

Underwater Archaeological Investigations of First World War Shipwrecks around the Island of Heligoland in the German North Sea

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Abstract – In the North Sea lies the German Island of Heligoland, which has a long settlement history and great strategic importance, especially in the First and Second World Wars. Many shipwrecks from different periods are present in the waters surrounding the island. The following article presents five German shipwrecks of the First World War that have been documented during the past few years. Four ships sank during the Battle of Heligoland at the beginning of World War One in August 1914, and the U-boat UC 71 shortly after the war, in February 1919. Their conservation and protection are essential to the memory of the atrocities and horrors of war. The results of archaeological research on the wrecks provide important knowledge and previously unknown insights into the sea battles from 1914 to 1918 as well as their present conservation status.

Inhalt – In den Gewässern rund um die deutsche Nordseeinsel Heligoland finden sich aufgrund der langen Besiedlungsgeschichte sowie der militärischen Bedeutung der Insel während des Ersten und Zweiten Weltkriegs zahlreiche Schiffswracks aus unterschiedlichen Epochen. Der folgende Artikel stellt fünf deutsche Schiffswracks des Ersten Weltkriegs vor, die in den letzten Jahren dokumentiert wurden. Vier Schiffe wurden während des Seegefechts bei Heligoland zu Beginn des Ersten Weltkriegs am 28. August 1914 versenkt, während das U-Boot UC 71 kurz nach dem Krieg, im Februar 1919, sank. Ihre Erhaltung und ihr Schutz sind für die Erinnerung an die Schrecken des Krieges und seine Geschichte unerlässlich. Die Ergebnisse der archäologischen Forschung an den Wracks liefern zudem wichtige Erkenntnisse und bisher unbekannt Einblicke in die Seeschlachten von 1914 bis 1918 sowie in den derzeitigen Erhaltungszustand.

The island of Heligoland

Politically affiliated to the German state Schleswig-Holstein since 1890, Heligoland was historically a territory of Denmark, then became the possessions of the United Kingdom from 1807 to 1890, and briefly served as a war prize from 1945 to 1952.¹ The island is located in the Heligoland Bight, part of the German Bight, in the southeastern corner of the North Sea, approximately 69 km by sea from Cuxhaven at the River Elbe estuary (Fig. 1). The German Bight and the island's coastal areas were inhabited since prehistoric times. The island became a major naval base under the German Empire. During the First World War, the civilian population was evacuated to the mainland and Heligoland was fortified with concrete gun emplacements.² This role as a sea fortress continued in the

Second World War. Due to its long settlement history and military importance, numerous shipwrecks from different periods can be found in the waters around the island (Fig. 2).³

A research environment under threat

The North Sea is part of the Atlantic Ocean and located in North-Western Europe. It classifies as an *epieiric sea* with an average depth of circa 90 m. From Palaeolithic landscapes presenting the life of stone-age hunter-gatherers to medieval and modern shipwrecks,⁴ the North Sea is abundant in archaeological sites. A number of sea battles from the First and Second World Wars took place near Heligoland and caused the sinking of many shipwrecks, for instance the Battle of

Heligoland Bight, which erupted west of the island. Whilst their ammunition poses a threat to the marine environment, these warships are simultaneously war graves in need of protection from looting. The North Sea basin is politically divided between the territorial waters of Great Britain, France, Belgium, the Netherlands, Germany, Denmark and Norway, as well as an Economic Exclusion Zone (EEZ).

However, natural and man-made factors pose serious threats to the maritime heritage of the North Sea.

* English Translation: Emily Anderson.

¹ Drower 2017.

² Jentzsch – Witt 2016.

³ Arnhold 2008.

⁴ Warnke 2015, 37.



Natural threats stem from the North Sea's natural environment with strong tidal currents, waves and sedimentation, which are stronger than in the Baltic Sea. Heritage sites and wrecks located directly on the seabed are affected by high salinity (ca. 3 – 3,5 % compared to 0,8 % in the Baltic Sea) and relatively high average temperatures of 10° C, which both facilitate the growth of wood pests like *Teredo navalis* (shipworm). Human activities such as economic exploitation (oil and natural gas), construction of wind farms, chemical pollution and fishing — especially deep-sea-trawling — add to the endangerment of the North Sea's fragile ecosystem. Additionally, an increasing number of divers illegally salvage maritime heritage sites, for example the SMS MAINZ, which was repeatedly looted in 2011, 2015 and most recent in 2016.⁵

The Battle of Heligoland Bight

On the 28th of August 1914, in the western seas of Heligoland, a sea battle between the British Royal Navy and the Imperial German Navy erupted, which had a lasting effect on the outcome of the First World War. The British, having watched the Germans stationed on the island's fortifications over a period of time, scrutinised patrol patterns and routines. They subsequently managed to ambush the Imperial Marine, taking the Fleet completely by surprise. Bad visibility led to confusion during the battle, especially on the German side, resulting in major operational mistakes. Small cruisers were called as reinforcement of the torpedo boats, however, due to lack of coordination, the superior British faced solitary vessels rather than a solid, possibly superior German formation. Further, the fleet of battle cruisers stationed in Wilhelmshaven were delayed by low tide, failing to reach the battle site on time. Despite errors in planning, coordination and communication on both frontiers, the British Navy, albeit by luck, emerged victorious. The German Navy lost the three



