Chapter 7
Based on BeiDou (COMPASS) Build the Environmental Protection Services System of Hainan Marine Fisheries Production Safety

Yubo Lv, Jianfeng Xu, Linhao Xu and Chengye Qi

Abstract Integrating of existing Hainan Province vessels dynamic management information system, to build the environmental protection services system of Hainan marine fisheries production safety, making direct services to all types of marine fishery production safety environment thematic services and products, through the BeiDou system sends real-time to the majority of maritime operations fishing boats and fishermen in the hands, enhancing the overall security environment marine fisheries production support capabilities. The system uses technologies of BeiDou, GIS, network communications, etc., to achieve the dynamic vessels monitoring, producing marine forecast and warning products, forecast and warning message intelligent publishing, initiative to provide accurate early warning for the marine fisheries production safety management, which can effectively reduce marine disasters caused personnel and property damage.

Keywords Marine fisheries · Safety manufacture · COMPASS · Forecast and warning · Environmental protection

Y. Lv
Ocean Monitoring and Forecasting Center of Hainan Province, Haikou, China
e-mail: lvyubohappy@126.com

J. Xu
Department of Ocean and Fisheries of Hainan Province, Haikou, China
e-mail: xujianfenghappy@126.com

L. Xu · C. Qi (✉)
BDStar Information Service Co., Ltd, Beijing, China
e-mail: chyqi@navchina.com

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7.1 Demand of the Environmental Protection Services System of Hainan Marine Fisheries Production Safety

Our country is a Marine power, Marine fishery occupies an important position in the Marine economy of our country. According to incomplete statistics, there were all kinds of marine fishing vessels of about 310,000, more than 1,000 various types of fishing ports, aquaculture area of over 1,500 ha, more than 800 million people engaged in fishing. Statistics show that in 2011 the total marine production in Hainan Province reached 612 billion yuan, accounting for 27 % of the province's GDP, fishery economic output, value added amounted to 29.5 billion yuan and 18 billion yuan, marine and fisheries economy has become an important pillar of the national economy in Hainan Province.

Marine fisheries production safety is related to the vital interests of the fishermen, and is also highly concerned about the levels of government. After years of construction, Hainan has now set up a dynamic management information system, which covers the province's 6000 medium-sized ocean vessels, realized the Marine fishery ship dynamic monitoring and comprehensive management of Hainan province provide effective guarantee for safe production of fishery and play an important role in fishing boat shelter, emergency, command scheduling.

National marine sector plays an important role in the marine environment observation forecast and marine disaster warning released, the majority of fishermen and fishing are important clients marine warning newspaper work [1]. Aim at the south sea fisheries Forecast and warning failed to business, not unified and not timely forecast source, how will the Marine department station reported Forecast and warning content integration into the existing fishing vessel dynamic management information system, the active for Marine fisheries production safety management to provide accurate warning, is of great significance to reduce disaster losses.

7.2 System Construction Goal

The environmental protection services system of Hainan marine fisheries production safety is the national Marine fisheries production safety environmental protection service system of provincial node system, is a important component.

The environmental protection services system of National marine fisheries production safety construction goal is to build the country, the sea area and the provincial level three-fies system, fusing the Marine station reported Forecast and warning information that is closely related to fisheries production safety, to implement the dynamic monitoring of fishing boat fishing port and aquaculture area, Marine environmental protection services, auxiliary decision-making functions for Marine fishery production, to improve our country's Marine fishery environment comprehensive guarantee ability, effectively reduce the economic

loss and casualties in Marine fishery production, promote the healthy development of China's Marine fishery production [1].

The environmental protection services system of Hainan marine fisheries production safety to ensure the safety of fishery production oriented, with Marine forecasting service in fishery production as the main line, real-time positioning by fishing boats, Marine project station reported Forecast and warning, communication network technology integration, building the environmental protection services system of Hainan marine fisheries production safety that can cover Hainan key fishing waters [2]. This system integration has built Hainan sea fishing vessel dynamic management information system, based on existing Marine environmental forecasting expand and deepen the service, and fishermen fishing areas and fishing ports to make direct services in the fisheries production safety of the Marine environment project service products, in real time to the sea fishing boats and fishermen, improve environmental protection to the safety of fishery production ability.

