

## Geospatial Intelligence for Sea Fighting

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**ABSTRACT:** *Geospatial intelligence (Geoint)'s goal is to provide timely, relevant, and accurate geospatial intelligence to support national security. GEOINT as the exploitation and analysis of geospatial imagery and information to describe, assess and visually depict physical features and activities that are geographically referenced on Earth. Without an effective GEOINT, the state and its armed forces will be vulnerable to security risks and threats. GEOINT must have the speed, precision, accuracy, and relevance of its geospatial analysis. data sources increase in number and type, and the volume of data increases. As GEOINT moves rapidly to temporal, spatial, radiometric, and spectral resolution, increasing volumes and more complex data must be absorbed—that is, collected, processed, analyzed, and reported. Marine geospatial data is the main raw material in building marine geospatial intelligence which is very vital in every implementation of maritime defense policies so that it can facilitate leaders in making the right, effective and efficient decisions.*

**KEYWORDS** - *Geoint, naval warfare, chart, map, navigation*

### I. INTRODUCTION

Geospatial Intelligence (Geoint) is a science, technology and art to analyze sensing image data into geospatial information and intelligence knowledge below and above the earth's surface for decision making/policy in the field of defense. Geoint covers all aspects of imagery including data obtained from ultraviolet via microwave of the electromagnetic spectrum as well as information obtained from analysis of literal imagery, geospatial data, non-literal analysis of image spectra, spatial, temporal, radiometric, polarimetric and so on.

Geoint is often used in intelligence disciplines which consist of exploitation and analysis of geospatial data and information to describe, visually assess the physical characteristics of both nature and buildings as well as geographically referenced activities on earth. Geospatial intelligence data sources can be obtained from satellites, Unmanned Aerial Vehicles) UAVs, discrete data that have locations on earth and others.

Generally Geoint can be more easily defined as data, information and knowledge collected about an entity that can refer to a specific location on, above or below the earth's surface. Intelligence gathering methods include IMINT, SIGINT, MASINT, and HUMINT. Geoint is used to identify various outputs using various existing spatial skills and disciplines including photogrammetry, cartography, image analysis, remote sensing, and terrain analysis. (Hotroiman et al., 2017)

Geoints can be used in a variety of applications and methods, including modeling and simulation to support concept development and experiments such as Urban Resolve and Multi-National Experiments. It also has a role in military operations support to deploy troops based on the current situation and geography. In addition, Geoint is used to support the Joint Forces Command in providing information regarding the current situation in the area of operation. (Barrowman, 2007)

## II. RESEARCH METHODOLOGY

This research was conducted using descriptive analysis methods and literature studies that aim to provide a comprehensive and analytical explanation based on data from the literature study by searching for appropriate keywords in search engines, books, journals, or other scientific sources, which are then analyzed and the results are analyzed. put in writing.

## III. RESULT AND DISCUSSION

With geospatial intelligence and data fusion techniques as well as intelligent methods and technologies to combine/integrate data and products obtained from various heterogeneous sources using machine learning techniques and big data technologies generate information that is important in decision making. (Kussul et al., 2012)

Applications and Future Trends is to explore cutting-edge methods combining geospatial technologies and artificial intelligence related to several diversified fields such as smart farming, urban planning, transportation, and 3D city models. It introduces techniques which range from machine and deep learning to remote sensing for geospatial data analysis. (Barramou et al., 2021)

The transformation of naval warfare undergoes a change in tactics, both changes in military institutions and the emergence of new types of warships must be taken into account. These three aspects of warfare namely military organization, shipbuilding innovation and tactical approach are important things to consider. By using geoint in naval warfare, it affects tactics in carrying out military operations. (Larrea, 2020)

Geoint obtains information from survey and mapping technology, such as photogrammetry and cartography in which there are remote sensing techniques to produce images that can be used to make maps, but now it has been developed so that it becomes a geographic information system that makes it easy to produce intelligence products on geoint. Geoint consists of several intelligences, namely open source intelligence (osint), measurement intelligence (masint), human intelligence (humint) and signal intelligence (sigint). (Dadang & Supriyatno, 2019)

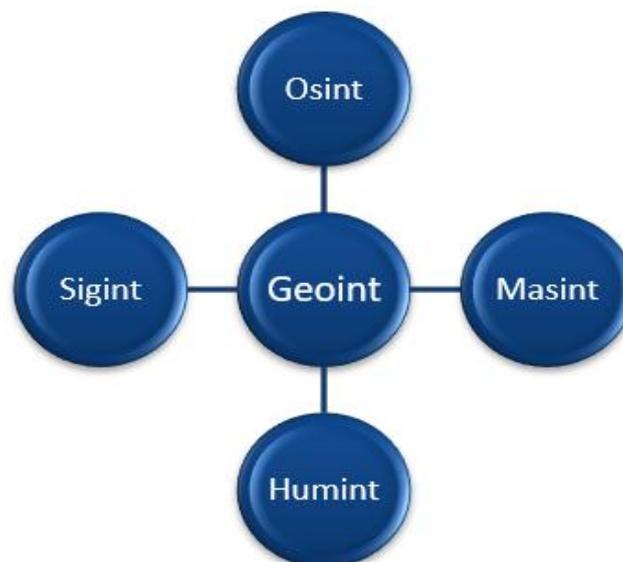


Figure 1. Geoint relationship with other intelligence

Geoint plays an important role in the field of national defense and national security, because not all earth space information can be used for public consumption, moreover it is related to state sovereignty. With the Geoint can protect important country information that is confidential. In this case Geoint is defined as a science in the field of defense for the collection, processing, storage, dissemination and use of geospatial information so that it can be used for planning operations, military exercises, simulations and precise targeting.

