

The correlations of Kommos and Agia Triada under aspect of coastal alterations.

1. A look at some parameters to define Minoan harboursites,
2. The details of coastal alterations in Gulf of Messara,
3. An analyse of the harbour-installations in Kommos and Agia Triada,
4. The maritime conditions and the development in ship-building techniques,
5. Conclusions.

1. What do we have?

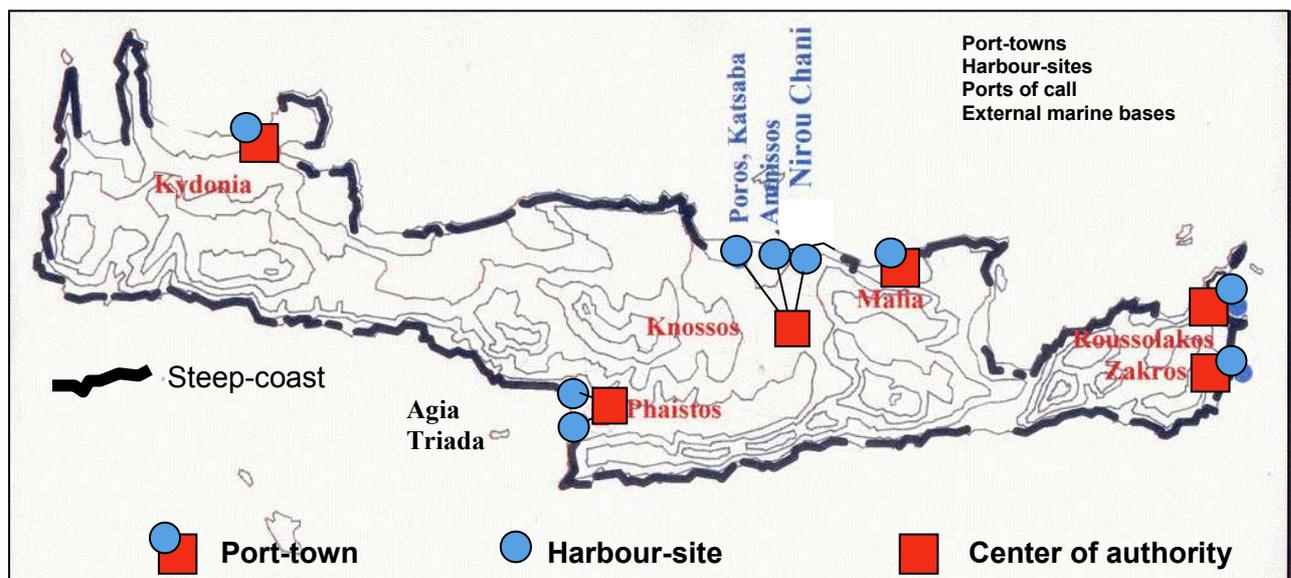
We have nice bays with sandy beaches all around Crete, we have fragments of harbour-buildings in shallow water, on the beach and as well in the hinterland. But we do not know, what are the parts of bronze-age harbour-installations in detail.

So, I will list up some classifications:

First a determination of port-towns and harbour-sites:

We have a lot of settlements alongside of the Cretan coast. Here some of these towns of authority. On the first view it is to see, that there were port-towns like Kydonia, Malia, Roussolakos and Zakros. These have their own harbour direct in front of the town.

A complete difference to sites like Kommos, Amnisos, Poros or Nirou Chani, which are far away from centers of authority. These sites were only harbour-sites, that are dependent on authority-centers. A very important fact in order to understand the function of ancient harbour-installations.



Second it is to differentiate between ports of departure, ports of arrival, ports of call and external marine bases.

The parameters of harbour-installations are nearly the same as today with some specifications (there are nowhere evidences of quay-installations):

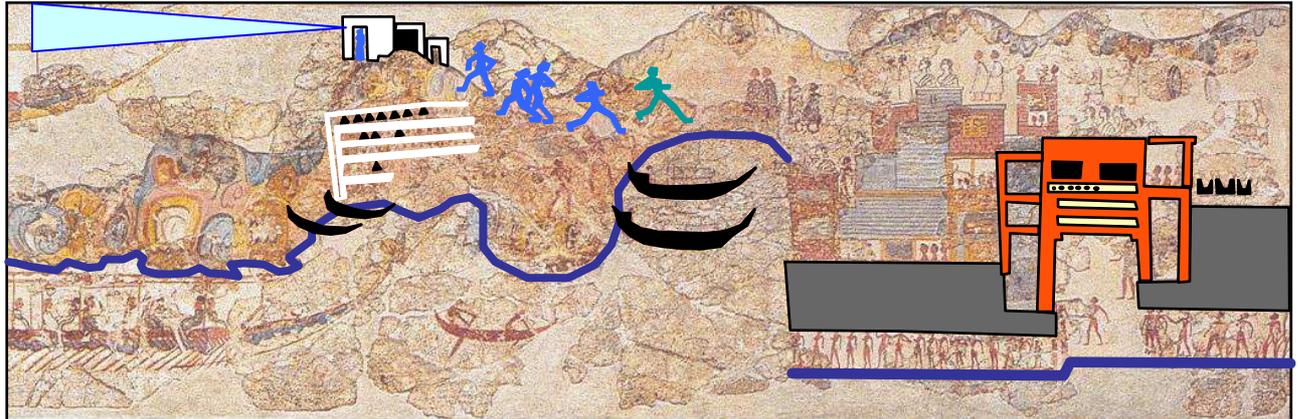
- square-rigged sailing vessels need a sheltered bay with leese side anchorage, because of absolute flat water for discharge and loading,
- cargo-transport by land need roads between port and authority centers,
- weighting, measuring and registration of cargo need weights, seals and clay-tablets,
- to ride at anchor need anchor-stones in shallow water and bollards at the beach,
- jetsam-stones in handling sizes are necessary to trim the vessels,

- the goods which are to ship by sea must be seaworthy stowed and lashed by well

- skilled stowers,
- secured and protected buildings for interim-storage are needful,
- only well skilled sailors are able to handle maritime conditions of eastern Mediterranean Sea.
- qualified craftsman and best of timber is needed to build seaworthy vessels,
- sweet water wells with clear quality and enough volume must be nearby,
- molestations by flies or other insects from swampy regions was the dead of a harbour,
- the equipment include food, water, boarding tools, reserve-ropes
- a broad and high beach to winter the vessels,
- and last but not least we need a competent ordering administration.

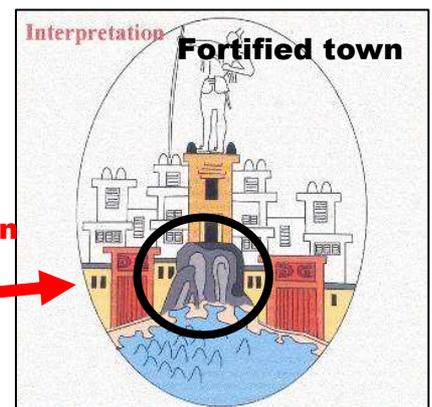
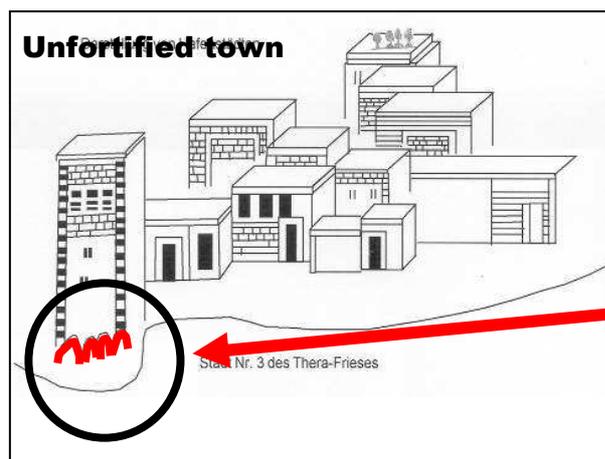
Let's have a look at pictorial evidences of port-towns:

The well-known Thera-fresco – here the port of arrival - gives a fine summary of all components:



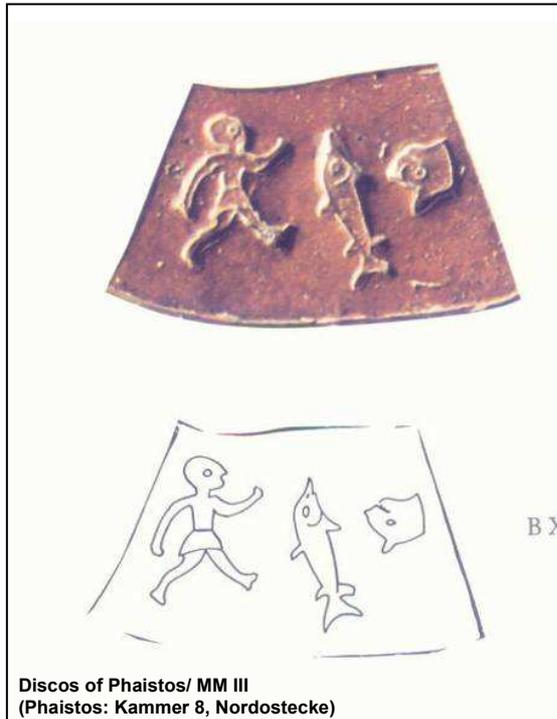
- situated direct at the beach, enclosed by a town-wall, with a huge gate, presumably a quay-installation in front, some houses on a hill nearby and the runners between town and look-out post,
- a storehouse outside of the town,
- two bays with vessels, stern first to the land side.

Other pictorial evidences shows us also town-walls like the master seal of Kastelli, and they show us tower-installations, directly situated at the beach.