7.3 System Architecture Design

The environmental protection services system of national marine fisheries production safety adopts the country, area, the provincial level three-fies system of the network structure design, connection between nodes at all levels (Fig. 7.1) [1].

Environmental protection services system of Hainan marine fisheries production safety join hands with has been built in Hainan province of Marine fishing vessel dynamic management information system, this system can be made of fine station reported an alert products sent to the fishing boat through the BeiDou system, realized the ocean station reported an alert products can truly for the purpose of service for fishermen. System works such as Fig. 7.2.

System design divided into multiple function relatively single software modules, each do its independent task, through the message, network, file to data exchange, to access and upload ship static data, dynamic position data, station reported Forecast and warning product, to production and upload station reported warning products. System composition such as Fig. 7.3.

7.4 The Main Construction Contents

7.4.1 Marine Forecast and Warning Products Produced and Pushed

Marine forecast and warning products produced module is based on GIS visualization technology, realizing fine mesh wind, wave and other marine forecast and warning products of Hainan's coastal waters produced, and through standard

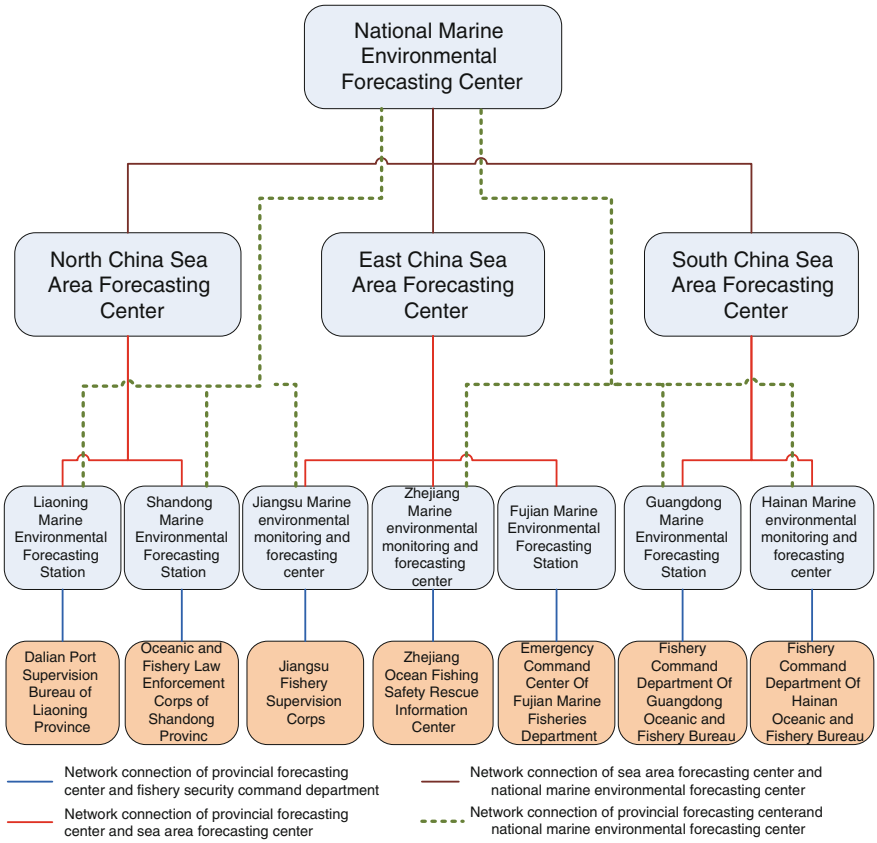

Fig. 7.1 The country, the sea area and the provincial three level system network structure

interface of network transmissing software, upload it to the National Marine Environmental Forecasting Center, South China Sea Forecasting Center, sharing resources of forecast and warning product data.

