppo, thereby signalling an effective end to Egyptian expansion in the East to Asia and creating a “cordon sanitaire” to preserve Hittite trading interests in Northern Syria and Canaan from future Egyptian interference (Fig.6).²⁸ And yet, in the years surrounding the late LBA, what survived of the Hittite culture, its language, its people, even its capital Hattusa? Did literacy or the written word seemingly become “extinct”, to the same extent that no Mycenaean writing found root in the wider, popular culture after Linear “B” fell from usage until the Greek language added vowels to the consonant based 8th century Phoenecian derived alphabet script, thereby demonstrating an intriguing connection with former Greek parlance? With regards to post-collapse Hittite Empire, Hieroglyphic Luwian and the Luwian language closely connected to Hittite, were used on post-collapse Iron Age inscriptions. There is therefore and, in this respect, a recognizable cultural link and continuity with the LBA Hittite Empire, differentiating it from the disrepair into which fell usage of “Linear B.”²⁹ One may venture that this is not an unnatural consequence of the end of a palatial system with which the

²² Millek 2021, 255.

²³ Idem. 255. Citing Iacovou 2008 & 2014.

²⁴ For example, Yakar. J. 2006.

²⁵ Hittite Code of Nesilim, c.1650-1500 BCE.

²⁶ Stele of Hammurabi Law Code. 282 Rules. c.1792-1755 BCE. Louvre Museum.

²⁷ Map of Kadesh Area.

²⁸ Map of Extent of Hittite Empire.

²⁹ Weeden 2013, 1-2.

Linear “B” was so closely administratively connected and deeply rooted and a natural continuation of the Luwian given the vast territorial extent of the Hittite Empire and the existence of already recognizably functioning Neo-Hittite entities such as Carchemish, post-Hittite collapse.

Were populations dispersed and/or migrated to pastures new or did they just fragment and create a multitude of smaller kingdoms, with the diplomatic and military bravoura of the earlier Hittite “Great Kings”³⁰ and members of the closed and elite circle of “Great Powers” just a fading memory and parodied by Ramses II on the celebratory Wedding carvings of the monumental Temple stones of Abu Simbel?? And, how could a Hittite vassal state such as Carchemish flourish, intact, and what shape may it take as the capital of a Neo-Hittite kingdom, evolving into an important trading centre, whilst its neighbour Emar, also on a strategic location of the Euphrates, or even Ugarit were deserted?³¹ Moreover, in circumstances that its formerly highly successful Hittite overlord, floundered under the weight of internal dissent, sucessoral conflict and external military threat from the Kaska people from the North, from the East (Assyrians), suffering from territorial over-reach with a dynastic and core administrative system unable to cope with the events and forces of change that it implodes, whilst also contending with drought and famine. The consequences of a ruler who abandoned and then reclaimed Hattusa as his capital, as well as the disruption in its established trade routes. All leaving scant trace of its former existence.

Paradoxically, both survived by Carchemish, this former vassal state and dynastic rival and descendant of Suppiluliuma I, Kuzi-Tešub who, in a supreme irony, then abrogated for himself the title of “Great King” formerly reserved for the Imperial Monarch seated in now ruined Hattusa.³²

“Things Fall Apart; The center cannot hold; Mere anarchy is loosed upon the world.”³³

For, eventually, even Carchemish and other Levantine regions would fall under Neo-Assyrian influence and control as provinces of that Empire or, as vassal states. Interesting to compare the “resilience”, survival mode of Greeks and Hittites with the aggrandizing, conquest policy of the Neo-Assyrians as they swept Westward into Anatolia and into the Levant. Bigger, more bellicose and diversified was better in Assyrian eyes. Not, in a way too different from the Hittites they replaced but one cannot fail to be impressed by the

³⁰ Sherratt 2013, 6. Citing Liverani 1987, 66-7.

³¹ Giusfredi 2010, 35-51.

³² Bryce 2015, 345.

³³ W.B. Yeats, 1919. “The Second Coming”. Faber & Faber, London.

shrewd mixture of diplomatic prowess and strategic military thinking displayed over the generations by the Hittite rulers, even up to their last iteration. Retained doctrine has it, as proposed i.a. by Liverani as well as Buccellati that: “The people of the city-state were not bound by common historical traditions; they especially lacked traditions attributing the foundation or conquest of a certain city-state to a certain ethnic group. This proves once more that the self-identity of the group is based not on the group itself, but on the territory in which it resides”³⁴ This would tend to lead to the conclusion that everything relational in the Bronze Age system, was based on a “Rapport de Force”. Contemporary society, and many of those preceding it, is still based upon the same premise: whether the “ethnic” groups are now ethnic, class, moneyed or political etc. Although, in such an inter-connected community as was the Aegean and other Mediterranean groups, contrasts and similarities were to be expected.³⁵

However, the interesting reference to “ethnic” states renders the debate over migration origin yet more complex and again, pinpoints an absence of probant archaeologically recorded evidence, without prejudice to the various exceptions as may be identified by an Aegean presence. And Ugarit, again within the vassal sphere of Hattusa, the confluent of so much, (raw, unworked), precious stones, metals and commodities from the Indus, Mesopotamia, the Gulf-Bahrain supply hub to the mainland Aegean notably, the Mycenaean palatial centres of the Argolid via Naupio, Tiryns, the Dodecanese emporia of Miletus and Rhodes as well as of Egyptian grain to the Hittite Empire. In particular, to the grain silos of the palace at Hattusa providing food for its network of retainers, placating ambitious political “appetite” and nurturing the dependency of the elite and military classes.

Ugarit, recipient of those exported finished goods of jewellery, metal ware and apparels, fine pottery and fragrances from the palatial workshops of the Mycenaean mainland; this city physically destroyed with no remnant of its Monarchical regime or commercial vibrancy left intact. The fall of Ugarit was to the gain of Cyprus also lying within the geographical template of the north Levant. Cyprus, no stranger to the flux of Aegean-Eastern Mediterranean maritime tramping commerce, which leveraged its LBA copper mining and smelting technology to master progressively the art of iron “carbonization” to create steel

³⁴ Buccellati 1967, 62.

³⁵ Wallace 2018, 491-521.

hardened iron. It is interesting to note that most iron finds between 1200-900 BCE come from Athens, Tiryns and Naxos with virtually no iron finds in the West.³⁶

With the continued demand for copper³⁷ as well as quite likely an arrival of mainland Greeks - potentially Mycenaeans fleeing palatial collapse³⁸ notably in the South-Western Paphos area creating a distinct Arcado-Cypriot -Greek dialect borrowing much from the Mycenaean language, Cyprus is a prime example of an island link in the Mediterranean supply chain. Adaptable to new technology, an immigrant influx, administratively flexible and sufficiently self-resourced, to sustain itself through the travails that beset the Greek and Anatolian main-lands and the coastal Levant; the latter a mere 68 kilometers across the water, to the East.³⁹

Travails in the LBA Mycenae and Eastern Mediterranean which were preceded by a noticeable increase in the size and wealth of palatial economies as well as other societies in diverse regions, becoming inter-twined through mutual interest but subject to and responding to natural and human agency created events and phenomena in different manners but, ultimately, with not dissimilarly dire outcomes. The nature and extent of change in the LBA -be it insidiously inherent within their complex and stratified societal structures and/or extraneous, unforeseen or insufficiently guarded against -engendered Palatial and Dynastic collapse, civilization precarity and disappearance as well as a splintering of the commercial, societal and political foundations upon which the “Great Powers” of the Aegean and Eastern Mediterranean had previously flourished.

A fundamental change, that shifted the hierarchical but loosely controlled power structure of the Palatial regimes, (as compared, for example, to the highly hierarchical, centralized and authoritarian Hittite administrative matrix with its control over satellite vassal states), into an era in which the “elite” bronze-based value system became overshadowed by and, over much time transited into the EIA. Transformed as composite hierarchical-heterarchical forms of society in which iron, commonly found and

³⁶ Enverova 2012, 76.

³⁷ Millek 2002, 254. Citing Yahalom-Mack and Eliyahu-Behar. “(They) have recently summarized the situation: ‘With respect to the question of tin availability for the production of bronze, analysis of 95 copper-based artifacts from LB II–Iron II contexts showed that tin-bronze was continuously used and that the average tin (Sn) content (5–6 wt%) was maintained throughout the periods. This supports earlier studies that showed there was no shortage of tin during the transition period....’”

³⁸ Georgiou 2014, 219.

³⁹ Georgiou 2014, 222.

workable became, progressively, the primary utilitarian material displacing, in Greece, the usage of wood.⁴⁰

In essence, this amounts to a transformation retaining limited uprooted vestiges of the preceding eras, such as Maa-Palaekastro, Pyla-Kokkinokremos in Cyprus.⁴¹ A transformation into a socio-economic structure most unsuited to that of the LBA “elitist” mould.⁴² But, a transformation which, in turn and time and almost cyclically,⁴³ would itself cede to the more rigid and hierarchical structure of a Greek “Classical” society during which its “Golden Age” would come to pass. A transformation which will not spare an examination as to the meaning of the words “collapse” and “destruction” when applied to the LBA Mycenaean and Hittite civilizations and the impact of change(s) in regional climatic conditions and established trading practices, as referred to below. By way of prior disclaimer, it may nevertheless remain a moot point as to whether the latter, in particular, as a factor of human agency, can be evidenced as having contributed to the decline of those civilizations, were an outcome thereof or, were even critical to their decline. For example, Tiryns maintained its contact with Cyprus through 1200 BCE. Tiryns, not as extensively destroyed and deserted as Gla or Mycenae but destroyed areas re-constructed to a new style and inhabited, marking a schism from the authority of the collapsed palatial system and a spring-board to travel to the Dodecanese, West Anatolia and the broader Mediterranean.⁴⁴ Equally possibly, a form of refuge or sanctuary. Pylos, not re-built at all. And what each of these non-exhaustive examples of Tiryns and Carchemish, land and nautical miles and cultures apart do display, is that within territories distinguished by relatively contiguous geographic areas and/or topographical differences, very considerable variations in fortunes can occur, perhaps as much the result of extraneous forces as unwittingly shaped by the intervention (or lack) of human agency.

I B. Scope.

⁴⁰ Enverova 2012, 97.

⁴¹ Georgiou 2014, 30.

⁴² Enverova 2012, 91.

⁴³ Compare Arnold Toynbee’s 12 volume “Study of History”, 1934-1961. A cyclical theory of the rise and decline of civilizations. A dialectic and evolutionary progression...the stages in which are brought about indirectly by man's freedom of will and of action self-consciously exercised in the aims of his own immediate goal.

⁴⁴ Wallace 2018, 293.

This paper does not pretend to add to the plethora of learned explanations as to “What?” caused the so-called Late Bronze Age collapse. For, it is reckoned that at least 26 events⁴⁵ (and counting?) may have contributed to the demise of the Mycenaean palatial system and civilization alone, The Dorian invasion of Greece now having been discounted for want of evidence.⁴⁶ This paper will not descend to (dis)-proving a negative.

And, there are no longer causal grounds to blame the LBA collapse on any one singular occurrence nor, to ignore the regional, local and temporal specificities attributable to dynastic or socio-political collapse, viz: the demise of the Hittite Empire based in Central Anatolia and that of the Mycenaean civilization; be the latter a form of “federated state” under a Mycenaean palatial hegemony or, comprised of competing but co-existing “city-states/ “polities”⁴⁷ This is not a topic upon which this paper is conceived to opine other, than observing the obvious. Namely, that the less remote the inter-connection, the more probable the effect of a contagious “shock” effect. Instead, this paper seeks more to embrace the “Why?” or the “How?” applied, in particular to the Mycenaean main-land and of the Central Anatolian Empire, through the lenses of the conclusions of recent data in climate change and a view of the links that went to build relations in commercial practice. And, alluding collaterally to Ugarit, Cyprus and the Levant and their attachment to the Mycenaean and core Anatolian main-lands to which the former had been directly or indirectly attached to supply the latter’s commercial and commodity requirements. In the case of Ugarit, a visceral connection as a Hittite vassal state and major transit supplier of Egyptian grown cereals to Hatti. Because the conclusions of recent scientific data have now become more precise and far more is understood of the decades long corrosive effect as well as the consequences of short-term successive years of climate change upon the eco-systems of the regions under review, this paper will have regard to the manner in which those regions were able to appreciate the “risk” involved in the climate change they endured and to what extent they were able to mitigate, become resilient to or, fall prey to it. The role and modern day understanding of “systemic risk” as an inherent feature of societal and economic organization as applied to the LBA regimes and the collapse of their Systems. The latter, an on-going archaeologically

⁴⁵ Crielaard 2022, 37.

⁴⁶ Middleton 2019. “ Climate Change and Migration”.

⁴⁷ Middleton 2019. “ The Mycenaean Background”. Argumentation, the “Megastate” v the “City -State”.

debatable concept. This is the meaning this paper attributes to “Why?” or “How?.” For much the same reasons of “risk” analysis and ‘mitigation” response, this paper will also cast its regard over the trading activity and practices and commercial relations wrought between the Mycenaean, Anatolian and East Mediterranean trading ports. Not only because the broader picture in terms of financial, commercial and operating risk to the traders and merchants is not wholly dissimilar to that borne to-day, even by robust multi-national concerns but, also the greater appreciation we now have of how a disruption or breakage in a part of an international land and maritime supply chain, may have “knock-on” effects and ripples throughout a tightly woven, inter-dependent commercial network. Indeed, in conjunction with or spawned by other factors, they may constitute a major “tipping point” event horizon, with the potential to disrupt the economic inter-connectivity amongst the various societies and civilizations in the LBA Aegean and Eastern Mediterranean as well as of virally affecting other components within the societal structures, provoking a systemic contagion and resulting in an irretrievable breakdown of the entire established order.

The demand for commodities, “exotica” and vital metals in the manufacture of bronze, tin and especially copper, for precious stones, for gold and silver, the latter an accepted currency of traders and merchants whose reach was as societally and politically aspirational as it was territorially extensive, created what might be described as an integrated, inter-locking community of international vested interests, based on custom and trust, promoting commercial exchanges by affording protection to merchants through the enforcement of legal rights and obligations as goods transited frontiers across the land and sea.⁴⁸ The archaeological and textual records are replete with evidence of which, the commercial/trading aspect, is treated in greater depth, below ⁴⁹ and will illustrate how the “merchant class” had benefited from the wealth creation of cross-border trade and become enfranchised in its own right, no longer tributary to palatial wealth but capable of surviving, albeit in a lesser intensity, the precipitate disappearance of their “elite” patrons.

As to why the “breakdown” alluded to at the end of the last but one paragraph should be viewed through the prisms of changes in climate and trading relations, various motifs may be invoked, amongst which:

⁴⁸ Viz: Texts of Hammurabi and Hittite Codes of Law.

⁴⁹ In particular: Kemp & Kline, 2022.” Systemic Risk and Resilience: The Bronze Age Collapse and Recovery”.

- the inescapable parallelism with the effects and consequences of global warming, cyclical and volatile climate change and the intense threads of commercial inter-connectivity in this 21st Century;
- the contagional and detrimental reach of lack of risk preparedness and awareness, resilience and foresight upon infra-structures and populations as regional and international crises—notably, poverty and access to staples of housing, nutrition and welfare, huge and glaring disparities in material inequality as well as climate insecurity went-- and continue to go-- unanswered and, perhaps above all,
- the avoidance of a one-dimensional, linear view so as to encompass through two very fundamental and perennial pillars of human existence—commerce and climate—as many of the facets of the human condition and reactions thereto as possible as well as trying to obtain as clear an overview as possible of the effect of global, regional and localized “variations”, as per the Tiryns and Carchemish examples above. “The long-term sustainability of human systems requires the maintenance and restoration of ecosystem integrity, resilience, and biodiversity.....Driving our unsustainable global economy is an unsustainable culture. The consumer culture creates false needs for power, status and wealth instead of satisfying real needs for meaning, community and survival”.⁵⁰

One cannot help but pause and reflect whether the “elitist” palatial and Dynastic regimes of LBA Mycenae and Hattusa would not have recognized some traits of their own societies were a description of their wealth accumulative and non-distributive culture to replace that of the “consumer culture” in these lines written in the first quarter of the 21st Century. And, whether, in so doing, they may not have acted upon them as a prescient warning to adopt a more resilient form of societal structure to counter the “events” which weakened and finally toppled their established “status quo”.

Chapter Two

II A. What is the Sense? Giving Meaning to Words: “Collapse,” “Destruction” and “Earth Movement” literally and in the context of the archaeological record of the LBA.

⁵⁰ Taylor 2007, 1.

Giving words their “natural and ordinary” meaning used to be a fundamental tenet of Judicial interpretation of Statute law in the English Common Law system. This has now evolved into a more “purposeful” and “intent” oriented stance, looking at both language and context, mitigating many of the harsher effects of the previous “literal” approach but, nevertheless and particularly in formal documents, linguistic mistakes are not easily accepted.⁵¹ Applying a definition embraced by the generally consulted reputable dictionaries, in other words, being faithful to the “ordinary”, generates the following:

- “Collapse”: Oxford Dictionary definition: “...to fall down or fall in suddenly, often after breaking apart;”⁵²
- Cambridge Dictionary definition: “....to fall down suddenly because of pressure or having no strength or support;”⁵³
- “Destroy”/” Destruction”: “...the act or process of damaging something so badly that it no longer exists or cannot be repaired. “⁵⁴

Certainly, seen over the spans of history, the collapse of the Mycenaean Palatial system (although not its culture) and the muted disappearance from the Court of the Great Powers, appears as “sudden”, dramatic and abrupt. By some accounts taking place over a period of some fifty years.⁵⁵ However, it is a thrust of this paper that the LBA palatial system was already in decline, suffering from inherent legacy defects which would ensure that their rapid departure was due to nothing more than the natural consequence of succumbing to one or more “shock” events of potent, unmanageable force. As for the Egyptian Empire, it underwent a century long gradual, persistent and fragmentary decline, engendered principally by unresolved internal rather than external issues, as of the end of the reign of Ramses III in c.1155 BCE.

II A i). Collapse.

⁵¹ Chartbrook v Persimmon Homes Ltd, 2009. 913. As per Lord Hoffman.

⁵² <https://languages.oup.com/oxford-learners-dictionaries-api/>

⁵³ Cambridge University Press and Assessment 2023

⁵⁴ <https://www.britannica.com/dictionary/destruction>

⁵⁵ Middleton, 2019 in “Destructions”.

Repairing to the archaeological context, “Collapse is most clearly understood to be a political process in which states and societies undergo rapid (decadal) simplification—they become less complex”.⁵⁶ What preceded the “less complex” is somewhat problematic for, can the collapse of Mycenae or Hattusa be attributed to a “political process” something which, if attached to the political scene, would currently be associated with a thought-out, rewards vs. risk, deliberate and non- casual short or long- term strategy? It is part of the thrust of this paper, that the effects of changes in climate and commercial practices in the Eastern Mediterranean went largely unguarded against –omission rather than (pro)-activity- within Greece and Anatolia and this, over many years. Paradoxically, a process dissimulated by their very apparent and seemingly inexorable accretion of wealth, grandeur and territorial acquisitions.