Geoint can be used for war military operations and military operations other than war. In military war operations, including Amphibious Warfare (AMW), Naval Special Warfare (NSW), Anti Submarine Warfare (ASW), Under Sea Warfare (USW), Mine Warfare (MIW) and so on. Meanwhile, in military operations other than war, the application is in disaster management, Search and Rescue, handling vital objects at sea, securing maritime borders, research and so on.

Geoint's products include the Digital Nautical Chart (DNC), which is a map that is confidential and only used by the military.



Figure 1. Digital Nautical Chart

Meanwhile, the one used by the public is the Electronic Navigation Chart (ENC), which is an official vector map based on an electronic map that complies with the requirements of the Safety Of Life At Sea (SOLAS) convention. ENC has become a necessity and obligation for ships of various types and sizes as a means of marine navigation aids. DNC is an ENC with an Additional Military Layer (AML).

In military operations of war, especially in naval warfare, Geoint is very much needed because its data is very relevant to determine parameter info for submarines in underwater warfare. Submarine navigation system is highly dependent on the visibility of the water column, bathymetric conditions, type of seabed, speed profile of sound (temperature, salinity, depth), planktonic organisms and echolocation. In the use of marine maps, the difference between bathymetric contours on ordinary marine maps and AML is the density so that there should be no errors in using the map.

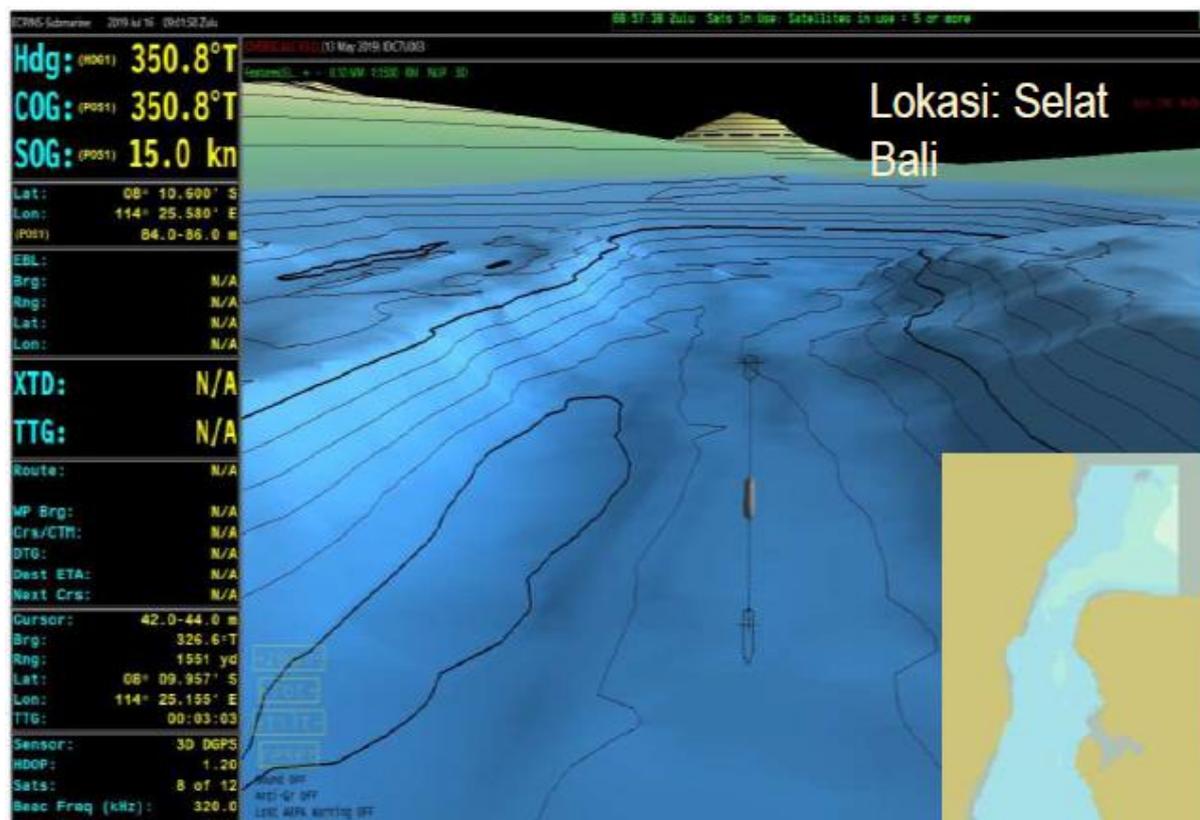


Figure 2. AML Net Work Bathymetry

Submarines when sailing must be able to know environmental conditions so that they can determine the right position when diving at a depth that is safe from enemy monitoring and the surrounding environment because each area has different conditions. So the submarine in diving can not need to be too deep but the enemy maritime patrol aircraft do not know it.

#### IV. CONCLUSION

The importance of marine geospatial (Marine Geospatial) as the main field for the interests of maritime defense and security. Geoint used in naval warfare can provide information to submarines to be safe when operating in a battlefield without being noticed by the opposing maritime patrol.

Marine geospatial data is the main raw material in building marine geospatial intelligence which is very vital in every implementation of maritime defense policies so that it can facilitate leaders in making the right, effective and efficient decisions.

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