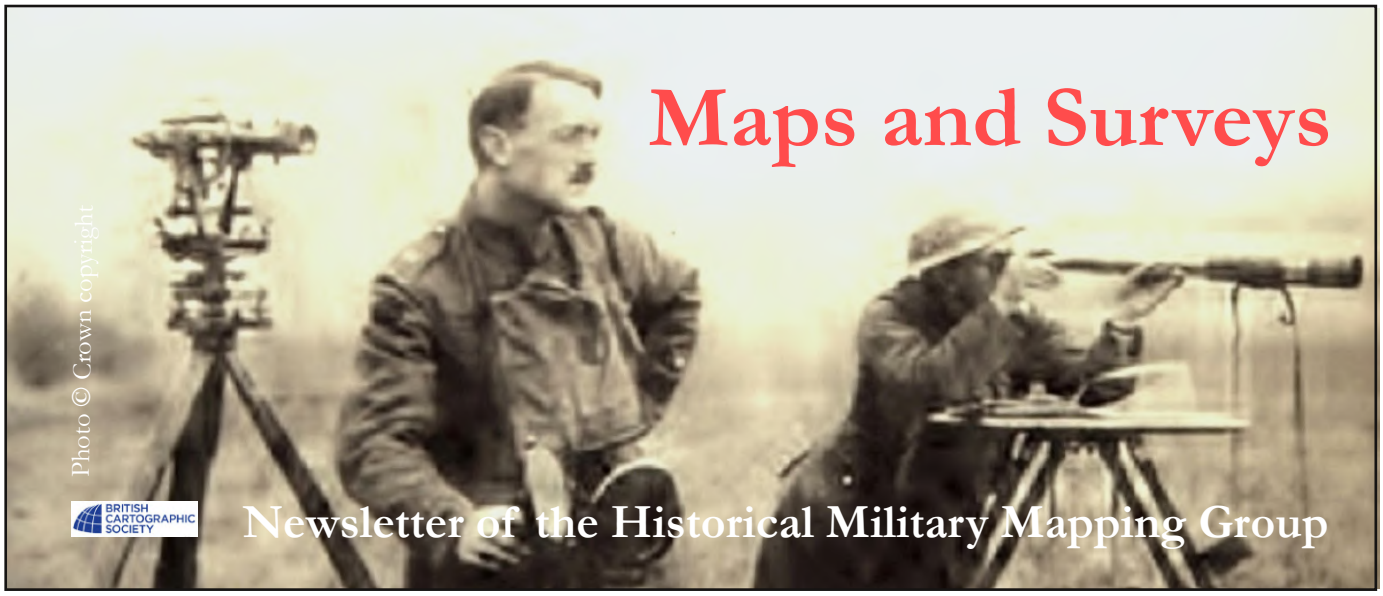
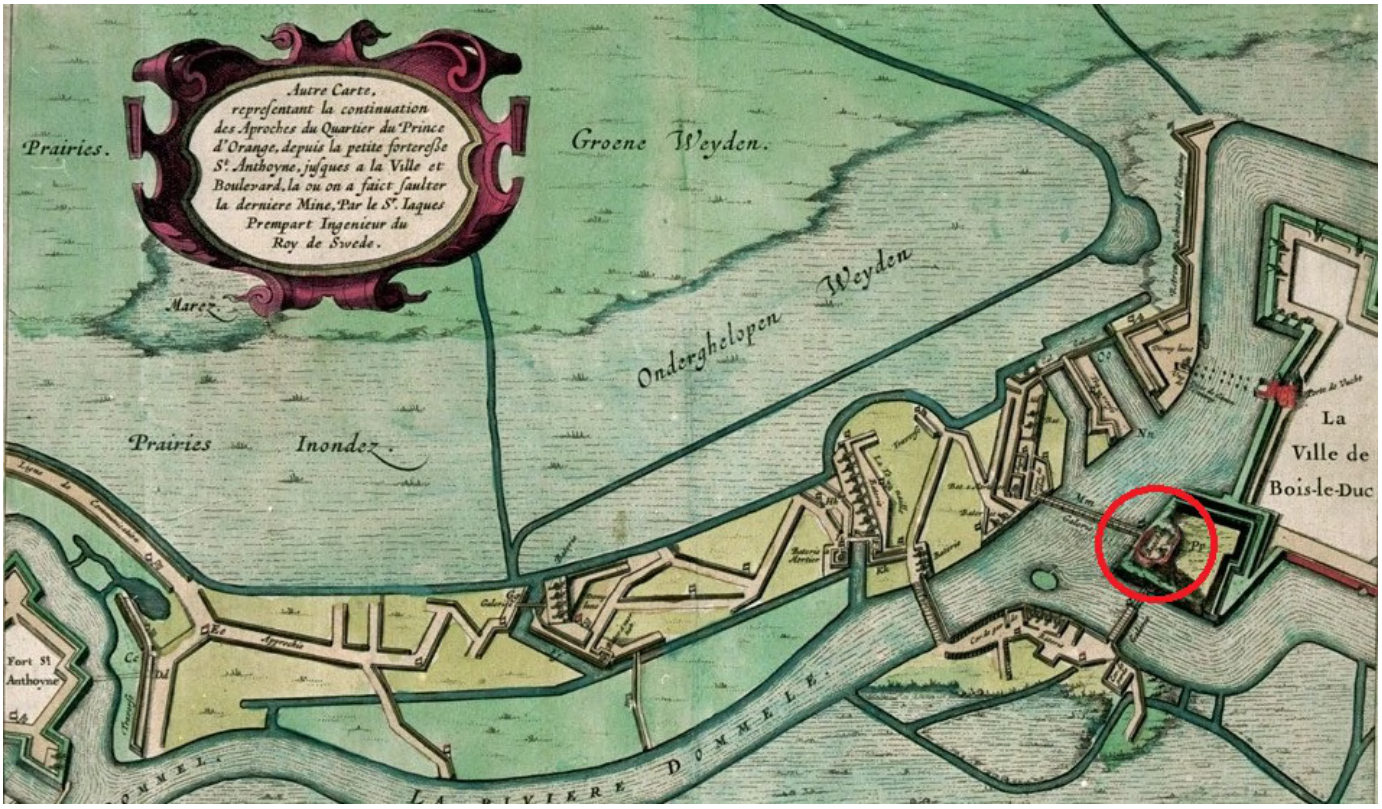


Maps and Surveys appears in spring, summer and autumn. The Newsletter welcomes contributions - please contact Ros Derby, BCS Administration (*admin@cartography.org.uk*) for information. Editor: Paul Hesp (*Paul.Hesp@drei.at*).