Hence, whilst a stock dictionary definition of “process” as being: “....a series of actions which are carried out in order to achieve a particular result...,” may fail to be applicable for want of deliberate implementation or resilience on the part of the political class in its quest to achieve a determined outcome, (presumably regime survival and sustainability), perhaps a more apposite definition of “process” for the purposes of this paper, its evolutionary and transformative under-current, would be”a series of things which happen naturally and result in a (biological or chemical) change.⁵⁷ (Emphasis and brackets added). In contemplation of the second definition, what seems to constitute a connecting factor between Mycenae and Hattusa is the disassembly or unravelling for multiple, sequential though quite possibly unrelated reasons, of a recognizable political format or entity. Be it a Mycenaean Palatial system or a Hittite Imperial construct with a developed civil code backed by military and diplomatic prowess.

The exposition of the theory of ‘Entanglement’ and below, provides maximum resonance to the notion of ‘disassembly’. For, in connecting humans and ‘things’, we learn that ‘things’, as a word, traces its origin from the Old English-Old High German meaning an ‘assembly’⁵⁸ and of “...the dependent nature of all things within chains of interdependence, (be they) ...human, institutional, legalistic, bureaucratic and so on... Things appear separate and bounded. ... Things in their dependence on other things draw things, people together”⁵⁹ Take the example of the relatively resource poor Aegean and its progressive

⁵⁶ Middleton 2019. “Defining Collapse”. Citing Tainter, J. 1988. *“The Collapse of Complex Societies”*

⁵⁷ <https://www.collinsdictionary.com/dictionary/english/process>

⁵⁸ Hodder 2011, 24.

⁵⁹ Idem.

linkage to East Mediterranean economic, financial and supply added-value networks and goods.⁶⁰ Movement, of persons, commodities and high value merchandise and, through long-distance commerce, the cultural inter-course present, for example, in the “Minoan” style motive Frescoes intertwined with images of local flora and fauna in Egyptian Tel el Dab’a and Canaan Tel Kabri. The accent here is on a systemic, almost evolutionary change, perhaps only perceptible with hindsight, occurring within the socio-political order as, whether by neglect or through want of resilience, it becomes gradually transformed from within into a format which finally renders it “mature” to succumb to the strains of a series of long term and/or volatile events. None of the latter may necessarily be critical but, when taken in the aggregate and over the years, they mutate the structural integrity of the political regime to the point that when it receives a further, extraneous evenemential “coup de grace”, its very “raison d’etre” is dissolved, its structure incapacitated for want of relevance and/or support, and it fails in short order.⁶¹ The “tipping point” has been reached and, in a way, the fallen regime has succumbed and become victim to the legacy of the flaws and lack of resilience it inherits from its own predecessors.

System failure as part of a structurally flawed DNA. How then does the archaeological record reflect the occurrence of a “collapse” event? Five main features are proposed and within them, some illustrative examples are provided: (a) destructions at most major palace sites;⁶² (b) cessation of major building projects. The interruption of pre-collapse major infrastructure undertakings: Gla its Cyclopean fortifications and massive engineering work in the drainage of Lake Kopais and re-purposing of surrounding lands. No further construction of palaces and their robust fortifications (albeit some partial restoration work being done at Mycenae as well as riverain re-coursing at Tiryns with the latter retaining the old Megaron foundations), ports, roads, tholos chamber tombs;⁶³ (c) loss of the Palatial Workshops and the skilled artisans. Gone the market driven by a privileged elite; (d) cessation of use of Linear “B”

⁶⁰ Wallace 2018, 484.

⁶¹ As per Middleton 2019 in “Defining Collapse”. “Collapses are identified by profound and abrupt changes in the archaeological record, although there may be both biological (population) and cultural continuities”.

⁶² Middleton 2019 in “Destructions”. “Widespread destruction horizon at principal Argive citadels of Mycenae, Tiryns and Midea”.

⁶³ A cessation which nevertheless interrogates. Lack of resource—human or material, disinterest and/or rejection? No question of a lack of technical ingenuity and ability as per Giannakos K, 2015. Preface. “Minoan, and Mycenaean Greeks used advanced cutting-edge technology and ‘engineering’ know-how, from the beginning of the early MH (begins ca. 2200/2100 BC), or even earlier”,

as an administrative tool. Already a restricted faculty and now a disappearing link between the palace and its outlying constituents and suppliers⁶⁴. Perhaps, as with the re-modelling of Building “T” at Tiryns, a very conscious rejection of the “ancien regime” and, (e) site abandonments. Is it abandonment and/or migration and/or dispersion and what evidence exists which might provide an accounting for estimates of a population reduction? Were the populations of the time unsustainably large at the time of the Collapse, leading to displacement or did they just down-size to accommodate the prevailing and quite possibly, historically recurring environmental circumstances? (Fig.7).⁶⁵

The following sections seek to provide some recent data-based responses. However, before proceeding, what the preceding catalogue of features does serve to provide and which is as relevant to the Mycenaean example as to the Hittite one, is that the foregoing examples, when applied thereto, do arguably provide discernable event matrices into which a timeline can be inserted with some reasonable degree of accurate approximation.

II A ii). Destruction.

If “Collapse” can be given some objective phenomenal description for the purposes of identifying the nature and chronology of “Collapse Events” and, which again, it is worth emphasizing may be cumulative, not necessarily consequential or even consecutive, the same objective recent data-based approach can, it is proposed, be applied to the phenomena of “Destruction” and “Migration.” The former very much associated with the latter and vice-versa and both to “Collapse” but, for this paper and in both cases considered, in the following sections, to be to an exaggerated extent. The case for “Destruction” in LBA is, judging from a review of the archaeological lexicon over the last fifty years, somewhat enigmatic, at the least problematic. This is an equally provocative assertion given the uncontested physical damage and destruction suffered in places as far removed as the Argolid Palatial centres, Hattusa as well as Ugarit—to an extent never to be restored to their former imposing glory and function. Although, it is not being suggested by this paper that the causes of the “collapse” were identical. But, it does serve to highlight the singularity of the palatial destruction and abandonment given the fact that Argolid non-palatial centres did

⁶⁴ For the sake of completeness, the cessation of the use of the language of the Hittites, Nesa/Nisite.

⁶⁵ Map of Aegean LBA Mainland Palaces. Middleton 2019.

not succumb to the same fate⁶⁶ and, when dealing with “destruction”, the archaeological pendulum has oscillated wildly –thanks to contemporary research and data—over the last half- century.

The arc of that pendulum moves from: “Within a period of forty to fifty years at the end of the thirteenth and the beginning of the twelfth century almost every significant city in the eastern Mediterranean world was destroyed, many of them never to be occupied again,”(Fig.8)⁶⁷ to a contemporary, fact based version and which, because it is so trenchantly contrarian, merits full citation: “Yet, what if this wasn’t the case, and Drews’s map was inaccurate, and that over half of all destruction events he claimed affected the Eastern Mediterranean at the end of the LBA never happened at all, or at least not ca. 1200 BCE? As it turns out, this is in fact the case, and Drews’s “Map of the Catastrophe” is a perfect example of how many destructions from this supposed “destruction horizon” were misdated, assumed, or simply invented out of nothing and are what we can call, false destructions.”⁶⁸

In fact, statistically, over the last 150 years archaeological writings ascribe 148 sites with 153 so called “destruction” events. But, 94 are proven as non-conclusive, a 61% error rate, due to non-occurrence, misdating or based on evidentially inadequate support.⁶⁹ An interesting coda is that Athens, Carchemish, Kadesh, Knossos, amongst others, find themselves on the “non-conclusive” destruction list.⁷⁰ Behind this figure, is not only the research necessary to establish the sites in which an alleged “destruction” event actually occurred but also the degree to which the “destruction“ event may be categorized, not only in terms of severity,⁷¹ but also its sorting into three “non-conclusive,” non-destructive event categories: misdated, assumed and false citation along with the exhaustive schedule of such categorization per site and related time lines(Fig.9).⁷² This latter exercise is of great practical use and, when applied for example to the Levant, recalibrates the entire extent and provides a different perspective upon scale and meaning of actual v fake or non-conclusive “destruction” in the 1200 BCE era. No “destruction” occurred in the Central Levant circa 1200 BCE; a 70% error rate in 20 events in the North Levant and, a 67% error rate

⁶⁶ Deger-Jalkotzky 2008, 387-415. This raises the issue as to whether non-palatial Mycenaean polities were truly spared such destruction, any such degree thereof or any form of collapse with, by contrast and not exclusively, offshore Naxos and mainland Lefkandi and Mitrou prospering. Cf: Middleton. 2019.

⁶⁷ Drews, 1993. “Map of Catastrophe”.

⁶⁸ Millek 2023, 54.

⁶⁹ Millek 2023, 54.

⁷⁰ Millek 2022, 5.

⁷¹ See Finkelstein et al, 2009 and Wallace, 2018 as to the degree of physical destruction; distinction between damage and destruction; localized or generalized leading to abandonment or partially habitable etc.

⁷² Millek 2023, 289. Appendix: Overview of Destruction ca. 1200 BCE.

of false destructions of 63 so-called destruction event in the South Levant. Overall, 28 destruction events are tallied in North and South Levant circa 1200 BCE but, with the rider that many destruction events were not, in the event, as serious as originally deemed.⁷³

II A iii). Destruction and Desolation. Earth Movement.

However, as applicable as the foregoing may be to the Levant, destruction can take on a far more universal sinister overtone when applied to the consequences of seismic events and “storms”. As contemporary actuality shows, destruction through tremors and their after-shocks, the concussive force of consecutive earthquakes or those opening up existing fault lines range, not exhaustively, from site destruction, refugees, loss of societal structure, loss of life, population dislocation and, when associated with drought and famine, social unrest, disorder and disease as mere survival in a hostile and uncertain environment becomes paramount. Relying upon contemporary data, the relevance to the Aegean and Eastern Mediterranean lies in the overlay of Drews 2013 “Map of Catastrophe” with 20th Century earthquakes of the regions suffering a 6.5 or above Richter scale earthquake, demonstrating that those sites in Drews Map destroyed in late LBA coincide with those suffering substantial seismic tremors over the course of the 20th century (Fig.10).⁷⁴ This led Nur and Cline to conjecture that the new data may reveal the occurrence of an earthquake “storm” in the late LBA Aegean and Eastern Mediterranean in the period 1225-1175 BCE.⁷⁵ The revealing feature of seismic “storms”, of earthquakes “unzipping” existing fault lines,⁷⁶ is in the successive waves of damage that they create. The Argolid Plain is a site fertile in prominent faults. Mycenae sits on one⁷⁷ as does Hattusa: the North Anatolian Fault. The Aegean region is seen as an area of “intense seismic activity”.⁷⁸ There is a splaying of fault lines running from Anatolia across to Greece (Fig.11).⁷⁹ Quite possibly, some tremors may not have been enough to do more than

⁷³ Millek 2023, 32

⁷⁴ Nur & Cline.2000. Sketch of the plate in Turkey and the Aegean, showing the relative motions between the Africa, Arabia, Turkey and Eurasia, accommodated by strike-slip faulting on the North (NAF) and East (EAF) Anatolian fault zones and by shortening in the Hellenic Trench (HT). Black arrows are the approximate directions of motion of Arabia, Turkey, the southern Aegean, and Africa relative to Eurasia. DSF is the Dead Sea Fault zone, C is Crete, and P is Peloponnese (from Jackson, 1993 Map).

⁷⁵ Nur and Cline 2000, Preface.

⁷⁶ Nur & Cline 2000, 5.

⁷⁷ Nur and Cline 2000, 7.

⁷⁸ Nur and Cline 2000, 4.

⁷⁹ Nur & Cline 2000. Splaying Fault lines, Greece.

disturb masonry and damage roughly built structures but, the Mycenaean walls were Cyclopean, Tiryns replaced its circuit walls with Cyclopean stone walls and strengthened its Main entrance on the East side. Thebes built a Mycenaean circuit wall and Midea was strengthened. It is therefore not unreasonable to associate very strong and successive earthquake activity to the scale of destruction and damage (fire, collapsed, distorted walls etc) to the sites affected in the review provided by Nur and Cline of which only a relative few, Mycenae, Tiryns and Midea were the object of a partial rebuild.⁸⁰

Of particular note in the above, is the reference to the destruction of Ugarit with the occurrence of an VIII level intensity earthquake in c.1365 BCE with, it is surmised, a further destructive event (LH IIIB2/ c.1190-1200 BCE), at the time of the tremors that ravaged the Argolid palaces. The final destruction of Ugarit resulting from a combination of the successive earthquakes—a “storm,” not one isolated occurrence—and hostile, destructive invaders. In that respect, although an identification has never been precisely ascertained, it has been suggested that Ugarit was also weakened by an ongoing diplomatic tryst with Carchemish and Hattusa, leaving it vulnerable and prey to destruction and the flight of its inhabitants.⁸¹

To provide some perspective to this section and as a foretaste for the ones to follow, the OECD deems earthquakes as “critical” risks, with others such as sudden onset events (e.g. climate extremes like hurricane, industrial accidents, terrorist attacks); gradual onset events (e.g. pandemics); and so-called “steady-state” or pervasive risks, all of which share the communality of generating cascading effects and consequences, preventing public institutions from fulfilling their function(s) and being detrimental to the fulfilment of the lives of citizens.⁸²

II B. What is the Sense? Giving Meaning to Words: “Migration”.

Migration.

Since the fate of systems, cities, populations and destruction have been touched upon, it is an appropriate juncture to delve into the Mycenaean and Hittite history of the migrations of the period and

⁸⁰ Nur and Cline 2000, 48-51.

⁸¹ Halayqa 2012, 326.

⁸² OECD.2023. <https://www.oecd.org/gov/risk/Critical-Risks-Recommendation.pdf>

which, according to a recent academic paper, there is no proof—in the sense of archaeological evidence or scientific data—that supports a conclusion of a mass migration of indigenous Greeks from the main-land Asia Minor following the palatial collapse in “...the transitional period from the Late Bronze Age into the Iron Age in LH IIIC.”⁸³ The same paper opines to a numerically restricted proportion of home-landers leaving post-Mycenaean collapse and, in respect to the already familiar Minoan and Mycenaean outstations of Western Asia Minor, a movement in what may be described as an accultural, “soft” integration as opposed to an oppressive “harsh” take-over.⁸⁴ Construction features, grave goods and tomb types revealing a mixture of the Mycenaean and the Hittite.⁸⁵ A continuity and adaptation in forward looking best interests as opposed to a “marauding” and/or “invasive scorched earth” policy.

However, an even more recent contrasting view is provided in that there could have been as much as a 75% reduction in population in the Mycenaean mainland, dropping to 10% of the previous level ⁸⁶ with 80% of all mainland Greek settlements being wholly abandoned, to the profit of migrations not only to Asia Minor but also to Sicily, Sardinia and large parts of Italy. But, this raises the question as to whether this site abandonment was not actually a process devolving over many years and a recent conclusion according to which the archaeological and Linear “B” evidence is to the effect that the numerical level of the overall Mycenaean population never became unsustainable, in the aggregate or in any particular locality.⁸⁷ This may be because it dwindled, inter alia, through the effects of such migration as occurred or naturally adapted itself in accordance with the variability of available economic, hydraulic/water and alimentary resources.

Perhaps not foreign to such reactions would be that the Mycenaean palatial economic model was not of a “beneficial” redistributive nature, but more a “wealth finance” system in which the palatial economic network was synonymous with control and power, privileging the “elite” and essentially assistance indifferent to unconnected members of the civil community.⁸⁸ In times of protracted existential difficulty, a recipe for civil unrest, desertion, disorder and even regime usurpation. That said, the objective observer is more likely to question reliance on such Linear B records as exist and the value of such monikers as

⁸³ Veli Kose, 2017. Article, no identifying numerotation.

⁸⁴ Idem

⁸⁵ Idem.

⁸⁶ Middleton, 2019 in “Site Abandonments”.

⁸⁷ Middleton, 2019 in “Climate change and Migration”.

⁸⁸ Enverova 2012, 55. A view seconded by Saro Wallace.

“distributive” to describe the system of an entire economy. For, if Linear B was a bureaucratic recording device relating to the Mycenaean palaces input of raw materials and commodities and of its production of finished, exportable goods, essentially an administrative tool, what practical use can it be of assisting us in gauging the extent of external, non-palatial connected economic activity and of the non-directly palatially connected persons involved? Hence, as to whether the latter were beneficiaries and dependent upon the palaces’ “distributive” largesse as may have actually occurred or, were organised in “extra mural” mutually assisting communities of a size capable of self-sustenance? Indeed, in regarding the “Medinet Habu” source, what is there that assists in positively identifying Greek or migrating Anatolian figures within the reliefs? One may even question, beyond the ox-carts, whether the depicted civil population does not constitute ex-patriate farm folk or, simply local people caught up in and trying to avoid the warring factions by whatever means available. Never a reliable source and seemingly even less so for descriptions of “mass” migrations, arriving in “boat-loads.....(in) war and transport ships.”⁸⁹

As seen above, the “destruction” events of Northern and Southern Levantine sites, with some notable exceptions, appears grossly overstated. And, when attempting to identify Anatolian migrations in the “Collapse” temporal parameters, it is not only the archaeological record that stands highly exposed⁹⁰ through want but, predictably, the realm of simple logic and deduction. The driest event period through the Bronze Age has been conjectured as occurring for a 300year period at the time of the crisis years of 1200 BCE.⁹¹ However, a statement rendered convincingly implausible, at least in as much as a generator of a migratory flux is concerned.⁹² Indeed, why would Anatolian farmers make the effort to move across

⁸⁹ Knapp 2021, 19-20 and citing Stager1995, 398. “This purported mass migration of ‘sea peoples’ is said to have occurred during the decade between 1185–1175 BC; it was likened (paraphrasing Braudel) to mere ‘crests of Sea Peoples’ foam, which the tides of history carry on their strong backs’, and resulted from the ‘fragmentation and ruralization’ of the Mycenaean and Hittite worlds”.

⁹⁰ Middleton 2019, n. 46 and citing van de Mieroop 2010, 248-249. “There is evidence in the Hittite texts of the **15th century BCE** that whole villages of people might pack up and try to leave their home in one kingdom for another, presumably better place, something that the kings tried to prevent and reverse.” (Emphasis added).

⁹¹ Knapp 2021, 40. Citing Kranieski et al, 2017,90. ‘The 3.2 kyr cal BP event’ (i.e. c.1200 BC) represents a period of extreme aridity, a century-scale episode of dry conditions that was the main factor behind the ‘huge population migrations and the decline of ancient eastern Mediterranean civilizations, 3200 years ago’ and referred to Kranieski et al 2013, 9 where it was concluded that the LBA crisis coincided with the onset of a 300-year long drought event that ‘...caused crop failures, death and famine, which precipitated or hastened socio-economic crises and forced regional human migrations at the end of the LBA in the Eastern Mediterranean and southwest Asia.’

⁹² Knapp 2021, 41 “In chronological terms, the 3.2 kyr Cal BP event is still framed by 2σ calibrations extending over at least three hundred years (c.1320–1025 Cal BC), which hardly help to demonstrate, much less pinpoint, any flow of migrants swelling to the level of a large-scale migration.”

arid and inhospitable terrain to an equally uncertain and unwelcoming destination? Topographically arid conditions are one climatic issue (one of temperature) but persistent drought entailing famine conditions due lack of precipitation entirely another. One that human agency, if the agrarian culture is based upon the “dry” as in Anatolia as opposed to the “irrigational” as in Egypt, is ill armed to counter other than through grain importation and storage. This would apply to even the most advanced, for the time, riverain irrigational projects in the bread basket of the Empire—Upper Mesopotamia—were the Taurus and Zagros mountains and the reservoir of Lake Van to deprive the Euphrates and the Tigris of a requisite seasonal water supply due to an over-arching lack of consistent precipitation.