Fig. 1: Heligoland, aerial view (F. Huber)



Fig. 2: Wreckage sites of the five German warships. The battle on August 28th 1914 spread across an area of 4.500 square miles within the German Bight (Jana Ulrich)

small cruisers SMS MAINZ, SMS ARIADNE, SMS CÖLN, torpedo boat V 187, and suffered 723 casualties,⁶ whilst on the British side, only the cruiser HMS ARETHUSA obtained severe damage.⁷

From 2017 to 2020, a cooperation between the Deutscher Marinebund e.V. (German Naval Association), Museum Heligoland, the scientific diving company Submaris and further partners surveyed the aforementioned four wrecks.⁸ The archaeological sites were located, documented and identified with modern remote sensing technology, for instance sidescan- and multi-beam-sonar.

Using thorough videography and photogrammetry, the scientific

divers recorded the current conservation status of the wrecks. Unfortunately, it can only be described as poor throughout. Diving operations in the North Sea are only possible during slack tide. The narrow time slot between incoming and outgoing tide must be timed precisely – when the tidal current is almost still. The tide allows an hour of diving operations. Equip-



⁵ Huber 2020.

⁶ According to Groos (1920, 206) 712 officers and enlisted men were killed, 381 were taken prisoner and 149 were wounded.

⁷ Osborne 2006; Jentsch – Witt 2016, 44; Huber – Witt 2021, 164.

⁸ Huber – Witt 2018, 48; Huber – Witt 2021, 164.

ment used by the divers were closed-circuit-rebreathers with a breathing mixture containing helium, called trimix, allowing for a bottom-time of about 30 minutes on the shipwrecks at depths of up to 45 m, followed by a 20–30 minute ascent back to the surface. Very often, the visibility was only to 2–3 m, limiting the orientation on the wrecks which are up to 130 m in length. Strong currents, ammunition, darkness, and discarded fishing gear further added to the complicated working conditions.

Torpedo boat V 187

V 187, in service since 1911, was damaged and lost in the early hours of August 28 at around 10:10 am by British destroyers HMS NOTTINGHAM and LOWESTOFT, both equipped with superior firepower (Fig. 3).⁹ As this shipwreck had not yet been identified at the time of the diving operation, a porcelain bowl and a signal flare cartridge

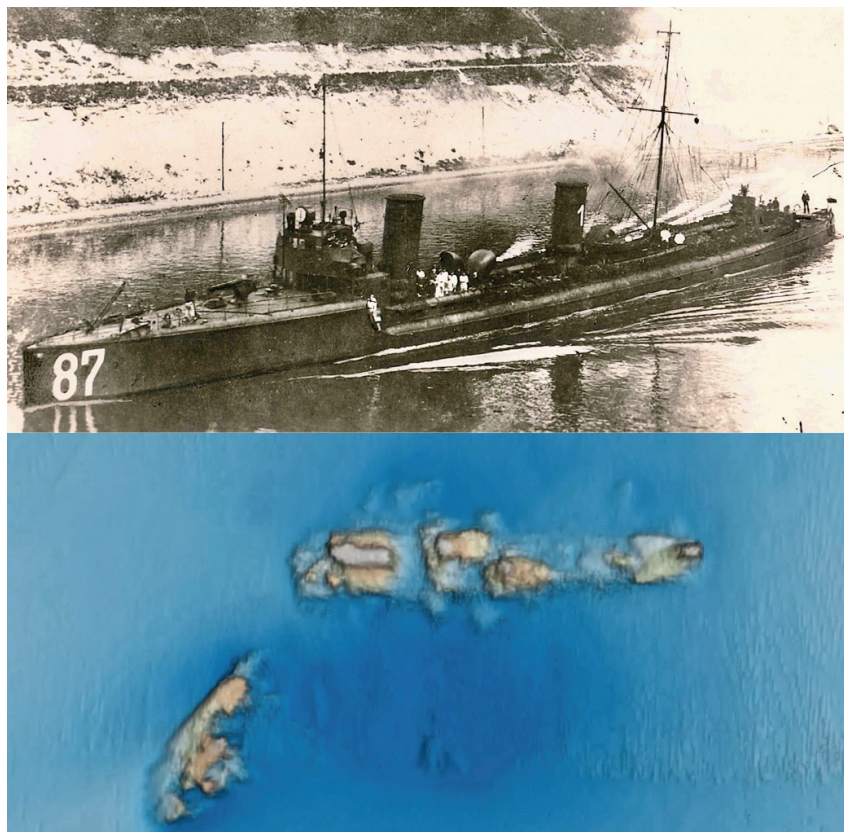


Fig. 3: Torpedo boat V 187, historical photograph and multibeam-image of the present-day site (Collection German Naval Association / Sea War Museum Jutland)