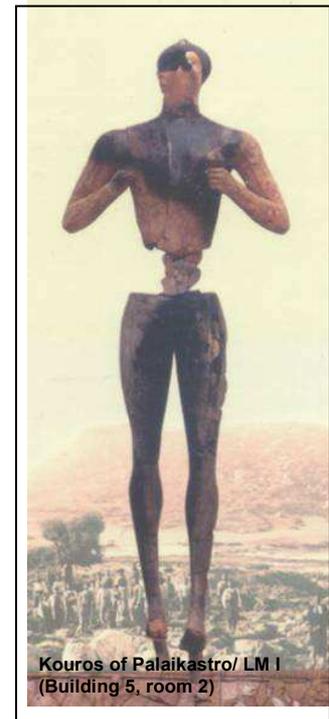


The runners:

These runners are very important to understand the functional correlations between town, harbour, look-out posts and centers of majority. These runners were the “telephone wire” in ancient times. And they were well respected and honored like gods.



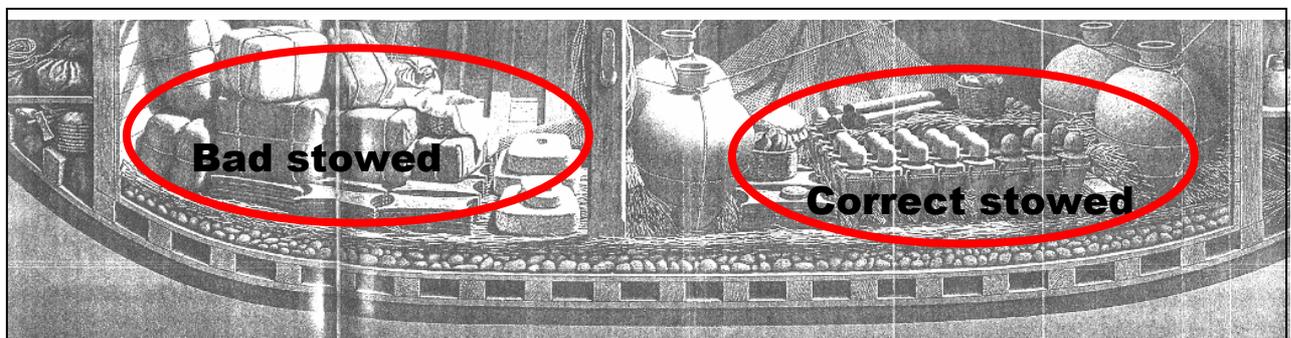
Discos of Phaistos/ MM III
(Phaistos: Kammer 8, Nordostecke)



Kouros of Palaikastro/ LM I
(Building 5, room 2)

Logistic facts:

The stowage and the trim of a vessel is the most important act before putting to sea. The live of any sailors is dependend on this work. Here the difference between bad and correct stowed cargo. A vessel, stowed like to left, will capsize in the next wave laterally.

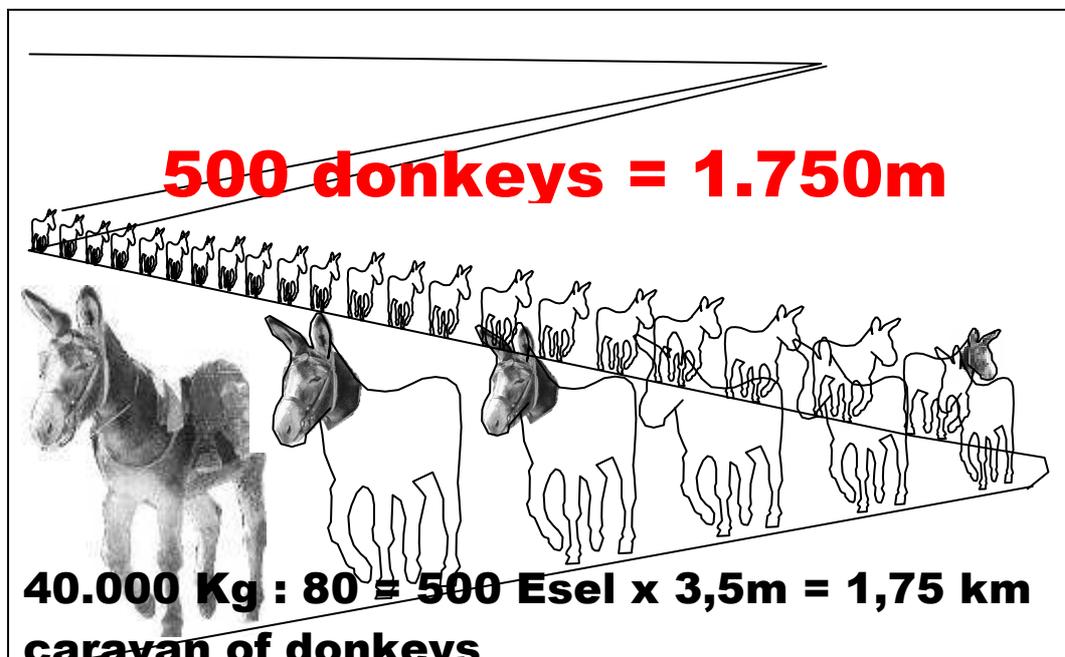


A look at the delivery from the hinterland :

We have nowhere evidences of quay-installations. So, it is to consider that all vessels must have been loaded in shallow water. It is not imaginable that loaded vessels have wait for best wind in shallow water during days or weeks. The protection of cargo is not secure because of robbery, changing winds and waves or i.e. loose anchoring ropes.

So, the loading-process of ships was to do as quick as possible to set sail.

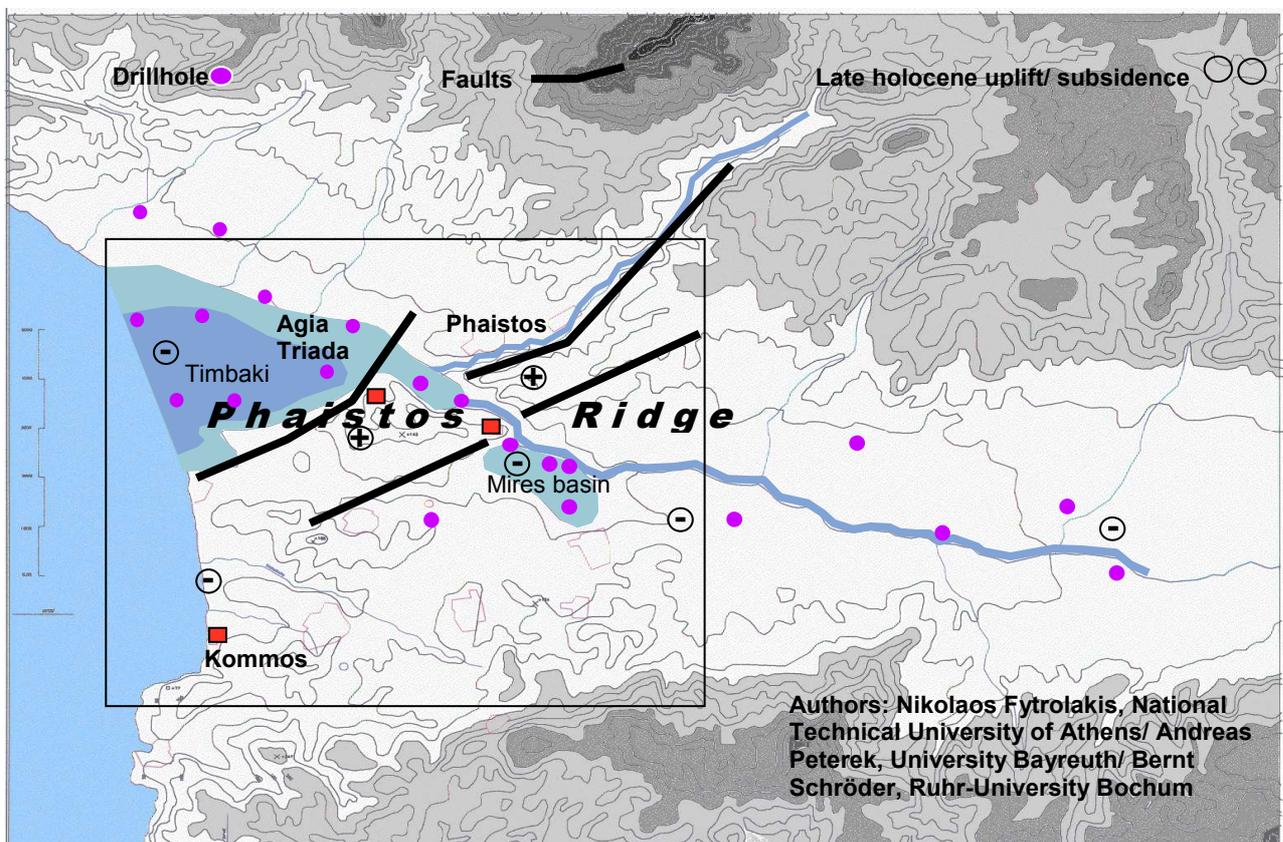
The loading process of a MM/LM-fleet with 40 tons is impossible by carrying cargo just in time over roads from hinterland by donkey-caravans.



This logistic fact was the main reason for installing secure store-rooms nearby the beach. Evidences of such store-rooms do exist in Malia, Kommos, Nirou Chani.