Population shrinkage to avoid a complete demographic collapse is a more likely resilience response and outcome to on-going or perceived drought induced famine conditions as it would be in the event of volatile or associated straightened economic or material conditions. Resilience, as an attempt to keep society and its institutions on a functioning even keel in the face of internal and external shocks, of which more below. In short, is it not as much and just a question of “could” one leave given the attachment to the existing societal bonds as to “where”? Which place would provide “safe haven”, safe passage and welcome?

Chapter Three

III A. Systemic Risk and the Ability to Sustain—Resilience.

The relevance of including an explanation of systemic risk and resilience into this paper is to obtain a perspective of how climate change and trade relations’ disruption could have played a role in the decline and fall of the palatial system in the Eastern Mediterranean and to provide a glimpse into the way societal and political organisation may have been aware and, if so, to what extent, they may have taken mitigating measures to preserve their “status quo”.

III A i). Systemic Risk. A Meaning, a Context.

“Systemic risks overwhelmingly do not follow normal risk distributions, but tend to be fat-tailed, i.e. there is a high likelihood of catastrophic events once contagion starts to unfold.”⁹³ From a layman’s view this can be interpreted as meaning that the risk arises, or is latent within, interactions between several individual existing elements each of which is pregnant within its own particular risk. In reality, the greatest interest, at least for the purposes of this paper, is the inter-connectivity between systems; meaning that systemic risks, in all their complexity, uncertainty and problematic character, can deploy their effects not only within their own native system but, are capable of commuting themselves and affecting the functionality of critical functions in other entangled systems, creating disruption and collapse on a global or a regional or a localised level. This then becomes more tangible in defining the major properties of systemic risks: “Complexity”, being the difficulty in identifying the non-obvious nor immediately observable cause and effect relation; “Uncertainty”, due to randomly structured relations, lack of scientific or reliable data; “Ambiguity” being the variability of legitimate interpretations due different norms or criteria and, “Ripple Effects”, the either immediate, observable or latent and occult negative effects that systemic risks can trigger in systems foreign to their own indigenous point of origin.⁹⁴ As conveniently summarised by the body promoting management and governance of risk within the global community.⁹⁵

In brief and overall, “systemic risk” could be described prosaically as being comprised of a bundle of connected or latent risks, coming together to create a combined waterfall of effects, the duration and severity of which depend on the nature and gravity of those very, various constituent and latent risks. Not only do individual parts of the machinery break but their failure may well entail a conveyor belt of malfunctions and collapse (as defined above) of the entire societal and political machinery. In other words, the failure of one strand may be the “tipping point” that unleashes an irreversible escape and snapping of the others. The balance of the system reaches the “tipping point” (whatever it/they may be), where the local effects are no longer sustainable, the system can no longer be maintained by any means and the

93 <https://www.oecd-ilibrary.org/>. “Systemic Risk Emerging from Interconnections: The Case of Financial Systems in Systemic Thinking for Policy Making: The Potential of Systems Analysis for Addressing Global Policy Challenges in the 21st Century”.

94 Renn 2020, 905

95 International Risk Governance Center, 2018. “Systemic risk is the potential for a threat or hazard to propagate disruptions or losses to multiple nested or otherwise connected parts of a complex system. Systems prone to systemic risks are highly interconnected and intertwined with one another. Such interconnections contribute to complex causal structures and dynamic evolutions – typically nonlinear in their cause-effect relationships, often stochastic in their effect structure, and potentially global in their reach, in the sense that they are not confined within borders”.

“tipping point” effects ripple out, spreading systemically until, overwhelming, the merciless cycle of destruction and collapse commences.

Given the very uncertain and unpredictable nature of the risk elements involved, it seems inevitable that complex (and cross border) societal and economic structures are at major risk and, can at best, in the absence of a “crystal ball”, only count upon past (negative) experience and efforts to improve their existing response and infra-structure. These would include internal breakdowns and disruptions in the system as much as external occurrences affecting the survival or proper functioning of a system’s organisation. This may nevertheless create responses that may lead to an ever-increasing degree of complexity within the system itself, be it economic, regulatory, cultural etc, thereby propagating even more seeds of its own self-destruction as the ever more complex system becomes even more exposed to an ever- greater degree of systemic risk. A form of non-virtuous circle which inevitably recalls Iago’s warning to an ingenuous Othello that jealousy is a monster that “...mocks the meat it feeds upon “ and so, Palaces and Empires may be devoured from the inside by their own cupidity and overbearing organisation, tumbling into historical redundancy by a “tipping point” of famine, drought, cyclical climate change, a hugely volatile environmental upheaval (as in Thera) or, a part of a sequence of seismic “storms”, maybe months or years apart, traversing the Tectonic plates underlying the Mediterranean floor, “unzipping” the fault lines and the very ground upon which they stood(Fig.12).⁹⁶

III A ii). Systemic Risk and Climate Change. A General Theory, practically Applied.

Climate Change, certainly up until the mid-20th Century was most likely viewed as a localised phenomenon. Gradually, public perception was altered as the extent of affected localities and hitherto untouched areas became plain and the images were transmitted and became accessible, instantaneously, across the planet. “Global” climate change became part of the local conscience and the realisation that regional and local effects of climate change could have much broader impacts, both territorially and into the human biosphere—be it not only agricultural, but also upon the very tools and systems that human organisation depends for its security and existence.

⁹⁶ The Aegean and Eastern Mediterranean sites destroyed c. 1225–1175 superimposed on the maximum intensity of seismic ground motion in the Aegean and the Eastern Mediterranean during c. 1900–1980, in which the intensity was greater than VII.

Indeed, the fragile and potentially vulnerable nature of the strands that make up the inter-connectivity, the “globalization”, of the modern world, (and which have recently been laid all too bare), in much the same way the world of the Hittites and Mycenaeans had become inter-twined with that of the Eastern Mediterranean and rendered dependent upon a network of extended commercial strands. “Globalised” for the period, for their supply of grain and the commodities and “exotica” that propped up the palatial system, supported the Dynastic Capitals and their power structure as well as lubricating the wheels of the diplomatic relations between the “Great Powers”. By its very nature of lack of predictability the occurrence of a systemic risk is virtually impossible to foresee. However, this has not prevented the doctrine from categorising systemic risk induced by climate change into “emergency” and “incremental” risks attributing an archaeological “Carnival of the Animals” to denote their effects.⁹⁷

Emergency “black swan” events are assimilated to unpredictable and random catastrophic events such as extreme weather; “black rhino” events are those associated with events perceptible as having a high degree of probability, most likely signposted prior to occurrence and deploying the so-called “fat tail” effect; i.e.: a slow, gradual phenomenon that over term produces very considerable impacts and durable consequences, ultimately becoming unsustainable because ungovernable. This latter category accounts for the majority of climate change induced systemic risk in a lengthy process that swerves from quantitative to qualitative change and, ultimately, disaster,⁹⁸ forming one of the three constituent parts of systemic risk induced by climate change. The remaining two being, the extent of impact affecting a wealth of human organisational systems; financial, social, environmental etc., and, the lasting, long duration of climate change impacts.⁹⁹ Kemp and Cline attribute three distinct characteristics to “Systemic Risk”, leading up a path to and outcome of failure; the latter to the extent, one presumes if not recognised and neutralised in time or, society is not made adaptive. Whether it be “Contagion” risk, a first shock which repercussions around and into the socio-environmental system, “Synchronous” failure with its many inter-acting stress factors spreading, inter-acting with each other over a length of time, feeding off each other to multiply, exploit and create vulnerabilities and result in the creation of much larger, tsunami like crises or, finally,

⁹⁷ Hui Min 2022, 385.

⁹⁸ Idem. 386.

⁹⁹ Idem. 386

“ Critical Node” loss, being the loss or failure of a critical component which, in quick time profoundly disturbs and disrupts the functioning of a system.¹⁰⁰

For the same authors, the Bronze Age Collapse is redolent of a systems failure brought about by unrelated but mutually reinforcing shock events; the very definition of “Synchronous” failures.¹⁰¹ The substantive categories can be rendered on a graphic support (Fig.13).¹⁰² If Systemic Risk is to be assessed, it requires a holistic view of the manner in which it may impact and shape the core institutions of human organisation: the economic, the environmental, the political, the commercial etc. The modern means of analysis and awareness transcend the purely local or regional in a way that would not have been available to our forebears hence, theirs was more a desperate attempt at damage limitation or control as they stood as unconscious, powerless, (the vain pleas of Hatti to Ugarit for grain supplies from Egypt), paralysed victims as their decades old systems inevitably unwound before them, for reasons out of their control, maybe even lost to sight or comprehension, such as the re-shaping of overseas trade routes and commercial intermediary connections (see below).

How not to be intrigued at the parallelism between modern day conditions and those confronting the Mycenaeans and the Hittites as they struggled with the effects of systemic risk induced by climate change¹⁰³ and the severity and nature of its impact upon their environment and well -being?¹⁰⁴ Translated into vivid statistics: For every 1C degree increase in temperature, economic production is affected by c.1%-1.7% (not including “emergency” risks such as earthquakes etc); warmer climate or extreme precipitation create human health, water resource crises, amongst others, social unrest and conflict; human health, behaviour, morbidity and mortality are all affected by a degraded living environment. As temperatures rise so does annual mortality: e.g. a rise of 11.2% in the years between 1968-2002. Climate change affects the availability and peaceful sharing of staple resources, such as water or, conversely, inundation. Impossible not to imagine a “knock-on” effect of social discontent, of insurrection in affected minority ethnic or economically impoverished groups. Inequality gains ground; climate change will impact negatively the

¹⁰⁰ Kemp and Cline, 2022. 211.

¹⁰¹ Kemp and Cline, 2022. 215

¹⁰² Kemp & Cline. 217.

¹⁰³ Hui Min 2022, 388.

¹⁰⁴ Hui Min 2022, 390.

entire scope of the human living condition, be it from availability of resources, liveable and life sustaining acreages, to malnutrition and disease etc.¹⁰⁵

However, taking and implementing a holistic view, had such been even available and not obstructed by human hubris or physical distance, leads to the very societal complexity in which systemic risk thrives and which, if resilience measures are not taken and are effective, lead to progressive decline, even “collapse”, with a vacuum and only vestiges of the past surviving until they, themselves over time, get caught up, discontinue and transition into the oncoming trajectory of a new societal organisation. Ultimately, and as the record shows, more heterarchical and founded upon a new economic and raw material premise, as was the Iron Age. But one example over the centuries of human existence of the seeds of destruction germinating into creation. An explanation perhaps of the manner in which Neo-Hittite clones, such as Carchemish, survive the rapid and somewhat furtive disappearance of the “core” and its reigning king. For, they were already functioning vassal states: formed and working modules under the aegis of and previously integrated within the Imperial diaspora.

III A iii). The Ability to Sustain—Resilience.

In general parlance, the ability to “resist” has a connotation more of holding firm, unwavering against the odds, against internal and external pressures. “Vulnerability” and “Sustainability” are two further notions that are frequently associated with “Resilience”. Does this accent on stability and endeavour to keep the “status quo” exclude adaption, sustainability or, is resilience a futile undertaking in societal organisations already undergoing stress and internal instability, so that their low resilience threshold is insufficient to counter the impact of domestic and external pressures which then accumulate to provoke a terminal, and quite possibly, sudden crisis event? Paradoxically and perhaps even more damning, do resilience measures in themselves, if not targeted, be timely, effective and efficient propagate, in their own wake, systemic risk through a flow of synchronous events, the abatement of which can only be made possible by concerted, in-time, efficient and effective resilience action? The very foundations of an archaeological “Catch-22.” “Resilience” within Socio-Ecological Systems (nowadays commonly abbreviated to “SES”), has found its meaning as “...the property or the ability to maintain “healthy

¹⁰⁵ Hui Min 2022, 389.

functioning...” and “...remains within the same regime, essentially maintaining its structure and functions.”¹⁰⁶

These are useful conceptual labels because they express similarities of outcome. But, perhaps overly simplistic since, to be truly effective, “Resilience” cannot just be confined to the upper strata of the societal economic and political organisation, it needs to involve and engage whole swathes of the population, right down to the most elementary actors in the class and production chains. But people and communities are complex. They inter-act and inter-connect at different societal and geographic levels and can have vastly differing perceptions of their own and collective sustainability interests and requirements. In short, throw in climate change as a given factor but do not underestimate the ability of the human, individual or as a collective, to act in what might seem as a contrarian or unpredictable manner. Since, its/their perception(s), its/their vision of reality, of what it is effective or even fair to do, will be based upon and bound up in a bundle of rules and customs of its/their own making and upon what and how much they have, or are prepared to surrender, of their own resources.

But this is not to say that the concept of “Resilience” when applied to the archaeological domain, has been received with universal acceptance. Whilst recognising certain of its innate virtues and inherited vices, it has been the subject of overt critique.¹⁰⁷ The lack of a precise and accepted definition, other than being the antithesis of “collapse”, for one. Any attempt to come out of the collapse phase and definitions and link “resilience” with them founders because resilience is a coping mechanism, based on preserving the perennity of the actual system, not letting it perish or self-destruct. Aside from this seemingly fundamental flaw, other equally basic defects have been identified. For example: It is suggested that in its very application to the aspects of societal transition, the “Resilience” theory can only provide a one-dimensional view of the complexities and ever moving nature of human society and its environment - to what aspect of societal organisation is “Resilience” being applied to? Moreover, how does one treat a resilience practice that, in the very long run, actually ends up by creating an environmental disaster? The example is given of land use practices. How is “Resilience” to be measured? What uniformly accepted criteria, providing adequate accuracy and sufficiently extended breadth of the archaeological record, can

¹⁰⁶ Bradtmoller et al, 2017, 3. See also: <http://www.resalliance.org/resilience>

¹⁰⁷ In particular, Rashidian, 2021.

be relied upon? The question remains moot.¹⁰⁸ Unsurprisingly, the conclusion arrived at was damning in as much that “Resilience” in its present conceptual format, was unusable in an archaeological context because “.....it is almost impossible to define archaeologically sound parameters for its measurement,it limits the interconnected interpretation of archaeological data... (and)... resilience is a momentary condition despite its claim as a framework for long-term developments.”¹⁰⁹

Taking a concrete example of “Resilience”, and its consequences in the Argolid context and which, as an agricultural territory would have involved much the same rain dependent agrarian culture as in Central Antolia, in deference to the irrigational mode practised in Egypt. It is reckoned that the LBA Argolid Plain, with an annual rainfall of a minimum 300 mm and 10,000 hectares under cultivation at any one time per year, would have provided a fertile platform for crop cultivation, with its diversified cereal crop yield of barley, einkorn, emmer and free-threshed (bread) and typical, for the Mediterranean, domestic animal husbandry of sheep, (meat and wool production), goats (milk, meat and skins), cattle (dairy, meat and leather) and pigs (meat and skins). On average, the area would have supported circa 35,000 people and the LBA population is estimated at circa 20,000.¹¹⁰ Consequently, only successive years of crop failure resulting in a 55% reduction in annual yields, exhausting “resilience” or mitigation efforts in place, would have led to a “catastrophic” environmental and societal outcome.¹¹¹

A scenario which is not generally as applied to the Mycenaean and Greek mainland territories as it is to the Anatolian mainland with its well documented summons to Ugarit to deliver shiploads of Egyptian grain in times of shortage, of famine. There is no such evidence as links the Argolid to famine conditions, quite possibly because Myceanae was not the “be all and end all” of human occupation of the Argolid which had known an extensive settlement presence planting the roots of the era of the Mycenaean palaces. Although, slope failure, lack of terrace maintenance and soil erosion would have been an inevitable concomitant to a rural exodus, be it to urban centres or provoked by population decrease or movement. For such reasons, one cannot gloss over the sheer scale of manpower –and sustenance- requirements commanded by the 13th century BCE monumental palatial and hydraulic works undertaken throughout the Argolid plain. It is estimated and based on the example of Tiryns that: “...Midea, Tiryns and Mycenae

¹⁰⁸ Rashidian 2021, 3.

¹⁰⁹ Idem. 4.

¹¹⁰ Brysbaert 2021. “Discussion”.

¹¹¹ Brysbaert 2021, in particular section: “Climate’s Impact on Rainfed Agriculture”

citadels together would have taken, for example, 100 people to build continuously for 14.4 years (or less people for more years, or more people for less years).¹¹² Alternatively, this projection by way of an illustration of overall Argolid monumental construction man power /year requirements.Fig.14.¹¹³

This paper takes a somewhat contrarian view in that it concurs that harvest failure induced by climate related factors is problematic. But, shortages, even when not successive, can nevertheless lead to acuter conditions if intervening years do not make up for the short-falls. Furthermore, it goes beyond the requirements of basic human consumption, health and nutrition. Cereals are also used as food-stuff for animal husbandry during the fallow seasons and livestock is used to enrich depleted soil. The entire food chain and livelihoods dependent upon agrarian and animal farming are, consequently, threatened. The most obvious “resilience” mode, given that crop failures are a recurrent event, ingrained upon the individual and collective conscience is therefore one of harvest storage and crop diversification, with barley being more drought resistant and providing larger yields than wheat. But, the crucial difference lies in their respective water requirement during the important winter growing season with 300mm or less of rainfall being the onset of the drought threshold, with wheat needing the same quantity of water, barley slightly less but vegetables around a third more.¹¹⁴

But what if...?

What if, differentiated, lower and shortened periods of rainfall during the peak growing months created an imbalance or penury of crops growing to maturity, the soil ceasing to act as a reservoir of annual rainfall, failing to accumulate enough to allow the roots to take? The problem is not just lower precipitation during the growing months but the very lack of. Meaning, whether the crops are in the Argolid plain or the Anatolian heartlands or wherever, some but simply not enough water. Some but simply not enough harvested crops for the ratio of sown seed. Large but simply precarious reliance on two years’ worth of storage as a means of overcoming what might well extend into several years of failure or shortfall induced by adverse climatic conditions, rendered more or less acute by the facility with which the terrain may be prepared and irrigation infrastructure installed.

¹¹² Brysbaert 2021, in particular section:”Construction”.

¹¹³ Brysbaert 2021, in particular section:”Construction”.

¹¹⁴ Brysbaert 2021. “Agricultural Cycle Data”.

