

Navies churn seas

Laws of physics governing Hot Soup in a Cup

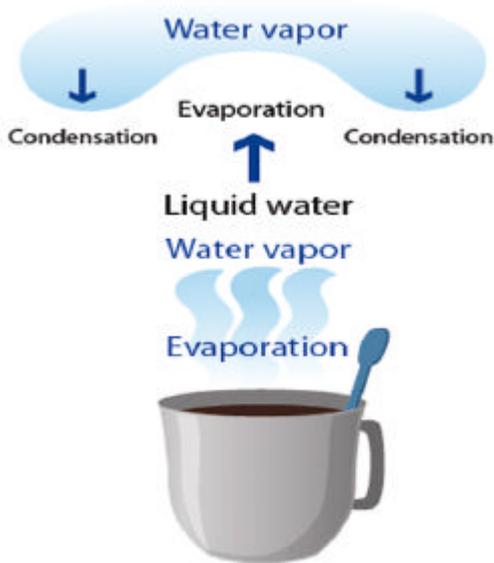
Laws of physics also apply to hot soup in a cup. WWII unleashed tremendous military forces unheard of in history. Millions of soldiers marched up and down the battlefield. Thousands of naval ships ploughed oceans and seas day and night. When war broke out, the most affected seas were the Baltic and North Sea. Both of them would have normally stored heat to their highest capacity by the end of August. Since the last Ice Age, they lay idle in autumn to serve as a substantial heat reservoir during the forthcoming winter season, when days are short and sunrays contribute little to regional weather conditions. Together with the Gulf Current, west of Great Britain and Norway, these seas ensure moderate winters in Northern Europe. These seas decide whether Western Europe, at the north of the Alps, has maritime or continental winter climate. Winter 1939/40 turned out to be extreme continental in Northern Europe.

Allowing navies to participate in a war at sea, in Northern Europe's natural heat reservoir, is like hastily stirring a hot soup to cool it down for quick consumption. Once the soup in a bowl is cooled down, it will not warm up again naturally. Likewise, once the heat storage of Northern and Baltic Sea is diminished, water will warm again only during the next year's summer. Once the navies were out at sea in autumn 1939, the inevitable happened. Arctic cold was to come during winter 1939/40. Naval activities during the first four war months (from September to December 1939) were a force to reckon, as it will be demonstrated in the following section. Although it might appear as if some sort of naval history is presented, this is in no way intended. It is presented only with the purpose to awake the awareness that warring navies in early WWII days were effective enough to stir and churn the seas about like a spoon moving in a cup of soup.

“A spoon in a cup”

Dimension matters when considering the effect of a spoon stirring the soup in a bowl. In oceanic terms, Northern Europe’s enclosed seas are only 0.2% of the global sea surface and a mere drop with respect to the total volume (0.0026%). Nevertheless, they play a vital role as their size is roughly one-fourth of North-Western Europe. With regard to the effect of a ‘turning about’ of sea areas, the available depths also matter considerably. In North and Baltic Sea, depth is not significant,

i.e. a mere average of 50 meters. In comparison, Mediterranean Sea has an average depth of 1,500 metres and sunrays warm the sea even in wintertime. It matters if a ship moves through a moderate water depth or a sea mine explodes only a few meters above the seabed. In those days, battleships had an average size of about 35,000 tons, a draught of 10 metres and a speed of 32 knots (ca 60 km/h). Accompanied by a number of escort destroyers across the seas, battleships



turned huge water areas around. Suddenly, there were thousands of naval ships out on the sea, hunting enemies or being hunted from shore, air, surface ships or submarines. Our following task is to describe which mighty forces have been set in motion before the war winter plunged to arctic cold, in mid-January 1940 (for the first time) and in mid-February (for the second time). Our proposition is to demonstrate that the image of a spoon moving in a hot-soup-cup corresponds to the huge naval force which was active in North and Baltic Sea during the initial war months of 1939.

Naval Fleets

By December 1939, the number of main naval ships belonging to Germany, Great Britain, France, Italy, the Soviet Union and Italy had amounted to more than 1,000 vessels (including submarines, torpedo boats, etc.) with a total tonnage of 2.8 million, plus at least another thousand smaller vessels and boats serving for example as minesweepers, etc.

- **Great Britain:** 250 big naval vessels (183 destroyers and bigger vessels) and ca. 57 submarines;
- **Germany:** 30 big naval vessels (21 destroyers and bigger vessels) and 57 U-boats.

Merchant Fleet and Convoy System

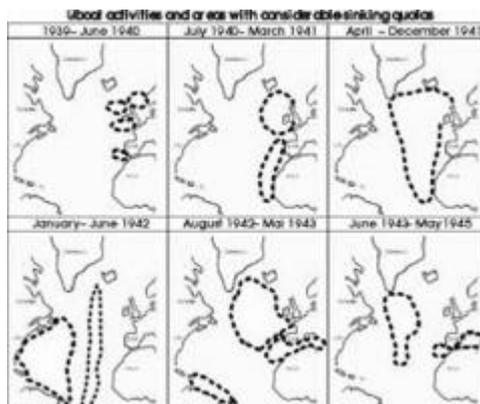
World merchant fleet comprised 30,000 ships with a total tonnage of about 70 million when war commenced. Presumably not more than two thirds of the fleet were fit for ocean crossing. British fleet was by far the largest, with 20 Million tons, followed by Norway, with 5 Million tons, Germany, with 4.5 Million tons, and France, Holland and Italy, with about 3 Million tons each.

