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A Cartographic Analysis of the 1939-1945 U-Boat Campaign

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Abstract:
The 1939-1945 U-Boat campaign was inherently a geographic puzzle. The geographic extent of U-Boat operations stretched across the world's oceans and seas. Despite this spatial extent, most U-Boat books present the campaign in chronological terms relying on text to convey that history. If maps are included, they are few in number, not well designed, and univariate. Thus, maps are relegated to a supporting role. Surprisingly, a cartographic perspective on examining this puzzle is missing. To fill this gap, this presentation argues that a cartographic analysis of the U-Boat campaign through data-driven and map-based evidence is needed to better visualize and understand this campaign's geographic puzzle.

Geospatial data on the U-Boat campaign is published by Rohwer (1983), Kemp (1997), and Niestlé (1998). In these sources, records of each Allied vessel or U-Boat sunk include various attributes and coordinates. Visualizing this loss data using methods such as small multiple, mapping attributes, and bivariate/multivariate symbolization presents insights into the U-Boat campaign in ways not previously provided by U-Boat books. By applying these and other cartographic methods, the reader can begin to piece together this campaign's geographic puzzle by making inquiries into the *why*, *where*, and *what* of the geospatial data.

A small multiple can show the change in a variable over time or space. For instance, a small multiple can show the changing locations of Allied vessels sunk or damaged by U-Boat types for a given time-period. Doing so reveals clues that help explain why patterns in the sinkings appear as clustered or dispersed. For instance, between 1 September and 31 December 1939, Allied vessels sunk or damaged by Type IIA, IIB, and IIC series U-Boats were clustered in the Skagerrak Strait and the eastern coast of the British Isles. During that same time-period, successful attacks on Allied shipping by Type VIIA, VIIB, and IXA series U-Boats were dispersed in areas west of the Bay of Biscay and the Iberian Peninsula, respectively. The patterns reflected on this small multiple encourage readers to ask questions about *why* these patterns exist.

Maps found in most U-Boat books present the locations of Allied vessels or U-Boats sunk according to a specific chronology or focused on a specific event such as an important convoy battle. While this chronological approach helps reveal the changes to patterns of vessels sunk over time, mapping attributes provides additional insights into patterns in the loss data. For instance, one can examine the spatial distribution of the attack methods that Allies used against the U-Boats. Mapping the attack methods, we learn that between 1 September and 31 December 1939, more U-Boats were lost due to mine fields around the British Isles compared to other attack methods. However, as Allied improvements to technology progressed (e.g., centimeter radar), other attack methods (e.g., depth charges) would prove more successful in sinking U-Boats beyond these British coastal waters.

Maps appearing in U-Boat books are generally univariate (e.g., a dot on the map represents the location of a sunken vessel). Taking a multivariate approach, more complex relations in data in a compact form are possible. To illustrate what kind of toll the campaign had on U-Boat crews, Figure 1 shows a multivariate map of 24 U-Boats that were lost from 1 September through 31 December 1939. The map uses a combination of proportional circles, grey values, and icons to present four variables: the location of the sinking, the number of U-Boat patrols, the percentage of crew casualties/survivors, and whether the U-Boat commander survived the attack. The mapped pattern reveals that out of the 24 U-Boats lost, there were no survivors in 13, some percentage of the crew survived in seven, and the entire crew survived in only four. Overall, two-thirds of the U-Boat commanders perished. Seven of the U-Boat lost were on their maiden voyage. This multivariate view presents grim statistics on the toll of U-Boat crews during this time-period of the campaign.