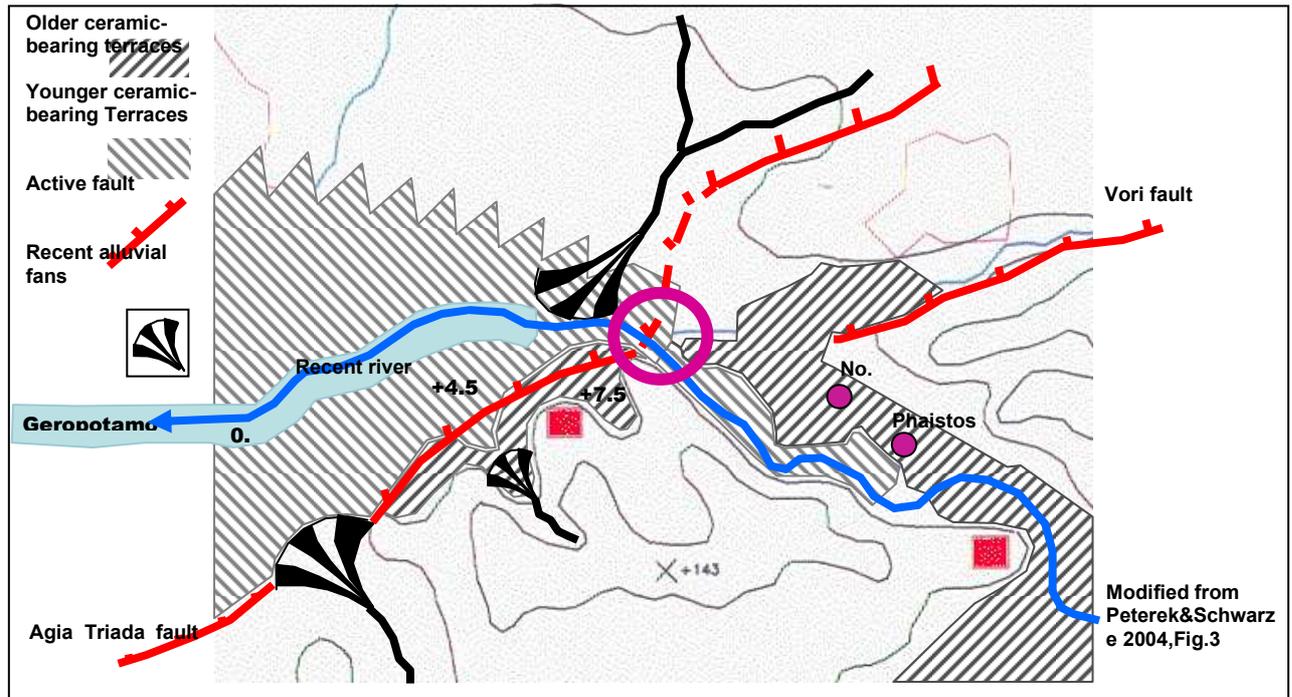
2. The Geomorphologic aspects:

The wellknown Minoan sites of Phaistos and Agia Triada were founded in a favourite position on the so-called „Phaistos-ridge“. The area is characterized by high seismic and neotectonic activity. The Timbaki basin ist the westernmost part of the Messara plain separated from the Mires basin.

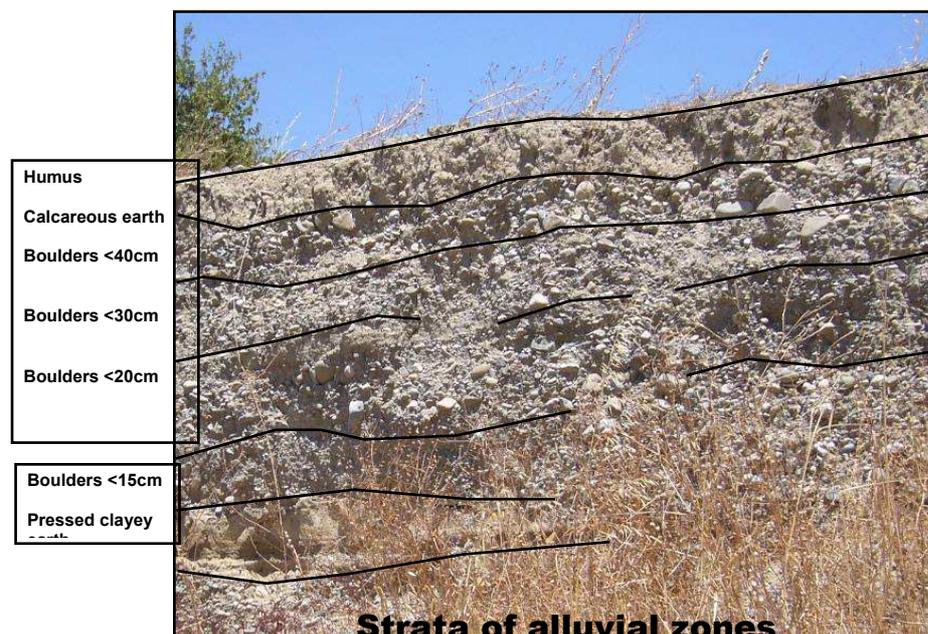


The more than 30 years old geotechnical drilling programm reveals some tens of unconsolidated sediments that are most likely of Late Pleistocene to Holocene age. This geomorphologic work was done from Nikolaos Fytrolakis, Andreas Peterek, Bernt Schröder.

In 2002 a key borehole was drilled north of Phaistos, where the Geropotamos River crosses the Phaistos ridge. The upper part of this drilled profile is built up by predominant unconsolidated gravels up to 20-22m depth. Beneath these fluvial deposits grey-coloured sandy material was drilled between 22-28m that yield preserved faunal remains with an assemblage of marine mollusc fragments. Additional information was given by an older drilling (No.95 of 1972).

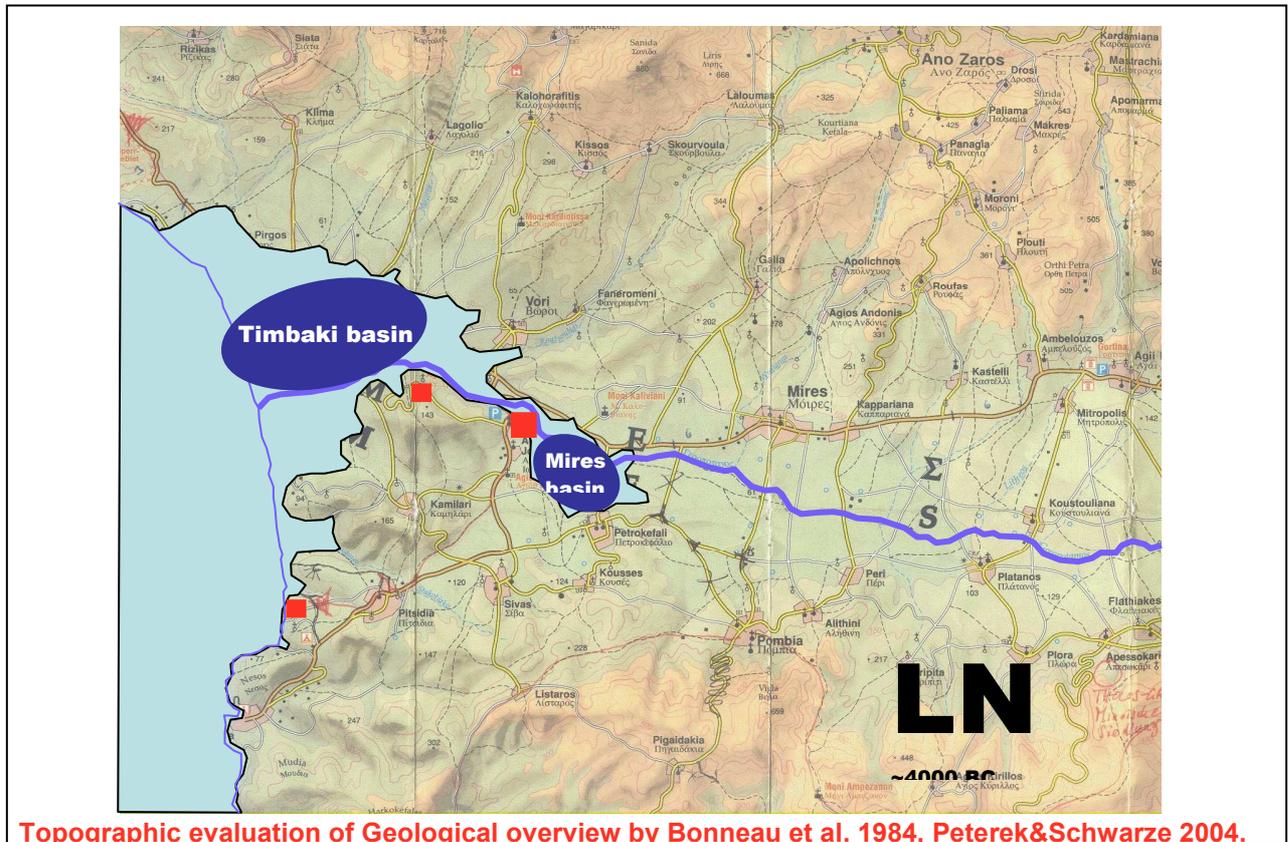


The Agia Triada fault is very fine to see in north-east of the ancient site. This fault crosses the river-bed of Geropotamos in a height of around 4m. The strata of alluvial sediments are well to see: smaller sediments were coming at first, the bigger boulders at least.



The geologists assign this process of alluvial progradation in Late Neolithic until Early Minoan. In correlation to the phases of building activities it could explain changing harbour-sites and in special the establishment of Kommos.

Phase I: The starting point was in Late Neolithic, with Timbaki basin as part of Gulf of Messara reaching up to Phaistos, and the Mires basin behind Phaistos. It is to suppose that Phaistos have had an own way to the sea. Agia Triada was in direct connection to Gulf of Messara.

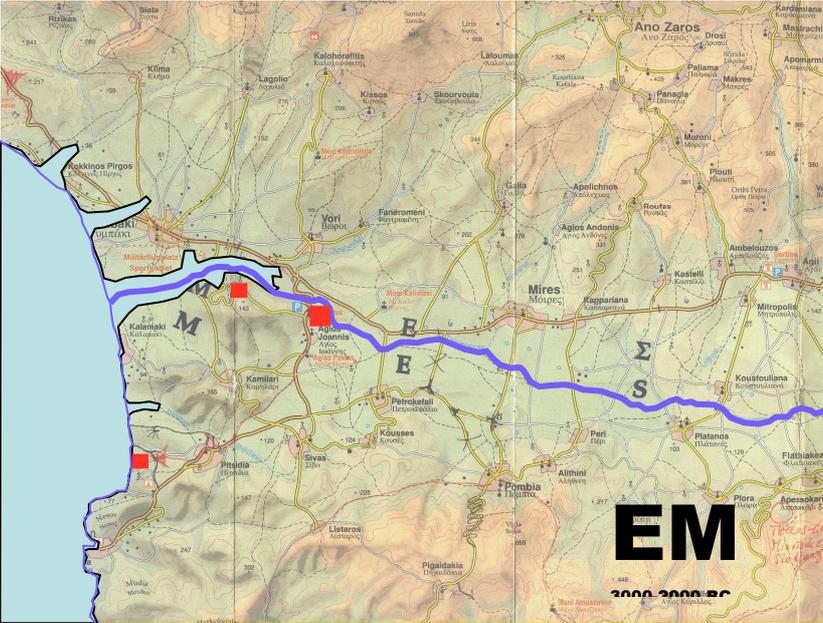


The changes of relative sea-levels during this time by around 50cm are without important influences.