Spring 2024

From the editor

This Newsletter starts with a spectacular example of the use of hydraulic engineering during a 17th century war. A contribution from Denmark then explores attempts to hide military installations from the Soviets. How the topographic services of that country and Norway fared under what Annual Reports of the Danish service euphemistically called 'extraordinary conditions' is the subject of the last article.



A sap constructed by Dutch troops from Fort Sint Anthonie to undermine the walls of 's Hertogenbosch (Bois-le-Duc) during the 1629 siege. Red circle shows where the mine was sprung. North is top right. Map by Jacques Prempart, a French military engineer working for the king of Sweden. See the contribution on p. 2. (Source: Erfgoed 's Hertogenbosch)

Roel Sluis - A HIGH-TECH SIEGE

Fragment of a 1629 German (?) map based on mapping by Jacques Prempart, a French military engineer working for the king of Sweden. Events that probably took place sequentially are shown as happening simultaneously. Troops under a Dutch flag (orange circle) move through a sap in drained land to attack a position with a Spanish flag (yellow circle). Forts Sint Anthonie and Isabella fly Dutch flags, and a sap to the town walls (schematically shown) has been dug from Sint Anthonie. The part of the circumvallation visible at the bottom is still shown on mid-twentieth century maps. (Sources: Rijksmuseum Amsterdam, Wikimedia Commons)

In the early 17th century, during the long war of independence of the Dutch Republic against the Spanish Empire, the town of 's-Hertogenbosch (commonly referred to as Den Bosch) was controlled by the Spanish. In 1629, the stadtholder of the Republic and commander of its army, prince Frederik Hendrik, decided to launch an attack on the strategically important town - it controlled one of the few all-weather routes into the Republic from the south (see inset map for location).

The town was surrounded by flooded fields except for the neck of the sandy ridge on which Den Bosch was built. This was blocked by Fort Sint Anthonie and Fort Isabella (named after the Spanish emperor's daughter, governor of the Spanish Netherlands). Frederik Hendrik's troops occupied all access points to the town on May 1. The next step was draining the inundated areas so that Den Bosch could be attacked from different directions. For this purpose, large numbers of farmers were press-ganged into helping construct an earthen dam with ramparts and fortifications, 'eleven hours on foot' long, which encircled the town. The rivers Aa and Dommel, which fed the moats and inundations, were diverted from their course. Windmills and horse mills then drained the fields.

As draining progressed, saps were constructed to the town walls from several directions. In the end, the capture of Sint Anthonie and Isabella sealed the town's fate: the town wall was undermined from there. But as the defenders had to split their forces and waste their limited supplies of gunpowder, bullets and cannonballs on threats from all sides, the complex and costly engineering operation paid off. On September 14, Den Bosch capitulated. It remained in Dutch hands.

Roel Sluis studied Human Geography at Amsterdam University. He spent most of his professional life at RAAP, Weesp (NL), an agency for advice and research on archaeology and cultural history.

Peter Michaelsen - WHAT NATO DID TO HAMLET'S CASTLE
The Cold War and Danish topographic maps

Topographers in Denmark have had guidelines for what to show on the maps at least since 1830. In the early years, these covered just a few pages. By 1949, the *Bestemmelser for Rekognoscering 1:15 000* (Rules for Reconnaissance 1:15 000) covered 34 A4 pages, and topographers continued to receive new instructions about what to bring home from the field almost every year. Items like parsonages, midwives' houses and post offices were dropped from the maps; new features included public swimming pools, communication masts and towers and municipal offices.

CONFIDENTIAL. Military installations on the institute's maps.

The Professor has decided the following:
1. Names on military (navy) installations, training areas, exercise areas, camps etc. have to be omitted from all maps.
2. Barracks, camps etc. have to be represented by simple, neutral buildings at their main entrances and along streets. The rest of the area has to be shown as a garden or market garden.
3. Military airfields may not be shown. Runways, fences and buildings have to be omitted. Radar and radio installations may not be shown. (…) Large fortifications have to be omitted; they can be shown as gardens or fitted in with the surrounding area in another way.
4. The corrections have to be carried out on all corrected new printings.
5. On Copenhagen and surroundings 1:15,000, issue 1950, all military place names and buildings have to be omitted. Except 'Citadellet' [a historic fortress and barracks] and 'Frederiksberg Slot' [castle in Copenhagen]. (…)
6. For Aarhus and surroundings 1:15,000 the same rules apply as mentioned in point 5. 'Exercise area' has to be omitted.
7. Names on the national railways repair shops and transformer stations have to be omitted. 'Engine works' is to be avoided as a designation. (…)

The instructions of 30 May 1949

Denmark joined NATO when it was established on 4 April 1949. NATO very soon had an influence on the national topographic maps issued by the Geodetic Institute (*Geodætisk Institut*). On 30 May 1949, confidential instructions were delivered to all at the Institute responsible for large-scale maps about what had to be omitted from these maps. The instruction was declassified in 1954, but it was still an order. From 1954, power transmission lines – first shown on maps during the 1930s - had to be omitted from the maps as well; they reappeared in 1966.

A partial translation of the instruction is given in the text box. The 'Professor' was Dr. Niels Erik Nørlund (1885-1981), director of Geodetic Institute from 1928 to 1955. 'Engine works' (in Danish *Maskinfabrik*) has confused me and many others. Does it refer to shops producing equipment for farmers, or just machines in the sense of railway locomotives? Maybe it refers only to the last meaning.

The Key Point Section

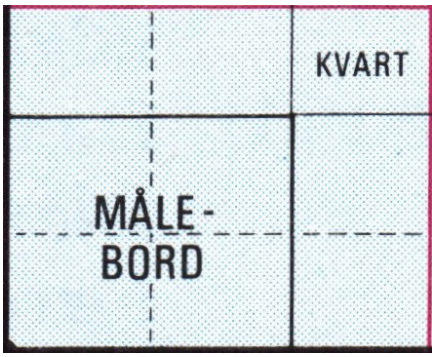
The Danish Armed Forces operated an office named *Nøglepunktssektionen*, the Key Point Section. The section operated a register of points, buildings and structures of vital military and public importance. An enemy should remain ignorant of the objects. More than 6,000 key points were classified. When the Geodetic Institute printed a new topographic map, copies were sent to the Key Point Section at the Intelligence Service at Kastellet barracks. The map was returned to the Institute a few days later with an OK or remarks. From 1965 onwards, new 4 cm maps (see below) were produced by photogrammetry as manuscript maps at 1:10,000. These were sent to the Key Point Section before the topographers started fieldwork to add details to the manuscript map which were not visible on air photos. The Key Point Section indicated which military installations had to be omitted. Examples of 'before' and 'after' maps are shown on p. 4 and 5.