7.4.1.1 Data Acquisition

Producing of fine mesh wind, wave and other marine forecast and warning products of Hainan's coastal waters, is based on the large surface products issued by the National Marine Environmental Forecasting Center, and the fishery products issued by the South China Sea Forecasting Center, release these two products at the same time every day, then via the storage middleware and file transfer software, finally, the data stored in the database of this systems. Warning Production and Releasement module via proxy module can be automatically or manually downloaded products to the local. Large surface forecast and warning

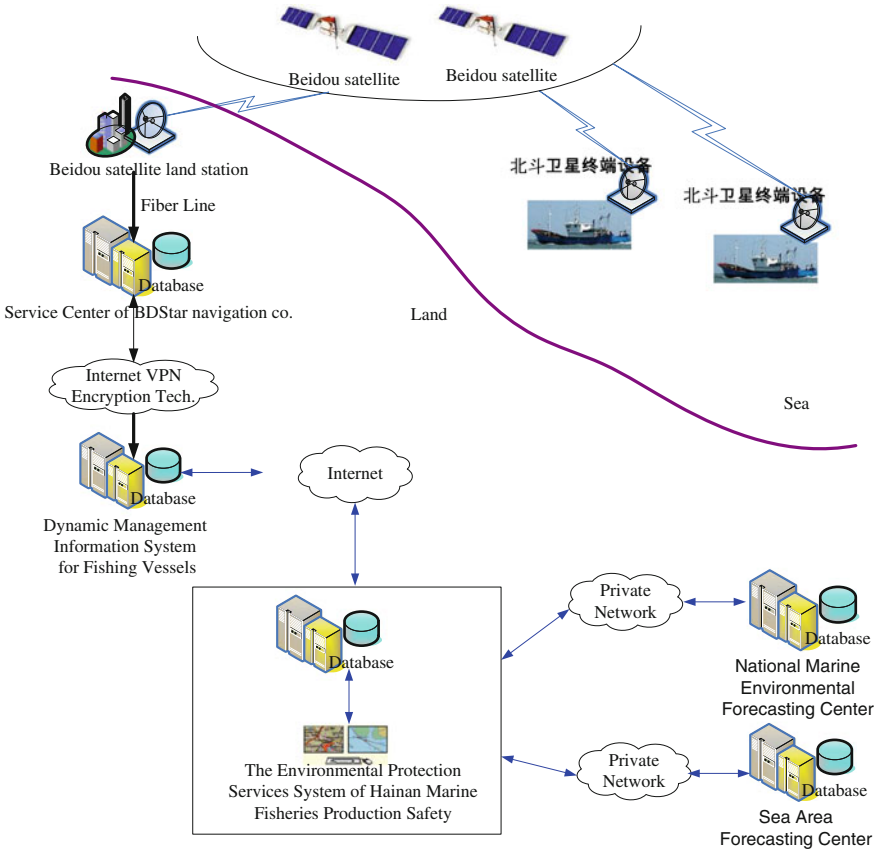

Fig. 7.2 The working principle of the system

products use SHAPE file formats, for easy handling, fishery forecast and warning products converted to XML file formats. The process as shown in Fig. 7.4.

7.4.1.2 Fine Wind and Wave Warning Products Production

System implements two ways of forecasting and warning products production: split sea area product mode and hand-painted mode. First mode is based on the fishery products issued by South China Sea forecasting Center, split it and create initial fishery forecasting and warning product of Hainan Province, then make manual adjustments to produce a final fishery forecasting and warning product; Hand-painted mode is drawing levels contour of the waves height or surface wind power on GIS charts, through the exact algorithm to calculate the wave height or wind power of each fishery, generating Hainan fishery forecast and warning products.

The effect of Hand-painted mode such as shown in Fig. 7.5.