Fig. 4: Torpedo boat V 187, porcelain plate recovered from the ship's mess, with the hallmark of the manufacturer Hutschenreuther in Selb, Upper Franconia (F. Huber)

were recovered for further investigation. The bowl bore the hallmark of the German porcelain manufacturer Hutschenreuther from Selb in Upper Franconia. This narrows the date down to 1887 to 1920, corresponding with the sinking date of V 187 (Fig. 4).¹⁰ The flare cartridge was a brass calibre 4 (colour red) with a circular grooved base, exactly the type used by the German Imperial Marine.¹¹ The examination of the recovered and in situ artefacts, combined with the vague coordinates of the ship's sinking, the dimensions and construction of the shipwreck as well as a torpedo, confidently allow for identification as the lost torpedo boat V 187.¹²

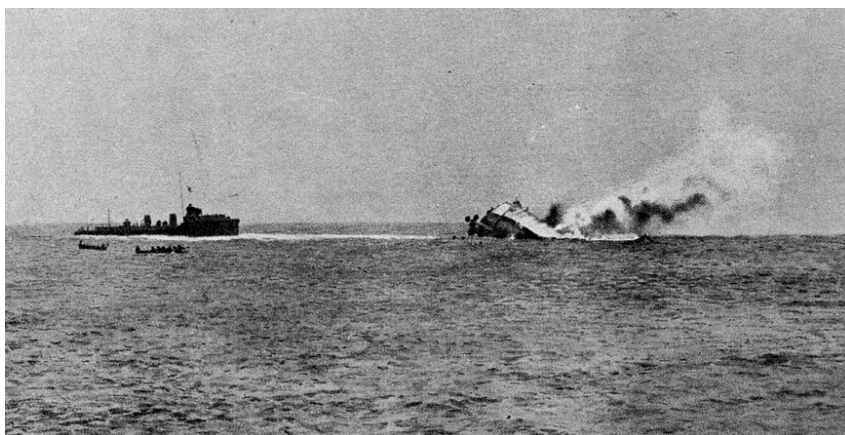


Fig. 5: The sinking SMS MAINZ (Collection German Naval Association)

⁹ Koop – Schmolke 2004.

¹⁰ Klingenbrunn 1990, 399.

¹¹ Scheidt 2008, 28.

¹² Huber – Witt 2021, 164.

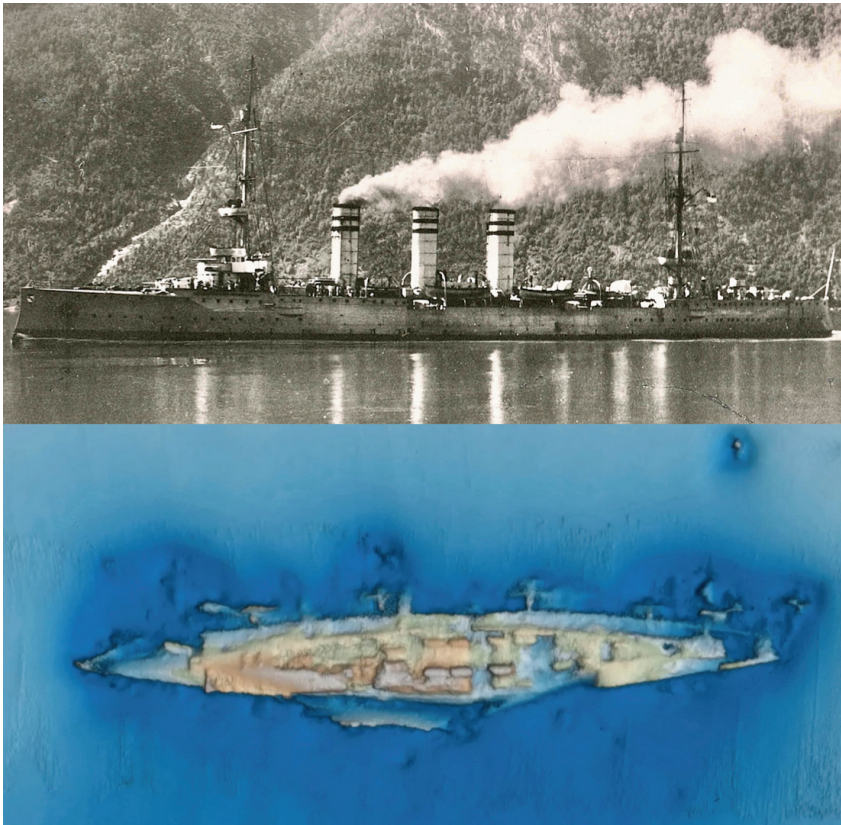


Fig. 6: SMS MAINZ, historical photo and multibeam-image of the present-day site (Collection German Naval Association / Sea War Museum Jutland)

SMS Mainz

SMS MAINZ, 130 m long and 14 m wide, like SMS CÖLN, was a small cruiser of the Kolberg class, a series constructed by the AG Vulcan in Stettin and the successor of the Dresden class.¹³ It was first commissioned in 1909. The Kolberg class was the first series of ships equipped with a turbine engine. On the morning of the 28th of August at around 10:00, SMS MAINZ left the estuary of river Ems towards Heligoland, where, at noon, it encountered several British destroyers and opened fire (Fig. 5). During the ensuing battle, numerous grenades and a torpedo struck the SMS MAINZ, causing irreparable damage. The commander ordered the ship to be scuttled, to avoid the warship being seized by the British (Fig. 6). The crew opened the flood valves resulting in the vessel's sinking 40 minutes later, at 14:10.