The maps to which the instructions applied

In 1949, all maps were based on plane table measuring from the period 1863-1933, with field surveys and revisions over a cycle of 20-30 years. In 1952, NATO standards for topographic maps were adopted. Denmark had been mapped at scales 1:20,000, 1:40,000, 1:100,000 and 1:200,000; the NATO standard scales were 1:25,000, 1:50,000, 1:100,000 and 1:250,000.

The US Army Map Service produced the first series of 1:25,000 or 4 cm army maps covering

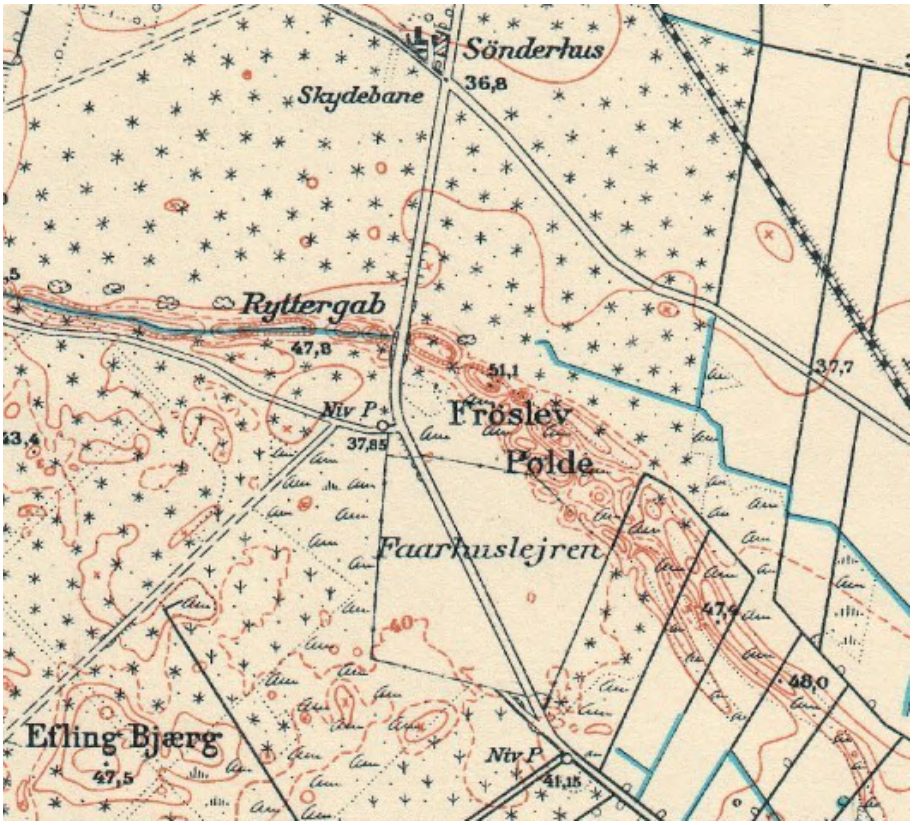
Denmark. These were enlargements of existing 1:20,000 maps which also covered a larger area (see diagram). This M814 map was printed in the USA in 1952 and reprinted unchanged in Copenhagen in 1972. Most of the information on the maps dated back to the 1930s. Danish 4 cm maps were produced from 1953 onwards, with the first printed map issued in 1957. The conversion from 1:20,000 to 1:25,000 lasted until 1978. These maps were never issued as army maps. The main army maps became 2 cm and 1 cm maps, the 2 cm maps being revised over a ten-year cycle and the 1 cm map over a six-year cycle, along with 1:250,000 maps. In 1990, the last new Danish 1:25,000 map was issued. Revision of that map series continued to 1998.



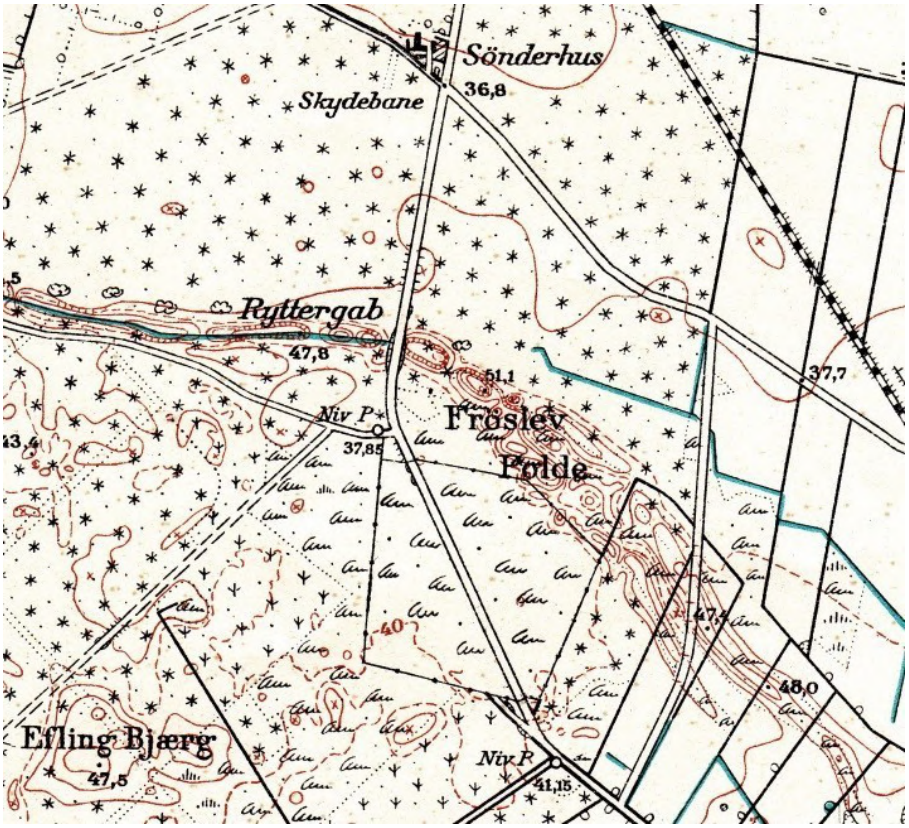
Sheet composition of the 1:25,000 map. Målebord is the old 1:20,000 map. Two half sheets and a quarter sheet have been added.

Map 1. Part of 1:20,000 sheet M 2630 Helsingør (Elsinore), surveyed in 1898, revised in 1948 and printed in 1953.
Map 2. The same map printed in 1961. © Geodatastyrelsen and Styrelsen for Dataforsyning og Infrastruktur.

