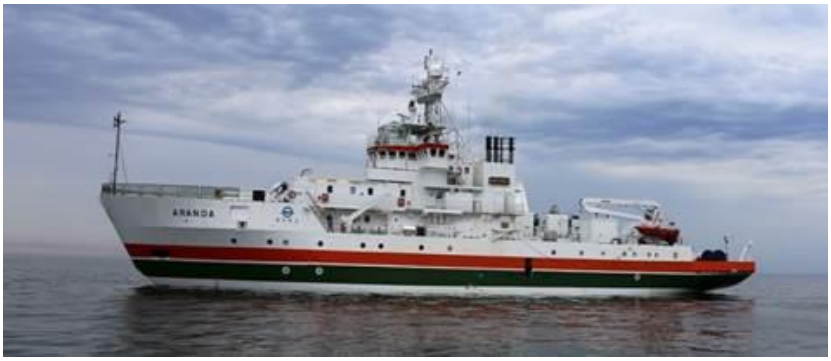
Suomen ympäristökeskus
Finlands miljöcentral
Finnish Environment Institute

ILMATIETEEN LAITOS

CRUISE REPORT



R/V Aranda

Cruise 06/2023

HYLYT

31.7.2023 – 4.8.2023

This report is based on preliminary data and is subject to changes.

Objectives of the cruise

The objectives of the cruise were:

- ROV observations and video footage collection at the wreck of battleship Ilmarinen
- Hydroacoustic surveys to verify wreck orientation and 3D model improvement
- Sampling of water and sediment
- Analysis of water samples for total oil concentration

Table 1. The scientific crew

Name	On board	Organization
Kankaanpää Harri	30.7.– 4. 8. 2023	Syke MEVERA
Kontto Tommi	30.7.– 4. 8. 2023	Syke JOTVIR
Alvik Riikka	30.7.– 4. 8. 2023	Finnish heritage agency
Farstad Miia	30.7.– 4. 8. 2023	Syke JOTVIR
Riikonen Jere	30.7.– 4. 8. 2023	Syke TUFRA
Valvio Jari	30.7.– 4. 8. 2023	Finnish boarder guard
Takala Marcus	30.7.– 4. 8. 2023	Finnish boarder guard
Leppäkorpi Juho	30.7.– 4. 8. 2023	Finnish boarder guard
Huopalainen Joel	30.7.– 4. 8. 2023	Finnish boarder guard

Cruise Route

Turku, Linnanaukio pier 25, 30.7.2023 at 21.00.
Ilmarinen, 31.7.2023 at 07.00
Kasuuni wreck, 3.8.2023 at 22.15
Huis Te Warmelo wreck, 4.8.2023 at 00.30
Helsinki, Tammasaari pier, 4.8.2023 at 09.15.

The cruise started one hour posterior to the departure time in original cruise plan. The mission continued to the vicinity of Finnish WW2 battleship Ilmarinen, around 59° 32.0’ N, 20° 54.0’ E, arrival on early morning of July 31. Afterwards, tasks included water samples from 11 locations and sediment sampling from four locations around the target on July 31, August 1 and August 2. Oil leak from the target observed with sheen/rainbow oil slick appearing every 15-45 seconds. One sample from the oil slick collected for subsequent analysis in the mainland. ROV operations commenced on July 31 and August 1. Sound velocity profiling plus multibeam (MBES) and single-beam chirp sub-bottom echosounding (SBES) around the target on August 1 and 2. Water-column-mode MBES over the wreck on August 3. Search operations for lost wreck of “Rigel” around 59° 36.6’ N / 21° 01.2’ E plus search operations of possible remains of mine mooring north and northeast of Ilmarinen on August 2.

As mission time permitted, hydroacoustic transect at historical Kasuuni wreck was performed on August 3, but this wreck was not present in location given in museum

registry. Further, MBES and SBES work at historical wreck of Huis Te Warmelo commenced during early hours of August 4. The cruise ended in Helsinki in the morning of August 4, 2023.

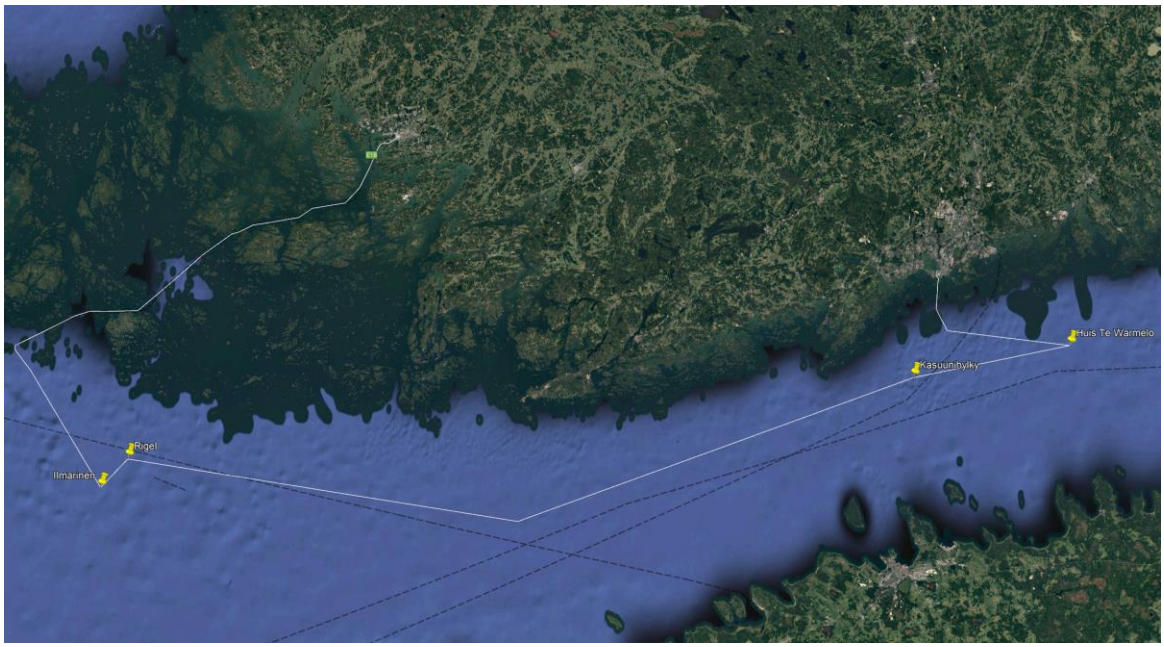


Figure 1. Cruise route.