Presently, the shipwreck of the SMS MAINZ lies at a depth of 30 m and has been repeatedly looted by Dutch divers, who then boasted

their actions on Facebook and YouTube. They were reported to authorities and faced charges of theft and disturbing a grave. Following a house search, numerous artefacts from the SMS MAINZ were



Fig. 7: A gun from SMS MAINZ that was illegally salvaged by Dutch divers. Today it belongs to the Military History Museum of the German Armed Forces (Militärhistorisches Museum der Bundeswehr) in Dresden and has been restored.

seized and handed over to the Military Museum in Dresden (Fig. 7).¹⁴

SMS CÖLN

This small cruiser was built in Kiel by the Germania shipyard, commissioned in 1911.¹⁵ Its dimensions are 130 m long and 14 m wide. During the British attack on German patrols on August 1914, several small cruisers, including the SMS CÖLN, were deployed as reinforcement. However, at the time of the attack, the battle cruisers were located in the Jade river and unable to sail due to low tide – a severe setback to the Imperial Marine. SMS CÖLN initially encountered the British cruiser HMS ARETHUSA and eight destroyers, engaged in combat with SMS MAINZ. Together with SMS STRASSBURG, SMS CÖLN joined the battle but then unexpectedly encountered five British battle cruisers. In the face of British superiority, both Imperial cruisers attempted to retreat from battle. Despite heavy resistance to British fire, by 14:35, the SMS CÖLN, now nothing more than a burning wreck, sank (Fig. 8), taking with her 506 lives. One sole survivor, chief stoker Adolf Neumann, was rescued unharmed after three unbelievable days drifting on the sea and brought to Heligoland (Fig. 9). He later gave an eyewitness account of the events



¹³ Koop – Schmolke 2004.

¹⁴ Due to the Covid-19 pandemic, no scientific dives could be carried out on the wreck.

¹⁵ Baum – Dollhoff 1988.

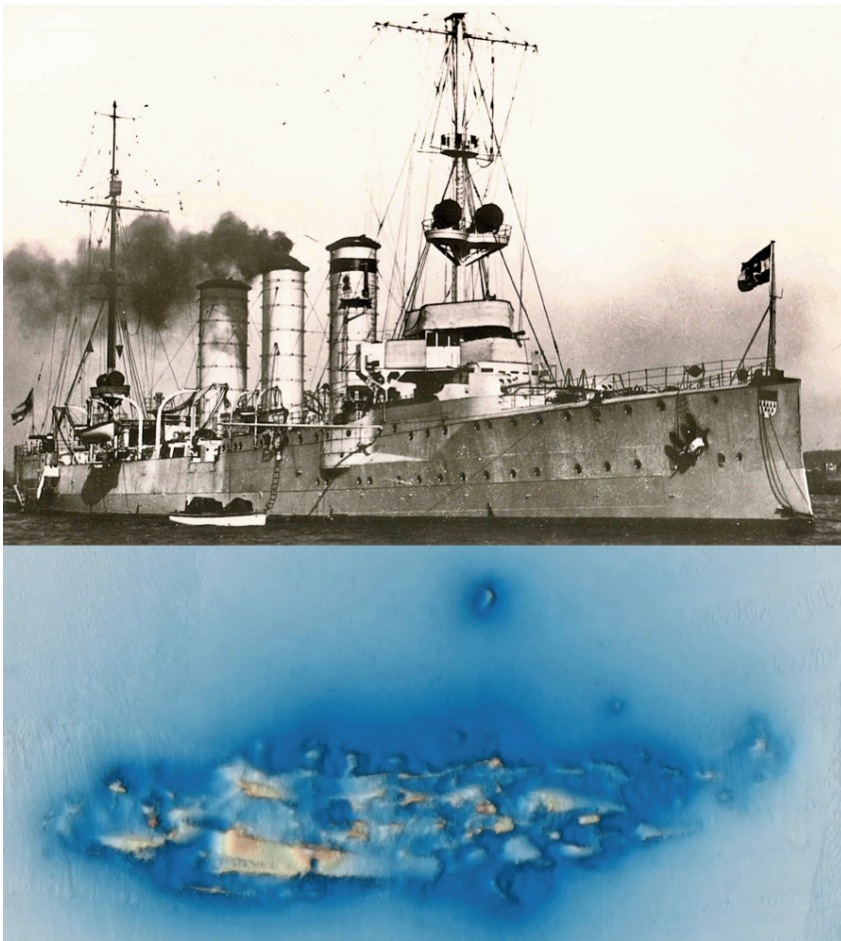


Fig. 8: SMS CöLN, historical photo and multibeam-image of the present-day site (Collection German Naval Association / Sea War Museum Jutland)

on the ship and his three days at sea. His narrative ends with the burial of a fellow soldier on Heligoland:¹⁶

“On the 9th of September, a sailor’s body has washed ashore. Inquiries about his person, facilitated by his nametag sewn into his clothing, identified him as a crewmember aboard the SMS Cöln. He received

the first-ever military burial with honours in Heligoland. As I stood at his grave and threw three handfuls of soil, a feeling of unease crept upon me. Here I stood, the sole survivor from our ship, paying my last respects to the dead comrade. Of all people present, only I knew of his last moments fighting and his death.”