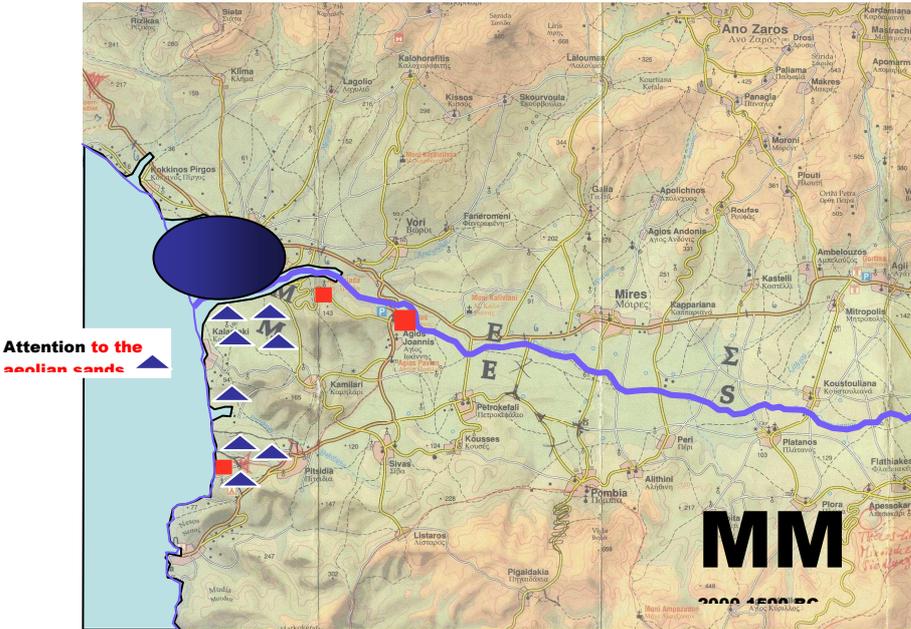
Phase II: After silting of Mires basin, only the site of Agia Triada have had access to the sea.



Phase III: in EM started the silting from the northern foothills of Psiloritis and Agia Triada becomes a riverine anchoring.

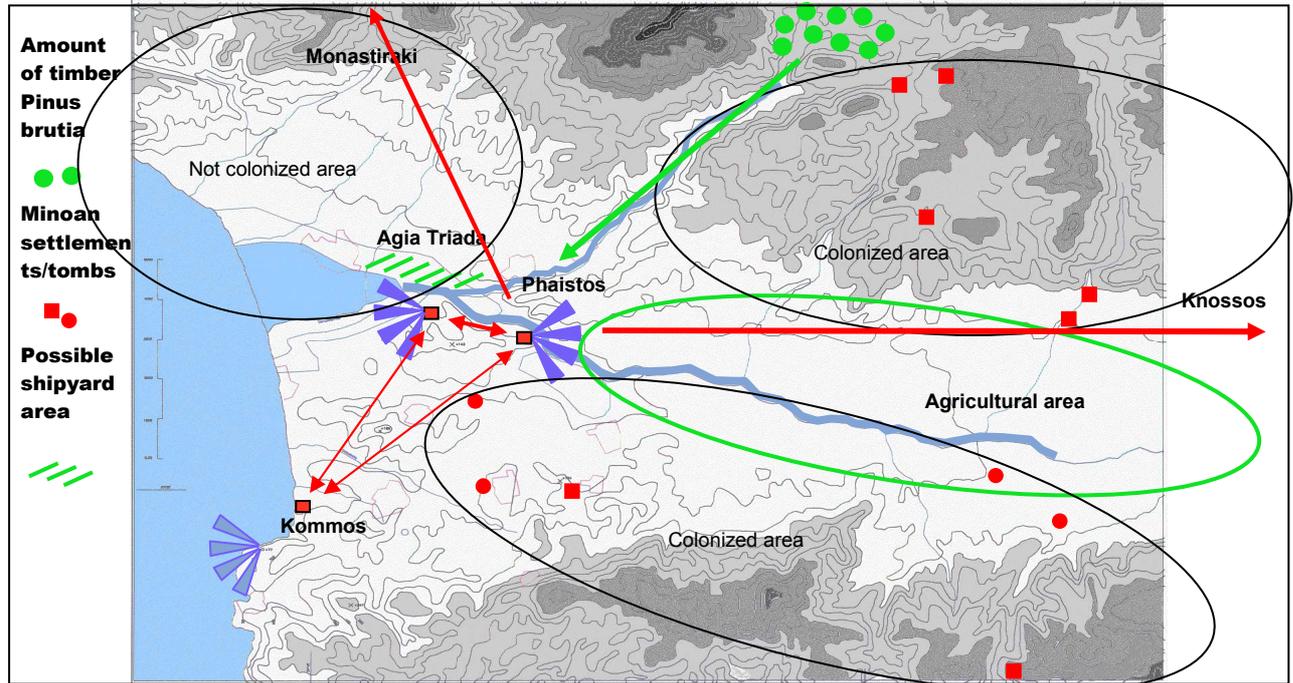


Phase IV: an important fact are the aeolian sands, which were arising at first in beginning of MM. These sand-dunes were stopped at the border of Geropotamos river. This is a clear evidence for an existing bay in front of Agia Triada during EM. After this – in early MM – a new harbour-site was necessary: Kommos was founded.

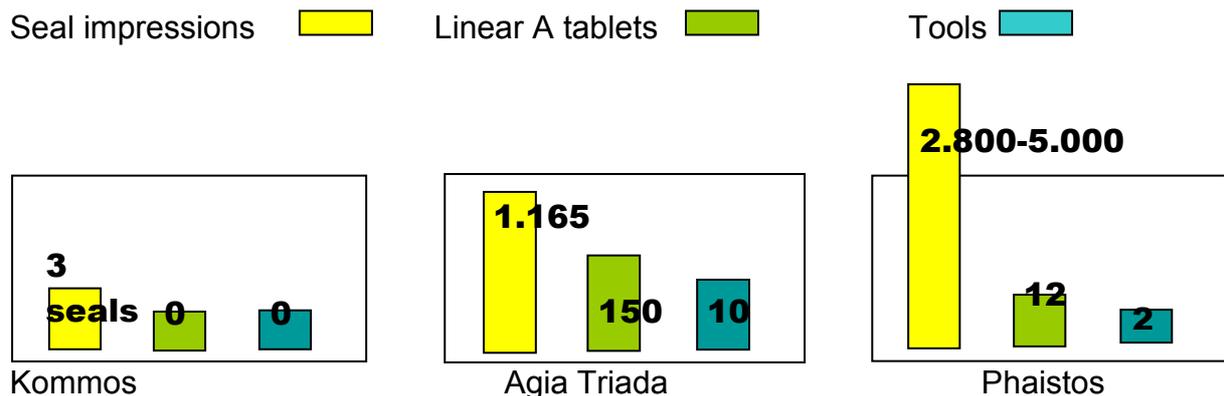


Phase V: in LM the site of Agia Triada was a town in the hinterland: 3,5 km off from the beach.

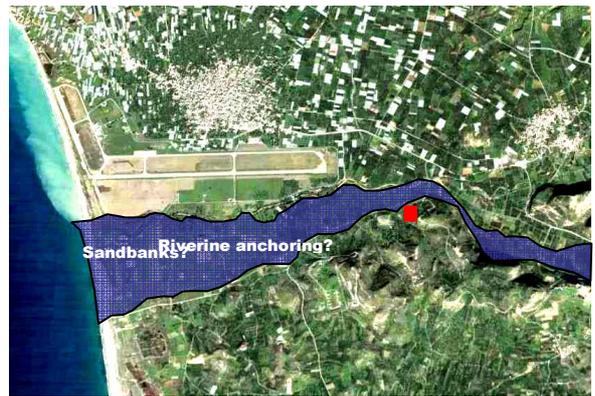
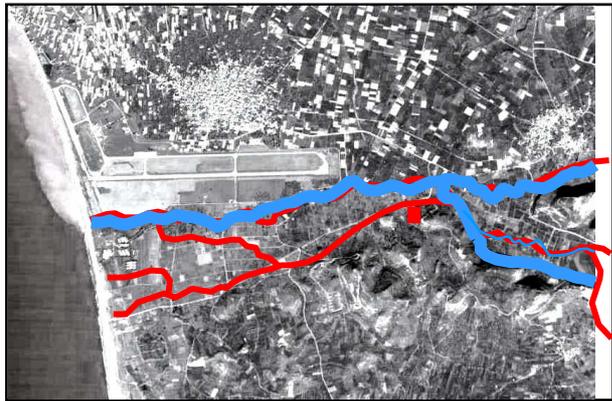
3. Aspects of town-planning: it is a surprising fact that all settlements in Messara plain were located at hidden sites of foothills or in valleys back in the mountains. Only Phaistos with his looking over the plain and Agia Triada with his looking over the sea, were situated at extraordinary sites. This could be a hint for a fine defensive structure: the controlling to the sea was given by Agia Triada, the controlling of the Messara plain was given by Phaistos. The not colonized area in north-west support this kind of view.



The archaeological heritage: to understand the different activities of these 3 ancient sites, the archaeological findings dated to Building T of Kommos are listed up. The nonexistence of any sealimpressions or registration tablets at Kommos is a clear pointer that there was no activity in registration, packing and sealing. But there are enough in Agia Triada. This fact support the view of the geologists in a changing of the harbour-sites between Agia Triada and Kommos. Kommos was the new harbour, but the authority of this harbour was in Agia Triada.