On Map 1, buildings can be seen west and south of Kronborg castle. On Map 2, the buildings are omitted. These housed an NCO school and some military offices. All tourists visiting the castle (the setting of Hamlet) could see all the buildings.



Map 3. Part of 1:20,000 sheet M 4408 Frøslev, surveyed in 1934, road revision in 1946, printed in 1949. Faarhuslejren (centre of the map) is shown as an area with a fence and no buildings.



Map 4. The same map printed in 1954. The fence is still on the map, but the area is now a heath and the toponym is gone. To the north the word Skydebane (rifle range) can still be seen.

The Frøslevlejren camp was established in 1944 as a Polizeigefangenenlager by the Danish government to avoid deportation of Danes to camps in Germany, but more than 12,000 people passed through the camp to Germany during the war. After the liberation in May 1945 the camp's name was changed to Faarhuslejren; it was used to intern Nazi collaborators. In 1949 the Danish army took over the camp as a barracks named Padborglejren. During 1968-1983, it was a civil defence camp. It is now Frøslevlejrens Museum, part of the Danish National Museum.

The Geodetic Institute

The Geodetic Institute was a civilian institution under the Ministry of War (from 1950 onwards Ministry of Defense). By law, the chief of the topographic department had to be an army colonel. In 1988, the Geodetic Institute, Sea Chart Archive and Cadastral Directorate merged to form the Map and Cadastral Agency, first under the Ministry of Housing, then the Ministry of Environment. In the process, the switch to digital production of public maps was made as well. While map production no longer involves the military, army maps still play an important part in what is now named the Agency for Data Supply and Infrastructure (*Styrelsen for Dataforsyning og Infrastruktur*).

Peter Michaelsen trained at the Geodetic Institute as a topographer and cartographer from 1966 to 1969. He did field work in Denmark and the Faroe Islands and acted as navigator for aerial photography in Denmark and Greenland. From 1989 to 2013 he was head of the section for topographic maps at the Danish national mapping agency.
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Paul Hesp – MAPS FOR THE ENEMY (II)
Topographic services under German occupation: Denmark and Norway

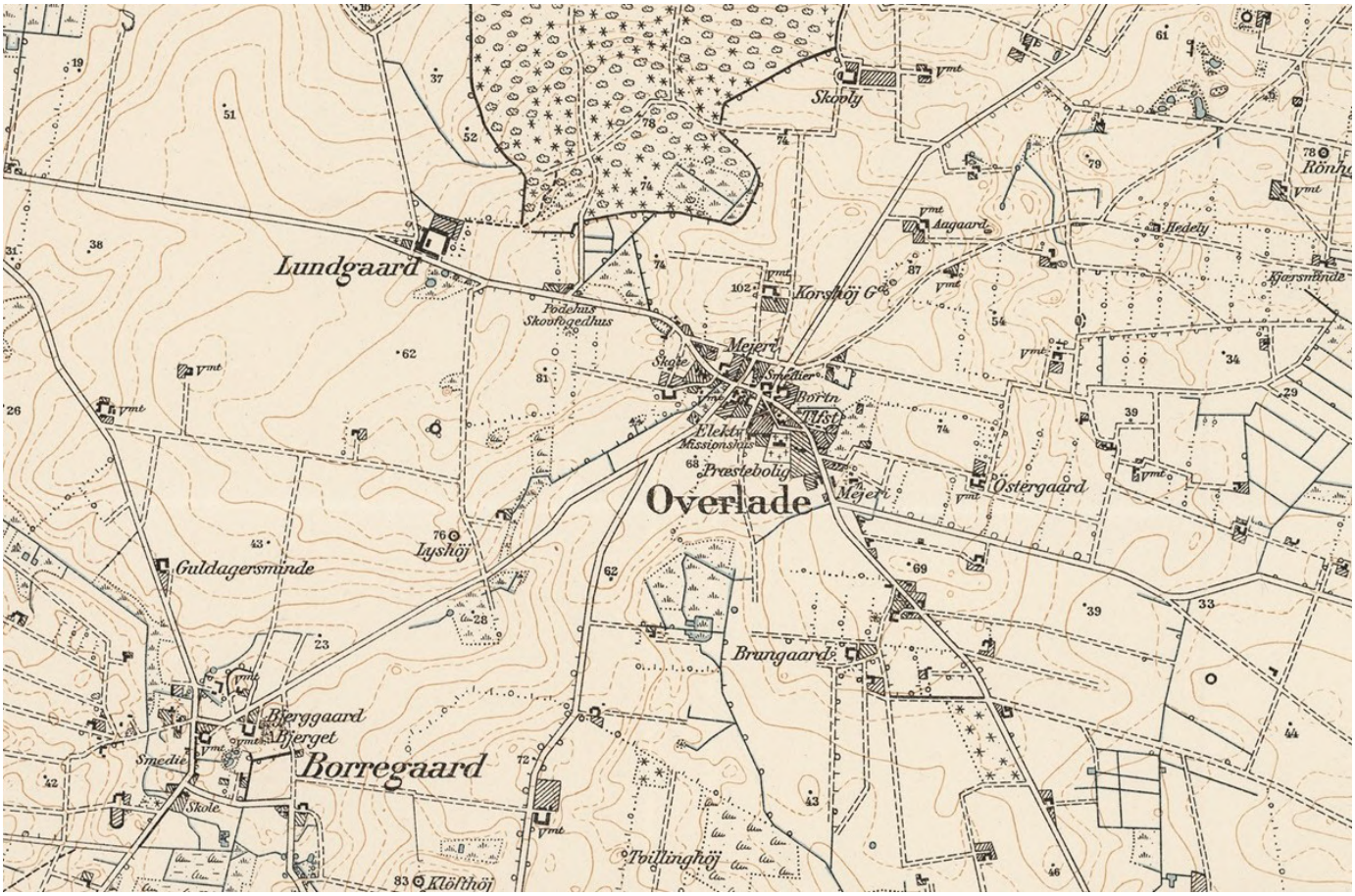
Denmark

'Cartographic work apparently continued unchanged… until the break with the occupying forces on 29 August 1943… but through a flexible attitude the management [of the Geodetic Institute] avoided an actual German takeover.' (Geodætisk Institut 109)

Denmark was ill prepared for war. The Germans – bringing with them a complete set of 1:25,000 maps based on Danish 1:20,000 originals – sailed into Copenhagen harbour at daybreak on April 9, 1940, took over key points and threatened the town with aerial bombardment. Denmark gave up the unequal fight after a few hours. The Danish government reached an agreement with the occupying forces which allowed it to operate independently in most respects.