Fig. 9: The sole survivor from the small cruiser SMS CöLN, chief stoker Adolf Neumann (Neumann, Cologne)

The wreck of the SMS CöLN lies at a depth of approximately 40 m (Fig. 10). It was discovered by coincidence in 1979 and demolished by detonation shortly after, to clear the modern shipping route. Thus, it is severely damaged and almost unrecognisable as a ship. Only a few construction elements can be safely identified (Fig. 11) and some artefacts, that were probably recovered before the demolition are displayed in the Museum “Windstärke 10” in Cuxhaven.¹⁷

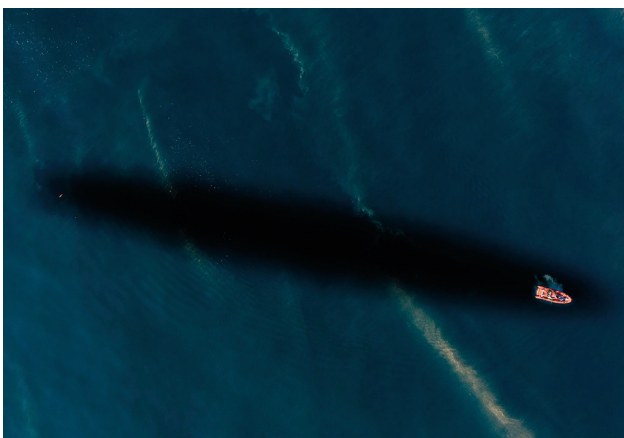


Fig. 10: Size comparison: Sketched outline of SMS CöLN and working vessel KLEIN OTTO (U. Kunz)



Fig. 11: Scientific Diver at one of the twelve rapid-firing-guns of SMS CöLN (10,5 cm L/45) (C. Howe)

SMS Ariadne

Constructed by AG Weser in Bremen and commissioned in 1901, this 105 m long and 12 m wide ship was the fifth of the Gazelle series.¹⁸ This type marks the first series of small cruisers of the Imperial Navy and is a direct result of the Naval laws of 1889. On August 28th SMS ARIADNE encountered a British battle cruiser formation under the command of admiral David Beatty. The cruisers gave chase and engaged with SMS ARIADNE in short-distance combat. The small cruiser sank at around 16:25 to a depth of just over 40 m, where it lies with its keel upright on the sandy-muddy ground, in relatively good condition (Fig. 12). It is mostly intact, apart from the decaying hull with holes up to 1 m wide caused by rusting material. A false keel made of oak wood is preserved along most of the hull, which is an unconventional construction element of German warships from this period. Following an older tradition, the false keel was attached onto the metal to protect the hull in case of ground contact (Fig. 13). The two three-winged propellers, 3,5 m in diameter, are missing, possibly removed during the 1970s alongside the demolition of SMS CÖLN.¹⁹

