

Final Report STSM TD0902-6516



Fig: Harbour panorama of Falsled, Denmark (photo F. Feulner).

The Short-Term Scientific Mission (STSM) of the **SPLASH-COS** action took place in Denmark from July 14th to 18th 2010. The host institute was the Langelands Museet, a regional museum on the island of Langeland, which is based in the harbour town of Rudkøbing.

Prior to the actual mission, the boat and equipment had to be prepared on the weekend (12th/13th) with picking up a mobile fuel-powered compressor, air tanks, weights, dinghies and excavation equipment from the museum stores. Following this the museum's own ship "*Mjølner*", a sailing ship built in 1926 as a mixed goods transport vessel which became retrofitted with a 45hp two-stroke Diesel engine in the 1930s, had to be conveyed from its port of registry Rudkøbing to the harbour of Falsled used as a base during the survey period. The 65km long journey through the Danish Archipelago took approximately seven hours to complete, mainly due to stronger westerly winds and currents.

Beginning on Monday 14th the rest of the crew and scientist arrived. This first STSM of the SPLASH-COS action was not entirely made up of researchers but also of interested amateur and sport divers, which usually crewed the ship alone on earlier surveys. To cope with different diving protocols all diving personnel was treated equally as sport divers regarding their qualifications. The scientific crew was made up of *Jonathan Benjamin* (USA; UK), *Kieran Westley* (UK), *Ehud Galili* (Israel), *Radek Szemelak* (Poland), *Frederick Feulner* (Germany; UK), lead by *Otto Uldum* (Denmark). Amateur archaeologists, students and sport divers from Denmark were *Anne Margarethe Wallden*, *Arne Bonde Jensen* and *Flemming Sørensen*. The vessel was helmed by *Hans* ?



The small harbour village of Falsled is located on the south-western coast of the island of Fyn, relatively sheltered from the Small Belt Baltic area by the peninsular Helnæs to the west of the bay. The bay measures approximately 100 km² and can be described as parallelogram-shaped. The depth of the bay rarely exceeds 10m. To the north, middle and south-east extensive shallow water areas are

clearly visible in the map. The surrounding land is mainly coined by glacial moraines and hills rising up to 100m to the east with slightly lower reliefs to the north, south and west. A couple of narrow islands (Illum and Vi) and shallow-water areas in the middle of the bay witness the sheltered location before sea-level rise and erosion took place.

