

## G2 What does the 'Battle of the Atlantic' mean to the marine environment?

### a. Introduction to WWII Atlantic matters

The North Atlantic covers about  $1/10^{\text{th}}$  of the earth's surface and reaches depths of as much as 4,000 meters. But not the sheer water mass is what steers the weather alone but many physical parameters of considerable complexity. There is no possibility to consider, or to explain this here. This investigation has only two parameters in mind, namely temperature and salinity structure in the sea surface layers as far as they can be affected by human activities. Ship navigation may shovel warm and low saline surface water to deeper layers. A submarine or a depth charge can push colder water to the sea surface. A sinking ship, its cargo, or stores, may force water from as deep as one hundred or thousand meters to the sea surface. As there are many combinations of human activities possible in the marine environment that alter the structure of temperature and salinity. Due to the sheer uncountable combination by which man operates in the marine environment during war time, it would be of little help to discuss them all in detail. It will not be of any help to distinguish between the summer and winter season, which was the principle tool for investigating the three extreme war winters in Europe from 1939-1942. For such a distinction the North Atlantic is simply too big, and too much dominated by a complex current system.

The justification for this consideration stems alone from two reasons.

\_\_\_First: If the war winters 1939-1942 can evidently be linked to naval war activities in Europe, then a contribution of the biggest naval warfare ever, that took place from 1939 to 1945 could have been a contributor to the mid 20<sup>th</sup> century global cooling as well.

\_\_\_Second: As long as the reasons for this cooling period are not convincingly explained, the Battle of the Atlantic should be regarded as a serious contender, or at least, not be excluded.

As in the previous chapters, the physical matters in focus are the two relevant main climatic parameters of sea water, namely its heat and salinity structure. Both have a strong influence on the internal current. The investigation is not about pollution or other physical/chemical properties. Including the issue of pollution would be not helpful, and could complicate the task considerably. The ocean change issue is, in my opinion, much more sensitive than previously anticipated, as recently acknowledged by *Quirin Schiermeier*: "*the discovery that a large patch of the ocean cooled by 0.3 °C within a few years around 1970 is a small sensation*" (see previous section). Who can definitely exclude that the Battle of the Atlantic could not have brought about a temporary temperature change of 0.1°?

### b. Physical stress to the Atlantic?

The section shall be kept short, as this writing is not about naval war. Even many dozen pages would not necessarily be sufficient to get a feeling of what the Battle of the Atlantic has done to the marine environment. Although the Atlantic between Europe and North America is huge in size and volume, a war related issue can not be excluded. But which information and figures would be sufficient enough for everybody to get an indication?

### c. For example: Atlantic Convoys

How to assess for example the impact of convoys with 20 to 50 ships on the sea structure, which is attacked by one or several submarines. What has happened to a sea body, with regard to temperature and salinity structures, after a convoy such as SC 118 consisting of 64 slow vessels had finished its Atlantic crossing? The convoy covering a wide area of over fifty square-miles was protected by several escort vessels after two more US destroyers and a coastguard ship had joined the convoy somewhere south of Greenland in heavy seas on February 5, 1943. From 60 submarines in the area, 16 were sent out to form a trap. It became a feast for the hunter but a nightmare for the hunted. Thirteen ships were destroyed and sunk by torpedoes; followed by three depth-charged submarines (*Slader*, 1995).

Two weeks later a westbound convoy ONS 166 consisting of sixty-three vessels and six escort vessels was sent out. Hampered by constant northwest gales, the convoy averaged only 4 knots (ca. 8 km/h) over four days, upon which a five day battle commenced which covered over 1,000 miles of sea space. In the course of this battle 14 vessels were sunk. One long distance airplane sank U-623. At that time these airplanes (VLR Liberator) were able to stay in the air for half a day and to search and attack submarines for hours.

- Remarks:

- \_\_\_The Allies lost 3,500 merchant ships and 175 warships in more than 100 convoy battles and perhaps 1,000 single-ship encounters.
- \_\_\_Total loss of bomber and fighter planes difficult to verify but certainly several thousands (see over next section on air planes).
- \_\_\_Total release of bombs, depth charges, and torpedoes, is difficult to verify but the total number is presumably many hundred thousands.
- \_\_\_Total release of shells and other explosive means, difficult to confirm, but presumably many millions.