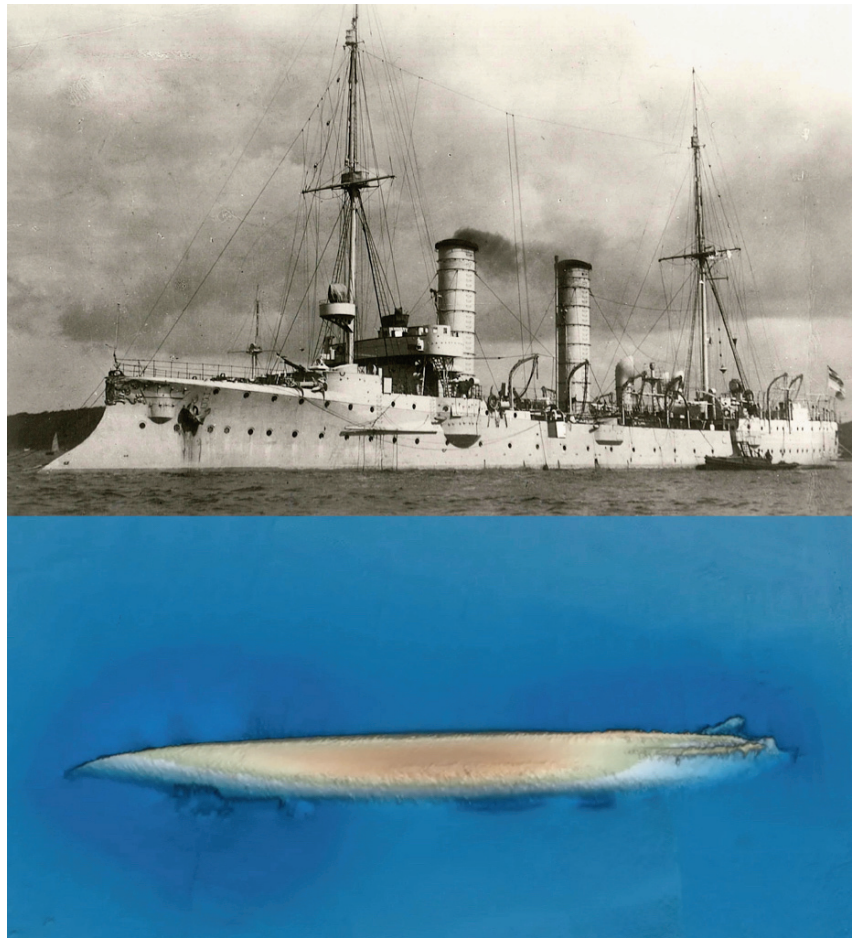


Fig. 12: SMS ARIADNE, historical photo and multibeam-image of the present-day site (Collection German Naval Association / Sea War Museum Jutland)



Fig. 13: A scientific diver extracts a wood sample from the false keel of SMS ARIADNE (C. Howe)

U-Boat UC 71

UC 71 was an Imperial Naval U-Boat of the UC-II type, constructed by the shipyard Blohm & Voss and launched on the 12th of August 1916. It was 53 m in length and able to reach depths of up to 50 m, generally carrying a crew of 26 (Fig. 14). One of the main advances in construction compared to its predecessor UC-I-type was the double hull. The 40-m-long, 11 mm strong cylindrical pressure hull was reinforced by a second, non-pressure-resistant hull, 3.5–4 mm strong. This created an inter-hull space, where fuel, trim and ballast tanks were placed, providing increased stability and better seagoing quali-



¹⁶ Baum – Dollhoff 1988, 24.

¹⁷ Huber – Witt 2021, 164.

¹⁸ Koop – Schmolke 2004.

¹⁹ Huber – Witt 2021, 164.



Fig. 14:
Possible photo of UC 71
(Sammlung Württembergische
Landesbibliothek / BfZ)

Fig. 15:
UC 71, watertight bulkheads and
portholes, all opened, within the wreck
(U. Kunz)



ties. For instance, the relocated fuel tanks increased the fuel supply to 41 t, compared to 3.5 t in the UC-I-type U-Boats. By firing torpedoes, mines and grenades, UC 71 caused the sinking of 61 ships in the North Sea, the English Channel and the Gulf of Biscay.²⁰ The ship was supposed to be turned over to the Allies after the German surrender. However, according to an official letter telegram, it sank shortly after departing from the southern entry of Heligoland towards England due to severe weather conditions on February 20th, 1919. Because of its specialised construction and extraordinary history, UC 71 is of significant historical, scientific and technical value. During a private initiative in cooperation with the Alfred-Wegener-Institute (AWI) in 2001, it was possible to identify the wreck, which lies at a depth of around 22 m.²¹ An initial survey and subsequent extensive research took place in July 2014. Using

photo- and video-documentation, scientific divers recorded the conservation status and further investigated the cause of the U-boat's sinking.²² Additionally, the divers used ultrasonic thickness measurement for the inner and outer hull, revealing the decay of the pressure hull from 11 down to only 4.3 mm.²³ Nevertheless, the wreck is still in relatively good condition, which can be attributed to its location within a natural reserve, banning diving and fishing activities. An extraordinary feature is the conning tower still standing upright. Towers are missing on most other submarine wrecks, as they are easily damaged and destroyed by trawling nets. The most significant discovery made during the initial dives of this campaign were the open portholes on the upper decks whilst only the tower hatch was shut – suggesting an intentional sinking of UC 71. During further diving operations, the portholes

and bulkheads within the wreck were found open (Fig. 15). Although the telegram blames bad weather, UC 71 was probably intentionally scuttled, and the whole operation was disguised as an accident.²⁴

In the summer of 2016, the net cutter, measuring 4.10 m long and weighing around 100 kg, was recovered using lift bags and an electric winch. It was subsequently given to the State Museum Schleswig-Holstein at Gottorf Castle in Schleswig. Net cutters were used against anti-submarine-netting, and were installed along the Strait

²⁰ Bendert 2001, 175.

²¹ Fröhle – Kühn 2005

²² Huber 2015; Huber 2020, 107.

²³ McCarthy 1998.

²⁴ Huber 2015; Huber 2019; Huber 2020, 107.