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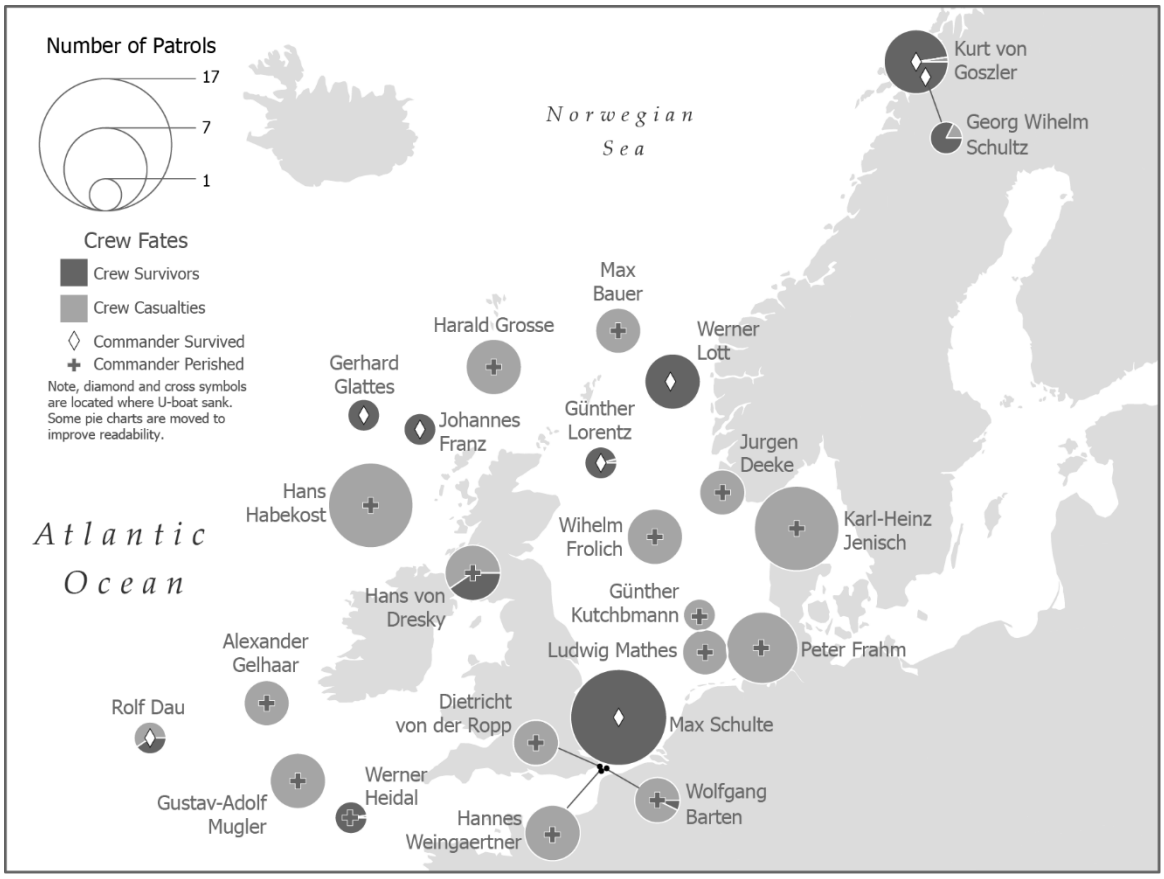

Figure 1. A multivariate map showing the location of U-Boats lost and their crew fates from 1 September through 31 December 1939. The U-Boat commander names are labeled.

This presentation focuses on the role that informative and well-designed maps can have in helping the reader to make inquiries into patterns observed on maps related to the 1939-1945 U-Boat campaign. Mapping geospatial data related to this campaign, specific themes are represented rather than employing a more chronological approach often used as the organizing framework for U-Boat books. Four important characteristics of a cartographic analysis of the U-Boat campaign will be presented. First, highlight the importance that aesthetically pleasing and well-designed maps can play in fostering an understanding of the U-Boat campaign's geographic puzzle. Second, employing a geospatial lens to examine the geography of the campaign, going beyond the more commonly adopted chronological approach taken when mapping vessels were sunk or damaged. Third, by taking a data-driven thematic approach, topics that previously have not been considered (e.g., patterns of Allied vessels sunk and damaged according to U-Boat type) can be visualized. Fourth, the mapped patterns will prompt readers to make inquiries into the geospatial characteristics, visualize information shown on data-driven maps, and arrive at new insights into the geography of the U-Boat campaign.

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