German merchant fleet was swept away from the oceans before the end of the year: taken as war prize, scuttled by its crew or seeking refuge in neutral ports. Vital transportation requirements in the Baltic Sea and ore shipment from North Norway required about 600 ship voyages per month, with additional requirements after the occupation of Norway (1940).

As far as Britain was concerned, shipping was of utmost importance. No effort was spared to maintain it functional. Atlantic supremacy was meant to ensure sufficient supply to Great Britain at any time. Allies introduced the convoy system without delay, a very successful measure during WWI, supported by the First Lord of the Admiralty, Winston Churchill, who considered it "the dominating factor all

throughout the war. ...Battles might be won or lost, enterprises might succeed or miscarry, territories might be gained or quitted, but our power to carry on the war, or even to keep ourselves alive, is represented by our mastery of the ocean routes and the free approach and entry to our ports"⁶.

Convoying meant that up to 50 ships sailed in four to five columns, frequently altering course by up to 90 degrees simultaneously (zigzagging), while naval escort vessels formed a shield around them. During WWII, on the 5th of September 1939, the first deep-sea convoy of eleven troop transporters sailed from Clyde for Gibraltar, escorted by the battleship *Ramillies* and eight destroyers. On Wednesday the 6th of September, the first of the East Coast convoys sailed from the Thames up to the Firth Forth. By the end of the war, coastal convoys around the United Kingdom amounted to 7,700, together with 173,000 merchant ships.



The threat of submarines and raiders was felt everywhere. Ships zigzagged the seas on their own. The British cruise liner “Andorra Star” crossed the Atlantic in 10 days (NYT, 13 September 1939), while the US liner “Manhattan” sailed from Bordeaux to the States escorted by two US Navy destroyers in mid-September (NYT, 17 September 1939). Britain announced that it would arm 2,000 merchant ships with guns (NYT, 1 October 1939). Within 12 months, 3,000 vessels were armed with a 4.7-inch gun⁷ each. By December 1939, 5,756 ships had sailed in convoys⁸. By the end of the year, only twelve

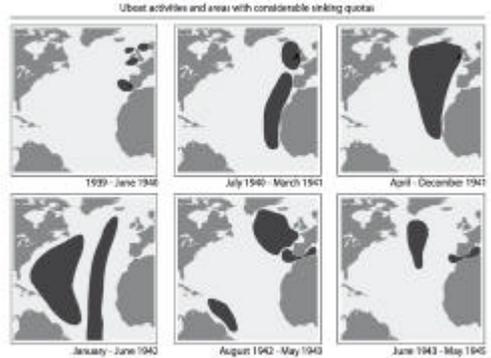
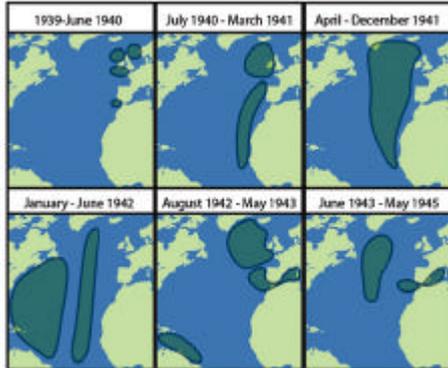
⁶ Source: www.usafa.af.mil/dfh/harmon_series/docs/Harmon36.doc.

⁷ Slader, John; ‘The Fourth Service’ -Merchantmen at war 1939-45’, Corfe Mullen, Dorset, 1995, p. 56.

⁸ Winton, John; ‘Convoy - The defence of sea trade 1890-1990’, London 1983., p. 128

vessels and five stragglers from convoys were torpedoed by U-boats and sunk. The total loss amounted to the tonnage of 421,156⁹.

Main operation areas of German U-Boats in the North Atlantic during six time periods

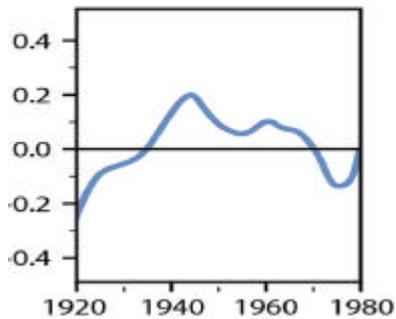


The German U-Boats which numbered about 1000 units at the end of WWII could only operate over certain time periods in certain areas of the North Atlantic; further B/W page 66



Naval war activity areas from 1942-1945

Marine Northern Hemisphere Air temperature deviation



The decrease of air temperatures since 1940 can be linked to naval war

⁹ Winton, p. 130.

Submarine – U-boats

When war started, German and British Navy had 57 submarines each. Britain eventually employed 270, the Germans about 1,000.