The Geodetic Institute (*Geodætisk Institut, GI*), part of the Ministry of War, continued its work. Iceland, the Faroe Islands and Greenland came under British and American control. Mappers remained active on Iceland and GI's seismological staff on Greenland received support from the US Coast Guard and Geodetic Survey. While access to Iceland, Greenland and the Faroes was lost, there was enough survey material at headquarters in Copenhagen to work on maps of these. Fieldwork in Denmark continued, and updated maps were published (Map 1). As a job creation measure, additional staff were hired for precision levelling as well as archival work. Statistics also show that (unspecified) additional equipment was purchased and that print runs increased.

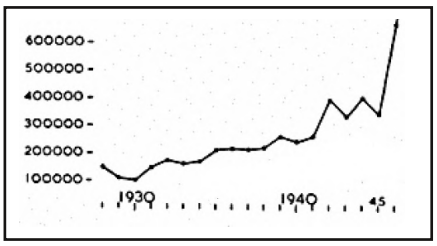
Until 1943, the Annual Reports of GI's Topographic Department contain few indications that business was not quite as usual. Aerial photography in support of mapping was no longer possible, and due to the 'extraordinary conditions… no auxiliary other ranks were trained'. But these were soldiers who performed menial duties, so work would not have been substantially



Map 1. Fragment of 1:20,000 map M 1408 Overlade, surveyed in 1881, revised in 1920 and published in 1943 with road revisions. Metres were introduced in the early 20th century, but elevations are still shown in Danish feet (314 mm). Maps issued by the Germans have conversion tables. (Source: Det Kongelige Bibliothek, Copenhagen)

affected. The Institute did reluctantly supply survey material to the Germans (and - deliberately – incomplete and erroneous survey and benchmark data). Danish source material was used by Germany's military geography (*Mil-Geo/Mar-Geo*) units in Copenhagen to produce, among other things, extensively annotated maps of the country (Map 2). The Germans took air photos for their own mapping, covering North Jutland and the islands. These were used for 1:25,000 *Bildpläne*, air photos with added topographic details serving as maps (see p. 9 for a 1:50,000 example from Norway).

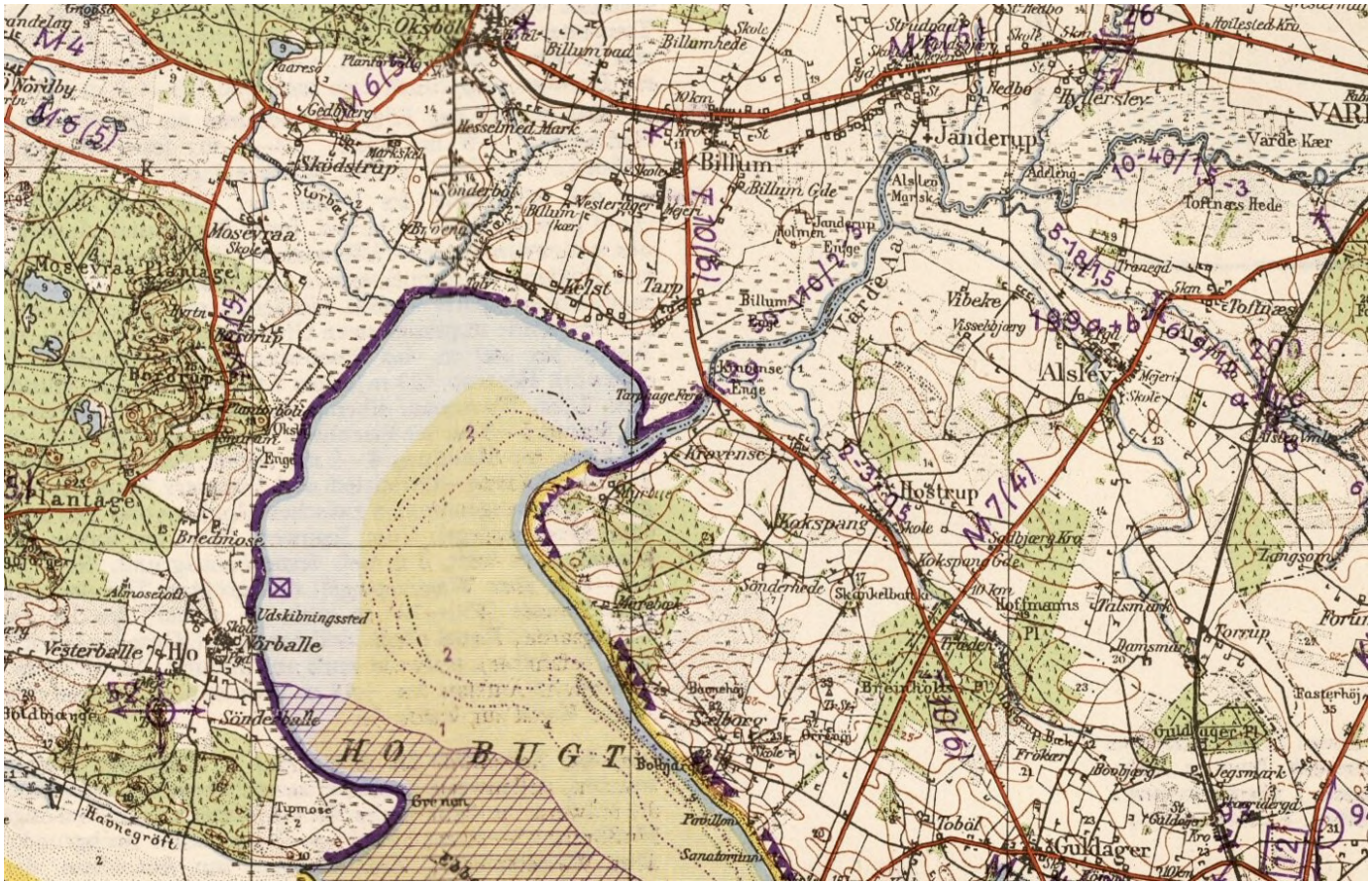
Increasing resistance to the German occupation led to the imposition of martial law August 1943. This had a serious impact on the Institute's work. Field work was severely limited (the Annual Report for 1943/44 gives a detailed example of the harassment of surveyors on the island of Fyn). Military staff were temporarily interned and transferred away from Jutland. Equipment and finished plane table sheets were impounded. Sales of large-scale maps were forbidden, which led to staff redundancies, according to the 1943/44 Annual Report. With regard to sales, however, the graph below tells a different story: after an initial rise (related to domestic tourism), sales remained roughly on the same level throughout the war. An error? Or had the Germans become major customers?



GI map sales, 1927-1946. Source: Geografisk Tidskrift 1956, p. 7.