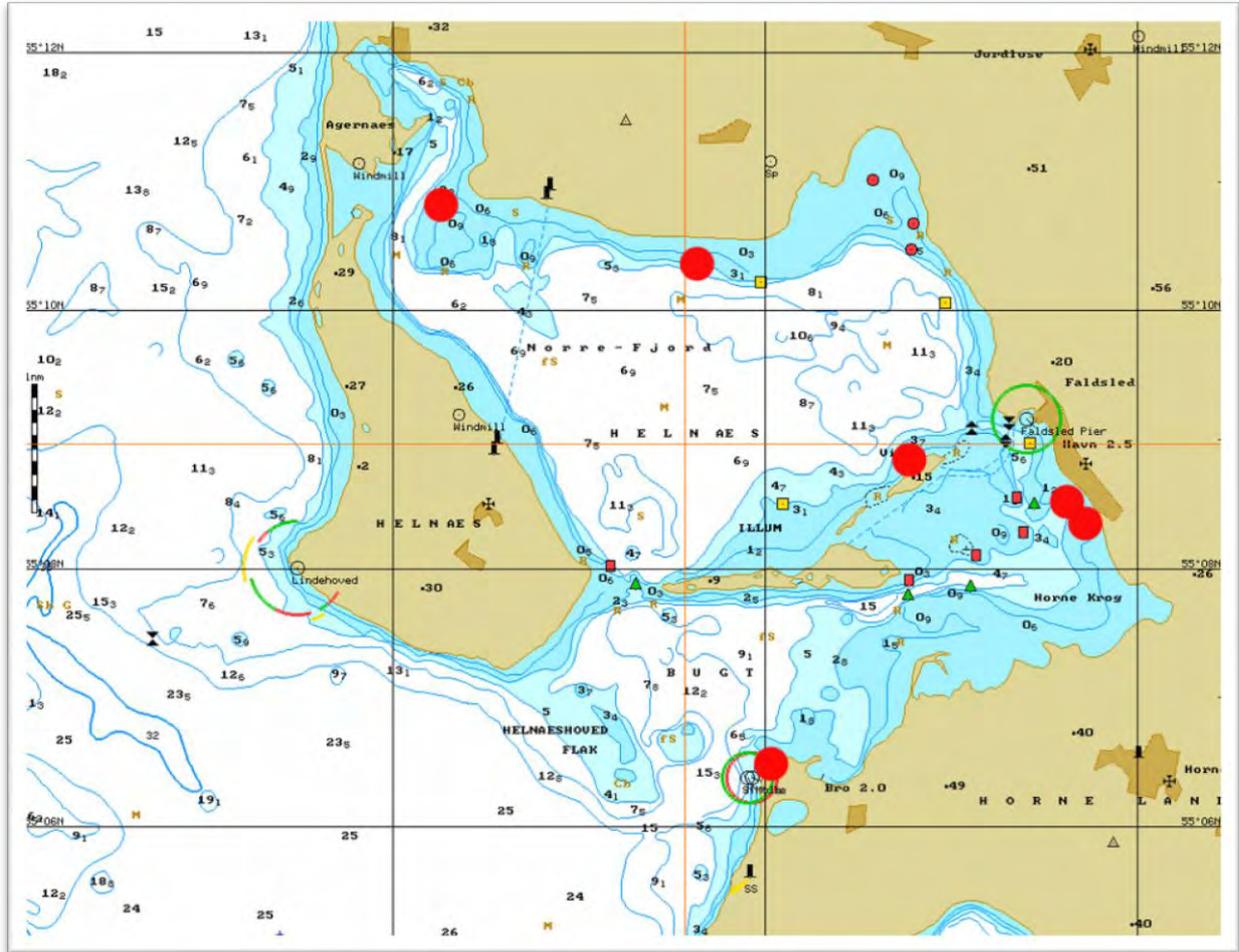


Fig.: Navigational map of Helnæs Bugt with dive site locations (red spots).

In order to optimize survey efforts navigational charts of the area were used to locate possible promising spots. Many favourite places of hunter-gatherer or other periods have their location in common. Closeness to the sea, to becks and rivers, on promontories or sheltered islands are some of the prerequisites. By looking at bathymetric maps and applying sea level changes, land tilting and erosion processes it could be possible to locate former sites in similar positions. This was done during the first days of diving.

Generally (except the first day) diving was done by single divers and individual dive plans, depending on the divers preference. Most divers had enough experience but the ones with less were paired alternating with experienced divers. Most divers carried a 12 or 15l air tank providing enough air for a prolonged search. Due to the good weather and warm temperatures drysuits were not necessary but worn by some of the crew. For security reasons each diver carried a marker buoy. Assistance for divers (e.g. buoy setting and diver retrieval) was provided by a rigid hull dinghy and a inflatable rubber boat. One person usually acted as a surface tender, monitoring individual divers. Each diver

had to fill in a survey form as soon as possible after return to the ship, noting vegetation, surface, position and observations made during the dive.



Fig.: Diver preparing for work (photo F. Sorensen).

The first positions were in the northern part of Helnæs bay near the village of Nældemose. Search boxes were marked by surface marker buoys and logged via GPS. Dive teams were sent out in two-man teams, tracked by individual buoys that followed a prearranged course within the search box. The actual surveying was done by removing cover sand and plants by hand fanning. The first two spots did not reveal much flint material, which could prove evidence for a nearby site. Only a few wave-rolled flint pieces, mainly debris or flakes were found with no direct context to a certain site.