Figure G2-1; Convoy in the South Atlantic

#### d. The chapter air planes in naval warfare matters

The use of the planes in war in the Atlantic made tremendous headway since the USA had entered the war after the Pearl Harbor attack in December 1941. The US production was estimated at 127,000 planes in 1942, exceeding the total number of German aircraft production during the whole war period (Overy, 1980). It meant that more aircraft with much improved quality and capability were available for surveillance, bombing and combat missions in the Atlantic. Even in August 1942 only eighteen American B-24 aircraft, called 'Liberator' were available to service Atlantic convoys. These planes had a range of 2,400 miles, had fuel tanks carrying

2,500 gallons fuel and reached heights of 30,000 feet (Slader, 1995). From the winter 1942/43 onwards long-range aircraft were assigned for anti-submarine warfare in the Atlantic, which sank 33 submarines between April 1943 and September 1944 (Overy, 1980). 209 long-range bomber aircraft were available to the US navy in July 1942. The number increased progressively to 2,200 searching and chasing U-boats between June 1943 and May 1944.

Also the German Luftwaffe flew bombing missions over the Atlantic in 1942 and 1943 that only diminished after D-Day (June 1944) while the Allied air force presence in the Atlantic improved impressively. The British Coastal Command flew approximately 238,000 sorties, totalling 1,300,000 flying hours (Thomas, 1990). Fourteen U-boats were confirmed destroyed with another twelve damaged.

The German Luftwaffe had not been well equipped to put up a significant performance in the North Atlantic battle. However, they had a few hundred long-range four engine planes in service, which flew from bases in France in 1941. During the month of August 1941, they succeeded in sinking more than 300.000 tons of shipping, i.e. almost one-third more than the U-boats sank in the same month. Axis airplanes shall have sunk a total of about 800 merchant ships in all war theaters. Even if less than half of that number has been sunk in sensitive waters of the Northern Atlantic and Northern Pacific, it actually meant the use of many ten-thousands of bombs and the plunge of many thousand of planes

into the oceans as well. The aerial sorties of the Luftwaffe over the Atlantic ceased after D-Day in June 1944.

### e. German/Axis U-boats

In August 1942 the German U-boat fleet had reached the number of 340, which were almost 300 boats more than three years earlier. During the whole war period, the U-boat force was comprised of about 1,100 boats, of which 850 participated in at least one combat mission, 630 were destroyed in enemy attacks.

- Loss incurred by German U-boat attacks (all told) is 2,822 vessels (14,220,000 tons).
- The Italians 152 boats sank 132 vessels (700,000 tons).
- The Axis U-boat fleet (German, Italian, and Japanese) is credited with the sinking of 25 large naval vessels, 41 destroyers and about 150 other naval vessels.

The main field of operation of the U-boats was the Atlantic. They were quite successful only from 1942 until March 1943. A special chapter is the period in early 1942 when U-boats operated extremely successfully along America's East coast. Within half a year they had sunk about 400 vessels. In two weeks a handful of U-boats could sink 25 ships with a total tonnage of 200,000, of which 70% were tankers. If every downed tanker carried about 2,500 tons of oil the total amount ending in the marine environment could have reached the total tonnage which the "Deepwater Horizon" accident discharged in the Gulf of Mexico in 2010 (here calculated with 780 mio. Litres). In summer 1942 the U-boat operation 'Paukenschlag' (Drumbeat) ended. The US Navy had become very effective. That had been six months of naval war in very sensitive waters, which had the potential to influence the Gulf Stream and the North Atlantic up to the UK and Norway.

### f. Atlantic Sea Mines

A barrage of 110,000 mines laid by Britain between 1940 and 1943 between Orkney and Iceland, received little attention. The mines 'Mk XX' were supposed to prevent U-boats from reaching shipping routes in the Atlantic (Elliot, 1979). Whether the barrage was a serious threat to U-boats is not known, but it seems not. It would have been a tremendous threat to the sea if the mines had tended to explode prematurely. It is not clear as to what happened to the mine barrage after the war ended. Were the mines 'gone' by 1945? Were remaining mines swept after 1945?

### g. Arctic Convoys

Arctic convoying was in numbers of naval activities only a very small fraction of what happened across the North Atlantic, in the Mediterranean Sea, or in other sea areas and sea routes around the globe. Arctic convoying was naval activity in a very sensitive marine environment, with water temperatures close to the freezing point, and

The Northern Mine Barrage – 110,000 mines in the Atlantic – 1940 to 1943; <i>Between the Faeroe Islands and Iceland.</i>	
Report by the Icelandic Coast Guard EOD (Explosive Ordnance Disposal) Unit (excerpt):	
During WW II Winston Churchill commented that of all the threats posed to the British Nation by Germany, attacks on Merchant Shipping were the most likely to bring defeat, especially attacks made by U-Boats, which, at the beginning of the war were far in advance of Royal Navy anti-submarine countermeasures.	
	In order to carry out the operation, 10 merchant ships were required; this figure was subsequently reduced to 5 vessels by special modifications to the mines, so reducing the numbers required to effectively achieve the barrage.
	The vessels could carry between 438 and 556 mines each depending on tonnage.
The operation lasted for approximately 3 years during which time the First Mine Laying Squadron laid over 110,000 mines, the majority of which were laid between the Faeroe Islands and Iceland. Mines were also laid between the North of Scotland through the Orkney Islands to the Faeroes and from the North West of Iceland to the Greenland Ice Belt.	
The explosive charge in a WW II mine is usually large, the destructive effect underwater being from the blast effects of the chemical reaction known as detonation. In British mines two sizes of charge were used, 227 kg and 137 kg, the larger charge being preferred.	
Source: <a href="http://www.lhg.is/english/eod/mines/">http://www.lhg.is/english/eod/mines/</a>	