The GI survived the war undamaged. Apart from resuming their usual activities, staff also had to 'count and sort' over 600,000 maps left behind by the Germans - an indication of the importance of maps for their war effort. Field work could only be resumed on the island of Bornholm after negotiations with the Soviet military who had occupied the island in the absence of British forces after the May 4 surrender of the Germans. Military installations remained out of bounds for surveyors until the Soviet troops left in April 1946.

Special thanks to Kristian Keller, Peter Michaelsen and Stig Svenningsen.



Map 2. Deutsche Heereskarte 1:100,000, sheet 8 Varde. Prepared by the Mar-Geo unit and published in 1944. Apart from Danish maps, 'Danish documentation' was used for the extensive notes printed on both sides of the map. Symbols transfer information to the map (e.g. solid dark blue line: flat coast; M 7(4): macadam road, overall width 7 metres, macadam surface width 4 metres). Some sheets in this series also include post-1940 town maps produced by GI. (Source: Det Kongelige Bibliothek, Copenhagen)

Norway

'German military authorities… continuously interfered with [the topographic service's] plans'. (Harsson-Aanrud 64)

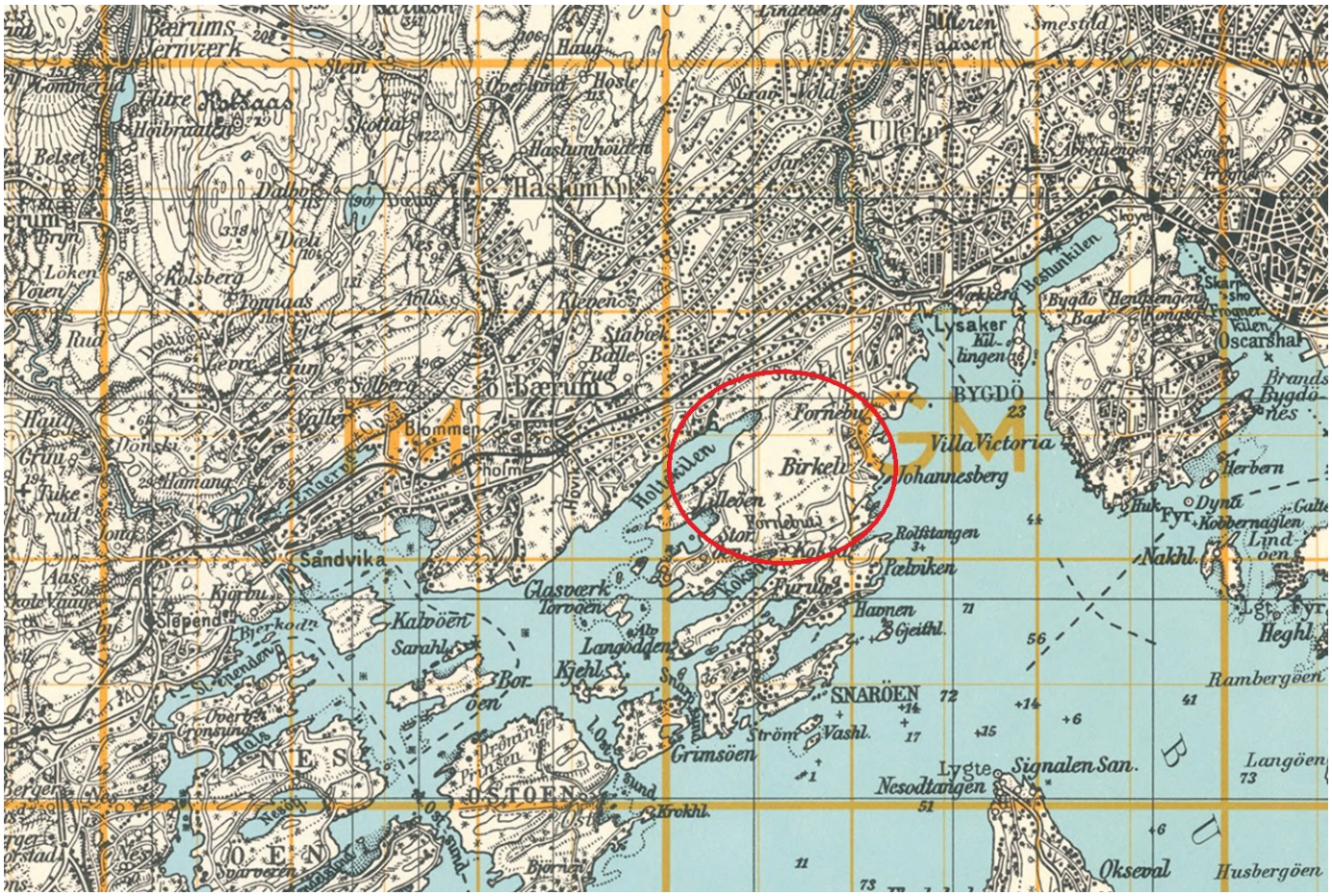
Norges geografiske Oppmåling (NGO) had not received government instructions for the case of an invasion. On its own initiative, the topographic service had taken some preparatory evacuation measures and air raid precautions. 'Otherwise, [NGO] management was quite unprepared for what happened outside its own windows' on April 9, 1940.

On April 12, NGO was placed under Wehrmacht 'protection'. The most important direct consequence was that all map sales had to be vetted by a liaison officer at the German *Vermessungs- und Kartenabteilung* in Oslo. Field work continued on a reduced scale. In late 1942, the Germans stationed some staff at NGO to work on Norwegian survey data. As of August 1943, the liaison officer was based at the topographic service and control over its activities was tightened. Map sales, for example, were forbidden.

The Germans arrived with maps at various scales reprinted from Norwegian originals. In contrast to the other countries, coverage was not complete, but taking control of the key strategic areas did not require that. Once in control, the Germans started a major programme to enlarge all existing 1:100,000 *rektangel* and *gradteig* maps (see box) to 1:50,000 (Map 1), with new, standardised sheetlines. Sheets without colouring or shading requisitioned from NGO served as the basis. Some revision took place using NGO material and aerial photography, but no actual field work was undertaken to include more detail. These maps were mainly printed by commercial Norwegian printers. As an interim solution for areas where only the inadequate 1:200,000 *amtskart* (county map) published between 1826 and 1917

Rektangel and gradteig maps

Production of *rektangel* maps started in the 1860s. They covered a rectangle of 4 by 3 old Norwegian miles (ca 45x33 k). The distortions resulting from the projection used led to the introduction, in parallel, of the *gradteig* map during the 1890s. It covered 20' of a parallel and 30' of a meridian; because of meridian convergence, the map covered 20' x 1° in North Norway. *The rektangel*'s 30 m contour interval was retained. Apart from special maps of urban regions these were Norway's most detailed maps. Neither series covered the country completely.