Diving continued on the next day in mainly single person dives. Nevertheless on the second day of diving an interesting feature was found by one of the divers. This was a wooden structure, made up of a line of short pieces of wood, sticking out of the clay ground, forming a several meter long row which was cut in a 90° angle by another more or less straight line of wooden sticks. The whole structure was uncovered to a large extent over a length of several meters and consisted out of small parallel wooden sticks or branches with bark. The top parts were eroded above the sand. One scientist believed to see the shape of a possible Neolithic hut or other man-made structure while others of the team favoured a natural phenomenon. Later theory speaks is backed up by other occurrences of similar wooden features throughout the Baltic, which might come from roots or lower parts of drowned trees that once grew near the shoreline. On the third day scale drawings were made and a sample was cut from this location but no matching artefacts were discovered.

The afternoon of the third day was spent on the northern shore of the island of Vi in the middle of the bay. Massive stones on the cliff coastline, paired with beach finds from a short survey trip, suggested a possible good location for a dive. Again on this spot, no interesting finds were recovered from the depth of up to 5m.

On the fourth day of diving “Mjølnær” was moved to a small cliff on the south-western coast of Helnæs Bay near the village of Bøjden. On this location finds have been recovered in earlier years. At first the usual search box was set up by the dinghy and shifted later to a more easterly position. Divers found layers of peat sticking out of the bottom as well as some flint artefacts. On the afternoon another dive was prepared along the shoreline between Falsled and Falden on the eastern

shore of the Helnæs Bay. A local person told about flint artefacts he found on the shore and this was the reason to start the search along this place. In order to speed up the survey two groups were formed and brought to places approx. 500m apart. One group investigated in the southern area of the bay and returned with some finds; among these were flint and a lower jaw of an animal (possibly goat?). The northern group went down, finding very deep sediments made of mud at a depth of 5m. These deep muddy area continued almost towards the shore where it suddenly disappears. Closer to the shoreline the mud is soon to be replaced by a thin layer of sand covering glacial clay or grey arine sediments. Peat cores were extracted as well.



Fig.: Faldslet site (red square) and depth measurements plotted on google.earth photo.

Returning from the shallow water area approximately 150m from the shoreline a conspicuous area in 2,9m depth in a submersed promontory/bay was localised with no sea grass growing on it and many stones sticking out of the sand. Divers began to fan the thin cover sands away, which soon brought finds like flake axes, flakes and debris to daylight. These flints were soon followed by other flake axes, core axes, drills, blades and numerous flakes all picked up on an area of around 8m², directly from the underlying grey sediment. Most of the flint was dark and freshly eroded and had not been rolled around by the waves. Large and small pieces were found, which have good chances of being puzzled together to form its original flint nodule. Among them was also a number of flint showing the influence of fire on these objects. Later that day several pieces of bones and suspicious pieces of wood were recovered from the site.

Fig.: Flint finds recovered during first survey (photo F. Feulner).

On the morning of the fifth day the search continued, concentrating the whole dive team on this spot. A measurement system was erected, stretching 15m towards all directions. Divers were ordered to do further search holes every 5m and pick a selection of finds. These search holes yielded the usual amount and type of material with no sign of decreasing numbers. Finally the holes were photographed. The rest of the day was used for demobilization of the dive operations