British submarines had the difficult task of intercepting well-protected German shipping around Northern Europe by direct torpedo attacks or by mine laying missions. Although Britain never managed to operate in the Baltic Sea during WWII, Royal Navy submarines took a heavy toll on German troop transporters, supply ships and escort vessels, quickly forcing the Germans to adopt defensive convoys when operating in the North Sea or, after 1940, in the Norwegian waters. During the Second World War, British submarines were supposed to have sunk 475 merchant ships, 105 warships and 36 submarines and to have damaged many others.

What happened to submarines in North Sea and elsewhere since the 1st of September 1939, for five years day by day, may be illustrated by a news report headlined: "British Submarines' Crew, Bombed All Day At Bottom of Sea, Passes Time by Betting", (NYT, the 6th of October 1939), "the Admiralty today released a story about the crew of a trapped, crippled British submarine who ran a penny sweepstake pool at the bottom of the North Sea while the Germans groped for them with sweep wires and shattered bombs and depth charges for twenty-four hours. During the first hour, six depth charges sounded faintly and, during the second hour, the explosions, louder and nearer, averaged every two minutes". Another report from the same date states: "British destroyer patrolling northeast of the English Channel had trapped two German submarines early this week and forced them into a mine field where they exploded and sank" (NYT, the 6th of October 1939).

However, the submarine warfare during WWII meant both success and failure to German U-boats in North Sea and North Atlantic, which were deputed to cut Great Britain off vital supplies from Canada and USA. About a dozen German U-boats were already in the Atlantic

when the war started, in September 1939. Others operated in the European waters. Also in September 1939, groups of three to five naval vessels of the Royal Navy were formed in order to patrol large areas. These groups criss-crossed the seas day and night, searching for U-boats and dropping depth charges when a Uboat was detected or assumed to be around.

On the 14th of September 1939, U-39 operating near the Hebrides shot its torpedo at the 22,000-ton aircraft carrier 'Ark Royal', but missed. Escorting destroyers *Faulkner*, *Foxhound* and *Firedrake* depth-charged U-39 in a series of attacks, as reported by an eyewitness: "We gained ASDIC Contact with the Sub and each ship in turn went in at full speed and fired a pattern of depth-charges. *Firedrake* attacked last. As we came out of it and heard our depth charges explode, we thought we had missed, until up it came vertical like a huge cigar and then flopped down slowly"¹⁰. U-39 surfaced briefly, then sank. Attacks of U-29 succeeded a few days later. 22,000-ton British aircraft carrier 'Courageous' was on an enemy hunt along with four destroyers in the Southwest approaches (Southwest of Ireland), 150 nautical miles WSW of Mizen Head, Ireland, in the early evening of 17th September 1939. The carrier could travel at a speed of 30.5 knots (56 km/h). But HMS *Courageous*' days were numbered. "A German submarine struck a telling blow at the British Navy last night by sinking the 22,000-ton aircraft carrier *Courageous*, with loss of an unknown number of its complement of 1,100 officers and men. It was the first real success scored by the German Navy in this war." (NYT, the 19th of September 1939) From a salvo of three torpedoes, two hit the *Courageous* on portside. The destruction was devastating as Sub-Lieutenant Charles Lamb describes it: "There were two explosions, a split second apart, the like of which I had never imagined possible. As if the core of the earth exploded and the universe split from pole to pole, it could sound no worse... In the sudden, deathly silence which followed, I knew the ship had died.' The *Courageous* turned over and sank within fifteen minutes, with a loss of 519 of its crew. Lieutenant

10 / www.hmsfiredrake.co.uk/firedrake7.htm

Wesmacott 'heard two violent explosions which seemed to lift the ship'. (NYT, the 19th of September 1939)

Depth Charges

This section is about ASW, namely anti-submarine-warfare. A depth charge is a 'drum' containing explosives with a fuse which is detonated at a preset depth and which is based on hydrostatic pressure. Developed in 1916, during WWI, a depth charge could detonate up to 100m depth and carried 150 kg of explosives. There was little development for this weapon between the wars except for a 300kg variant. At the start of WWII, depth charges were essentially the same weapon as it existed at the end of WWI. This situation changed quickly.

In September 1939, The New York Times wrote about the procedures of U-boat hunting: "Once a submarine is located, British naval plans, so far as they were known before the war, call for attack by familiar methods of an enclosing diamond pattern of depth bombs, supplemented, of course, by shell fire and ramming if the submarine could be forced to the surface. In the diamond-pattern attack, the destroyer goes at full speed to the spot where the submarine, slow and clumsy under water, is thought to be. One depth bomb is charged just before the spot is reached. A few seconds' later two more are lobbed out by a Y-gun so that they land out on either side of the destroyer's wake. In the front part of the diamond pattern, another depth bomb is dropped over the stern, some distance ahead of where the Y-gun fired. This way a large area of the sea is covered by this diamond pattern. The effect is further increased by the fact that the bombs are timed to go off at different levels, so that the area is covered not only horizontally but vertically as well. The bursting area of a modern depth bomb is considerable". (NYT, the 16th of September 1939)

Evaluating the intensity of the destruction caused by the explosion of depth charges from sea surface to sea bottom is not easy. Many naval vessels were not out on sea for combat reasons, but for training,

surveillance or testing, etc. For many commanders the situation was new and they took precautions against imminent or assumed threats, as the following report illustrates it: “Russian commanders of the transport ships and torpedo boats were so much afraid of being attacked by a Finnish submarine in the Gulf of Finland that they set off depth charges every 15 minutes or whenever an unconfirmed sighting of a periscope was reported, all that resulting in a total of 400 depth charges having been dropped by the end of the operation that day”¹¹.