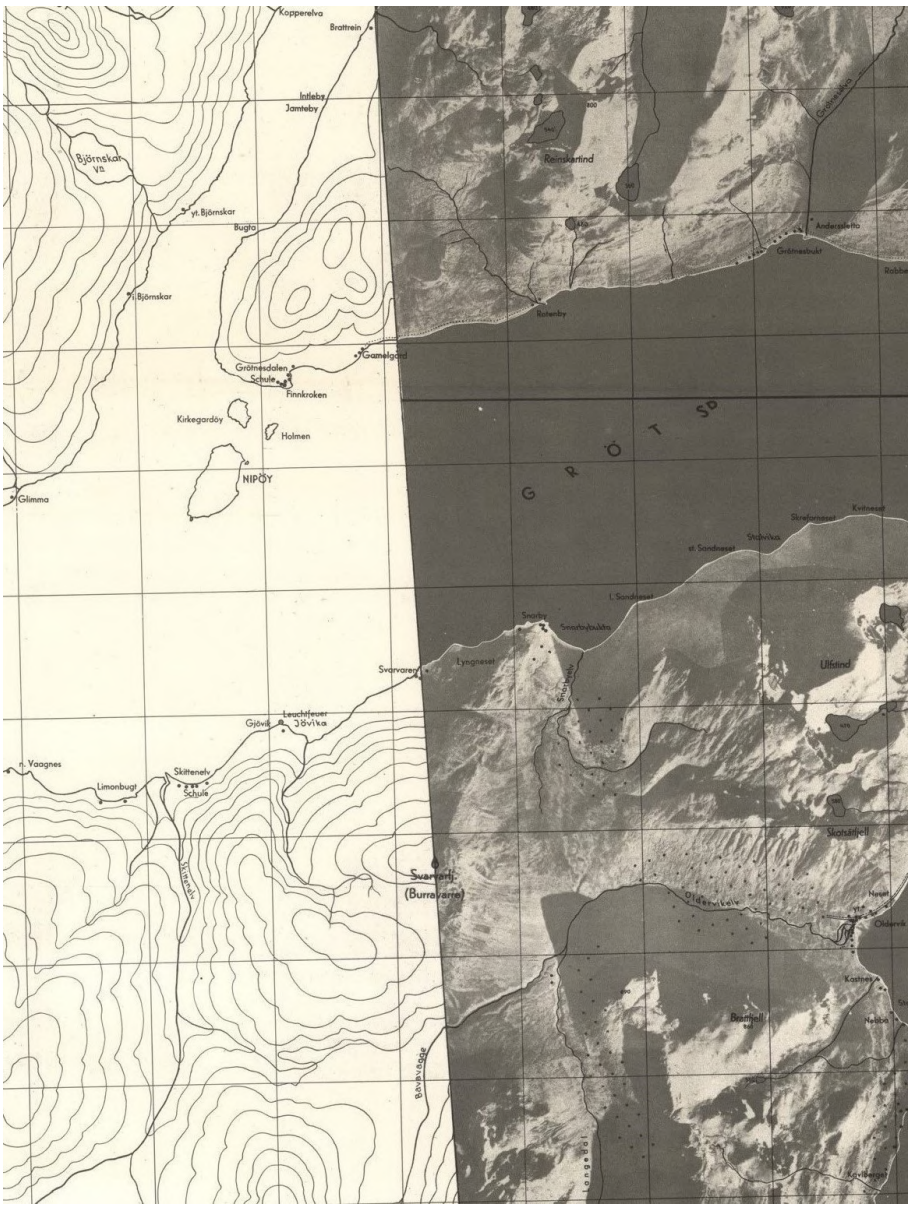


Map 1. Deutsche Heereskarte 1:50,000 G35W Oslofjord 1942, printed in 1944. Based on rektangel maps 1:100,000 14B, 14D and 19F. German Gauss-Krüger grid and Heeresmeldenetz. Oslo's Fornebu airport, used by the Germans from the day of the invasion, is not shown, even though there was air photo coverage for most of the sheet. This confirms that only limited revision of the originals took place. (Source: Kartverket [Norges geografiske Oppmåling])

was available, *Bildplankarten* (see text on Denmark) were prepared at 1:50,000 for parts of northern Norway (Map 2). Having laid their hands on NGO's single stereoplanigraph, the Germans started work on a completely new 1:50,000 series based on aerial photography, but little progress was made before the end of the war.

In the course of the war the Germans increased pressure on NGO to prepare and print maps for them. Sabotage of work on, for example, new German 1:300,000 maps resulted in threats to place German supervisory staff at NGO or – alternatively – to move Norwegian staff to the German mapping unit. NGO's director made it clear that his staff would not work under German supervision, and eventually the matter was dropped. The 'disappearance' of survey staff during field work in sparsely inhabited areas triggered another conflict which resulted in the threat of a German takeover, with staff to be laid off or sent to concentration camps. This was avoided by tighter control over field staff, but from early 1945 onwards staff increasingly deserted anyway.

About one hundred NGO staff were in some way involved in resistance work, and both the resistance and the Norwegian police troops being trained in Sweden were supplied with thousands of maps. After the war, remaining stocks of 1:50,000 maps were used by Norway's armed forces and sold to the public with a sticker indicating that they were 'war booty'.



Map 2. Bildplankarte 1:50,000, sheet P 5 Reinöy, printed by a mobile German unit in January 1945. Largely based on amtskart Tromsø 10-IV 1:200,000, first published in 1874, revised in 1933 (roads in 1942). Gauss-Krüger grid. Marginal notes point out that the map is at least 100 m off for every 2 mm, and that contour lines only show landscape forms, not heights; troops are requested to provide corrections. (Source: Kartverket [Norges geografiske Oppmåling])

Collaborationists?

With the exception of Belgium, the topographic services were trapped from day one of the war. In the Netherlands, The Hague wasn't actually occupied by the Germans until the country capitulated, but the fighting made it impossible to move topographic Service (TD) archives, stocks and equipment to safety, and no orders were given to destroy them.

Under the Hague Conventions on the conduct of warfare, the occupying force could requisition goods and services, but this had to be 'proportionate' to the country's resources and people could not be forced to take part in military activities against their own country. This left large grey areas, and no plans for dealing with an occupation seem to have been made by any of the services. A lawyer consulted by the Belgian topographic service argued that reprinting existing maps for or printing maps provided by the occupying force did not constitute a breach of the Conventions.