Observations

There was no observable change in overall angle or sediment burial of the wreck compared to hydroacoustic data from 2021. Ghost nets with unknown (wooden?) object inside one net surrounding anchors and adjacent sections of hull were documented. A fracture in hull exterior potentially close to one fuel tank area was observed. Based on ROV video footage and MBES data, there is a several-meter-long depression in hull close to wreck's original waterline. In general fuel tank sections over the seafloor appear intact. Oil leak from the battleship occurred but was not seen in underwater video footage. Notable corrosion around the wreck hull with local depressions was evident. Of fuel tanks of the wreck at least 12 can be accessed from above while the remaining three are at least partially buried inside soft sediment in wreck aft section. Sediment cores reflected sporadically oxic and anoxic conditions near seafloor level. Current deep water was oxic. There was no indication of oil in water samples based on fluorometric monitoring method. Hydroacoustic data on Huis Te Warmelo and its vicinity was of adequate quality. The main observations regarding the battleship Ilmarinen were presented in a media event in Helsinki on the afternoon of August 4.

Conclusions

Corrosion in the wreck of Ilmarinen seems substantial and is likely to continue, posing a risk to larger oil leak from fuel tanks right below hull exterior surface. Bottom section of hull seems intact and therefore tanks also are intact. The observed oil leak is small but constant. However, based on the water samples, the leak has not compromised local water quality yet.

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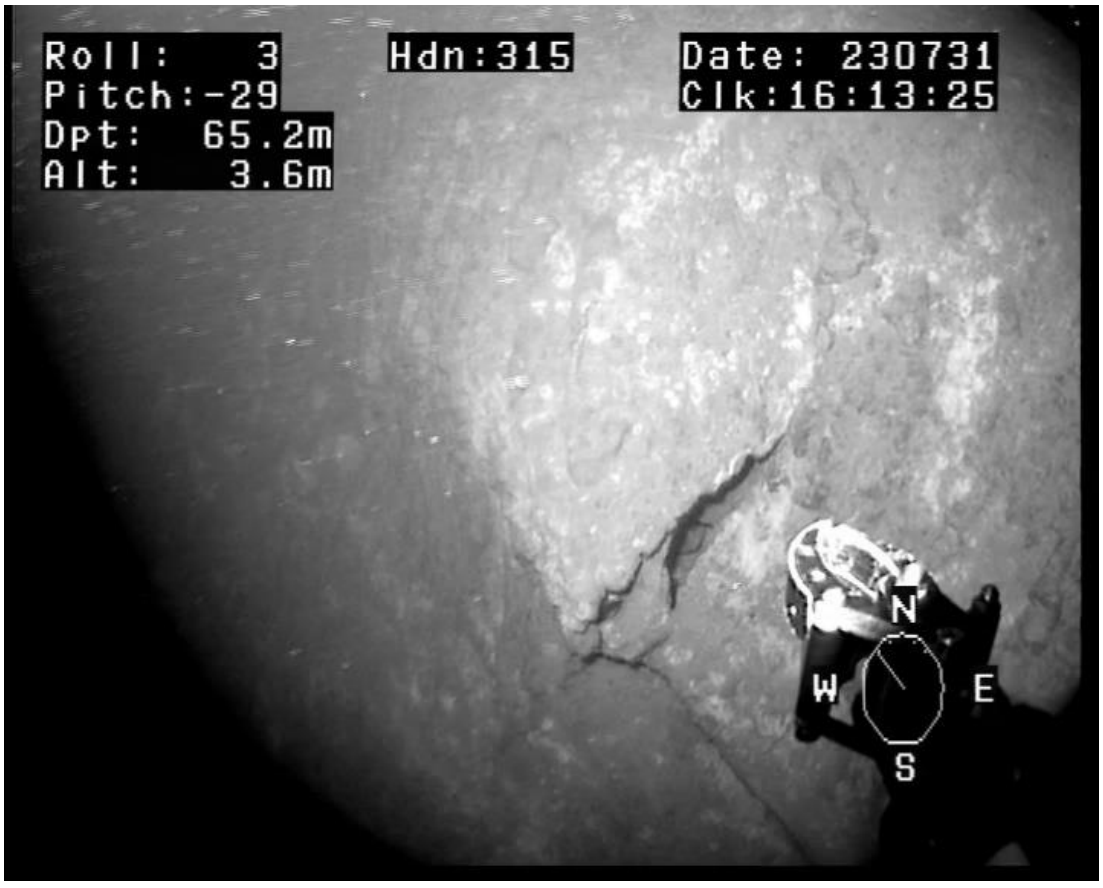
Annex 1. Screenshots of ROV footage: (upper image) depression around midships and (lower image) fracture close to ship's bow section (Finnish boarder guard).



Annex 2. Oil slick on top of the wreck (Miia Farstad, Syke).

Annex 3. Schematic view of fuel tank sections overlaid on 3D mesh of battleship Ilmarinen (Syke & Finnish boarder guard).