On the 29th of November 1939, at dawn, U-35 was cruising east of the Shetland Islands, in the North Sea. At the sight of the British Destroyer ‘*Icarus*’, the U-boat crash-dived to 70 m depth and started steering evasive courses. As ‘*Icarus*’ electronic devices for U-boat localisation were out of order, depth charges set for 80m were dropped in order to feign an attack. Two nearby destroyers were alerted. After contact had been established, two more depth-charge attacks followed, jamming U-35 diving plans and placing it at a sharp up angle. Crew was sent to the ship’s bow to bring it back on even keel, but all their efforts were in vain. Explosions had also destroyed the fuel and ballast tanks aft. U-35 appeared suddenly at the surface and the crew was ordered to abandon the ship, but their attackers rescued them.¹²

“During the first sixteen months of war, an estimated number of 33 U-boats were destroyed in about 4,000 depth charge attacks.”¹³ Each attack could mean the use of a few or, from the contrary, of many dozens of depth charges. The total number of depth charges dropped per month could easily reach several thousands. German naval vessels hunted Royal Navy submarines, too. Up to 10,000 or even more depth charge explosions could have occurred below the sea surface during the first four months of the war.

11 Dyke, van. Carl; ‘The Soviet Invasion of Finland 1939-40’. London, 1997, p.54

12 Source: /www.u-35.com/war/

13 Hackmann, Willem; ‘Seek and Strike’, Sonar, anti-submarine warfare and the Royal Navy 1914-54 , London 1984, refers who to six months, but the number 33 U-boats was only reached in late 1940), p.303.

Since then, development of depth charges focused on increasing the depth at which a submarine might be successfully attacked, due to improvements to their sinking speed. Since 1943, the detonation of depth charges carrying a charge of 100 kg of TNT at a depth of 300 meters became possible.

Arial bombing at sea

Neither the German navy nor the British one had a fully operational aerial arm at the beginning of WWII. The German Navy never got one. British Royal Air Force Coastal Command became operational in 1940. However, airplanes charged with bombing missions were operating frequently (British airplanes in the Helgoland Bight and German airplanes on England's East coast) or were attacking the enemy in the open sea. On the 3^d of September 1939, Britain was in possession of a fully operational unit of 2,600 aircrafts¹⁴; the Germans had nothing less.

A few out of many hundred events are listed below in order to offer you an outline of what happened during the first few months of the WWII.

The 4th of September 1939: The First RAF raid of about 30 planes. Organised in separated groups, they targeted a fleet of Nazi naval vessels in the German Bight (Wilhelmshaven and Brunsbüttel). One officer reported (NYT, the 15th of September 1939): "The enemy held his fire until we were almost over our targets. Then suddenly he opened every gun he could bring to bear on us. (The pilot described) the anti-air-craft fire 'terrific', especially from the larger warships, which seemed to carry seven anti-air-craft guns on either beam". About seven RAF planes were lost in mission.

The 27th of September 1939: "Nazi Planes Raid the British Fleet" (NYT, the 28th of September 1939). "Yesterday afternoon, a squadron of British capital ships together with an aircraft carrier, a cruiser and

14 Sauders, Hilary St. George; 'Royal Air Force 1939-1945', Vol. III, London 1954, p. 379

destroyers were attacked by about twenty German aircrafts in the middle of the North Sea. No British ship was hit and no British casualties were recorded. One German flying boat was shut down and another was reported to be badly damaged” (NYT, ditto). “This attack was made by fourteen German land bombers”, it is said (NYT, the 29th of September 1939). “Last Tuesday, about twenty German planes attacked a British Patrol in the North Sea”. (NYT, the 8th of October 1939)

The 29th of September 1939: “Six British planes have attacked a German naval squadron near Helgoland today” (NYT, the 30th of September 1939). “Five out of 11 Hampdens (planes) are shot down by German fighters”

The 9th of October 1939: “British cruisers hunting submarines in the North Sea (southern coast of Norway) fought off German bombers, which attacked repeatedly”. “The bombers attacked again and again. And anti-aircraft guns blazed from the decks of the warships” (NYT, the 10th of October 1939). “Also a German naval flotilla with more than a dozen ships; while the British employed 12 Wellington bombers, the Germans sent almost 150 planes to the battle scene but without any success”.

The 11th of October 1939: “Since the war broke out”, Sir Kingsley said, “the coastal command flew a distance of approximately 1 million miles on reconnaissance, anti-submarine and patrol missions, and provided escort for 100 convoys. Submarines were sighted by planes on seventy-two occasions and, on thirty-four times, the planes were able to attack”, he said. (NYT, the 11th of October 1939)

The 17th of October 1939: “Nazis bomb naval base in Scotland”. “About a dozen German planes yesterday rained bombs on British naval vessels in the Firth of Forth near Rosyth, Scotland” (NYT, the 17th of October 1939). “Three ships are slightly damaged; two bombers are shot down, crashed in flames at sea”.