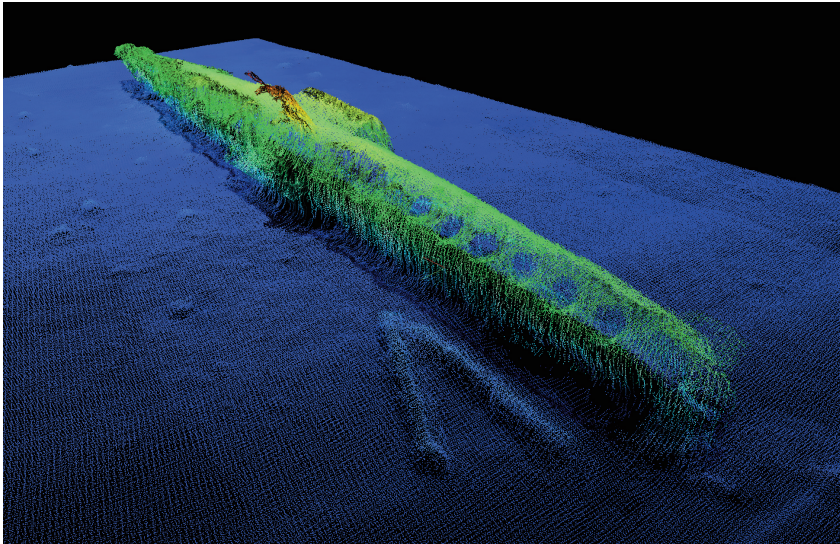


Fig. 16: UC 71, multibeam image of the two torpedoes which had fallen off. The six mine shafts are visible at the top (Sea War Museum Jutland)



Fig. 17: UC 71, diver next to the torpedoes, which have fallen off between 2016 and 2019, a further foreboding sign that UC 71 is slowly decaying (F. Huber)

of Dover, every river's estuary and port entry in England, draped in the water like curtains.

The net cutter was fastened on top of a submarine's bow, with two steel cables attached front and back, that stretched across the tower and towards the stern. Its purpose was to lift and guide away the nets, which were often laced with mines. Occasionally, the cutter was reinforced by a second saw blade attached under the hull. The net cutter in Schleswig was restored after three years and is now displayed in the newly designed museum on Heligoland. A TV crew accompanied both the archaeolo-

gical survey in 2014 and the recovery of the net cutter, creating documentaries that aired shortly after. Upon watching these documentaries, Kay Dzierzanowski remembered his great-great-uncle, Georg Trinks, from Niedersieffenbach in Saxony, who was chief mechanic aboard UC 71.

Georg Trinks served in 18 tours between November 9th, 1916 and May 25th, 1919, recording his impressions, fears, and experiences in ink, pencil, and sometimes just coloured pencil on paper. His two diaries, written in Kurrent (a form of cursive), have since been transcribed and published. They offer a

unique personal insight into daily life aboard a U-Boat during the First World War. The latter part of the second diary finally sheds light on the cause of its sinking:²⁵

“UC 71 has bravely endured until the liberation of Bruges and was transferred to Hamburg shortly before the revolution. In January 1919, it set out on its last voyage towards England, but never reached the English port, as it suddenly sunk just off the coast of Heligoland. No Englishman should ever set foot on the boat, that was the will of the crew and they succeeded. The crew was rescued by an escorting fishing steamer, which was recruited as precaution.”

The historical context for the scuttling is evident. Following the armistice of Compiègne, the order stated to surrender the majority of the German naval vessels, including all U-Boats, to the Allies.²⁶ Resistance against these sanctions reached its climax in the scuttling of the fleet detained at the British naval base Scapa Flow on the 21st of July 1919. The scuttling of UC 71 can be seen as an action in line with this response, demonstrating an opposition towards the Treaty of Versailles. A public and official sinking of UC 71 would implement a breach of the peace treaty, which could have prompted the Allies into further warfare.²⁷

The archaeological research, the resurfaced diaries, accompanied by TV documentation and other forms of publicity, finally put closure to the mysterious sinking of UC 71.²⁸ In early 2019, in cooperation with the Sea War Museum Jutland, the wreck was revisited and scanned using a high-definition multibeam, revealing two elongated tubular objects near the submarine's bow, which had not been present in 2016 (Fig. 16). Diving missions on



²⁵ Huber 2019, 245.

²⁶ Doepgen 2005, 16.

²⁷ Doepgen 2005, 25.

²⁸ Huber 2019; Huber 2020, 107.