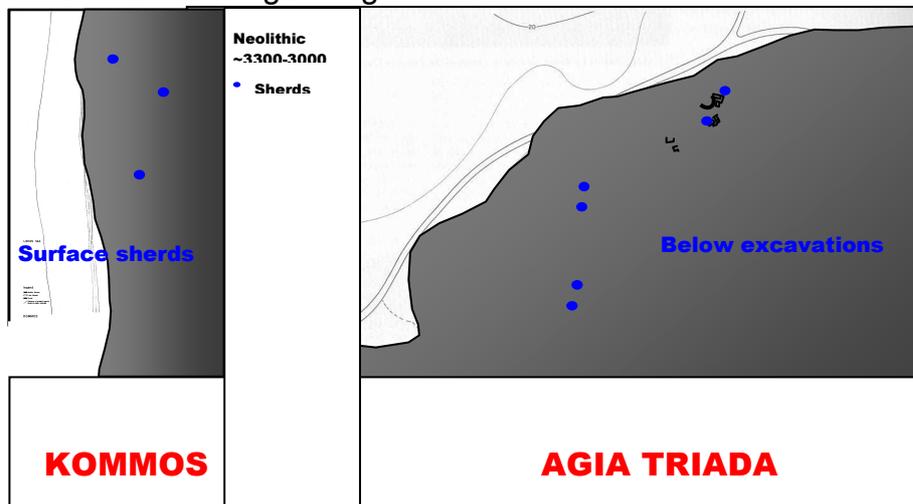


A view at Geropotamos estuary of today: in blue the Geropotamos and Koutsouliadi River. In red older river-beds – from German Seekarte.

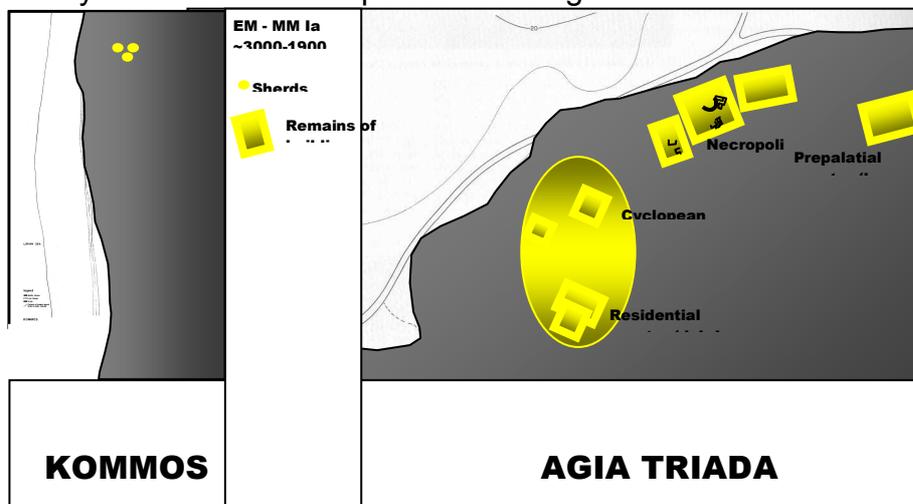


The combination of these estuary-arms presume a broader mouth of Geropotamos River, which reaches up to Agia Triada. But it is a situation with a lot of questions: Sandbanks? Water-level? Draughts? Riverine-anchoring?

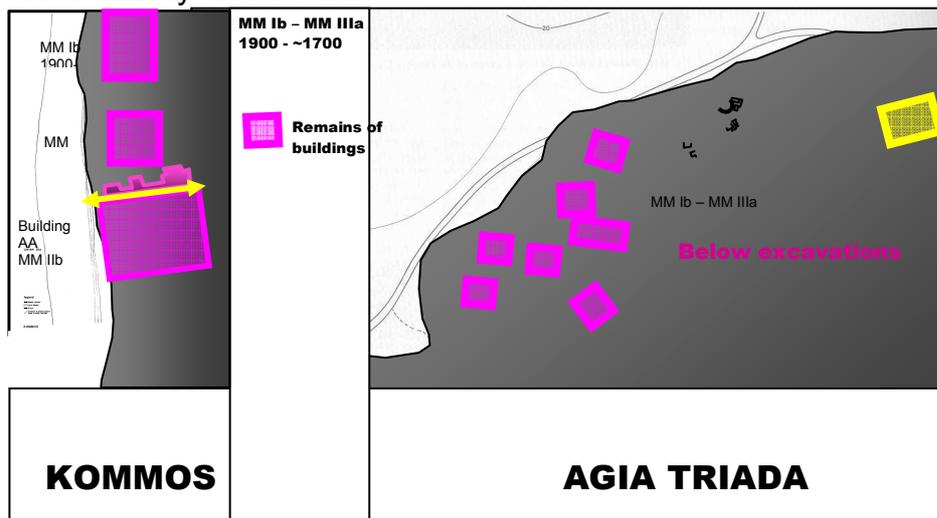
Periods+buildings I: Now have a look at the development of these two ancient sites. During Late Neolithic we have only some sherds, scattered on the field in Kommos, down under later buildings in Agia Triada.



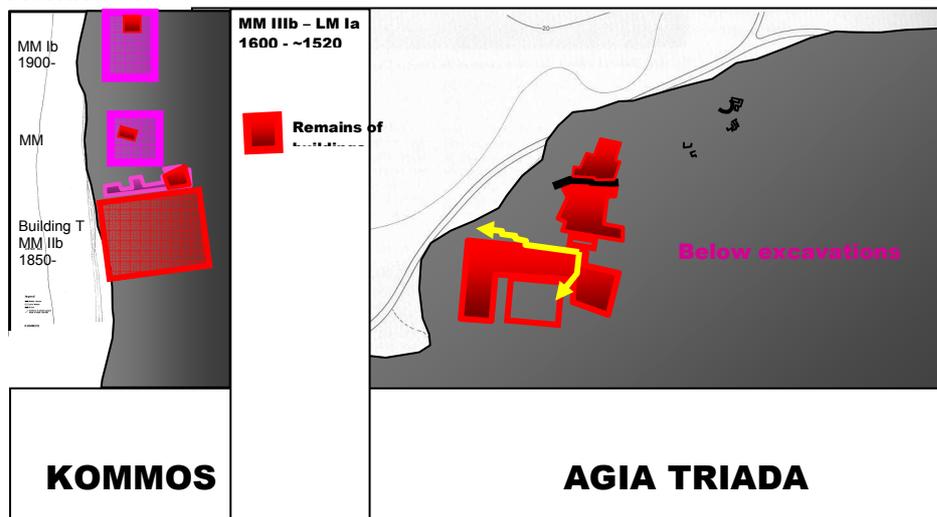
Periods+buildings II: during EM until MM Ia we have some sherds under later buildings in Kommos, but building remains with tombs in Agia Triada. These remains reaches nearly as far as the later palatial building.



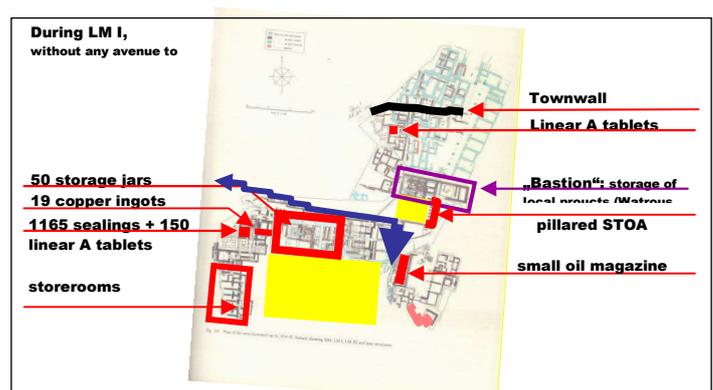
Periods+building III: in beginning of MM Ib the area in Kommos arised to a settlement with building AA and Agia Triada expand to the size of later palatial buildings. The walkway and the harbour-road in Kommos was built.



Periods+buildings IV: after destruction (earthquake) in Kommos the new building T with a lot of storerooms and two stoa were erected. At Agia Triada the final palatial building arised. Also with a way down to the banks of Geropotamos or eventually to a road to Kommos.

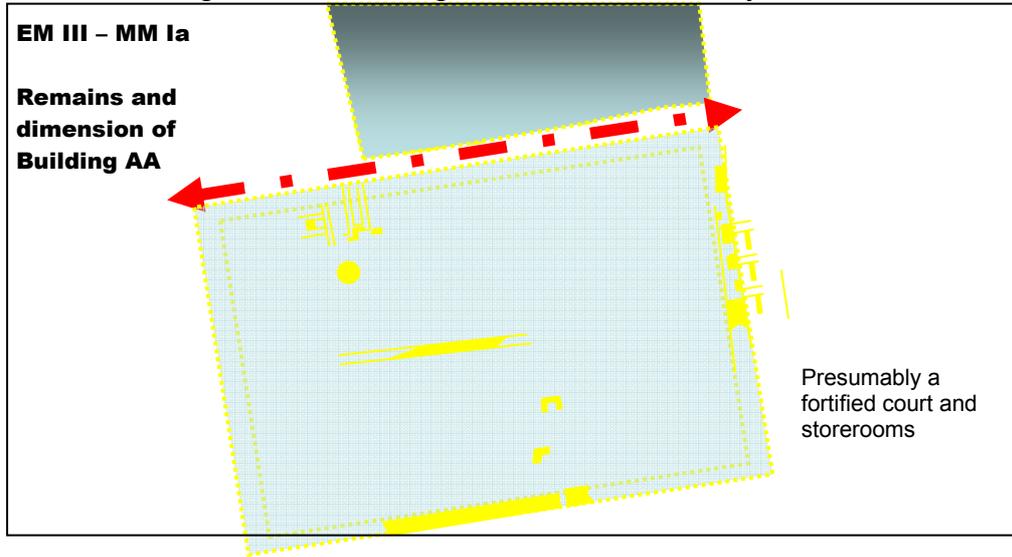


Specific features Agia Triada: the site of Agia Triada was excavated by unhappy circumstances. So, the dating of founds is not absolutely correct. But we have all components of a port-town, which needs no extern store-rooms, because they could use the own store-rooms inside of the town. And we have all evidences of a controlled storage of cargo: weights, sealings, linear A tablets and we have some rests of cargo: the copper ingots from Cyprus.