The 21st of October 1939: Fighter planes shot down four German bombers out of nine which were deputed to attack a British convoy off the Humber estuary.

The 5th of November 1939: “Our outlook shouted, ‘Planes right ahead, Sir; three planes; they are diving, Sir’. Our foremost guns opened fire with a roar that drowned everything. The muzzles were elevated almost level with the bridge and yellow flames sprang out, obliterating the shapes of the German machines swooping over the convoy. The sea leapt up in columns where their bombs were dropped.” (NYT, the 5th of November 1939)

The 7th of November 1939: First sorties of German torpedo-carrying aircrafts were targeted against a British destroyer, but without any success as the torpedo missed the target.

The 14th of November 1939: “Nazi planes bomb Shetland Island”. (NYT, the 14th of November 1939)

The 22nd of November 1939: “Three Royal air force planes send a Dornier (bomber) into the sea before it reaches the coast”. (NYT, the 22nd of November 1939)

The 14th of December 1939: Twelve RAF bombers attacked German warships in Helgoland Bight, but ended up by losing six “British Bombers and Messerschmitts fight; both sides lose planes in Helgoland battle” (NYT, the 15th of December 1939). “Nazis claim ten planes have been shut down” (NYT, the 16th of December 1939).

The 17th of December 1939: German bomber planes attacked trawlers near the English east coast and sank 10 boats of approx. 3,000 tons.

The 18th of December 1939: “Driven away from the English coast, two German bombers dived out of the clouds above the 487-ton British motor ship *Serenity* today, riddled its decks with machine-gun

fire and then dropped 18 bombs until one struck it and sent it to the bottom”. (NYT, the 18th of December 1939)

The 19th of December 1939: ‘Air Fleets fight off Helgoland’. ’34 down say Nazi’. “The biggest air battle of the war occurred yesterday when British bombers encountered German pursuit ships over Helgoland Bight” (NYT, the 19th of December 1939). The loss was 12 planes out of 24 RAF Wellington bombers deployed.

The 21st of December 1939: “German aircrafts attacked thirty-five vessels, including two neutral ships during the last three days”, the Admiralty announced tonight. “Of the ships attacked, one coasting steamer and six fishing trawlers sank.” (NYT, the 21st of December 1939)

Sea mines

During WWII the Allies and the Axis countries had laid about 600’000 sea mines in the European and Atlantic waters. Comparing mining activities during the four autumn months of 1939 to those 65 months that followed (1940-1945), one may tend to think that this short period of four months is hardly significant and therefore it can be ignored. This would be wrong for the subsequent reasons.

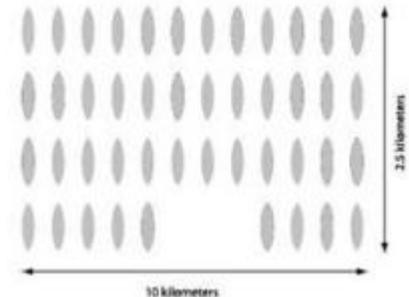
During the first four months of war, the ‘monthly-average’ of mines laid was 10 times higher than during the next five years and could have been somewhere between 50,000 and 100,000 or even more, due to the following facts:s

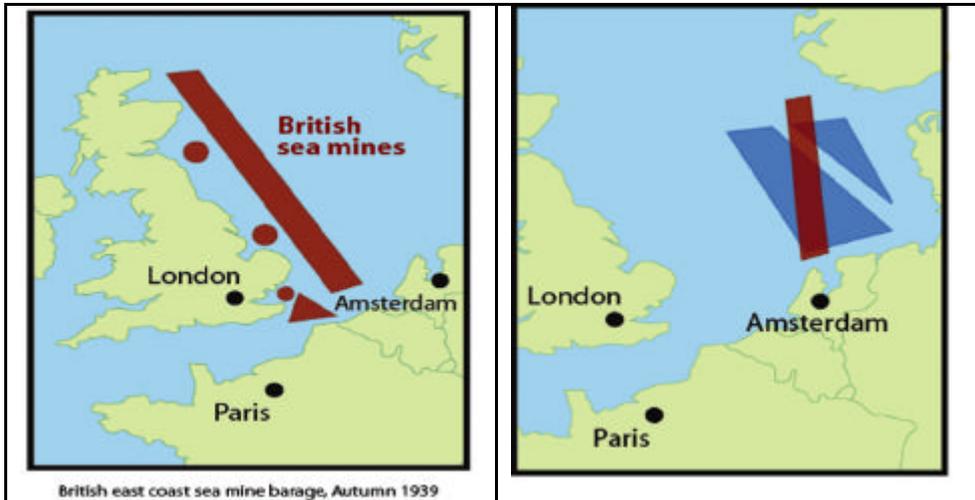
- a. The countries could immediately use their accumulated stockpile;
- b. Sea mines were regarded as ‘cheap’ weapons and it was not difficult to produce them in large numbers;
- c. Neutral countries also could and did use mines as a ‘defensive measure’.