In the years preceding the destruction of the Mycenaean palaces, the territory suffered a dry period c.1250 BCE which, it is conjectured, led to a potential destabilisation of the palatial authority and which was a contributory factor in the vanishing palatial economy, ultimately helped to destruction by a continuing dry, even arid climate and which, in turn, led to ever more fragile and decreasing crop yields. Progressively, an ever- loosening of societal bonds already thrown into question by the lack of relevance and disappearance of the palatial administrative structure.¹¹⁵ It goes contrary to the academic and intellectual purport of this paper which seeks to ground itself in evidence, data and rationality but, is it permissible, even in the absence of a probant archaeological record, that the decline and fall of the Hittite Empire may not have followed a similar path? It has been surmised that the Palatial structures were more interested in a mono-wheat based culture, leading to potentially greater harvest failure exposure and failure to nourish the soil through cereal and vegetable rotation, with agricultural products being stored for a maximum of two years either in storerooms of individual dwelling or small communities.¹¹⁶ Larger communal storage spaces are, it has been submitted, exceptional. Even in the large palatial centres.¹¹⁷

The latter finding tends to support this paper’s suspicion that the large grain silos unearthed in Hattusa were principally for the use of and conservation of the palatial coterie and military followers with farming throughout the territories being conducted at a small scale, precarious, subsistence level. “Resilience” is at worst a discredited theory; at best and in the circumstances, of a limited practical usage? Perhaps a too trenchant a view. Taking the “inter-connectivity” of the states as between themselves and pitched as terminus nodes onto a spider’s web of inter-linked networks, in the graphic example, a simulation of political and trade layers (Figs.15&16).¹¹⁸ The “reverberation” effect of the demise of one connected nodal link, may have been adequate to provoke the decline of its counter-part at the other end of the link in the same layer despite being geographically remote, because of the osmotic interdependence between the layers between themselves. The collapse of a node altogether when it is detached from enough links in a layer—and presumably—from those in the corresponding counter-part layer as well. Conceivably, when taken to its most unravelling of inter-connected and entangled of conclusions, large parts of the network of a layer may fall away and/or simply spell the “death knell” of the layer network itself. The network

¹¹⁵ Weiberg, 2018. Final Paragraph of Main Text and Conclusion.

¹¹⁶ Brysbaert 2022. “LBA Agricultural Production and Its Organization”.

¹¹⁷ Brysbaert 2022. “Construction”.

¹¹⁸ “Political and Trade Layers”. Cline 2024

simulation provides a telling example of the consequential effects of nodal de-connection and network collapse. Whilst it may be problematic to determine the exact order of LBA societal collapse, the chronologically proximate collapse of the Hittite Empire and destruction of Ugarit, would have “...been sufficient to collapse the Bronze Age network entirely due to the structure of the network itself.”¹¹⁹ From whence the loss of those nodes and links would have upset the links between Western Anatolia, Cyprus and the Upper Levant and, when all link de-connection and failures are taken into account, particularly the ruptured commercial ones, they provoke the collapse of Mainland Greece and Crete. Even contributing over the next hundred years or so to the collapse of the Egyptian Dynasties and, over further time, affecting the resilience of the Assyrian and Babylonian Empires (Figs.17a &17b).¹²⁰

“Resilience” however not to be overlooked nor under-estimated in the Anatolian model. Through the “Beyşehir Occupation Phase” (“BOP”) Fig.18.121 which lasted some 1500 years through the Hittite Empire until 300 to 650 CE, a span of between 1500-2000 years. The BOP was comprised of orchards, mixed crops-fruit trees areas, and high animal production in pastures, set in appropriate natural environments with sustainable management. The effect was to attain a very high resistance to external factors, of which climate effects, even when change occurred and indeed, three dry occurrences marked by intense drought spikes and drought successions occurred in Anatolia: (i) ca 3150/3050BCE; (ii) ca 2300-1900BCE; (iii) ca 1300-950BCE with (iii) being the most intense and longest.

Chapter Four

IV. Change in Climate and Trade Relations.

IV A. Long and Short-Term Climate Change in the Mediterranean: the Mycenaean and Anatolian heartlands.

It is common and undisputed knowledge that the Mediterranean Sea covers an area of some 2.5 million square kilometers. It constitutes the largest inland sea in the world and nowhere on Earth experiences a climate of summer drought and winter rain of cyclonic origin, being at the centre ‘...where

¹¹⁹ Cline, 2024. 4.

¹²⁰ Simulation of Aegean and Eastern Mediterranean LBA Collapse with Explanatory Text. Political and Trade Layers over Time. Cline, 2024.

three global climate forcing mechanisms meet, with the African-Arabian/Asian monsoon exerting greater control in the summer), the Siberian High dominating springtime climates and the North Atlantic Oscillation (NAO) affecting winter conditions. Evidence suggests a cyclic nature in the extremes of these climatic regimes, typically oscillating every ~1500 years with the NAO and 2300–2500 years with the Siberian High. The coincidence of these cyclic events can result in widespread, abrupt, and rapid centennial-scale shifts in Mediterranean climates.”¹²¹

To place this in a reduced, more relatable perspective, recent (mid-2023) research has proposed that the all-important rate of precipitation required to sustain a successful sowing to reaping ratio in ancient Mediterranean history finds correlation with the patterns of precipitation in the ice accumulation balance in the GISP 2 ice core on the Greenland plateau. Just as the lowest ice accumulation rate in the past 5000 years occurred so, contemporaneously, concluded the Aegean and Eastern Mediterranean civilizations.¹²² However, it is strongly disputed that societal change at that time was predominantly caused by varying conditions of wetness or aridity, as illustrated by an overall regional and country Aegean, Anatolian and East Mediterranean overview of Early Bronze Age Collapse sites affected by climate change as compared with those of the Late Bronze Age Collapse.¹²³

Climate as such does not appear to figure as the condition causing collapse or acting as the “trigger event.” Caution has to be exercised in deploying too “broad a stroke” approach since countries are made up of differing regional climatic conditions due varied environmental conditions: mountain ranges; proximity to the sea etc. The quotient of humidity decreases with the distance from the sea and therefore the inner Anatolian plateau, including Capadoccia, would be less privileged in terms of humidity conditions, more prone to semi-arid conditions than the South Eastern coastal regions. But an example that the large climatic changes cyclically affecting the area were not uniform in their impact but were felt in accordance with their specific geographic and climatic location.

And this notwithstanding the anthropogenic impact on the environment of the human imprint, which can be enduring as witness the relative success of the BOP program stretching, apparently insensitive to climate instability, between one and a half and two millenia, including the entire period of the Hittite

¹²¹ Hazell 2023, Introduction accompanied by numerous citations.

¹²² Oxford Open Climate Change. Abstract.

¹²³ Hazell 2023, Conclusion.

Empire, and a curious backdrop to the frantic calls from Hattusa to Ugarit for shipments of Egyptian grain due to famine conditions. But, perhaps not so unrealistic since drought years were not uncommon at least once a generation. Major droughts causing serious harvest failure in 2 consecutive years (the benchmark for sustainability through storage), were only a once or twice a century occurrence and, according to gathered data, would have occurred in central Anatolia for three consecutive years between 1198 and 1196 BCE.¹²⁴ This may well have challenged Hattusa disproportionately given the apparent success elsewhere in Anatolia of the BOP program for, as seen above, Hattusa itself was a notable omission to the program and its pleas for grain shipments may be induced by a local cereal shortage phenomenon. It has also been commented upon, that Hattusa and the Kingdom in general, consistent with the BOP program, had been engaged in wide scale land clearance and extensive pastoralism. The former engendering soil erosion, the effect of which would have been amplified by the lack of water absorption which the cultivated soil would have been capable of supporting in dryer atmospheric conditions, in what was essentially a “rain” dependent agrarian landscape. Both sustenance and, a measure of the tax base and consequential income, for farmers, landlords and the regional administrations would be exposed and affected in times of cereal paucity.¹²⁵

This also requires a more differentiated perspective of the effects of climate upon the socio-economic environment. Less water is problematic but it does not always lead to famine, although it may be a further “stress” factor engendering societal, economic and political instability. Most precipitation in the Eastern Mediterranean comes during the winter, when the cold and dry westerlies sweep in and absorb water vapor evaporating from the warmer Mediterranean. However, in the Mediterranean and during the period under review, it is estimated that sea temperatures dropped by 2C and consequentially decreased evaporation rates would have been an aggravating factor in the sustainability and productivity of dry agricultural systems as practiced in the mainland Greece Argolid and central Anatolia.¹²⁶

IV B. Change in Trade Patterns.

¹²⁴ Manning 2022, 4.

¹²⁵ Manning 2022, 2.

¹²⁶ Drake 2012, 9.

The “Trade Layer” simulation provides a “macro-economic” view of the commercial relations woven between the Aegean and East Mediterranean territories. It does not however, give up a “micro-economic” perspective of the manner in which commercial relations, custom and legislation between merchants, suppliers and their grand patrons lubricated the wheels of the terrestrial and maritime trade between them. A look into this “microcosm” reveals much in common with the exercise of commerce throughout the centuries, up to the highly organised and inter-locking mercantile system of the global trade network of the 21st Century. Long standing personal and privileged relations, a reliance on the enforcement of laws, with cross-border effect, protecting the merchant from robbery in foreign lands, the adoption of recognised and accepted means of measurement of weight and value, of payment, identification and transfer of ownership through application of seals, gradual take-up of more sophisticated marine architecture providing for larger, more robust vessels capable of hauling larger volumes of cargo, forms of trade financing. And, a cost-benefit profit motive.

The purpose of this concluding Chapter is not to delve into the detail of what was being traded. The “microcosm” is the prism that, once its strands lain bare, it is expected that the structural fragility of the trade network at its most elementary of sources, will become apparent revealing “fault lines”, the failure of any one of which can reverberate throughout and impact the other strands creating redundancy, failure and, in conjunction with other synchronous failures, collapse. In this case, as predicted above in Chapter III, the inter-dependent “Political Layer” will also come under massive stress, potentially leading to “nodal” trade and political failure and, the implosion of entire networks. This “black hole” scenario requires some mitigation. It does not necessarily spell the end of commercial relations. It is axiomatic that “Business talks to Business” and, what may be expected from a brutal downturn or rupture, as the period under review and modern mercantile events both demonstrate, is a re-sizing, a reconstruction of the business traffic built on the remnants of what went before. But, in the case of the Mycenaean palatial system, those remnants would most emphatically not include palatial workshops and their specialist artisans and craftsmen dedicated to transforming imported raw materials into finished products of great beauty and value any more than Hattusa, now consigned to the sands of Central Anatolia and permanently displaced by Neo-Hittite Vassal modular states, would have been able.

Trading between persons and nations, remind us of the linkage between humans and all the various intangibles and tangibles they use to conclude their business. This linkage is at once sophisticated and potent, making a call upon and leading to an entanglement of fundamental human urges, desire for profit,

trust, cupidity, an ever-present desire to control the precarious etc., along with all the multiple and vulnerable links in the material procurement, supply chain and manufacturing processes which form the larger web of commerce. This is an entanglement of things and humans on a person to person and on a local to cross border basis.¹²⁷ As such, borrowing from the detailed empirical research conducted,¹²⁸ permits a “deep-dive” into the basic building blocks of this “human -thing” relationship lying at the very root of the Aegean-East Mediterranean trade layer. Arguably, commercial relations are based on mutual interest, occasionally on philanthropic ones, and will be moulded and conducted consistent with customary principles and/or applicable legislation, without which the “risk-reward” equation becomes difficult to determine. However, many of the factors of risk and reward applicable over three centuries ago, still find their place in modern mercantile transactions.

Hittite laws, the Code of the Nesilim, originating from circa. 1650 -1500 BCE was considered more protective of individual rights than the more collective order oriented later Mesopotamian Hammurabi Code, also served to protect merchants from robbery and murder and provided for restitution in the event of theft during foreign transport. Rules set down to regulate maritime passage and indemnify loss at sea. Fairness and Equity embedded within the Codeified legal principles, not a separate strand of the Law, as per the English Common Law system. Domestic laws and Treaties extend, today, protection to professional merchants and lay clients alike. And maybe, it is permissible conceive of a third co-terminous strain, that of a “Lex Mercatoria”, the way the merchant communities supported their own commerce through customary rules and procedures.

Legal claims were adjudicated within a working legal administration, with records taken, a procedure followed and decisions rendered by Court appointed Governors and, it is known that Hammurabi himself was a keen dispenser of Justice as befits he, who engraved on the Stele, is captured proffering or receiving the Codes from the God of the Sun. Ultimately, the existence of a Legal Administration imbued with the power of enforcement of judgment, creates the stability through certainty that markets and merchants require to transact their business in an atmosphere where trust between partners is a fundamental aspect

¹²⁷ Hodder 2012, 9. “A more satisfactory definition of entanglement starts with the overall inter-dependence of humans and things and focuses more on the double bind, the tension between dependence or reliance between humans and things, and the dependency or constraint between humans and things; thus, entanglement is the dialectic of dependence and dependency between humans and things.”

¹²⁸ In particular, Monroe, 2009 & 2015 and multiple references therein.

to doing business and creating the conditions for trade credit, raising capital and the investment in cross border dealings. Of itself, the absence of application and enforcement of relevant Laws is akin to removing the backbone of International Relations and Commerce. Without an Empire and its Administration to administer Justice, anarchy soon prevails. If, the anarchy had spread before the “collapse” of the Palatial System and of Hatti, it is clear that it would resonate throughout the network, bring a resounding tremor in to the Palatial nodes, depriving Monarchs and their Elites of the very “raison d’etre” of their being and heralding the demise of their own system and which, they would be powerless to protect from the long-distance chaos fomented over the seas. A demise, that could be as abrupt as it would have been catastrophic.

In the same vein, the existence of a tried, trusted and recognised system of proof of ownership, good and transferable title to merchandise, weights and measures, form an indispensable part of that backbone. Merchants from different jurisdictions were able to mark weight equivalence based on an accepted standard, notwithstanding the different provenance of the goods as well as of their own origin. The simultaneous use of three different weight systems in Ugarit (Hittite, Mesopotamian and Levantine) did not prevent merchants from being able to apply a ratio which converted their own measures into a standard, capable of acceptance, promoting fairness and maintaining trust and stability through the network of counterparts. Again, any lack of respect or enforcement, by legal or reputational means, would lead rapidly to ripples of uncertainty and instability throughout the network for such a crucially important instrument. As remarked: “Late Bronze Age LBA weighing achieved all the functions of money or currency by facilitating shared price information, calculation, storage of value and accumulation of wealth”.¹²⁹ Seals were used to identify the control or authority of a merchant over merchandise and followed the goods through transportation and storage.¹³⁰ Any lack of confidence in this otherwise practical process and it would be difficult to conjecture how any form of similar density cross border transactions and shipments between merchants could be realised with the same security, leaving room for what may have been a limited, less dense form of trade conducted on a more parochial basis with attendant lesser values across the supplier board.

¹²⁹ Monroe 2015, 10

¹³⁰ Idem. 11

In order to encapsulate the apparent strength but inherent vulnerability and potential for massive disruption throughout the network, some reference ought to be made to the standing, function and community of the merchant class. To that end, it would be enough to draw upon the nexus of relations upon which the members of the class aspired to and upon which they relied. But, the archaeological record provides little evidential comfort. However, from the destruction and fire that ravaged and destroyed cosmopolitan Ugarit and from records salvaged from that commercial cross-roads, permit some evidence based deductions to be made. In an interesting parallel of the status level between the royal and the private sectors in Ugarit and those of the Greek city-states, we learn "... it would be erroneous to visualize the Ugaritic merchants according to the pattern of medieval Europe or even of the Greek city-states [...] that is, as an energetic middle class, growing in wealth but kept in an inferior social and political position by a landed aristocracy of mounted warriors which despised business and trade.... In Ugarit, the big merchants were the upper class—they owned the largest land estates, they surrounded the throne as advisors and administrators, and they served in the elite corps of the army [...]. If we look for a parallel to the Ugaritic *maryannu*, it would be the patriciate not of early Rome but of medieval Venice, except that the social relations in Ugarit were far from the rigidity and exclusiveness of the Venetian mercantile oligarchy"¹³¹ The reference to "maryannu" would be to an elite military class, as opposed to the "tamkaru". The former apparently an endowed, from the King, merchant personage distinguished from non-endowed, private entrepreneurs. The particular feature of the "tamkaru" would probably be tantamount to being provided with initial capital by way of transportable goods loaded and exchanged by way of sale/ purchase across the overland routes until, upon his return to his point of departure, the merchant would submit the acquired goods to an administrative process of fiscal accounting, according to a policy of rates and exemptions which have not been discovered but which may well have varied in accordance with proximity to the Monarch and members of his administration.¹³² It would appear that the wealthier "tamkaru" could also have been royally endowed with silver, akin to a "Royal Warrant" or acting as a royal agent, whilst also engaged in independent trading and as a foreign merchant in a commercial environment in which the Administration acted as collector and inter-face for the King. In consideration, the latter adopted a "laissez faire" policy to encourage commerce and (taxable) financial returns.¹³³A

¹³¹ Monroe 2009, 175. Citing Astour 1972,16.

¹³² Monroe 2009, 126.

¹³³ Monroe 2015, 24.

relationship which is described as symbiotic or interdependent,¹³⁴ since the wealthier merchants paid the King handsomely to acquire and own estates and profit from their own production of oil and wine etc, obtain royal service contracts, concessions and exemptions.¹³⁵

This analogy can be taken constructively further down the immediate circle of merchant contacts, sharing interests with merchants in a like position whilst engaging all manner of artisans, employees, boat-builders, construction workers, etc., whose livelihood revolved around the fortunes of their merchant patron and his family. From the highest level of the State to the household servant, their fortunes all unwittingly and unconsciously entangled into a bundle dependent upon the secure, stable and uninterrupted working of the entrepreneurial commercial trade network and its inter-connected nodal links, a well-defined and functioning civic order. One vitally important node in the “Trade Layer”, Ugarit, that collapsed definitively and comprehensively, never to be resuscitated, in the years around 1200 BCE.

Conclusion

An awkward word for a paper of this title. In part, because of the lack of specific and relevant archaeological record in part, because previous writing on the subject matter may have relied on assumptions or conjectures based on not necessarily identical or similar occurrences. In brief, writings which now stand as historical curios. And to what extent can this paper pretend to be of any the more purposeful and relevant? Only in respect of the evidence in as much that it borrows from the latest climatic and scientific data and findings, the most contemporary and varied sources of supra-governmental expertise and research into environmental and cross-border commercial related systemic risk induced by climate change and trade disruption, its formation, threat and antidote.

Consequently, in the light of the foregoing, hard and fast conclusions are few and far between. Data based deductions are more transparent but subject to inevitable conflicting interpretation and misinterpretation and, as with all data founded material, likely to be consigned to the archival “oubliette” as it is challenged and replaced by more sophisticated, “on-point” and reliable research. What is a

¹³⁴ Monroe 2015, 25.

¹³⁵ Monroe 2015, 37.

particularly intriguing facet of this study, is the proximity in circumstances continuing to exist between 1200BCE and 2023CE.

Climate change is a major global and regional pre-occupation. Material inequality is rife and increasing. Power and influence lie in ever more concentrated, often occult, cabals. Correct amounts of un-polluted, healthy food and nutrition are available and confined predominantly to developed first world countries and then, to financially resilient members of the populace. Populations seek to migrate to flee conditions of drought, famine, social unrest, regime change and outbreaks of contagious and deadly diseases. Conflict, civil and military warfare rage, not only because of ethnic rivalries but for access to precious resources. In particular, minerals, materials for construction, wares and implements, fertile land and, above all, to water. Precipitation, which plays such a prominent part in the climate change factor affecting both Mycenaeans and the Hittites.