Figure G2-2; Sea mine barrage between Iceland and Faeroe Island

with frequent sea ice in the winter season. There had been a very significant temperature turn about since WWII had started. *Rodewald* (1972) showed that at Franz Joseph Land (80°N, 53°E) a deep drop in temperatures occurred in 1950 by over 5°C in one decade after mean temperatures had varied between -10°C and -11°C between 1936 to 1950. As the sudden and remarkable drop is still unexplained the Arctic convoys and other naval activities in the high north should not be ignored as a contributing factor.

As soon as the Soviet Union was attacked by Germany, the Allies organised the transfer of war material to Russia by 78 convoys with about 1400 merchant ships between August 1941 and May 1945. Russia received about 4,000,000 tons of cargo, including 7,000 aircraft and 5,000 tanks via the most difficult and dangerous route from Britain to Murmansk. It was climatically the most sensitive sea route; presumably manifold more effective to climate changes than naval activities one thousand miles further south. Out of the total cargo shipped, 7% was lost at sea. Danger came not only from the arctic climate during most of the year, but from attacks by the German Navy and Luftwaffe from their bases in north Norway. At peak time the Luftwaffe had 264 aircraft in the area (*Schofield*, 1977), while the British Fleet Air Arm and the Royal Air Force flew 17 combat missions to north Norway from January 1942 to November 1944, involving a total of 600 airplanes (*Kemp*, 1993).

The loss of merchant ships was 100 with a total of 600,000 tons. The German side lost five surface naval ships including a battle ship, a battle cruiser and 32 submarines. The British Navy lost 20 surface vessels and one submarine. The Russian Northern Fleet lost some 20 submarines operating along the coast, which certainly does not reflect the Russian total loss in the Barents Sea.

To avoid confrontation with German forces the convoys sometimes travelled far to the North. For example: Ships of convoy PC17 navigated in July 1942 close to Edge Island (Spitsbergen) 77°N, and along the sea ice border, but were still attacked by aircraft of the Luftwaffe and U-boats.

An anti-aircraft gunner who was on service on the high-octane tanker the steamer *Bolton Castle* which was sunk from the ill-fated Arctic Convoy PQ17 reported: "We were sunk in the ice fields and the ship sank in thirteen minutes. Sunk by three bombs of a Junker 88, the *Bolton Castle*, which had hundreds of tons of cordite in cargo hold 2, looked 'like a giant Roman candle'. Of the 35 cargo ships and three rescue vessels convoy PQ17 consisted of, only 11 vessels and two rescue ships that survived (*Slader*, 1995).

Maybe another hundred stories are needed to provide at least some evidence of what the Battle of the Atlantic has meant to the marine environment, for which the interested reader should consult relevant literature.

**h. Total Allied loss**

\_\_Merchant ships (incl. Neutral) 5,150 ships (of 21,570,000 tons), which means a loss of 300,000 tons per month.

\_\_Total allied loss of oil tankers over 1,600 gross tons: 4,221 (world wide figure for the time period Dec.1941- May 1944) (*Slader*, 1995).

\_\_Merchant ship losses in the North Atlantic were about 3,600 vessels with a tonnage of 15 million tons.

*NOTE: All figures vary widely, and are here only indicated to show the dimension.*

<b>U.S. Coast Guard Account</b>
TOTAL NUMBER OF U.S. MERCHANT VESSELS LOST December, 1941-July, 1945: <b>674</b>
TOTAL OF THESE U.S. MERCHANT VESSELS LOST DUE TO ENEMY ACTION: <b>535</b>
TOTAL U.S. GROSS MERCHANT TONNAGE LOST December, 1941-July, 1945: <b>4,156,849</b>
TOTAL GROSS TONNAGE LOST DUE TO ENEMY ACTION (Same dates): <b>3,328,497</b>
<a href="http://www.uscg.mil/history/WEBSHIPWRECKS/ShipwreckWWIIindex.asp">http://www.uscg.mil/history/WEBSHIPWRECKS/ShipwreckWWIIindex.asp</a>

Figure G2-3; Losses of the United States of America