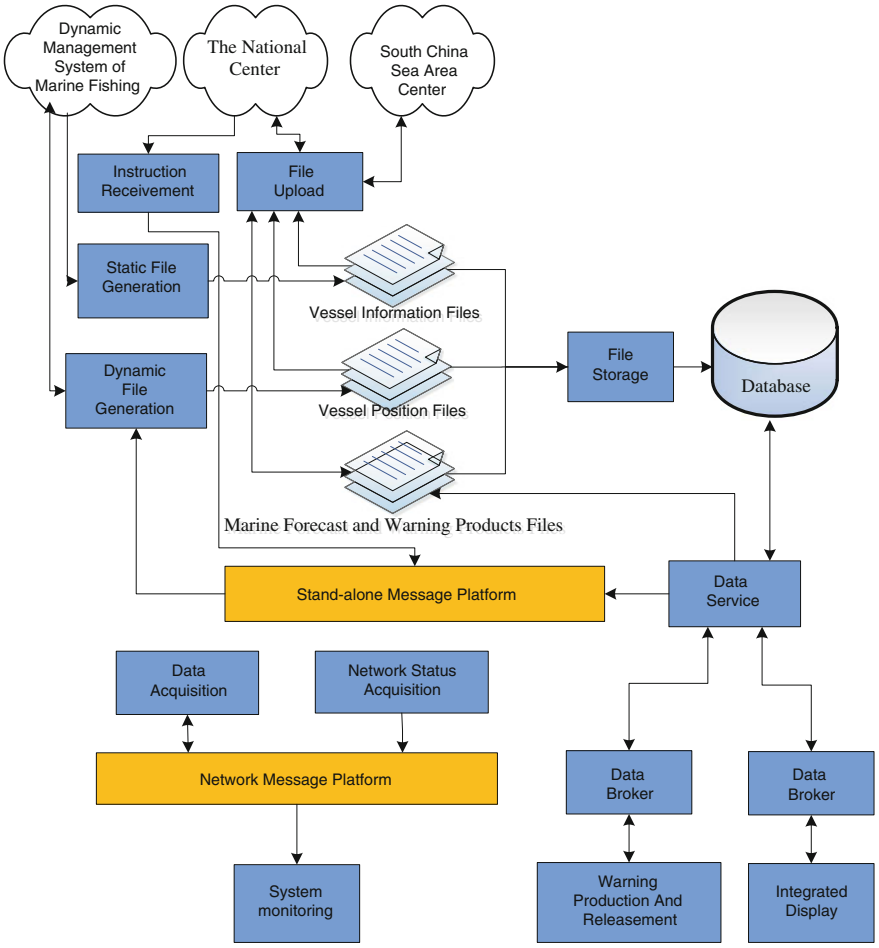

Fig. 7.3 The system composition diagram

7.4.1.3 Forecast and Warning Products's Publishing and Transferring

The forecast and warning products produced by this system stored in the form of EXCEL file and upload it to the server, the file preprocessing module package and make three copies, one for file storage program for its parsed into the library, the other two are uploaded to the National Center and the South China Sea Area Center by the data transfer middleware, with processes as shown in Fig. 7.6.