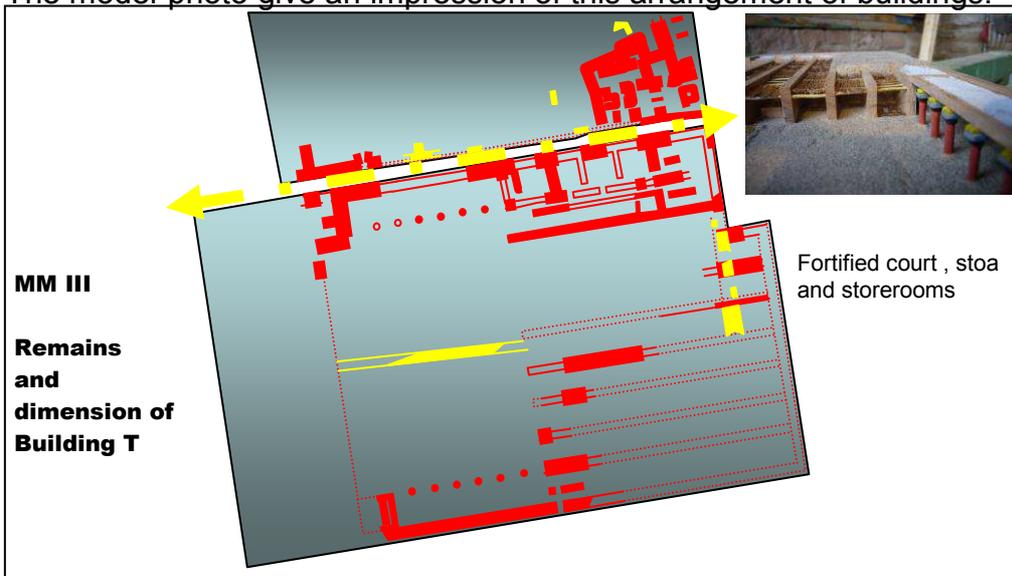


Horses + daggers: and we have some hints, which can give us a look at defensive activities: during LM I the existence of chariots (sealimpressions) and daggers (cup of the prince) are well documented.

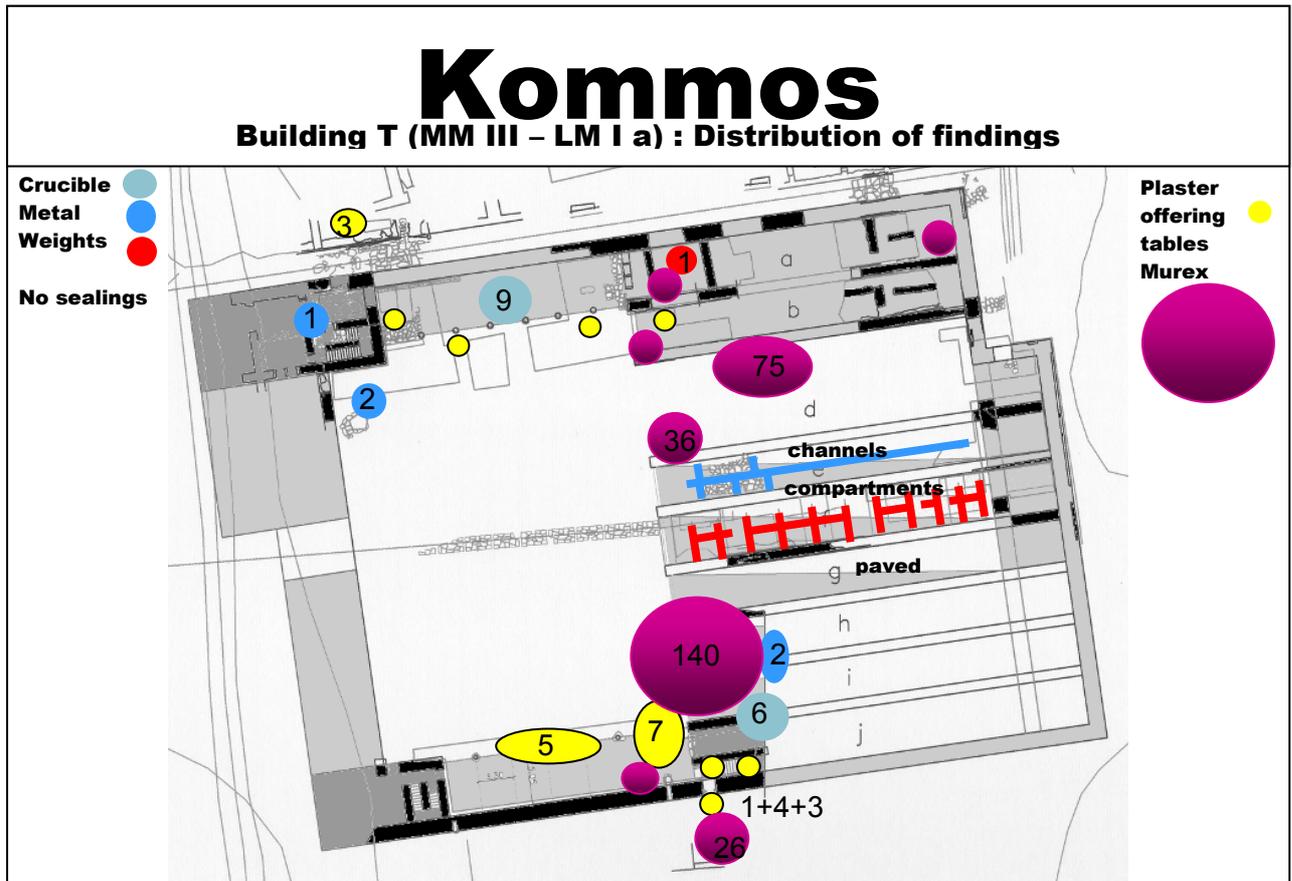
Specific features Kommos I: the appearance of building AA in last period of EM will give a look at a huge walled rectangular court, a walk-way inside and a road to the beach.



Building T: the later building T was a little bit greater to east, the huge outer wall of AA was new erected, two stoa built, presumably 6 large and long store-rooms were built. The model-photo give an impression of this arrangement of buildings.



Kommos T: at first look the archaeological findings will give a curious picture: masses of murex-shells are sign of a well organized purpur production at this site. Beside storage of cargo, this closed court was used for production of purpur and presumably of dye-works. But the offering tables could be a hint for processions in welcome or saying goodbye. The arrangement of the two stoa give a representative ambiente for such activities.



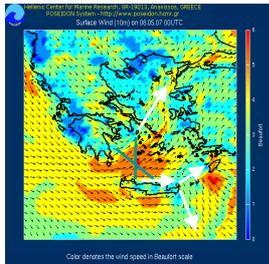
Model-Photo: this picture show building T, in prolongation of the walkway a presumed sea-gate is arranged. It is a surprising fact, that this prolongation meet the harbour-road on top of the reef far out in the sea. Considering the situation at Nrou Chani (Marinatos 1927) and the pictoral evidences of towers (showed as for) it is to presume that there was a tower building to secure the entrance of this harbour.



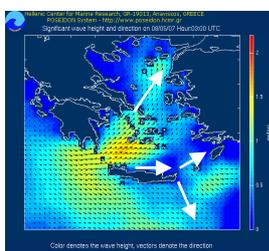
Maritime conditions: winds, waves and currents are registered in a long time study. The data of Hellenic Center for Marine Research, Poseidon-System, were used.

By start in march 2007 until end of September all day data were extracted in possible sea-routes by square-rigged sailing. There were a lot of days without a chance for sailing, because of too strong winds, waves or currents. All sailing days are superimposed in this map of the Aegean Sea. The area inside of the Cyclades are not evaluated. But it is to see that the well known western string is practicable, the route alongside of northern Crete, the triangle south of Thera and the route alongside of Dodecanes. The well known eastern string is a problematic route, because of the strong Etesian winds. The Island of Karpathos could be a interim stop, but there rare evidences of ancient sites.

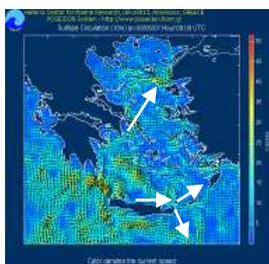
The most surprising fact is the nearly impossible route from southern harbours of Crete to northern harbours. This concern in special the harboursites of Zakros and Kommos.