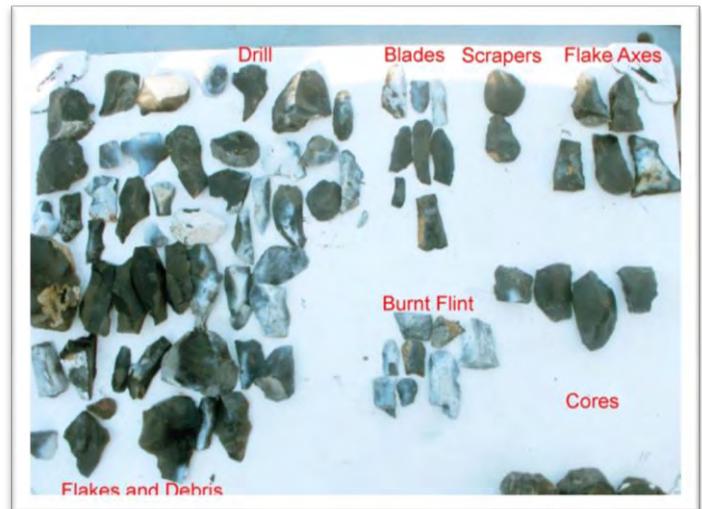


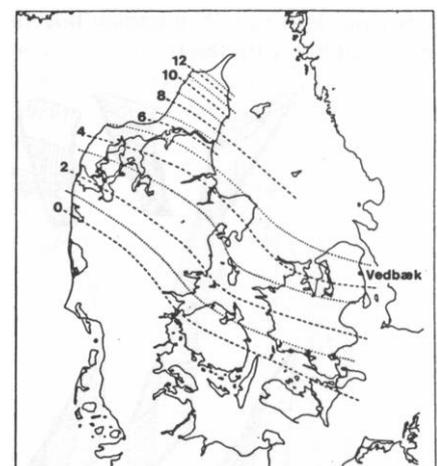
Fig.: Flint finds from the test pits.(photo: F. Feulner).



The Danish Archipelago and its coastal waters is a rich area of Stone Age finds, especially from the Ertebølle culture. The good preservation of finds –even organic ones- is caused by two factors:

- 1) **The tilting of the land.** The weight of the water bound as ice during the last glacial maximum that were situated over northern Europe pressed large parts of the northern landmass down by several meters. After the melting of the Fennoscandinavian ice shield pressure was relieved and northern Europe rose again, pivoting along a tilt axis, that stretches from Jutland to Poland. This change caused once coastal places in northern Denmark or Scandinavia to be situated inland, while on the other side contemporary coastal places in southern Denmark and Germany were literally drowned by the sinking land masses.

Fig.: Tilting of the land (Degn Johansson 200, Fig. 173)



- 2) **The rise of sea level.** Going hand in hand with the melting of the ice caps, the general sea level rose. Melting freshwater from the young Baltic and salt water from the oceans mixed during several stages in the Preboreal/Boreal, forming the Baltic as we know its shape since the Atlantic period.

So these both factors speak for a relatively fast transgression of the sea level, which had an impact on the local coastal populations. Often long visited places along the coast had to be left behind as the landscape changed. Many finds became trapped in mud and finally covered by sand, preserving organic material e.g. trees alike.

Submarine sites are known from the south-western Baltic area from depth up to 10m, although most Ertebølle sites are at around 4-5m depth. Thus looking at the map we have to bear in mind that the transgression of the sea caused by the tilting must be stronger on the German coast and that sea level change/tilting influence decreases towards the north. Therefore a depth of around 3m in this area can speak for an early stage of the Ertebølle culture. The spectrum of finds and the absence of pottery so far backs this first impression.

To sum up I can conclude that the first SPLASHCOS STSM diving field trip was a great success. It offered the participants the chance to directly exchange knowledge, discuss finds and the change of the landscape in this area. The first days of diving were not very exciting, but showing the necessary survey work which has to be done in advance in order to locate new places, failures included. But the last part, the discovery of a possibly full scale settlement site near Falsled proved the whole diving trip worth. Finding a place like this almost on the surface could mean that many other similar sites have been eroded and washed away by currents and wave. The nearby deeper muddy layers need further investigation as there might be a good chance of recovering preserved organic finds.