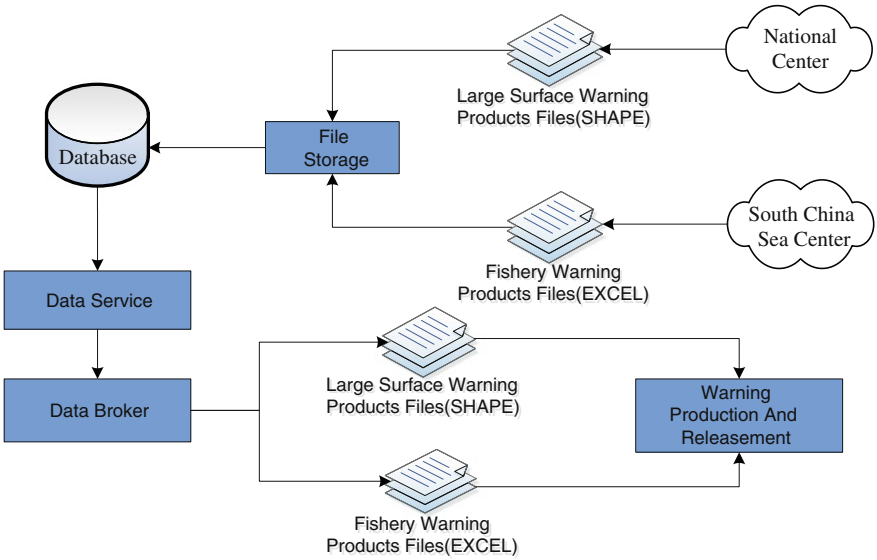

Fig. 7.4 Forecast and warning data acquisition process

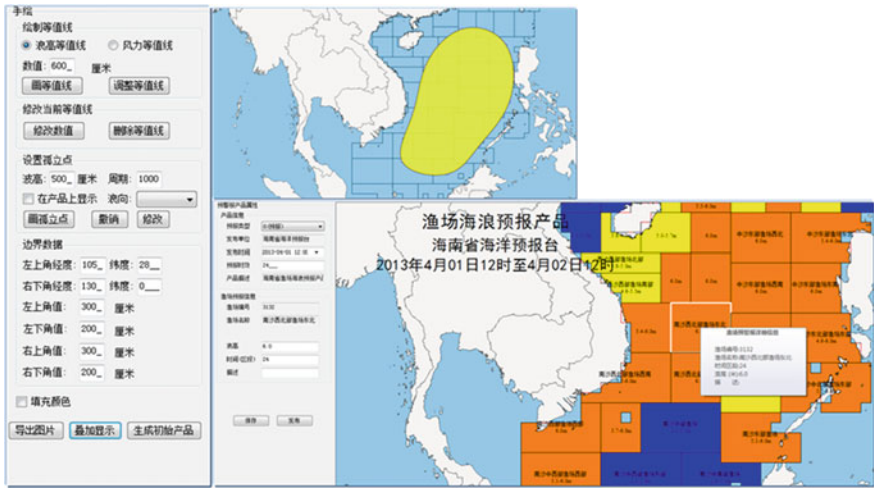

Fig. 7.5 Hand-painted produced forecast and warning products

7.4.2 Display the Marine Forecasting and Warning Products

Marine forecast and warning products display in the integrated display platform module. Platform supports forecast and warning products of shape format superimposed on electronic chart. Including chart display, forecast and warning

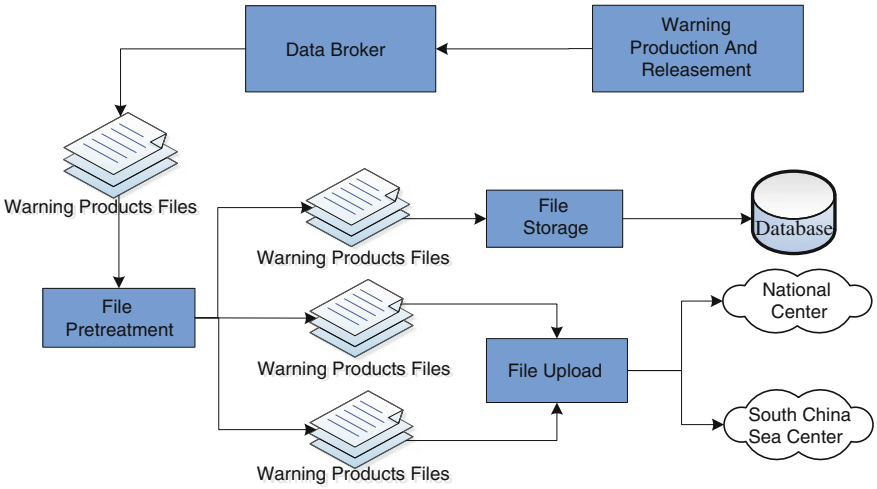

Fig. 7.6 Forecast and warning product release and transport processes

products superimpose, fishing target display, sends the getting ship's position commands, sends forecast and warning SMS, statistics ship online rate, statistics issued instructions etc. functions.

7.4.2.1 A Variety of Chart Display and Fishing Boat Display

The system supports S57 format and SHAPE format charts display, and supports display strategy of multi terminal fusion in fishing target display specification formulated by Ministry of Agriculture.