And cross border commercial relations. Trade, the diplomatic lubricant of “Gift Exchange” between “Great Kings.” Trade the preserve of a palatial “elite” and a far-flung network of commercial intermediaries and affluent merchants, plying their trade from well-established hubs, coastal fortresses and kingdoms in their own right, upon well frequented land and maritime routes. International relations progressively ever more entangled, inter-connected, creating prosperity in good times but inherently fragile and vulnerable to unforeseen external factors weighing upon the viability of the supply chain. Recent memory easily recalls how one single large container vessel blockage incident in the Suez waterway in the March of 2021, paralysed 369 merchant ships and an estimated US \$9.6 billion worth of trade per day being transported over the course of six days. This single location incident cascaded into a complete rupture of the East-West supply chain. Its effects were immediate: Global, regional and local. Its consequences affected many industries across the board: insurance, chartering, manufacturing etc. Diverting maritime trade around the Cape of Good Hope on a long-term basis, could have led to an 0.5% rise in global inflation due the increase in associated fuel, labour and insurance costs. Modern manufacturing costs are predicated on a “just in time” supply of components and are not set up for redundancy in the existing supply chain, far less to extended links in a new one. The occurrence of this incident had an immediate and negative effect on the world-wide financial markets. Estimates have been given that between 23-29 March 2021, each single day the Suez Canal remained blocked could decrease global annual trade growth by 0.2-0.4% and cost USD \$6-10 billion or, the equivalent of USD \$400 million per hour. Entire industries would have to adjust to the extra two weeks a longer and more

hazardous sea route would have involved. In this particular case, the six-day blockage spelt shortage of consumer goods ordered prior to the summer and late season High Street purchasing periods and a massive and unprovided for irrecoverable loss of revenue for wholesalers and retailers whose turn-over slumped. Some, into outright failure. Although, and perversely, it would be problematic to disentangle this particular fairly punctual “shock” event from the consequences of the other wholly unprovided for “shock” event which, at the same time, was in full raging mode and creating havoc throughout communities world-wide: the Covid Pandemic. The latter spreading even more commercial disruption within the commercial network layer as lock-down measures curtailed consumer spending, weakened dramatically the manufacturing and services sectors whilst, within the “Political Layer”, mayhem was created to budgetary and fiscal discipline, emergency health and welfare responses, community governance.

And yet, surely both entirely foreseeable occurrences, with historical antecedents. If ever there was a definition of “systemic risk” this was such, with one shock spreading synchronous effects through multiple regions and across entire social and economic strata, networks and layers. And this time, despite the glaring evidence of nearly two hundred years of usage of the Suez water-way, no 21st century “Resilience” measures to speak of in place. A very definite example, redolent of 12th Century BCE reactions and omissions, of a static response to an ever-changing need, seemingly blind to a “worse case” scenario. In this particular case, no navigational improvements to the ever- growing volume of traffic and vessel size. As for the Pandemic, what throw-back to the millions who perished during the latter years of the second decade of the 20th Century from the so-called “Spanish Flu” virus? In the present day, the Pandemic took hold on a planetary basis and wrought its tragic consequences, as if having been universally struck from the collective memory; confusing and overwhelming any scientific or political response.

A “Conclusion” might well be not to underestimate to this very day, the effect of the “input”, or lack thereof, of human agency into the entangled, inter-connected links between international parties. Despite wide-spread and sensational media coverage, climate change has abstract, long term connotations with an unwillingness to appreciate that substantial modifications of long entrenched behavioural patterns are required even and well before its most dramatic and potentially irreversible effects are felt throughout all levels of the socio-economic-politico-environmental strata. The ultimate “legacy” syndrome. Perhaps, this paper may be deemed and perceived somewhat exaggerated in its diachronic linkage of occurrences some several centuries apart. But how not to be struck again by just a cursory glance at the publicly available meteorological forecasts for the Hellenic region until the end of the 21st Century? They have a familiar

ring: More consecutive arid days, less precipitation. But, this time due not a rare sea cooling event but long- term atmospheric warming which deprives plants and soil of water by reason of higher evaporation rates. A mix of human generated climate change and cyclical “El Nino” now creating the Amazon’s worst drought and which, absent human intervention, would only have occurred once every 1500 years but, with the human factor accounted for, may now occur every 13 years and imperil the take-up of CO2 in the rainforest.¹³⁶

To be blunt, but with great respect, the cautionary words of one reputed archaeologist in recent print have been knowingly and consciously circumvented: “Someone once compared archaeologists to traveling troops, who dance to the music of their patrons. This exaggerated comparison is sadly rooted in truth. Our projects are often contributing pieces to a greater interdisciplinary framework of neighbouring sciences. We adapt our initial ideas to the predefined framework to secure funding. Archaeologists are wonderful storytellers. We manage to fit our ideas into any given shape and produce data for any given concept.”¹³⁷ This paper has sought to avoid such a predictable, albeit possibly understandable course. It relies upon the conclusions of current data and research, the input of a simple, interpretative perspective since the scientific formulae and statistical foundations are beyond the ken of this non-specialist paper but, nevertheless, with a penchant for the manner in which historical currents, societal, political, economic and environmental trends lead to what appears to the amateur eye, to be a repetitive cycle of the genesis, mutation, demise and, in some cases, the preservation of vestigial seeds of Systems and Civilizations. History and the archaeological record, interpreted throughout all its multiple associated and collateral disciplines are to be learnt from, and with reason.

A coda to this paper is therefore that it may, by dissecting and illuminating multiple, historically visible threads and learned definitions and passing them through the prism of 12th Century BCE change in climate and trade relations, modestly boast of providing a contemporary down-stream outlook, simply up-dating the subject matter. The reader may be none the wiser, maybe just slightly better informed.

But, a formal “Conclusion” in the Academic canon is required. As for the effect of climate and change on the Mycenaean and Anatolian heartlands, it can only be counted as one of the contributors to the bundle

¹³⁶ <https://www.bbc.com/news/science-environment-68032361>

¹³⁷ Rashidian 2021, 4.

of “systemic risk” factors, leading to their collapse. In short, and as demonstrated by the Anatolian example of which Hattusa, an omission from the Anatolian BOD program exemplifies in a wholly contrarian manner. A meteorological drought does not always equate to an agricultural one. As for the change in trade relations, it is beyond the scope of this paper to determine whether they were a contributory, synchronous component of “systemic risk” leading to the collapse of the Mycenaean and Hittite Systems or, simply an outcome thereof. Applying the inter-connected political and trade nodal and network schema, it seems improbable that the failure of the trade networks involving the Hittite and Mycenaean Systems would not have overwhelmed any “Resilience” features as were in place of the two respective systems in the “Trade” and “Political “layers; such was the magnitude of reliance on an uninterrupted supply chain and customary and legally enforceable cross-border trading conditions.

In any event, trade disruption either contributed greatly or was a powerful causal feature of their decline and ultimate collapse. That trade disruption, in itself, due to the linkage and nodal disappearances of the Mycenaean and Hittite systems, would give rise to new or “healed” inter-connected networks and opportunities. Not the least and over time, that of the Phoenician trading primacy from the Levant into the Mediterranean and extending through its maritime prowess to the Northern European trading centres. This somewhat qualified observation upon trade, permits this paper to conclude on its guiding premises. Namely, it has been conducted by an attachment to the empirical and followed unfailingly the 1624 CE lines of the English metaphysical poet, scholar, lawyer and Dean of St. Paul’s Cathedral in London, John Donne:

“No man is an island,
Entire of itself,
Every man is a piece of the continent,
A part of the main.
If a clod be washed away by the sea,
Europe is the less.
As well as if a promontory were.
As well as if a manor of thy friend's
Or of thine own were:
Any man's death diminishes me,
Because I am involved in mankind,

And therefore never send to know for whom the bell tolls;
It tolls for thee”.

Bibliography

- Adams, M. 2014. *"Egypt and the Levant in the Early/Middle Bronze Age Transition"*. W.F. Albright Institute of Archaeological Research. The Oriental Institute of the University of Chicago Seminars, Number 11.
- Barta, M. 2019 *"Civilisations: Collapse and Regeneration. Addressing the Nature of Change and Transformation in History."* in *"Civilisations: Collapse and Regeneration"*. Eds: Barta & Kovar. Academia, Prague.
- Bradtmoller, M, Grimm, S, Riel-Salvatore, J. 2016. *"Resilience theory in archaeological practice. An annotated review."* Quaternary International 446. Elsevier Publisher.
- Bretschneider, J. 2010. *"Late second-early first millennium BC abrupt climate changes in coastal Syria and their possible significance for the history of the Eastern Mediterranean."* Quaternary Research. Elsevier Publishers.
- Bryce, T. 2005. *"The Kingdom of the Hittites"*. Oxford University Press.
- Buccellati, G. 1967. *"Cities and Nations of Ancient Syria"*. Studi Semitici 26. Rome: Istituto di Studi del Vicino Oriente.
- Brysbaert, A & Timonen, R. 2021. *"Saving up for a rainy day? Climate events, human induced processes, and their potential effects on people's coping strategies in the Late Bronze Age Mycenaean Argive Plain, Greece"*. Climate and Society in Ancient Worlds Diversity in Collapse and Resilience. Eds: Erdkamp, Manning & Verboven. London: Palgrave.
- Cline, E et al. 2024. *"Are civilizations destined to collapse? Lessons from the Mediterranean Bronze Age"*. Global Environmental Change. Elsevier Publisher.
- Cline, E. 2022. *"1177 BC: The Collapse of Bronze Age Civilization article for BAR Summer 2022 issue"*, (Proof). Biblical Archaeology Review.
- Cline, E. 2014 *"1177 BC: The Year Civilization Collapsed."* Princeton University Press.
- Crielaard, J. 2022. In Review TMA. *"Collapse and Transformation. The Late Bronze Age to Early Iron Age in the Aegean"*. Ed: Middleton. Oxbow Books 2020.
- Drake, B. 2012. *"The Influence of Climatic Change on the Late Bronze Age Collapse and the Greek Dark Ages."* Journal of Archaeological Research. Elsevier Publisher.
- Drews, R. 1993. *"The End of the Bronze Age Changes in Warfare and the Catastrophe Ca. 1200 B.C."* Princeton University Press.
- Enverova, D. 2012. *"The Transition from Bronze Age to Iron Age in the Aegean: A Heterarchical Approach"*. Ankara Bilkent University.
- Finkelstein, A. Piasezky, E. 2009. *"Radio Carbon-Dated Destruction Layers: Skeleton for Iron Age Chronology in the Levant."* Oxford Journal of Archaeology.

- Giannakos, K. 2014. “Cutting Edge Technology and Know-How of Minoans/Mycenaeans during LBA and Possible Implications for the Dating of the Trojan War” *TALANTA* XLVI-XLVII (2014-2015).
- Georgiou, A. 2014. “*Flourishing amidst a “Crisis”: the regional history of the Paphos polity during the transition from the 13th to the 12th centuries BCE*” in 'Sea Peoples' Up-to-Date. New Research on Transformation in the Eastern Mediterranean in the 13th-11th Centuries BCE. Eds: Fischer & Burge. Verlag der Österreichischen Akademie der Wissenschaften.
- Giusfredi, F. 2010. “*Sources for a Socio-Economic History of the Neo-Hittite States.*” Winter Verlag.
- Herrero, B. 2011.” *Forces of Transformation: The End of the Bronze Age in the Mediterranean*”. Proceedings of an International Symposium held at St. John's College, University of Oxford, European Journal of Archaeology. Eds: Bachhuber & Roberts.
- Halayqa, I. 2012. “*The Demise of Ugarit in the Light of its Connections with Hatti*”. Heidelberg.
- Hall, T. 2012. “A ‘Perfect Storm’ in the Collapse of Bronze Age Civilization? Useful Insights and Roads not Taken: A Review Essay on 1177 B.C.: The Year Civilization Collapsed by Eric H. Cline.” *Clodynamics: The Journal of Quantitative History and Cultural Evolution*.
- Halstead, P. 1992. “*The Mycenaean Palatial Economy: Making the Most of the Gaps in the Evidence*”. Proceedings of the Cambridge Philological Society, No. 38.
- Hazell, C, Pound, J, Hockin, E. 2022. “*High-resolution Bronze Age palaeo-environmental change in the Eastern Mediterranean: exploring the links between climate and societies*” *PALYNOLOGY* 2022, VOL. 46, NO. 4, 2067259 <https://doi.org/10.1080/01916122.2022.2067259>
- Hodder, I. 2012. “*Entangled: An Archaeology of the Relationships between Humans and Things.*” Chichester; Wiley and Blackwell.
- Hoffner, H. 2012. “*Some Thoughts on Merchants and Trade in the Hittite Kingdom*” in *Altorientalistische Studien für Volker Haas*. Eds: Richter, Prechel & Klinger. Saarbrücken Druckerei.
- Holdaway, R. 2023. “*Empirical comparisons between the past 5000 years of European and Eastern Mediterranean history and precipitation as recorded by ice accumulation in the GISP2 (Greenland) ice core.*” *Oxford Open Climate Change*, Volume 3, Issue 1.
- Hui-Min LI, Xue-Chun WANG, Xiao-Fan ZHAO, Ye QI. June 2021 “*Understanding systemic risk induced by climate change.*” *Advances in Climate Change Research* 12:3.
- Jacobzone, S et al. 2023. “*Strategies to Govern Systemic Risks*”. OECDiLibrary.
- Jalkotzy-Deger, S. 2008. “*Decline, Destruction, Aftermath*” in *The Cambridge Companion to the Aegean Bronze Age*. Ed: Shelmerdine. Cambridge-New York. Cambridge University Press.
- Kaniewski, D, Guiot, J, Van Campo, E, Otto, T, Le Burel, S et al. 2013. “*Environmental Roots of the Late Bronze Age Crisis.*” *PLOS/one*.
- Kemp, L & Cline, E. 2012. “*Systemic Risk and Resilience*” in *Perspectives on Public Policy and Societal -Environmental Crises*. Eds: Izdebski, Haldon & Filipowski. Springer Verlag, Switzerland.

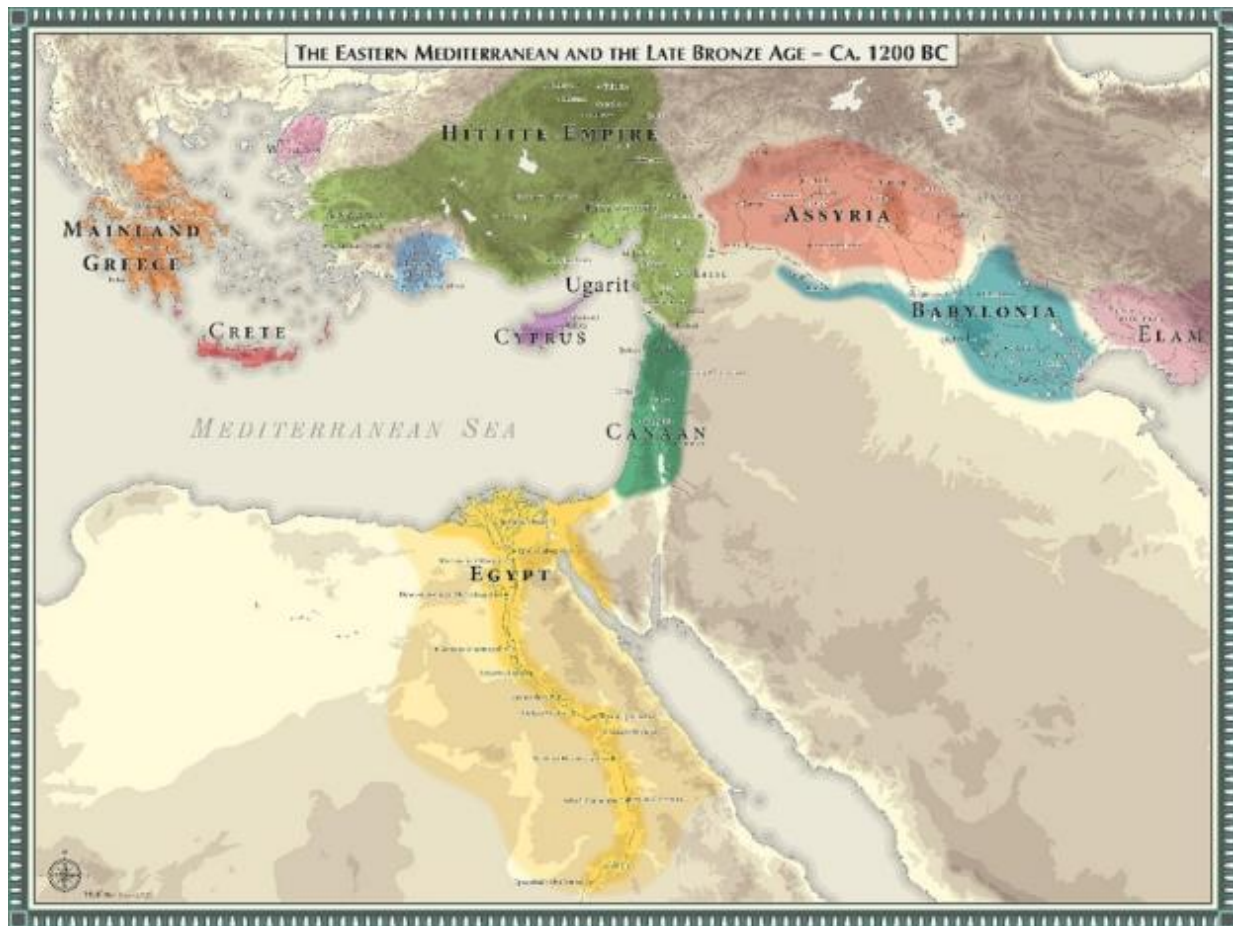
- Kitano, B. 2015. “*The Late Bronze Age Collapse.*” “The Climate Change Hypothesis during the Late Bronze Age Collapse: A Review”. Rivers and Civilisation.
- Knapp, B. 2021. “*Migration myths and the end of the bronze Age in the Eastern Mediterranean*” in Elements in the Archaeology of Europe. Eds: Fernández-Götz & Bettina Arnold. Cambridge University Press.
- Kose, V. 2017. “*Theoretical Approach for The So-Called Mycenaean Migration in Turkey*”. Belletten Turk.
- Kuzucuoglu, C. 2012. “*The rise and fall of the Hittite state in Central Anatolia: How, when, where, did climate intervene?*” Institut français d’études anatoliennes.
- Lawson, O. 2019. “The Climate of Middle East Studies” Jadaliyya Publisher.
- Lelieveld, J et al. “*Climate change and impacts in the Eastern Mediterranean and the Middle East*” National Library of Medicine. <https://pubmed.ncbi.nlm.nih.gov/>
- Manning S, Kocik C, Lorentzen B, Sparks, J. 2022. “*Severe Multi- Year Drought coincident with Hittite Collapse around 1198-1196BC.*” On-line Article 08.01.023.
- Manning, S & Knapp, B. 2016. “*Crisis in Context: The End of the Late Bronze Age in the Eastern Mediterranean.*” American Journal of Archaeology 120.1.
- Middleton, G. 2020. “*The Sea Peoples myth and Late Bronze Age collapse in the Eastern Mediterranean c.1200 BC*” in “*Wohin des Weges? Mobilitat und Migration in Altertum*”, November to December 2020, Czech Institute of Egyptology, Charles University, Prague.
- Middleton, G, 2019. “*Collapse of the Bronze Age Aegean*”. Oxford Classical Dictionary.
- Middleton, G. 2017. “*Megadrought and collapse: from early agriculture to Angkor*”. Ed: Weiss, H. Oxford: Oxford University Press.
- Millek, J. 2023. “*Destruction and Its Impact on Ancient Societies at the End of the Bronze Age*”. Columbus: Lockwood Press.
- Millek, J. 2023. “*Late Bronze Age Collapse Destruction Overview*”. Appendix to “*Destruction and Its Impact on Ancient Societies at the End of the Bronze Age*”. 2023. Columbus: Lockwood Press.
- Millek, J. 2022. “*The Fall of the Bronze Age and the Destruction that Wasn't.*” Ancient Near East Today.
- Millek, J. 2021. “*Just what did they destroy?*” *The Sea Peoples and the End of the Bronze Age.*” In The Mediterranean Sea and the Southern Levant. Eds: Kamlah & Lichtenberger. Wiesbaden, Harrassowitz Verlag.
- Millek, J. 2021. “*Dual Narratives: Collapse and Transition at the End of the Late Bronze Age.*” In Sessions from “*Bridging the Gap: Disciplines, Times, and Spaces in Dialogue.*” Eds: Hess & Manuelli. Conference: Universitat Berlin. Archaeopress Publishing Ltd. 2021.
- Millek, J. 2018. “*Just how much was destroyed? The end of the Late Bronze Age in the Southern Levant*”. Ugarit-Forschungen Band 49, 2018. Ugarit-Verlag, Munster.