East Coast Barrier

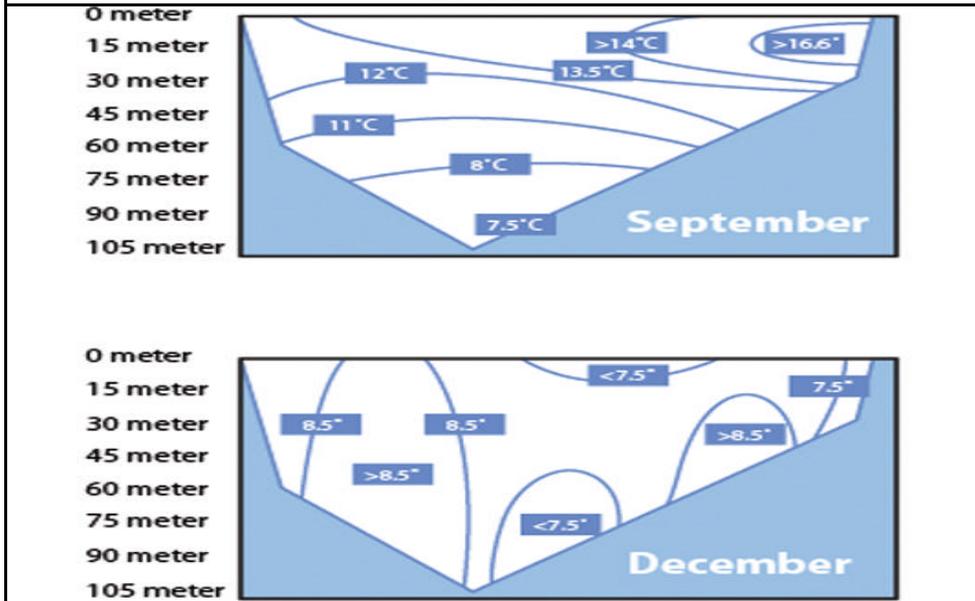
The British successfully mined their East coast from Dover to Orkneys during the first few months of the war. In September 1939 alone, the British minelayers *Adventure* and *Plover* laid 3,000 mines across the Strait of Dover. In the second half of September, the barrage was completed with 3,636 U-boat mines, which soon paid results, Germany losing three U-boats in October. The British set up the East Coast Barrier, a mine barrage between twenty and fifty miles wide, from Scotland to the Thames, leaving a narrow space for navigation between the barrage and the coast. In late 1939, the British Admiralty intended to lay a 500-mile minefield of unprecedented size, a barrage in a strip of thirty to forty miles. That was a “gigantic effort to check the German submarine campaign” (NYT, the 31st of December 1939). In early January 1940, it was reported: “British naval vessels are sowing some of the last mines needed to complete Great Britain’s 30,000,000-pounds protective shield for east-coast shipping, which is the most extensive mine field ever laid.” (NYT, the 11th of January 1940) If one assumes that the weight of those mines varied between 300 and 1,200 pounds, the number of mines laid in autumn along the east coast alone would be between 25,000 and 100,000 mines.

A mining mission on the 17/18th of October 1939: The German destroyers ‘*Galster*’, ‘*Eckholdt*’, ‘*Lüdemann*’, ‘*Roeder*’, ‘*Künne*’ and ‘*Heidkamp*’ took on their cargo of 60 mines each (except ‘*Heidkamp*’) at Wilhelmshaven and departed at noon, racing northwards first, at 30 knots, as a misleading measure, then, at dusk, turning westwards for the target area: the mouth of the Humber. In the early hours of the 18th of October, the five destroyers began their task, between the Humber Estuary and the Withernsea Light. On completion, the destroyers headed home at full speed. This minefield of 300 mines eventually sank seven ships.





Sea mines areas with presumably 200'000 mines laid already before years end of 1939



The lower graph shows the water temperature profile between Hull and Jutland between September and December with an average temperature loss over the upper depth of ca. 50 metres of about 2-7° Celsius

Helgoland Bight (Deutsche Bucht)

German Navy engaged very actively in planting contact mines starting from the Netherlands' coastal waters (near Terschelling island) and going northwards across the Helgoland Bight up to the entrance of the Skagerrak, at a distance between 50 and 100 km off the coast of Schleswig-Holstein and Denmark, called the "Westwall". The most north-westerly point announced by the Germans as 'Dangerous zone' was the position 56°30' North and 4°25' East. That was about half the distance between Skagerrak and Scotland. The first minefield locations were near Terschelling, Esbjerg, Helgoland and two places near Jutland (NYT, the 5th of September 1939). Specific warnings had been given to more than 100 Danish fishing cutters from Esbjerg (NYT, ditto). It was reported that one unidentified cutter had been blown up seventy miles west of Wyl light ship (NYT, ditto). For about three weeks, a flotilla of at least 25 naval vessels was engaged in laying mines along the "Westwall".