The countries in question were occupied by a ruthless enemy. Highly professional German military mapping units, located in close proximity to the national topographic services, had a varying degree of control over all of them. Pressure to cooperate only increased gradually. The Germans could use the threat of a complete takeover.

It is therefore not surprising that the management of the topographic

services (like other government services) rarely sought a direct confrontation, opting for compromises, delaying tactics and evasive measures where possible. With hindsight, it was easy to criticise the wartime management. This happened, for example, to the director of NGO. His defence was quite rightly based on what he saw as the realistic options open to him at the time. In the Netherlands, the TD Secretary, who had died in 1941, was 'purged' posthumously.

The documents consulted for these articles have little or nothing to say about the fate of Nazi opponents or Jews among staff. In Norway some staff were imprisoned for sabotage and one staff member was executed. In late November 1940, all Jewish public servants in the Netherlands were dismissed on German orders, a step towards their destruction. Whether TD staff were affected is not known.

After a variety of occupations, Paul Hesp studied Geography at Amsterdam University. He later settled in Vienna, where he worked for the UN Industrial Development Organization. Maps have fascinated him since he was given his first school atlas.

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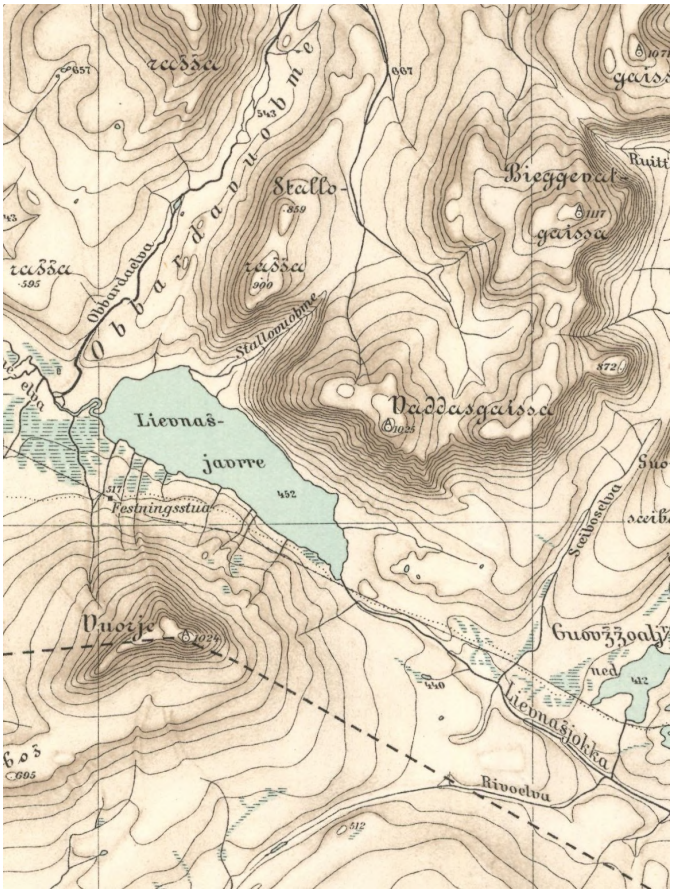
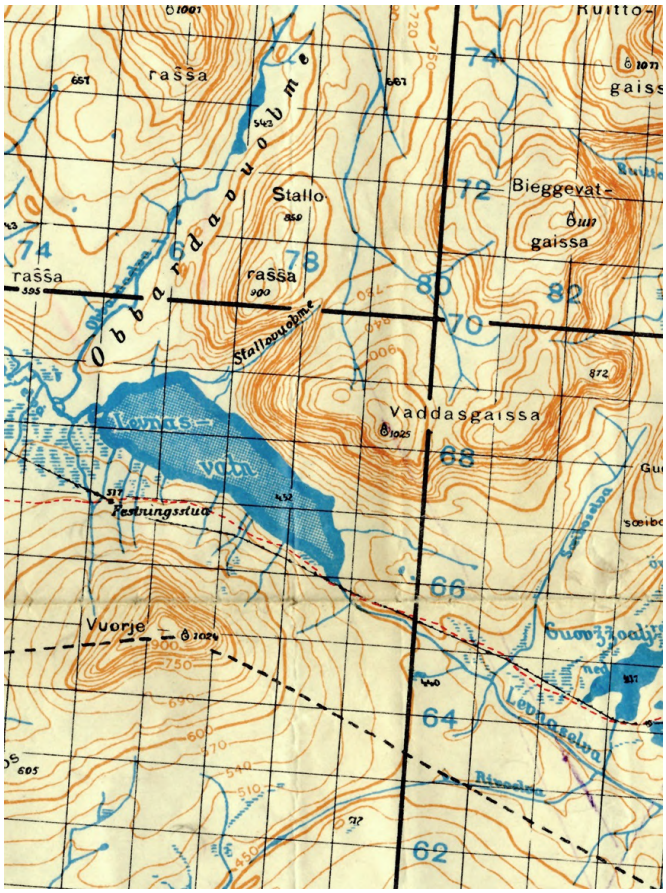
Norway

Bjørn Geir Harsson and Roald Aanrud - *Med kart skal landet bygges – Oppmåling og kartlegging av Norge 1773-2016*, Ringerike 2016 p. 63-67, 154, 462–468.

A Norwegian map and its GSGS version

The Allies of course used maps of the occupied countries as well. Left: Norwegian gradteig map sheet V5 1:100,000 Skoganvarre, surveyed during 1927-29, issued in 1933. Right: the Geographical Section, General Staff (GSGS) version, updated to 1943 and printed in October 1944. The British kept the rektangel and gradteig map sheetlines and numbering, but the grid was based on the Greenwich rather than the Oslo meridian. Where only the amtskart was available, it was enlarged, revised and given the gradteig sheetlines. (Source: Kartverket [Norges geografiske Oppmåling] and [right] editor's collection)





Notice Board

DGI 2024

The BCS is a partner in the DGI Defence Geospatial Intelligence event on 11 - 13 March. At the event (venue: the Queen Elizabeth II Centre in London), the BCS will join senior geospatial intelligence leaders to promote good quality mapping as a key component in any GEOINT strategy. BCS members can get 10% off the ticket price with discount code BCS10: http://tiny.cc/uklivz

EuroCarto 2024

EuroCarto 2024 will be held at Vienna's Technical University, 9-11 September. Early days, but if you register before 20 May the fee is € 270 rather than € 330 (BCS members). Several of the suggested Conference topics should be of interest to Working Group members: Cartography for Disaster Management, History of Cartography and Cartographic Heritage and Topographic Mapping. More information: https://eurocarto2024.org.