- Monroe, C. 2015. "Tangled up in Blue: Material and Other Relations of Exchange in the Late Bronze Age World" in *Trade in the Ancient Mediterranean*, Publications of the Ancient Historians 11, 2015. Ed: Howe. Ares Publishers. Chicago.
- Monroe, C. 2009. "*Scales of Fate: Trade, Tradition, and Transformation in the Eastern Mediterranean ca. 1350–1175 BCE*". AOAT 357.
- Nur, A. & Cline, E. 2000. "*Poseidon's Horses: Plate Tectonics and Earthquake Storms in the Late Bronze Age Aegean and Eastern Mediterranean.*" *Journal of Archaeological Science* 27, Article No. jasc.1999.0431.
- Niesiolowski-Spanò, L, Węcowski, M. 2018. "*Change, Continuity, and Connectivity.*" in *North-Eastern Mediterranean at the turn of the Bronze Age and in the early Iron Age*. Harrassowitz Verlag. Wiesbaden.
- Moody, J, Watrous, L. 2013. "*Climate Change in the Aegean Bronze Age*". *Proceedings of the Second International Congress on the Archaeology of the Ancient Near East, ICAANE 2, Copenhagen 2000*. Ed: Thuesen. Eisenbrauns.
- O' Brien, S. 2017. "*Boredom with the Apocalypse: Resilience, Regeneration, and their Consequences for Archaeological Interpretation*" in *Crisis to Collapse: The Archaeology of Social Breakdown*. Eds: Cunningham & Driessen. Louvain University.
- Rashidian, E. 2021. "*The resilience concept in Archaeology; a critical consideration*" *Academia Letters*.
- Renn, O, Laubichler, M, Lucas, K, Kröger, W, Schanze, J, Scholz, R, Schweizer, P-J. 2022. "*Systemic Risks from Different Perspectives*" *Risk Analysis* 42(9), <https://doi.org/10.1111/risa.13657>
- Sherratt, S. 2013. "*Introduction to the Levant during the Late Bronze Age.*" Chapter 33, Section E. "The Late Bronze Age." *The Archaeological Record*.
- Taylor, D. 2007. *The Collapse and Transformation of Our World*". *Journal of Future Studies*.
- Wallace, S. 2018. "*Travellers in Time. Imagining Movement in the Ancient Aegean World*". *Routledge Studies in Archaeology*.
- Weeden, M. 2013. "*After the Hittites: The Kingdoms of Karkamish and Palastin in Northern Syria.*" *Institute of Classical Studies*. University of London, 2013.
- Weiberg, A. 2018. "*Resilience and persistence of ancient societies in the face of climate change: a case study from Late Bronze Age Peloponnese*". *World Archaeology*, Volume 50, Issue 4.
- Wiener, M. 2014. *The Interaction of Climate Change and Agency in the Collapse of Civilisations ca. 2300-2000 BC*" *Tree Ring Research*, Vol. 70(3), S1–S16
- Yakar, J. 2006. "*Dating the Sequence of the Final Destruction/Abandonment of LBA Settlements: Towards a Better Understanding of Events that led to the Collapse of the Hittite Kingdom.*" *Structuring and Dating in Hittite Archaeology*. *BYZAS* 5.

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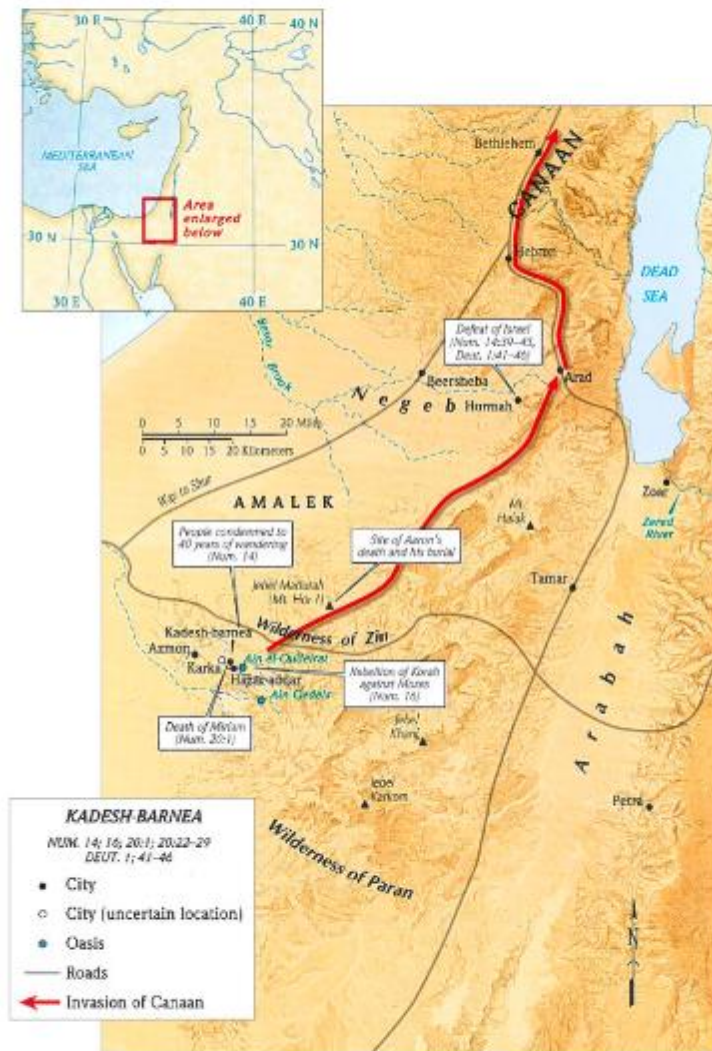








Kadesh-Barnea

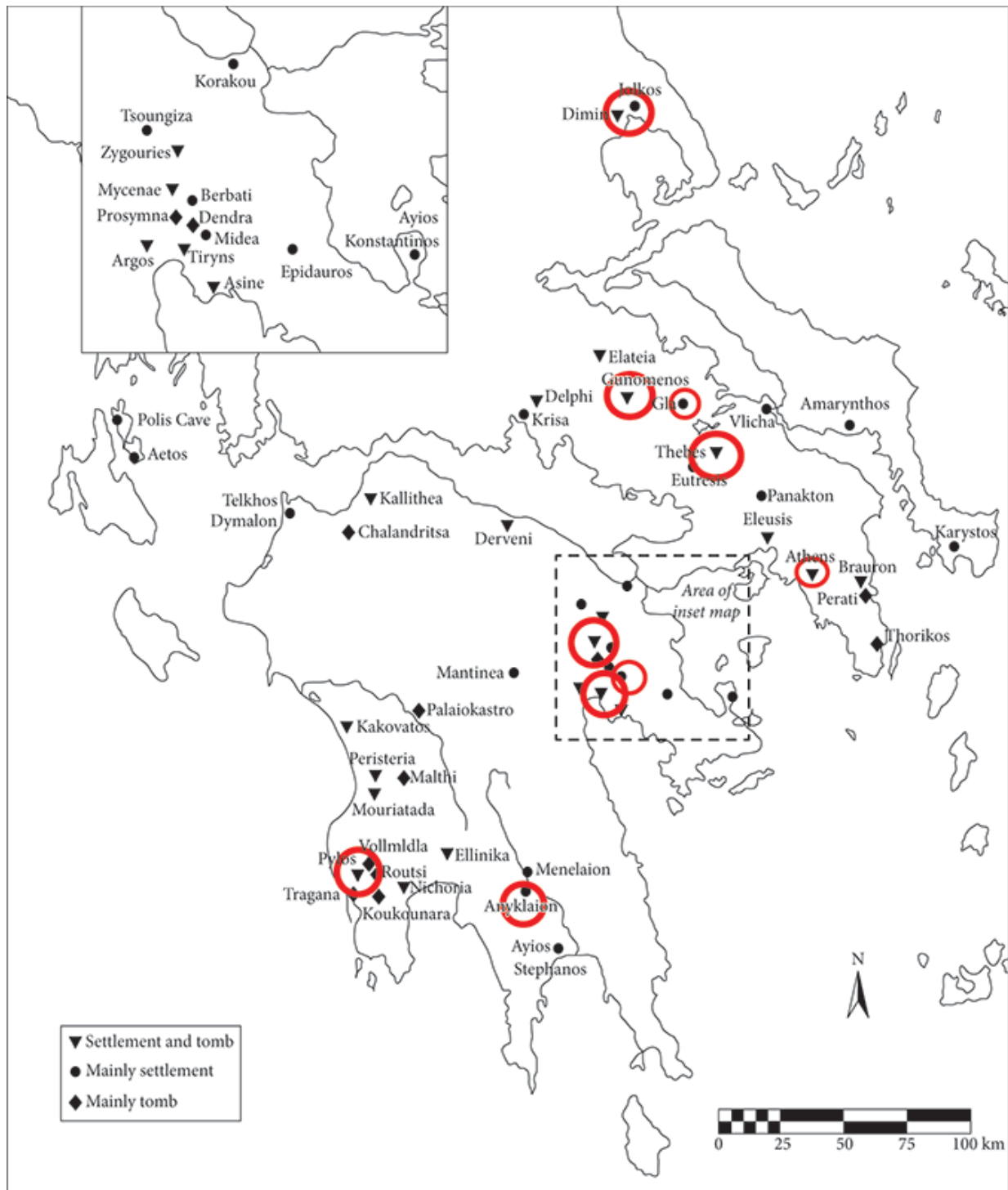


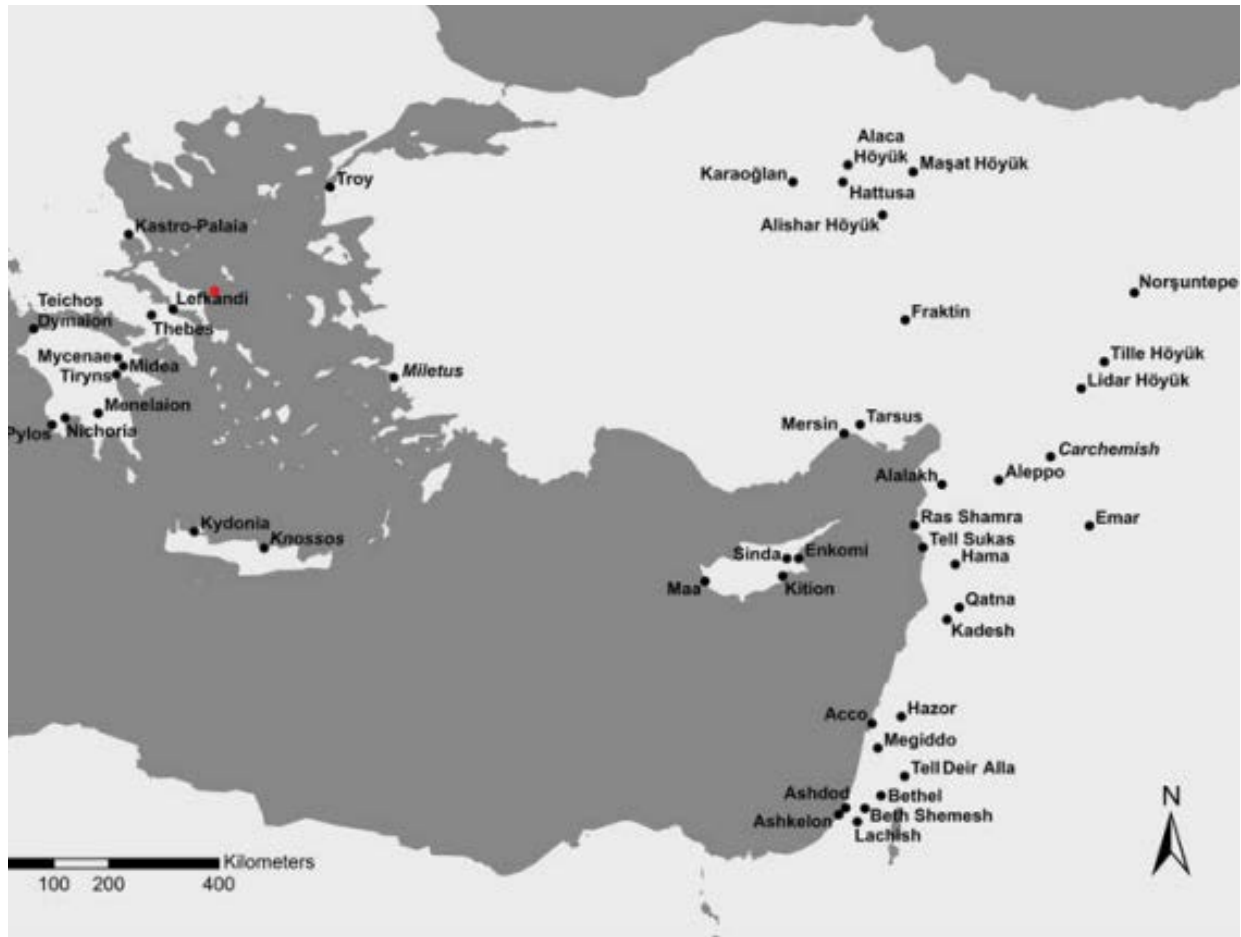
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Overview of Destructions ca. 1200 BCE

Misdated Destructions	
Site	Description
Lefkandi	No destruction at the end of the LH IIIB. Phase 1b destruction event occurred after the end of the Late Bronze Age.
Kynos	Destruction of the storerooms occurred in the LH IIIC Middle.
Knossos	Final Palace was destroyed in the fourteenth century BCE.
Palaikastro Kastri	Floor 2 ended during the mid-thirteenth century BCE.
Koukounaries of Paros	Mycenean citadel was destroyed ca. 1150 BCE.
Çine-Tepecik	Level II la destruction dates to the mid-twelfth century BCE.
Miletus	Third Building Period or Miletus VI dates to 1130–1060 BCE. No evidence of destruction ca. 1200 BCE.
Beycesultan	Level II destruction dates to ca. 1530–1410 BCE.
Zeyve Höyük-Porsuk	Level V destruction event occurred between 1514–1430 BCE.
Arslantepe	Imperial Gate destruction dates to the first half of the thirteenth century BCE.
Tille Höyük	Burning of the gate complex took place after 1090 BCE.
Lidar Höyük	Layer <7> and the possible destruction dates to late in the twelfth century BCE.
Tell Rifa'at	Level III material and possible destruction can only be dated to the Late Bronze Age.
Alalakh (Tell Atchana)	Level I dates to ca. 1300 BCE. No clear evidence of destruction was uncovered at the end of Level I.
Tel Dan	Ceramics and C14 dates from Level VIIA1 place the possible destruction between 1150–1130 BCE.
Hazor	Stratum XIII and 1A multibuilding destruction took place ca. 1250 BCE.

Misdated Destructions	
Tell Keisan	Based on recent analysis of the ceramics the Stratum 13 destruction took place ca. 1150 BCE.
Shiqmona	The possibly destroyed public building dates to the fourteenth century BCE. No end of the Late Bronze Age destruction was uncovered.
Megiddo Stratum VIIA	Stratum VIIA dates to the mid-twelfth or beginning of the eleventh century BCE.
Beth-Shean	The Stratum S-3a earthquake took place in the mid-twelfth century BCE, likely ca. 1150 BCE.
Jaffa	Based on the renewed excavations the Stratum RG-3a destruction took place between 1134–1115 BCE.
Tel Ḥarasim	The destruction event occurred in the mid-thirteenth century BCE.
Tel Azekah	The Late Bronze Age site was destroyed in a site-wide destruction ca. 1130 BCE.
Tel Zayit	The destruction event took place at some point during the early to mid-LB IIB.
Lachish Level VI	The Level VI site-wide destruction took place ca. 1130 BCE.
Tell el-Ḥesi, Pilaster Building	The Pilaster building was destroyed between 1150–1130 BCE.
Tel Sera'	The Egyptian garrison was destroyed in the middle or third quarter of the twelfth century BCE.
Tell Jemmeh	The Phase G–H destruction dates to the Iron II. No evidence of destruction ca. 1200 BCE.
Tell el-Far'ah (South)	The destruction took place at the end of the twelfth century BCE. Egyptian presence disappeared prior to this destruction.
Tell Irbid	C14 dates derived from short-lived samples places the destruction event between 1395–1260 BCE.
Pella	The destruction occurred at the end of the twelfth century BCE, possibly in association with Tell Deir Alla.
Tell Deir Alla	The earthquake induced destruction of Phase E occurred ca. 1150 BCE.
Tell es-Sa'idiyeh	The destruction of Stratum XII occurred either between 1150 and 1120 BCE or during the Iron IIA.

Assumed Destructions	
Site	Description
Orchomenos	Only broken pottery, fallen plaster, and pieces of melted lead were recovered from the floor of the courtyard.
Krisa	There is only a statement that the site was destroyed with no published evidence of destruction in any structure.
Iria	Some burnt material in a pit was assumed to be a destruction. There was no damage visible to the buildings.
Athens	The Houses on the North slope were not houses at all. It was refuse that was dumped on the stairs.
Ayios Stephanos	Burning was uncovered in one room from Trench Beta 11. No other damage was recorded.
Khania (Kydonia)	Burning was only uncovered in part of Room A of Building 1. This was likely a contained accidental fire.
Alishar Höyük	Drews misquoted von der Osten saying the site was destroyed by fire. The site was abandoned ca. 1250 BCE.
Kouklia <i>Palaepaphos</i>	Some burnt sherds from the wells at Evreti were cited as destruction. The settlement itself has not been found.
Myrtou-Pigadhes	No burning or wall collapse was uncovered, though the altar may have been destroyed by humans.
Alassa (Pano Mandilaris and Paliotaverna)	No evidence of LC IIC destruction. Building II suffered two separate fires that did not destroy the structure.
Hala Sultan Tekke	Melted silver was uncovered in City Quarter 2, the Northwestern Structure, Room 44. No further evidence of destruction was recorded.
Sinda	Only ash with no other evidence of destruction was uncovered.
Aleppo: Temple of the Storm God	There is no published evidence of a destruction. This supposed destruction only exists on two tables with no clear date.
Tell Abu Dannée	There is little published evidence of a destruction nor a clear date for the end of Level V.
Tell Faq'ous	The pottery from a possible destruction can only be dated to the Late Bronze Age. It was assumed it took place with the destruction of Emar.
Ras el-Bassit	Traces of fire and carbonized wood were discovered near a wall of a house. No other evidence of destruction was recorded.