It was difficult to verify how many mines the flotilla had planted during the first few weeks as it was not possible to get reliable figures about the stockpile the Germans had on the 1st of September. The number of mines laid during this period could be somewhere between 20,000 and 200,000. But as the distance from Terschelling to 56° 30' North is of about 350 kilometres (170 sea miles) and as the 25 naval vessels deployed for this task were able to cover thousands of mines per day, it seems reasonable to assume that, by the end of September, at least the first 10,000 mines were laid and, by the end of October, 20,000 were in place. The "Westwall" was more or less complete in the following months. According to a NYT report, one minelayer could lay 300 mines per hour (NYT, the 18th of February 1940). During the early days of WWII, one-third of the total of 200,000 sea mines of the German Navy would have been laid in the North Sea. Home Fleet's surface vessels undertook a number of missions as well, with the purpose of laying mines in the German home waters. Such an illustrating example would be the mission undertaken by the British

destroyers *Esk* and *Express*, which laid mines where “Westwall” ‘exit channels’ were assumed to be.

Mining the Baltic Sea, 1939

War had just started when the 1,555-ton, Greek ship *Kosti* hit a German mine, two miles south of Falsterbo/Sweden, on the 4th of September, and sank after a terrible explosion in the minefield of the Great Belt and west of the Danish island of Zealand. (NYT, the 5th of September 1939) Danish Government made public its plans of planting mines in its own waters. (NYT, ditto) On the 4th of September, the Germans laid about 1,000 mines at the entrance in the Danish waters and continued so during autumn as well. Situation worsened day-by-day for six long years. It is difficult to verify the number of mines the Germans planted in the Southern Baltic Sea. In the Western Baltic Sea, it would have been many thousands before the winter of 1939/40 arrived and, as a result, the German Baltic waters suffered the impact of a compact ice cover since January 1940.

Other riparian countries planted mines as well. With the help of minesweepers *Czajka*, *Jasolka* and *Rybitwa*, even the Poles managed to drop 60 mines south of Hela (Gdanska Bight), on the 12th of September. The Soviet Navy started laying mines in the Gulf of Finland in late September. A number of mining activities of Germans, Finns and Russians took place in November and December 1939. The total figure of mines laid in various parts of the Baltic Sea in late 1939 could reach several ten thousands.

Finally, more recent information: In 2001, a multinational squadron of minesweepers of the North Atlantic Treaty Organisation and Baltic States was searching for old mines in Latvian waters. According to Baltic experts’ estimation¹⁵, over 80,000 mines laid during first and second world wars remained in the territorial waters of Baltic countries.

15 /english.pravda.ru/cis/2001/11/19/21327.html

Chronicle of a few mining events

The number of serious sea mining events during the initial war months presumably goes up to several thousands, out of which only a few will be listed below:

3-9 September 1939: Four U-boats dropped magnetic mines in the estuaries of Orfordness, Flamborough, Hartlepool and the Downs, sinking four vessels with a total tonnage of 16,000 and damaging one ship of 11,000-tons.

4-20 September 1939: Several minefields laid in Western Baltic Sea to seal off the passage through Danish waters caused the following incident: The US *Mormachawk* sailed with pilot assistance through a German minefield in early September 1939 when five loose mines blew up 500 to 800 yards away. (NYT, the 20th of September 1939)

The 21st of September 1939: Soviet Navy plants mines in the Gulf of Finland to protect Kronstadt and Leningrad. (NYT, the 22nd of Sept.39)

The 17th of October 1939: Mine operation near Humber - German torpedo boats and destroyers sank seven vessels.

The 21st of October 1939: On 21st October and 25th November German mines sank their own German Coast Guard ships, south of the Great Belt. (NYT, the 26th of November 1939)

The 6th of November 1939, off Copenhagen shore: "Gales have loosened several hundred mines in the German mine fields. Drifting mines exploded breaking windows and frightening citizens with their terrific detonations." (NYT, the 6th of November 1939)

The 23rd of November 1939: Mines sank 22 ships in six days. (NYT, the 23rd of November 1939)

The 1st of December 1939: England claimed to have mined an area of 300 square miles between the Schelde and Thames estuary. The freighter *Sheaf Crest* of 2,730 tons struck a mine and sank. (NYT, the 1st of December 1939)

The 3rd of December 1939: “A British tanker was sunk by mines near the southeast coast of England. *San Calisto* (8,010-tons) struck two mines which went off with such a force that the blast shook buildings on shore”. (NYT, the 3rd of December 1939)

The 4th of December 1939: “A third German mine patrol ship was blown up this afternoon, north of the mine fields off Denmark, it sank in less than two minutes; its entire bottom was blown up”. (NYT, the 5th of December 1939)

The 5th of December 1939: German cruiser *Nürnberg* lays mines in the area Kristiansand/Skagerrak.

The 6th of December 1939: Sweden mined her waters opposite to Aland Islands. (NYT, the 6th of December 1939)

The 17th of December 1939: Four British destroyers laid 240 mines in the delta of the river Ems.

Minesweeping

Minesweeping was another particularly effective means of churning and turning huge sea areas about day by day since war started. A standard mine was the moored contact mine, a buoyant material filled with explosives of up to 1,000 kg. To nullify their effect, special ships used distant means to cut the mooring chain or wire attached to the mines to keep them afloat. Sometimes they exploded before reaching the surface but if they surfaced they were blown up by rifle shots.