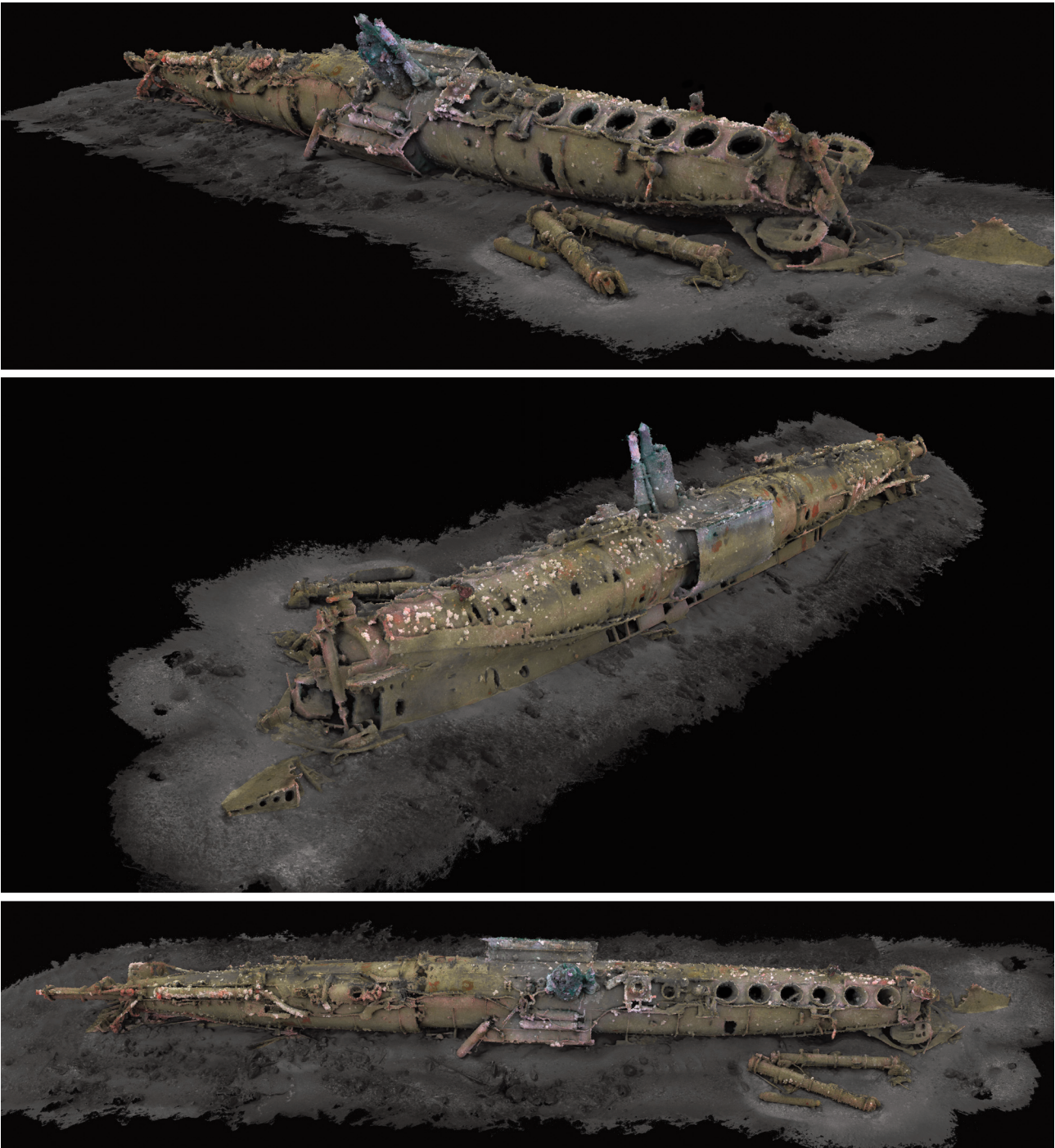


Fig. 18: Despite poor visibility and current, it was possible to document the wreck of UC 71 completely in order to create a 3D model. The printed model will be presented at the museum Helgoland from 2024 onwards (3DVisLab & Submaris)

the wreck identified these as the two torpedoes, which detached from the body due to progressing corrosion (Fig. 17). Consequently, the decision was made to record the wreck using photogrammetry before decay continued. In cooperation with the 3DVisLab at the University of Dundee, Scotland, UC 71 was filmed with four cameras in 4K resolution in the summer of 2023. Around 30.000 photos were later extracted from the

video clips and processed into an accurate digital 3D model using the software Metashape (Fig. 18).

Summary and the significance of World War Wrecks

Most battles of the First World War took place on land and are commonly associated with trench warfare in Verdun on the Western Front rather than the sea battles in

Skagerrak or Gallipoli. Nevertheless, these battles had a substantial impact and were significant in their indirect effects on the course of the war. According to UNESCO, there are as many as 10.000 shipwrecks from the First World War worldwide. These shipwrecks – alongside their Second World War counterparts – are complex archaeological sites. A few are in good condition, but most of the wrecks have been severely damaged or de-

stroyed by commercial salvage, looting, scrapping, and deep-sea trawling. A recent example is SMS MAINZ which has been repeatedly looted by Dutch divers. Although the wrecks are witnesses to one of the most significant conflicts in recent history, there has only been little research. In addition to their value as historical resource, representing the high state of technology in the 20th century, their conservation and protection are essential for the memory of the horrors of war and its history. The results of archaeological research on the five wrecks presented above provide important knowledge and previously unknown insights into the sea battles from 1914 to 1918 and present conservation status.

Extensive public outreach through TV documentaries, articles, books, and the new exhibition at Heligoland Museum serves to inform and sensitise the public about historical events. Eyewitness accounts from Adolf Neumann on SMS CÖLN and Georg Trinks on UC 71 add a human component to the shipwrecks and their stories. After all, these five shipwrecks took part in a war that involved 70 million people and claimed the lives of 17 million. The sites of SMS MAINZ, SMS CÖLN, and SMS ARIADNE are located outside German territorial waters within the EEZ (Exclusive Economic Zone), hence, no heritage protection law of a German state applies. V 187 and UC 71 on the other hand lie within the waters of Schleswig-Holstein. A similar situation occurs related to the battle of Skagarrak in 1916. These wrecks are located within the EEZ of both Denmark and Norway. The “Convention on the Protection of the Underwater Cultural Heritage” by UNESCO²⁹ came into force in 2014 and applies to First World War Heritage Sites. Currently, neither Denmark, Norway, nor Germany have ratified this convention.

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²⁹ McCartney 2016, 259.