Assumed Destructions	
Tell Tweini	Some floors yielded layers of ash. Most buildings were abandoned without any evidence of burning.
Tell Sukas	Patches of burnt floor and ash were highly localized. No destruction debris was uncovered.
Tyre	Stratum XV had a black ashy layer on its floor, likely from domestic cooking activity.
Kamid el-Loz	Evidence of burning was only uncovered in three rooms of Temple T1. No other structures have destruction debris.
Achzib	No end of the Late Bronze Age site has been uncovered and there is no evidence the Middle Bronze Age defenses were destroyed ca. 1200 BCE.
Acco	Ash from an industrial context was assumed to be evidence of a destruction event.
Tell Abu Hawam	There is no evidence of destruction from the settlement. The defenses deteriorated naturally and were not destroyed.
Tel Dor	Stern assumed the site was destroyed by the Sea Peoples. He noted that no destruction had been found.
Tel Mevorakh	There is no evidence of a destruction. It appears to have been abandoned.
Tel Zeror	Some burnt beams were uncovered on a floor. No other evidence of destruction was seen on either mound.
Tel Gerisa	An unspecified burning event from a 1929 letter was taken as a 1200 BCE destruction. No further evidence of a destruction was uncovered.
Beth-Shemesh	No evidence of destruction was uncovered in the renewed excavations, while the original account is questionable.
Tell Zira'a	The occasional fallen wall and ash were assumed to be destruction. Likely the site was abandoned resulting in some collapse.
Tell Abu al-Kharaz	There were scanty remains from Phase VIII, which lacked clear evidence of a destruction event.
Amman Airport Structure	Evidence of burning in Room VII can be attributed to the hearth in that room.
Ashdod	Some ash from Area A does not indicate a destruction, as all other areas lack destruction debris.

Assumed Destructions	
Tell eş-Şafi/Gath	Pottery on a floor from Area E was assumed to be a destruction. No other debris has been uncovered.
Qubur el-Walaydah	No burning or wall collapse was uncovered. It was simply assumed that the site was destroyed.
Tell el-Ḥesi, City Sub-IV Egyptian Governor's Residence	City Sub-IV Egyptian governor's residence has no clear published evidence of a destruction.

False Citations	
Site	Description
Pefkakia	Adrimi-Sismani repeatedly cited a destruction, even though the excavators clearly stated the site was abandoned.
Korakou	Drews created a destruction assuming that the lack of evidence was not the lack of a destruction.
Nichoria	An initial trial trench from 1959 led the excavators to assume the site was destroyed. Full-scale excavations proved this to be a false assumption, as the site was abandoned without destruction.
Phaistos	Kaniewski et al. simply placed it on a map as destroyed by the Sea Peoples with no citations. No evidence of an end of the Late Bronze Age destruction has been found.
Alaca Höyük	Bittel chose a sentence from the first season excavation as evidence for destruction even though all excavations have shown no evidence of destruction.
Kaman-Kalehöyük	Drews claimed a mid-eighteenth-century BCE destruction was ca. 1200 BCE.
Domuztepe near Karatepe-Aslantaş	The date of a possible destruction was changed to ca. 1200 BCE over several citations. No ca. 1200 destruction was uncovered.
Kourion (Episkopi)-Bamboula	Neither Benson nor Weinberg claimed the site was destroyed. No destruction was uncovered ca. 1200 BCE.
Maroni-Vournes	Olive pressing debris was assumed to be a fire in a room. No evidence of destruction was uncovered and the site was abandoned.
Kition	Karageorghis and Demas both state the site was not destroyed. Older references have been cited over newer works.

False Citations	
Carchemish	No evidence of a destruction was uncovered in the old or renewed excavations.
Aleppo	Drews misquoted Woolley, creating a destruction when Woolley never claimed there was one.
Hama	Drews misquoted Barret who never claimed it was destroyed. Fugmann too noted there was no destruction.
Qatna	Astour listed Qatna as destroyed without evidence, which Drews recited and popularized.
Tell Nebi Mend (Kadesh)	Astour listed Kadesh as destroyed without evidence, which Drews recited and popularized.
Arwad	Nothing is known about the Late Bronze Age site as all remains except for those from the Roman period have been removed.
Byblos	Kaniewski et al. simply placed it on a map as destroyed by the Sea Peoples with no citations. No evidence of an end of the Late Bronze Age destruction has been found.
Sidon: College Site	No evidence of an end of the Late Bronze Age destruction was uncovered.
‘Afula	Dever claimed it was destroyed by the Sea Peoples. No end of the Late Bronze Age settlement has been uncovered.
Tel Michal	Stern claimed it was destroyed by the Sea Peoples. The site was abandoned ca. 1300 BCE.
Tel Batash (Timnah)	Kelm and Mazar have stated the site was not destroyed, but it has been repeatedly cited as destroyed ca. 1200 BCE.
Tell ej-Judeideh	There was a settlement gap at the site between the EB III and the Iron II.
Tel Burna	No evidence of an end of the Late Bronze Age destruction has been excavated. The end of the Late Bronze Age at the site remains unclear.
Khirbet Rabud	Drews claimed Debir was destroyed citing Lapp, who assumed Debir was Tell Beit Mirsim not Khirbet Rabud.
Ashkelon	Phythian-Adams uncovered a layer of ash that was not a destruction. No destruction was seen in the renewed excavations.
Tell el-‘Ajjul	Bell simply placed it on a map as destroyed with no citations. There was no settlement ca. 1200 BCE.

Destruction ca. 1200 BCE by region

Region/Site	Scale	Cause	Description
Greece			
Kastanas	Multibuilding	Unknown	Trapezhaus and the Antenbau were burnt. No clear cause. Site was prone to burning events.
Dimini	Single-Building	Arson/Termination Ritual	Only Megaron B was burnt after being emptied and the building was left undisturbed during the LH IIIC. Possible termination ritual.
Kastro-Palaia in Volos	Single-Building	Unknown	Only the Palace was burnt, as houses were left alone. No clear cause, though arson is possible. The building may have been emptied prior to destruction.
Gla	Multibuilding	Arson	The site was largely emptied prior to the burning of the gates and Melathron. Destruction appears premeditated and planned.
Thebes	Multibuilding	Unknown	Several buildings were burnt, though there is no clear chronological connection between them. No clear cause, as there is no evidence for warfare or earthquake.
Teichos Dymaion	Partial	Unknown	Burning and debris were uncovered, but the extent is unclear based on the current state of publication.
Mycenae	Multibuilding	Unknown	Much of the destruction was excavated without record. No clear cause, though an earthquake seems untenable based on finds at Midea and Tiryns.
Midea	Site-Wide	Warfare	Fifty weapons, mainly arrowheads, were scattered throughout the destruction suggesting warfare. No clear evidence of earthquake.

Region/Site	Scale	Cause	Description
Tiryns	Multibuilding	Arson/Warfare	Monumental structures were targeted and no evidence of earthquake. Weapons were uncovered in domestic structures.
Prophetis Elias/Katsingri	Partial	Unknown	Burning was uncovered but it is not clear if this is a destruction or not based on the state of publication.
Pylos	Site-Wide	Warfare	Weapons were scattered throughout the Palace of Nestor suggesting it was destroyed completely in an act of war.
Menelaion	Single-Building	Unknown	Much of the Menelaion was excavated without record, leaving little clues for the possible cause. No other structures were destroyed ca. 1200 BCE.
Crete			
Kannia	Partial	Natural	Three refurbished rooms from a LM I villa collapsed without burning. This was likely from a natural cause, though not necessarily an earthquake.
Kato Gouves	Partial	Unknown	Some structural collapse with no evidence of burning was uncovered. The state of publication is too sparse to conclude the extent or cause.
Anatolia			
Hisarlık-Troy	Site-Wide	Warfare	Weapons were uncovered in nonstorage locations. Destruction was rampant and several individuals were killed.
Karaoğlan	Partial	Unknown	At least one individual died in the destruction. However, the published information is unclear on the cause or scale. Destruction may predate the end of the Late Bronze Age.

Region/Site	Scale	Cause	Description
Oymaağaç Höyük-Nerik	Single-Building	Unknown	The Jüngerer Tempel was burnt, but it had been cleared to the floor level by later activities at the site. There is no indication of cause.
Boğazköy-Hattusa	Multibuilding	Arson	The site was abandoned prior to the burning of some but not all of the monumental structures.
Maşat Höyük	Single-Building	Unknown	A single house was burnt, which possibly took place in the mid-thirteenth century BCE, not ca. 1200 BCE. No indication of cause.
Fraktin	Single-Building	Unknown	A single house was burnt, likely after the Hittite Empire had already collapsed, based on a LH IIC stirrup jar uncovered in the debris.
Kuşaklı-Sarissa	Multibuilding	Warfare	Much of the site lay in ruins when Temple 1 and other structures were burnt. Weapons were found in the destruction debris. It was possibly prior to ca. 1200 BCE.
Kilise Tepe	Site-Wide	Unknown	The site was burnt, likely after it had been partially abandoned. There is no clear cause. It likely took place well after the destructions at Mersin and Tarsus.
Soli Höyük	Partial	Unknown	The remains are so fragmentary it is unclear if there was a destruction, and if so, what was the cause or extent.
Mersin-Yumuktepe	Multibuilding	Unknown	Burning was found in several structures, though the houses may have been avoided. This event possibly took place earlier in the thirteenth century BCE.

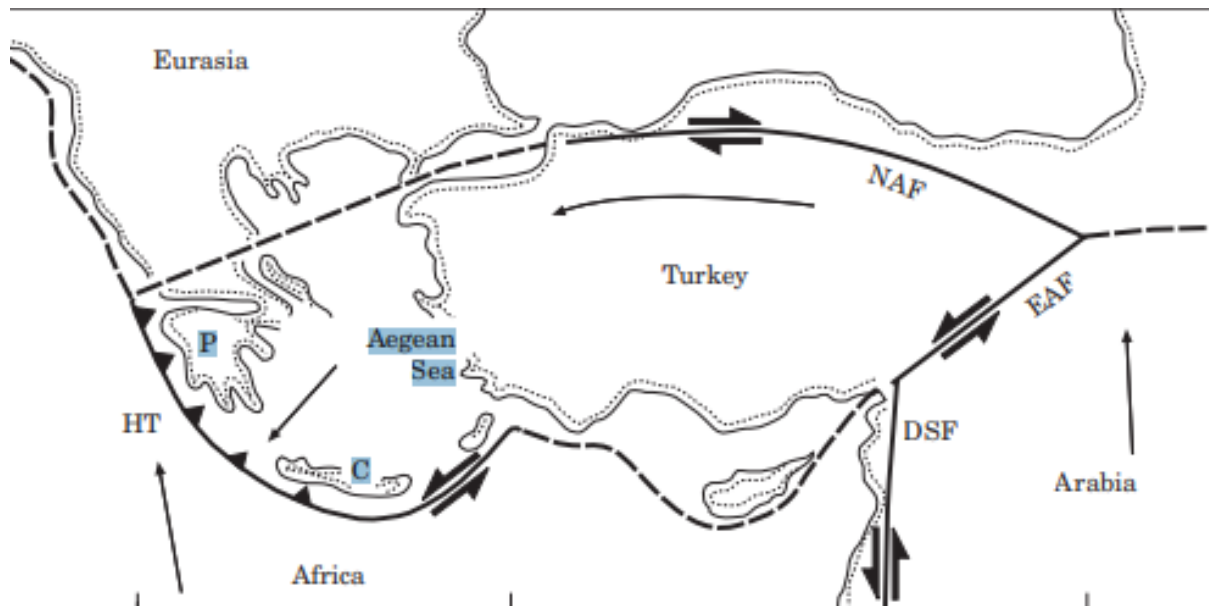
Region/Site	Scale	Cause	Description
Tarsus-Gözlükule	Site-Wide	Unknown	All buildings were burnt, possibly by warfare. C14 dating might indicate this took place earlier in the thirteenth century BCE.
Kinet Höyük	Partial	Unknown	Evidence of burning is minor based on the paucity of finds from the end of the Late Bronze Age. It is unclear if there was a destruction, and if so, what was the cause or extent.
Norşuntepe	Multibuilding	Warfare	An arrowhead was lodged in a wall, likely indicating warfare. This is provisional as the publications are sparse in details.
Cyprus			
Enkomi	Partial	Unknown	It is unclear if this was a destruction, as burning was rare. Much of the debris could have resulted from a brief hiatus, causing the partial deterioration of some walls.
Pyla-Kokkino-kremos	Partial	Earthquake	Several walls were tilted east, and part of the plateau collapsed on several rooms. Unclear if this preceded the site's abandonment or if abandonment occurred later.
Kalavassos-Ayios Dhimitrios	Single-Building	Accidental	Building X was reused by squatters after the site had been abandoned. It partially burned, likely in an accidental fire.
Apliki Karamallos	Single-Building	Unknown	A single storage building burned, possibly accidentally. No other buildings were damaged. There is no clear cause.
Maa Paleokastro	Site-Wide	Warfare	Weapons were uncovered strewn throughout the site indicating warfare. The site was rebuilt after destruction and was later abandoned without destruction.

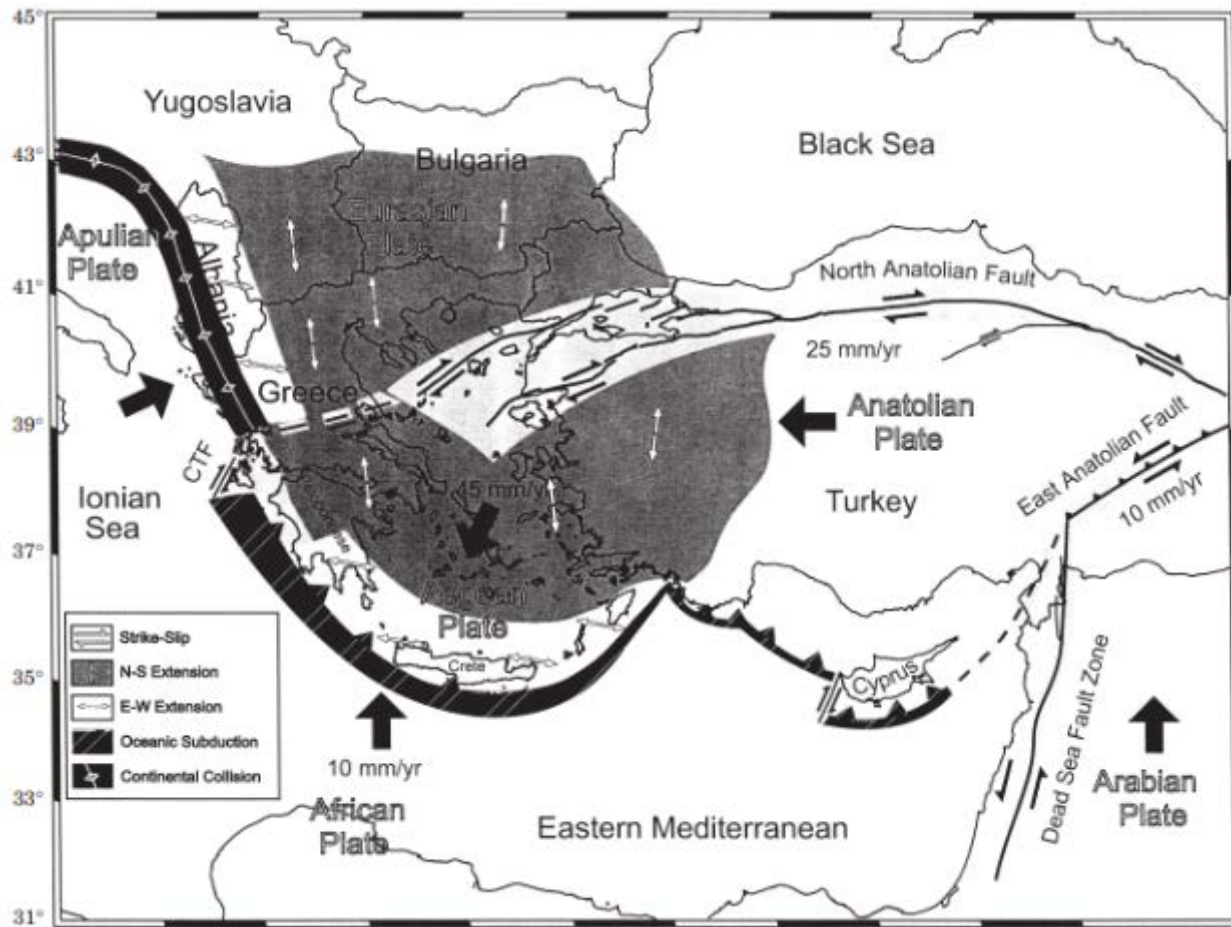
Region/Site	Scale	Cause	Description
Northern Levant			
Ras Shamra	Site-Wide	Warfare	Dozens of weapons were scattered throughout open spaces and streets in a domestic area. All areas of the site were burnt except for the <i>Ville Sud</i> .
Ras Ibn Hani	Single-Building	Arson	Only the <i>Palais Nord</i> was burnt, as all other buildings were untouched. It appears that the site was abandoned prior to this destruction event.
Tell Kazel	Multibuilding	Warfare	Only the buildings in Area IV show evidence of destruction. Scattered weapons throughout domestic structures and on a street indicate warfare.
Tell Afis	Multibuilding	Unknown	Possibly arson, as the monumental structure may have been targeted, though this is unclear. The date is possibly after end of the Late Bronze Age.
Tell Qarqur	Multibuilding	Unknown	Evidence of destruction has been uncovered in two structures, but there is no clear extent or cause based on the current information.
Meskene-Emar	Multibuilding	Arson	Site was partially abandoned and only the monumental structures were burnt. Houses were left untouched, even those adjoining a temple that was burnt.
Southern Levant			
Tel Yin'am	Multibuilding	Unknown	Several buildings were burnt while others were untouched. The destruction was possibly earlier in the thirteenth century BCE.
Tel Qashish	Partial	Unknown	The end of the Late Bronze Age remains were highly disturbed. It is unclear if there was a destruction, and if so, what was the cause or extent.