Germans used magnetic mines for the first time in November 1939. The NYT soon reported that: “Some wild stories have appeared here

suggesting that the Germans have invented a so-called ‘magnetic mine’, (NYT, the 22nd of November 1939). Actually, one magnetic mine was discovered on the shore near Southend, UK, on the 22nd of November, and was examined by the Navy’s mining school. Only two countermeasures were available against magnetic mines. One was to explode the mine by towing a cable, which passed an electric current through water. From the point of view of the climate, this was the worst possible result. The mine exploded at its location, at a depth of 20, 50, 100 metres or more, producing the highest possible “stirring” effect in the water column above. The other countermeasure was to deactivate the ship’s ‘magnetism’ so that it could pass near the mine without activating it.

Minesweeping proved to be a tremendous round-the-clock operation, travelling millions and millions of miles in the sea for detecting and destroying the ‘weapon in waiting’. The efforts made during WWII had been tremendous. German Defence machinery against Allied mining involved 46,000 personnel, 1,276 sweepers, 1,700 boats, and 400 planes, whereas the British Defence against Axis mining involved 53,000 men and 698 sweepers¹⁶. When, on the 19th of November 1939, five ships were destroyed by mines, the urgent need of a huge mine sweeping operation became obvious (NYT, the 20th of November 1939). The discovery of a ‘sample mine’, on the 22nd of November, confirmed significantly the effectiveness of these countermeasures. The British Admiralty put quickly a pre-war plan into action, whereby some 800 commercial trawlers, drifters and whalers were requisitioned, fitted out with wire sweeping gear and their crews trained accordingly.

“Stirred and shaken”

The destructions of war at sea are usually accounted in sunken merchant tonnage or enemy naval ships destroyed. The total loss of

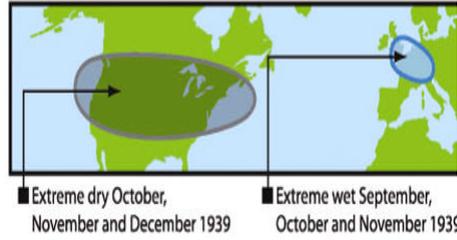
16 Hackmann, Willem; ‘Seek and Strike’, Sonar, anti-submarine warfare and the Royal Navy 1914-54, London 1984, p.344.

merchant ships from all causes was of about 380 with a tonnage of 1 million, whereby British, Allied and Neutral accounted for 320 vessels and about 900,000 tons. These are the figures relating to the sunken ships in UK waters:

- September 1939: 33 ships totalling 85,000 tons;
- October 1939: 24 ships totalling 63,000 tons;
- November 1939: 43 ships totalling 156,000 tons;
- December 1939: 66 ships totalling 152,000 tons.

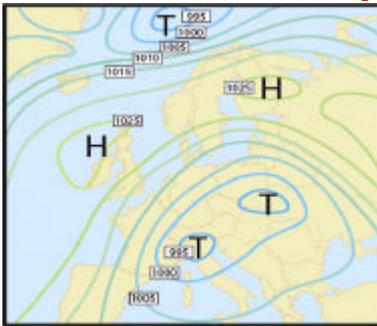
In addition, the Royal Navy lost: one battle ship; three destroyers; one aircraft carrier; one armed merchant cruiser; ca. 10 trawlers; two U-boats; and a number of smaller units. The German Navy lost 9 U-boats and, from its bigger units, the pocket battleship *Graf Spee* on the La Plata, in December 1939.

However, the sinking of about 500 big objects with several thousands of dead sailors and service men may tell a lot about man and material loss, but little about the violent shaking of climatically sensitive seas. Since war commenced, many hundreds of vessels ploughed the seas day and night in numerous naval activities. A battleship at cruising speed of 30 knots causes a water column of about 12 meters over an area of 72 square km, within a period of 24 hours. Only 300 such ship movements over one month are needed for turning the complete North Sea surface layer about. And naval war in 1939 was lasted four months until the arctic winter 1939/40 arrived. Until that moment, up to several thousands of explosions caused by bombs, sea mines, depth charges and shells had taken place above and under the sea surface of the Northern European seas. The climatically relevant seawater structure was, in the sense of statistical average, severely affected by anthropogenic actions. A cold winter was inevitable as explained in the next section.



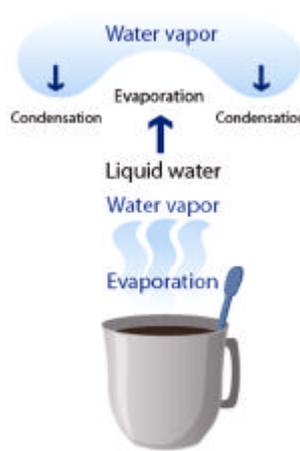
The map shows a number of areas with relevance for the general weather conditions in autumn 1939, B/W p.85

While Central Europe had excessive rain, four weeks later the USA saw extreme little.



200% to 300% rain above average during October & November 1939

Air pressure on 27th October 1939 – First signs that Atlantic depressions loses supremacy in Europe



A mere three meter sea-water layer holds as much heat as the total high of the atmosphere of more than 10'000 meters. Heat in the atmosphere is mainly due to water vapor coming from the oceans, and in the air for only 14 days. .

Central Europe with extreme rain up to more than 300% of long-term average