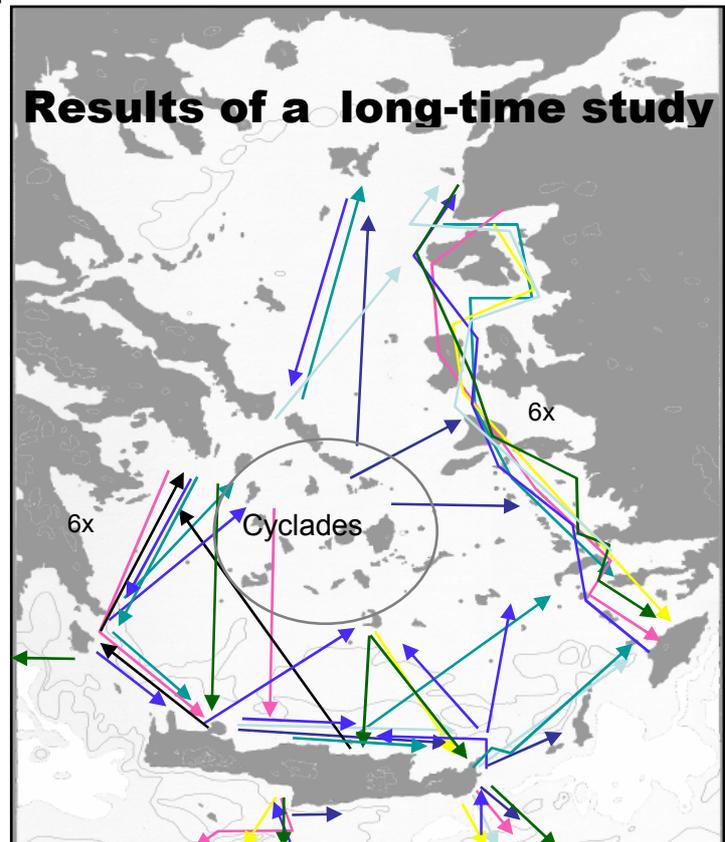
Winds



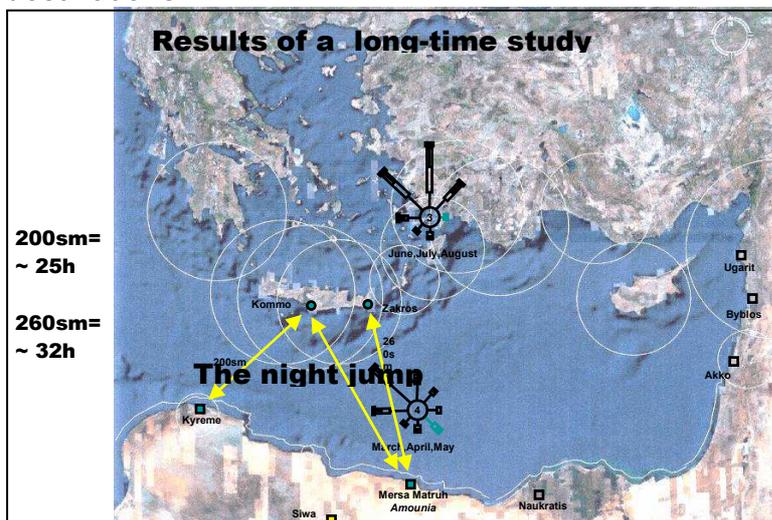
Waves



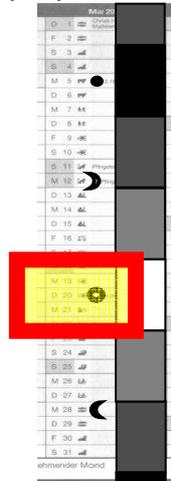
Currents



Eastern Mediterranean: the reachable destinations of these harbours are the northern coast of Africa. This coast is rare equipped with suitable bays for anchoring, only in Kyreme and Mersa Matruh are remains of bronze Age and suitable bays. But the time at sea needs minimum 25 hours, a so-called night-jump is necessary to reach these destinations.



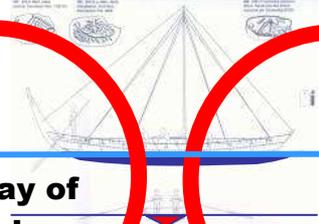
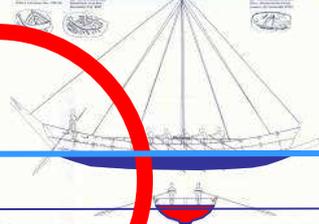
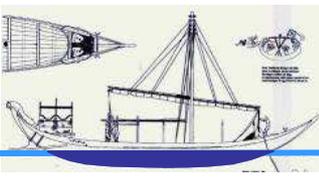
The night jump: only a small time-window opens the chance to practise these sailing-routes. A full moon light is basis, constant winds (less than 4Bf) and low waves are necessary. Such conditions are most given during springtime and autumn. The way back is secured by arising Khamsin which is blowing with a soft wind of max 3Bf. This fact is of great importance for the logistic preparation of a sailing fleet, because of this small time-window to put to sea: all components of cargo and utilities must have well prepared to load the ships in shortest time and put to sea during this time-window.



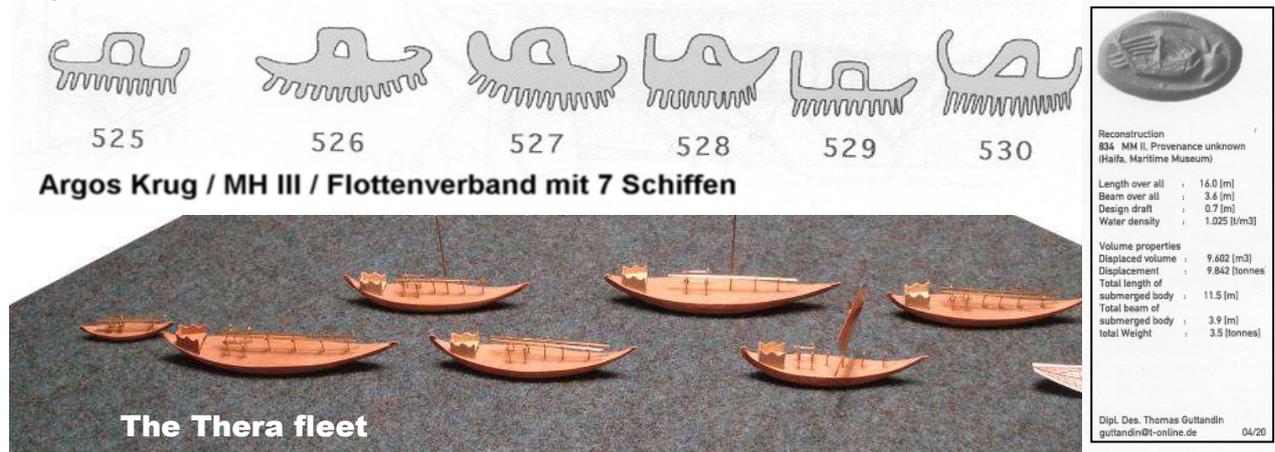
The time window

- Full moon**
- Constant winds (<4Bf)**
- Low waves**

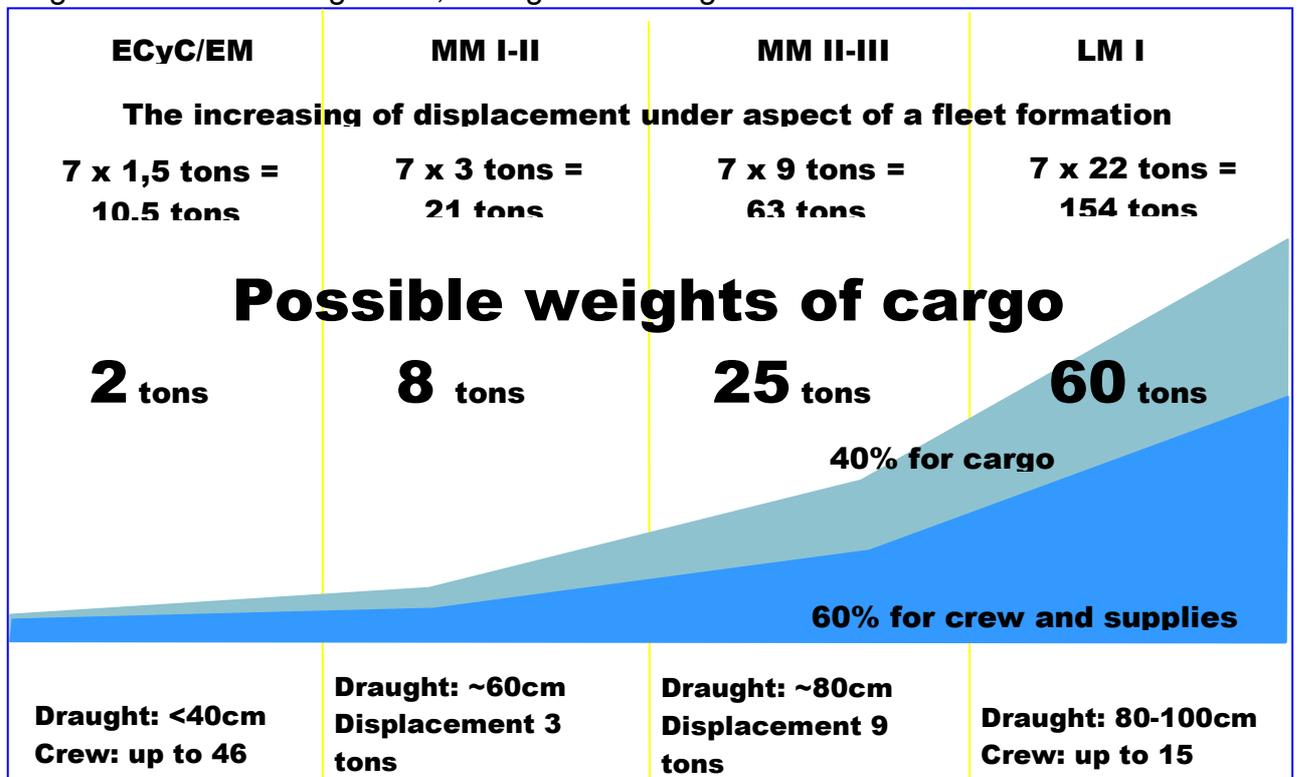
Developments in ship building: the development from logboat to plankboat is well documented by the work of scholars in ancient ship-building. On basis of the work of Thomas Guttandin I list up all components in relation of anchoring details. There is to notice an increasing of draught from 40cm up to 100cm, this made it difficult for riverine anchoring since MM II. The big crews of Cycladic boats changed with sailed vessels to smaller crews of 10-15 sailors. This is of importance for beaching the vessels. Only a big crew of 20-40 men is able to pull the vessel onto the beach. So, it is a necessity to put to sea by a fleet formation. One crew can help the others.