Region/Site	Scale	Cause	Description
Jokneam	Multibuilding	Unknown	Two buildings show evidence of burning. No clear cause, as much of the Late Bronze Age site was removed or is covered by Iron II remains.
Tel Nami	Partial	Natural	No burning was uncovered. A natural event appears to have caused the superstructure to collapse, perhaps during a storm, given the layer of mud on the floor.
Megiddo VIIB	Single-Building	Unknown	There is no evidence of destruction outside of some possible material from Area AA, which is equivocal. It is possible Megiddo had no destruction ca. 1200 BCE.
Tel Hefer	Partial	Unknown	A storage room burnt. However, it is unclear if there was a destruction, and if so, what was the cause or extent.
Aphek	Site-Wide	Warfare	Palace VI was the sole structure when it was destroyed by fire. Arrowheads were scattered in the debris. This was followed by a local Canaanite phase.
Bethel	Partial	Unknown	The destruction was possibly more extensive, but the publications are unclear and lacking crucial details.
Gezer	Single-Building	Unknown	No evidence of destruction from the Dever excavations. In the renewed excavations, a single building was burnt. Merenptah does not claim he destroyed Gezer.
Tel Mor VII	Single-Building	Unknown	The Egyptian garrison was burnt with no clear cause. A new building was constructed that maintained the Egyptian characteristics in Stratum VI.

Region/Site	Scale	Cause	Description
Tel Mor VI	Single-Building	Natural	Structural collapse without fire, likely as a result of mud bricks on a foundation of sand. The building was rebuilt and then abandoned without destruction.
Tel Mique-Ekron	Single-Building	Unknown	Single storage unit was burnt. This was followed by a local Canaanite phase that was then replaced by the Philistine city without an intervening destruction.
Tel Zippor	Single-Building	Unknown	A single storage unit was burnt, while the nearby temple was left untouched. It is possible this was accidental, but this is unclear.
Lachish: Area S	Single-Building	Accidental	A domestic structure was burnt in a likely accidental fire, as the most intense damage was in the kitchen. New excavations may change this interpretation.
Lachish: Fosse Temple	Single-Building	Arson/Termination Ritual	Building appears to have been ritually terminated. It may have been replaced by the temple in Area P Level VI. Area P was not abandoned without destruction ca. 1200 BCE.
Tel 'Eton	Partial	Unknown	It is unclear from the limited finds if there was a destruction, and if so, what was its cause or extent.
Tell Beit Mirsim	Partial	Unknown	Albright published no clear evidence of a destruction. It might be that the site did not suffer a destruction ca. 1200 BCE.
Tel Haror	Partial	Unknown	A mud-brick building was burnt with no other evidence of destruction. No clear cause based on the limited published information.

Region/Site	Scale	Cause	Description
Tell el-Fukhar	Single-Building	Unknown	The palace was burnt only after it had been transformed into a squatter's abode. There is no clear cause, as there is no overt evidence of an earthquake.
Umm ad-Dananir	Partial	Unknown	One corner of a building had evidence of burning. It is unclear if there was a destruction, and if so, what was the cause or extent.
Tall al-'Umayri	Single-Building	Earthquake	Building C was burnt after an apparent earthquake. The building had already been transformed into a squatter's abode prior to destruction.





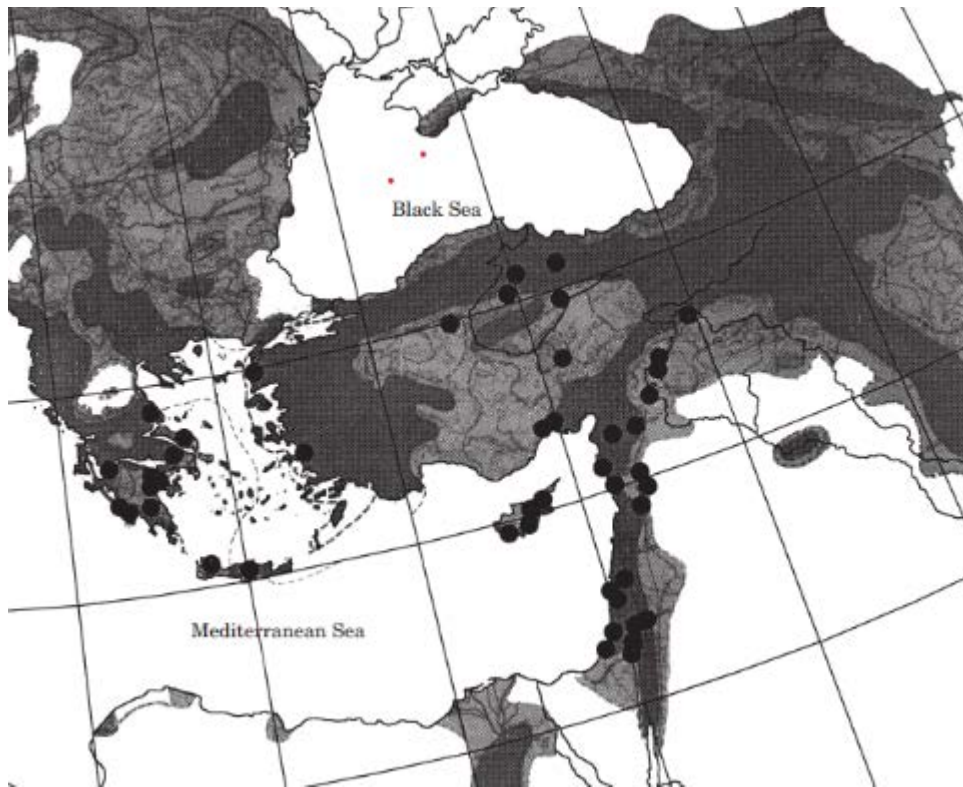
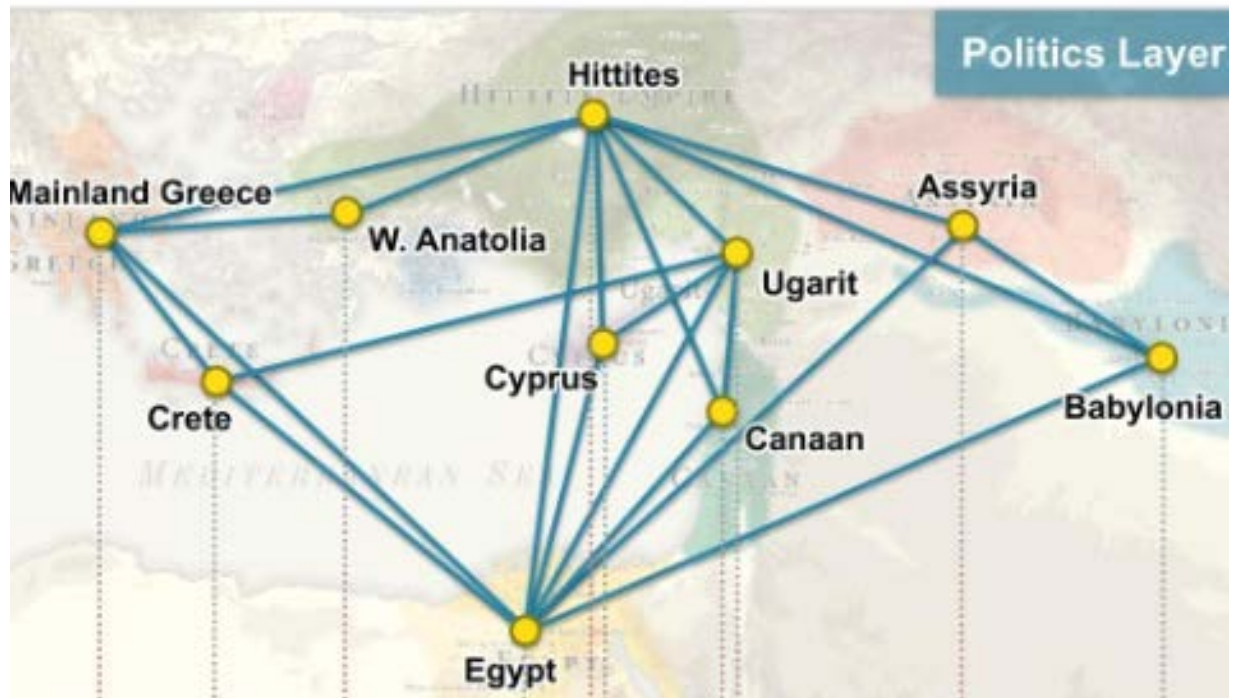


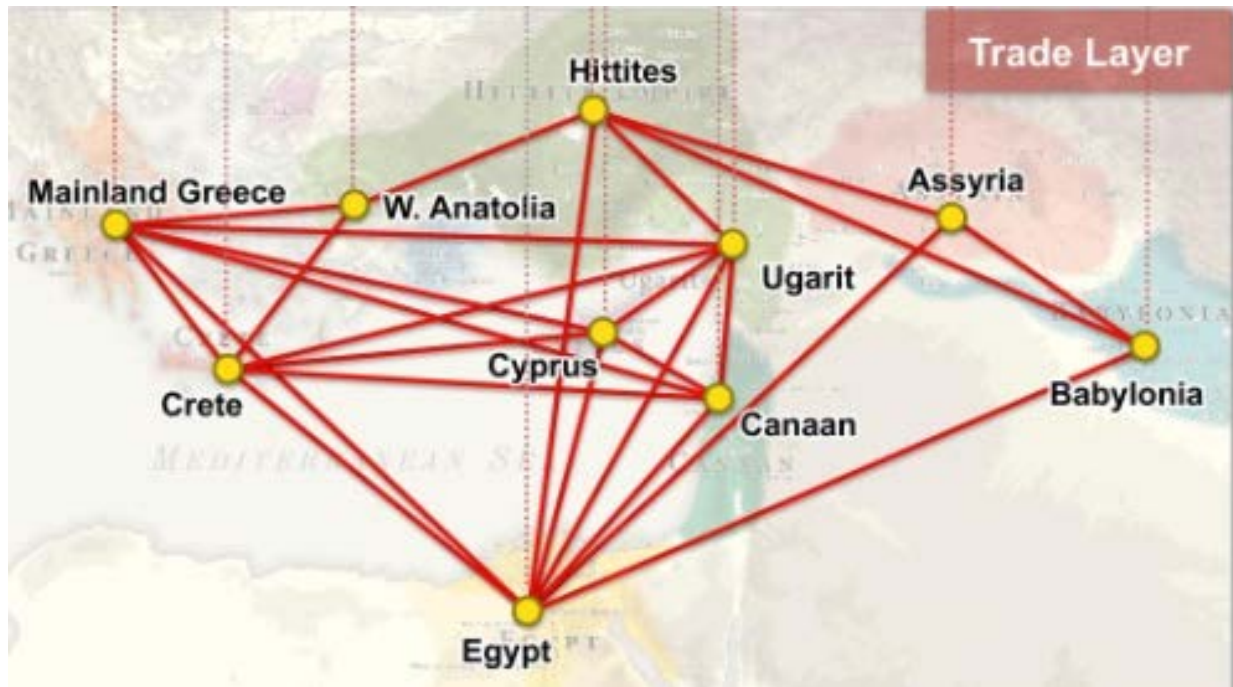
Table 3 Examples of different strategies of resilience in the iron age recovery

State	Process	Primary resilience strategy
Neo-Hittites	Continuity	Modularity through semi-feudal structure
Neo-Assyrians	Expansion	Adaptation through conquest (niche construction)
Egyptians	Recurring fragmentation	Diversity and differing exposure
Canaanites/Phoenicians	Transformation	Adaptation through expansion overseas in the absence of Ugarit

	Dimensions	Work efforts in individual person years (py)		Efforts in c. 100 py, i.e. 100 people employed simultaneously	
		Brysaert based on Brysaert 2015a, 2013	Loader 1998 [†] Cavanagh and Mee 1999 [*]	Brysaert 2015a, 2013 Harper 2016 ^{ab}	Loader 1998 ^{††} Cavanagh and Mee 1999 ^{**}
Tiryns Citadel	725 m L wall	c. 60 py	55.26 py [†]	5.5	0.55 ^{††}
Tiryns Dam	100m L x 9m H x 65m W (av.)	-	144 py [†]	1.45 ^{††}	1.44 ^{††}
Mycenae Citadel ^{†††}	980 m L wall	c. 75 py	-	7.4	-
Mycenae Atreus treasury	13.5m H x 13.5m diam	-	20,000 pd [*] = 54.8 py ^{**}	267,570 / 162,240 [*] = 1.65 x larger than Cavanagh and Mee (1999) = 0.9 ^{**}	0.55 ^{**}
Mycenae Clytemnestra tholos ^{**}	13.5m H x 13.5m diam	-	20,000 pd ^{**} = 54.8 py ^{**}	267,570 / 162,240 ^{**} = 1.65 x larger than Cavanagh and Mee (1999) = 0.9 ^{**}	0.55 ^{**}
Midea Citadel	462 m L wall	c. 15 py	14.16 py [†]	1.4	0.14 ^{††}
TOTAL WORK EFFORTS FOR 100 PEOPLE				17.6 years	

Data combined from Brysaert (2013, 2015a), Loader (1998[†]), Cavanagh and Mee (1999^{*}) and Harper (2016^{ab}). ^{**}Extrapolated data from Cavanagh and Mee (1999) by AB. ^{ab}Extrapolated from Harper (2016) by AB. ^{††}Extrapolated from Loader (1998) by AB. When compared, the right two columns show an 8–10 times difference in effort scale between Loader's and Brysaert's work and a 1.65 times difference between Cavanagh and Mee's versus Harper's work





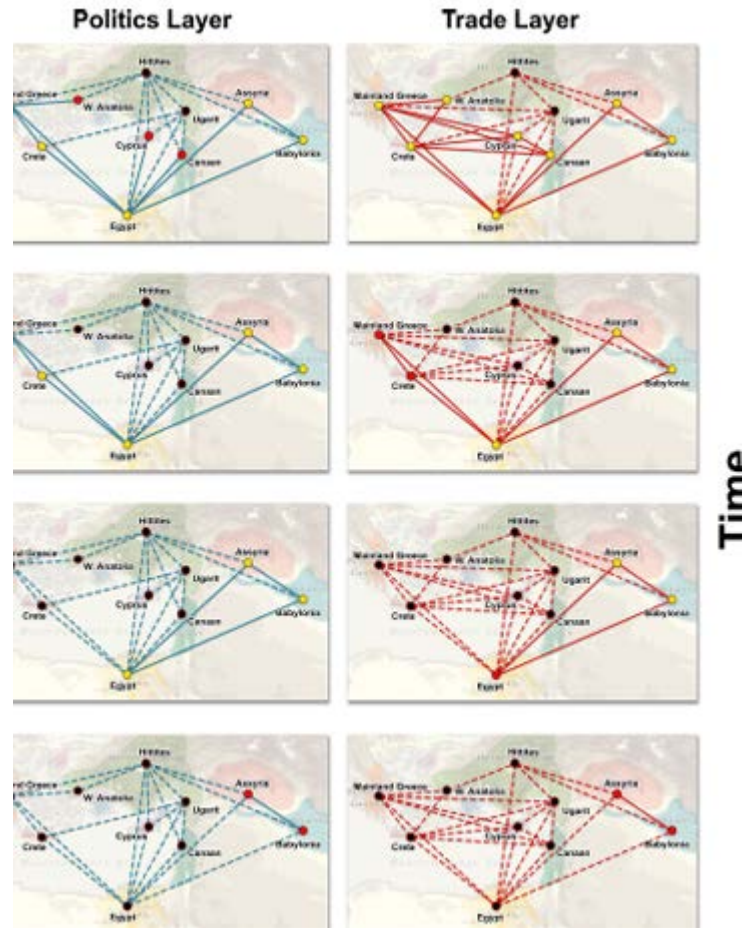
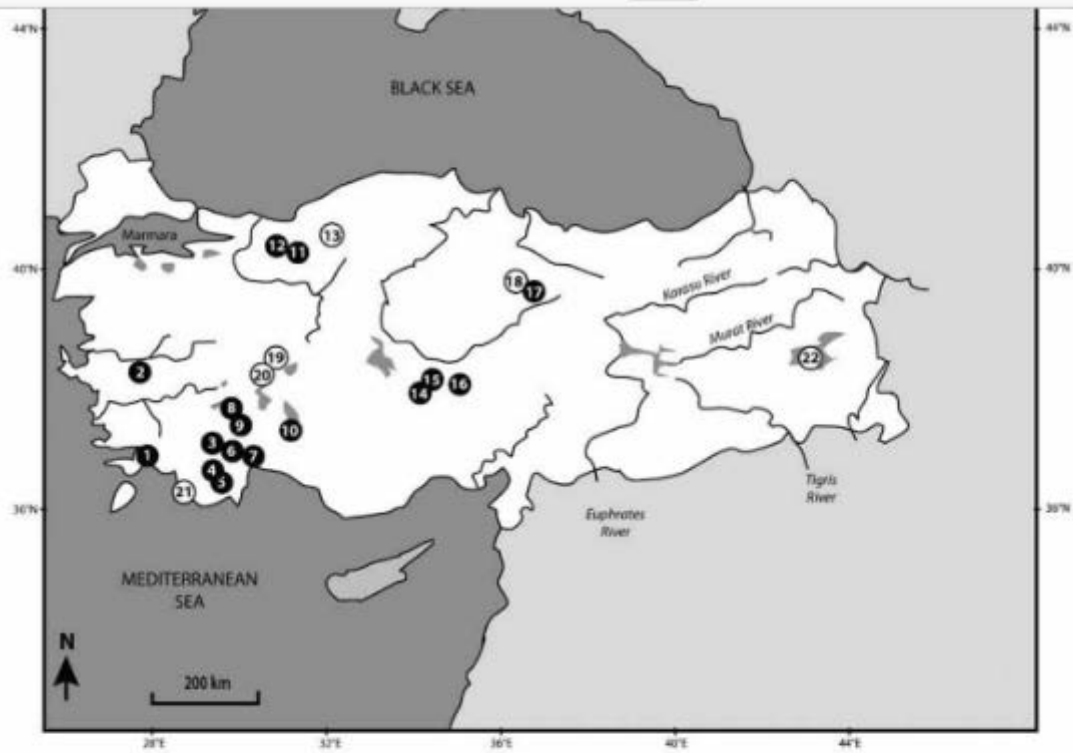


Fig. 4. Simulation of the Aegean and Eastern Mediterranean Late Bronze Age Collapse. Reviewing the regional network (political layer on the left in blue, commercial layer on the right in red), we simulated outcomes when Ugarit and the Hittite Empire were 'destroyed' (decoupled from the broader regional network). Panel 4a displays the collapse of the Hittites and Ugarit, causing W. Anatolia, Cyprus, and Canaan regions to lose a substantial number of links in the politics layer. 4b, the subsequent destruction of W. Anatolia, Cyprus, and Canaan leads to the weakening of Mainland Greece and Crete in the commercial layer. 4c, the destruction of Mainland Greece and Crete causes Egypt to lose 6 of the 8 original commercial ties. 4d, the destruction of Egypt weakens Assyria and Babylon as well, leading to the complete disintegration of the Late Bronze Age network. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)



Legend:

Sites references: 1. Köyceğiz; 2. Gölcük; 3. Gölhisar; 4. Elmalı; 5. Aylan; 6. Söğüt; 7. Öküzini; 8. Pınarbaşı; 9. Gravgaz; 10. Beyşehir; 11. Abant; 12. Melen Gölü; 13. Yeniçağa; 14. Nar Gölü; 15. Eski Acıgöl; 16. Cora; 17. Suppitassu; 18. Tecer; 19. Hoyran; 20. Karamık; 21. Ova; 22. Van.

1 Sites with Beyşehir Occupation Phase

18 Sites without Beyşehir Occupation Phase

Fig. 8: The Beyşehir Occupation Phase (ROP) in Turkey