Under the S57 format chart, the effect of vessels target display shown in "Fig. 7.7 Fishing boat display in S57 format chart".

7.4.2.2 Forecast and Warning Products Overlay Display

The system supports two types of products superimposed on the GIS map: large surface products issued by the National Center, fishery products issued by Sea Area Center and the Provincial station, large surface warning products for the SHAPE format, fishery products for the EXCEL format.

Large surface forecast and warning products display as shown in Fig. 7.8.

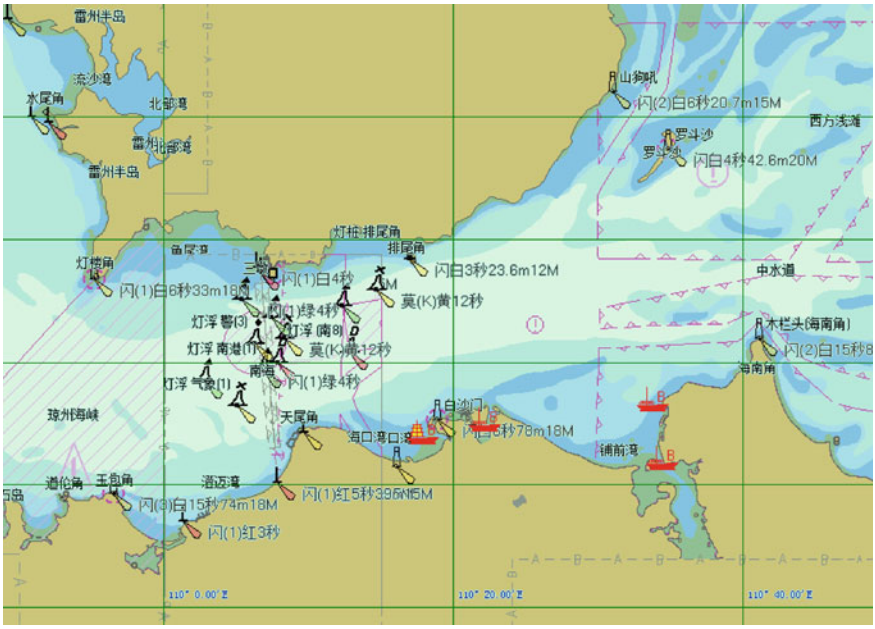

Fig. 7.7 Fishing boat display in S57 format chart

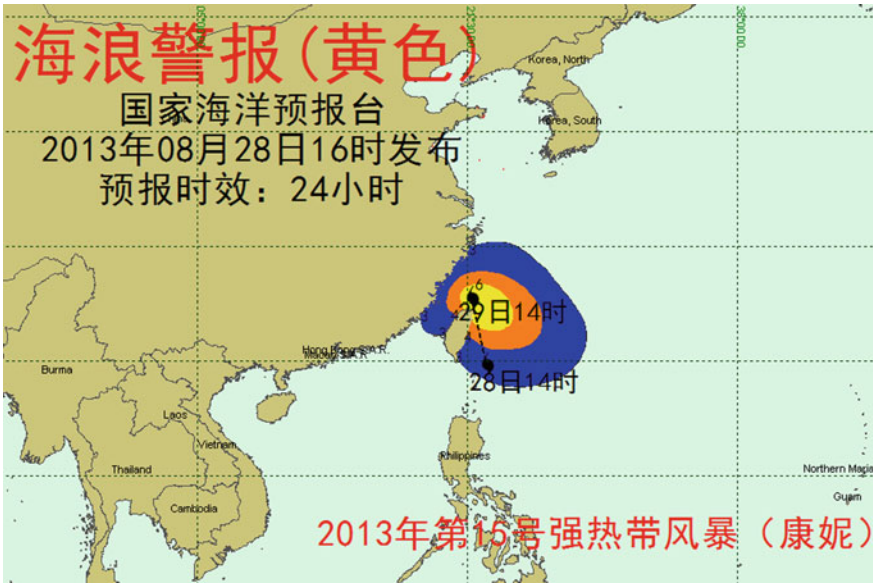

Fig. 7.8 Large surface wave warning product overlapping display

7.4.2.3 Forecast and Warning Messages Produced and Pushed

The system get the dynamic position of fishing vessels through BeiDou, analyzing the type of forecast and warning product, the level and range to achieve release forecast and warning messages based on location intelligence capabilities.