ECyC/EM	MM I-II	MM II-III	LM I
 <p data-bbox="367 1243 678 1545" style="text-align: center;">The way of planks down under the</p>	 <p data-bbox="718 1243 1029 1545" style="text-align: center;">Precursors of decks</p>		
<p data-bbox="276 1597 435 1742" style="text-align: center;">Riverine anchoring possible</p>	<p data-bbox="595 1597 786 1742" style="text-align: center;">Riverine anchoring problematic</p>	<p data-bbox="890 1597 1185 1798" style="text-align: center;">Riverine anchoring difficult sandy beach / one crew help</p>	<p data-bbox="1297 1597 1520 1798" style="text-align: center;">Riverine anchoring: difficult the question of auavs</p>
<p data-bbox="220 1877 467 1955" style="text-align: center;">Draught: <40cm Crew: up to 46</p>	<p data-bbox="539 1854 850 1955" style="text-align: center;">Draught: ~60cm Displacement 3 tons Crew: up to 10</p>	<p data-bbox="882 1854 1185 1955" style="text-align: center;">Draught: ~80cm Displacement 9 tons</p>	<p data-bbox="1225 1877 1520 1955" style="text-align: center;">Draught: 80-100cm Crew: up to 15</p>

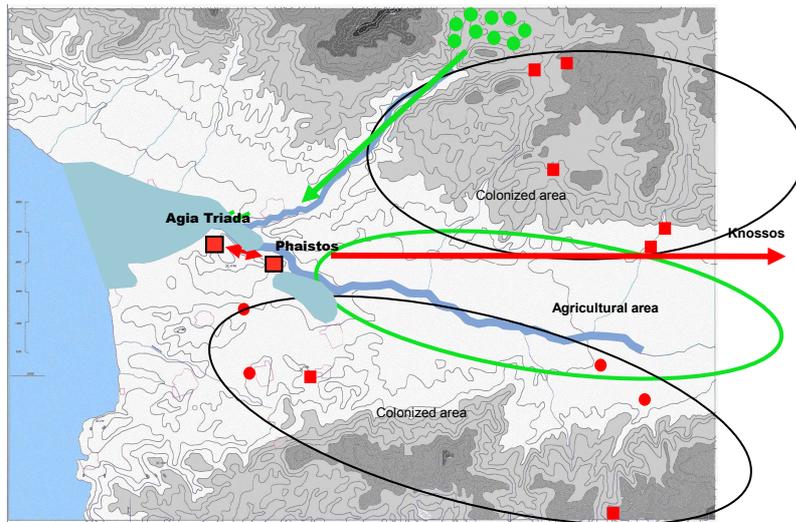
Fleets: such fleet formations are well represented at some archaeological finds and wall paintings. And last not least the Amarna-letters are spoking in plural when Keftiu-ships are mentioned.



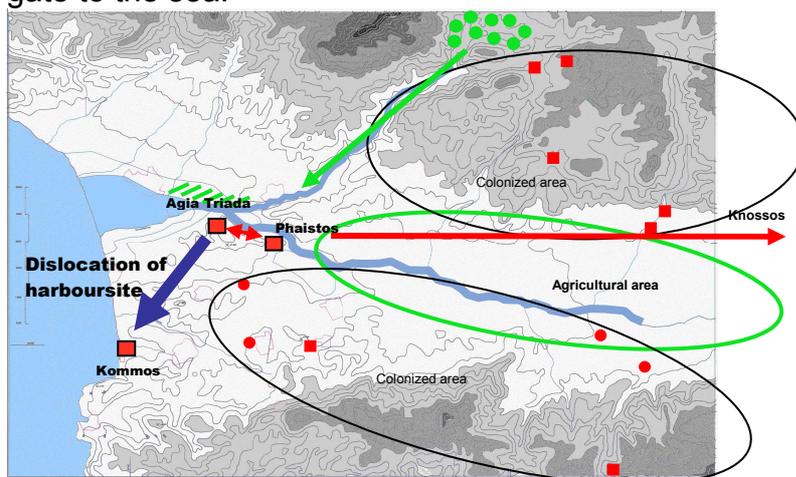
Developments of cargo: the increasing of displacement in development of ship-building together with fleet formations will give a hint at possible carried cargo. A rapid growing of cargo is to notice during MM II, the age of building T at Kommos.



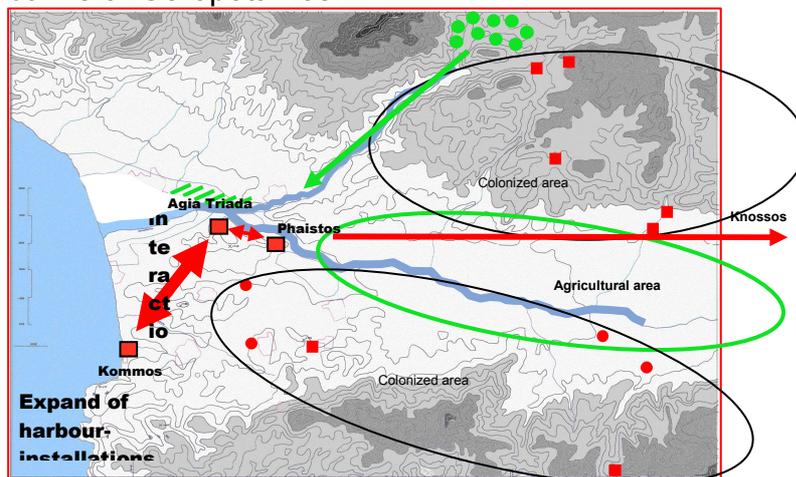
Conclusions I: the first settlements of Phaistos and Agia Triada are to date in LN ages. The functions are clear divided in a landside and a seaside controlling view. The best timber (pinus brutia) for ship-building could come down from slopes of Psiloritis. At the banks of Timbaki basin the shipyards are to look for.



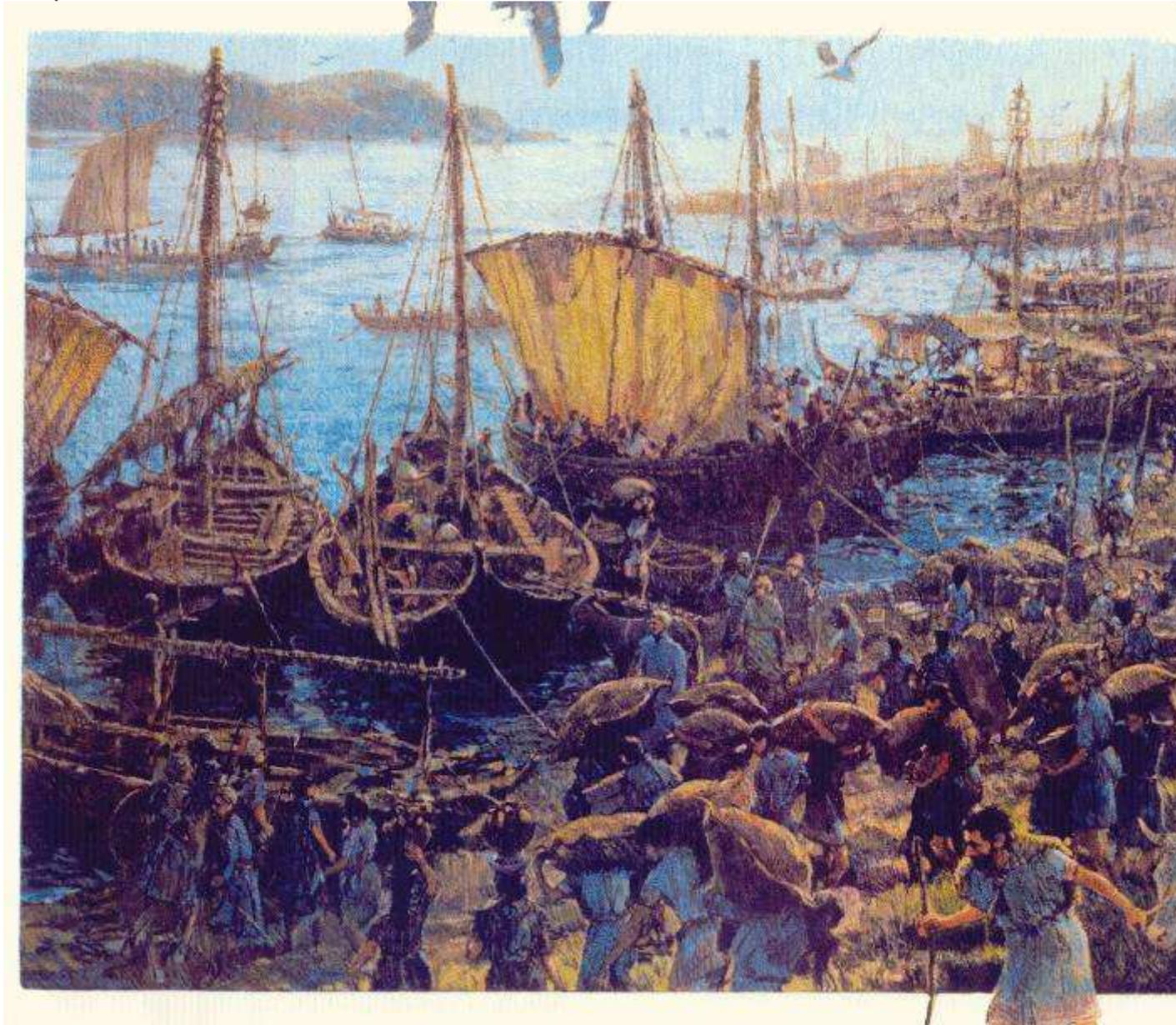
Conclusions II: during EM the Phaistos site have had lost the direct gate to the sea. Agia Triada was the present gate to the sea until MM I. The more and more silting process in Timbaki basin led to the founding of Kommos in MM Ia. Agia Triada has lost his direct gate to the sea.



Conclusions III: during MM II until LM I Kommos was expanding to the only seaport of the Minoan Messara, controlled by Agia Triada. The shipyards could be after that at the banks of Geropotamos.



Painters vision: at least a painting of an british artist of an bronze-age harbour situation. I do think, that the character of what was going on in this time is very well represented in this picture.



END

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