To optimize a further STSM into the Baltic I would like to suggest an organized field trip by boat/car, offering the participants the opportunity to dive on locations along the Danish and German coastline, getting first hand information from the excavators in charge as well as getting the public involved into what happens with their tax money, e.g. public lectures on local finds and sites in order to convince why the protection of ancient underwater heritage is important, how the broader public can help with reporting finds, what we can learn from the late Mesolithic coastal people.



Fig.: SPLASH-COS STSM 2010 group photo (photo: random guy).



Fig.: Ehud Galili starting a field flint workshop (photo F. Feulner).

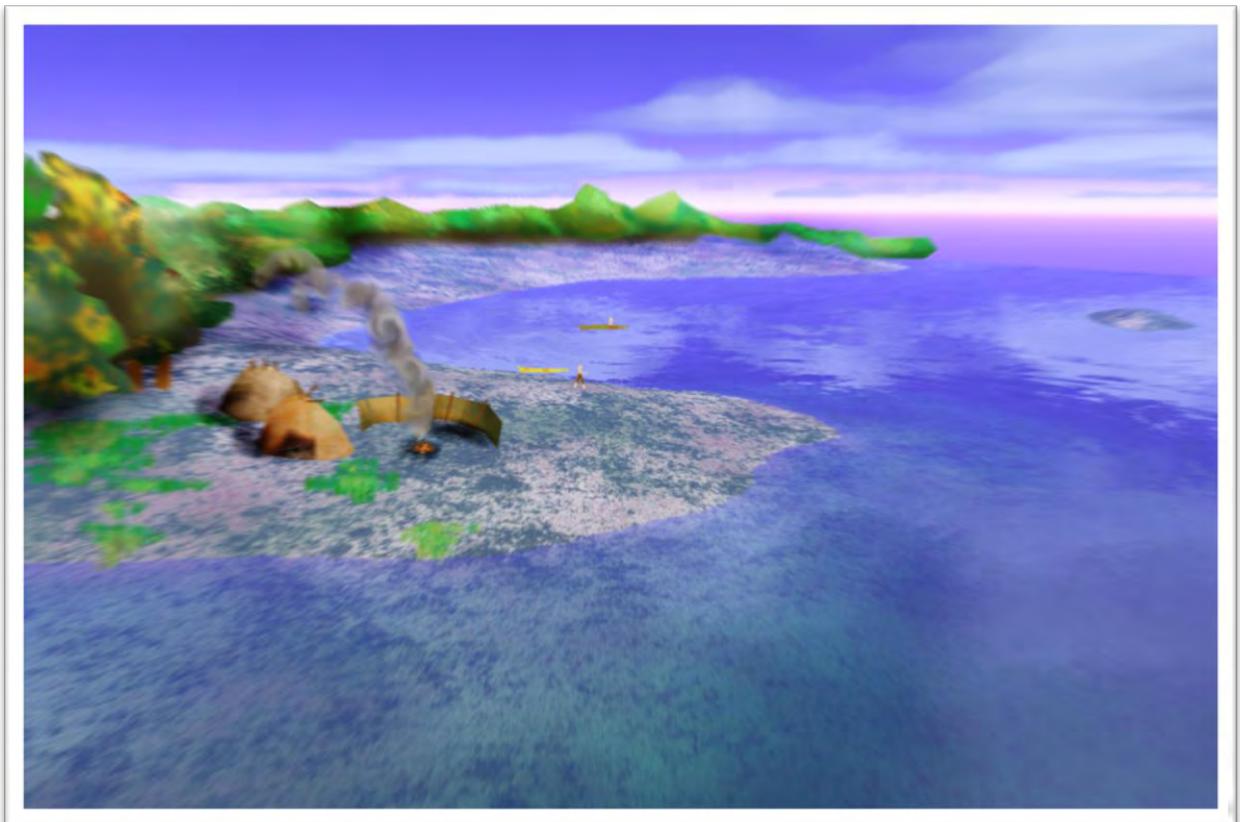


Fig.: Artists impression of promontory at Falsled.