For forecast and warning products the affected fishing can be analyzed in different grades or wind waves grade range, for fisheries forecast and warning products, can be analyzed the affected fishing vessels within range of user-selected. According to the results, the system intelligence generates detailed report warning messages, and through the BeiDou system will send warning messages to the fishing boats and fishermen reported the hands of real-time, effective pre-disaster warning, to protect the safety of fishermen production operations.

7.4.3 System Performance Monitoring

7.4.3.1 Network Status Monitoring

Collected using protocols such as SNMP routers and other network equipment network connection status in different colors respectively connect and disconnect status. Target acquisition can be configured in the form of configuration files stored locally, read the software for the next start. For network anomalies in log mode records to the database.

7.4.3.2 Data Transfer Monitoring

The push process of various types of data visualization monitoring, logging and exception handling the abnormal of document reads and transfer status. By collecting data upload middleware components, data processing log analysis d-ata storage member, including data collection compression, network transmission, data analysis, the time information storage, the information is normal or not, and the number of information data processing, data transmission queue information on HMI, histogram, curves and other forms displayed to the attendant.

7.4.3.3 Server Running Status Monitoring

Through Windows programming interface, access to the specified server and running related processes, including CPU usage, memory usage and so on. And processing server can be configured as a file is saved to the local time for the software to read the next start. When the process is abnormal, through pop-up dialog, playback duty prompted alarm sounds. Create a table in the database corresponding to record abnormal process alarm time occurs, the target machine IP address, the alarm process name, etc., for use in future queries.

Fig. 7.9 Ship's position daily collection and sending curve

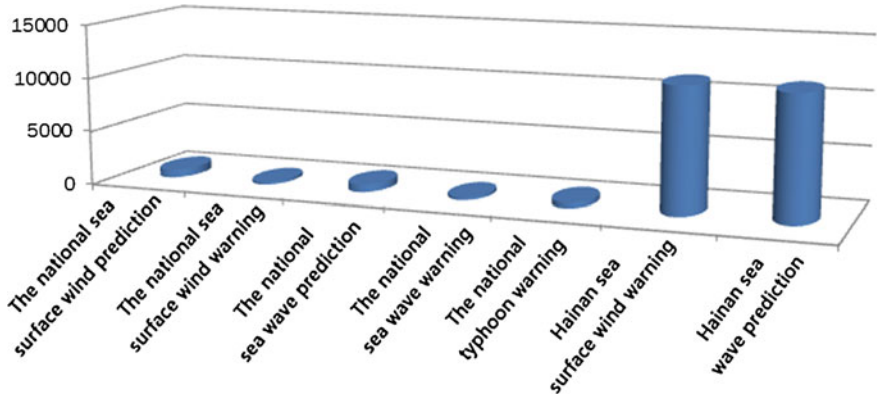

Fig. 7.10 Distribution and reception of forecast and warning products

7.5 Application

The National environmental protection services system of marine fisheries production safety in June 1, 2012 entered operational phase of trial operation, July 3, 2013 by the National Oceanic overall acceptance. Since the system operational test run collected information on all installed fishing BeiDou satellite positioning terminal of Hainan, and a variety of marine warnings on packets of information sent to the affected vessels in the marine fisheries production safety has played a significant role. During the 2013 typhoon affected departments make use of the system sending promptly report warning messages to vessels, effectively reducing staff because of the typhoon disaster and may cause property damage.

As of October 31, 2013, the systematic collection of information on vessels fishing in Hainan 6143, which matches the terminal has reported 6120. Form 2012 June 1 to October 31 nodes collect and South China Sea Area Center, National Center sends a dynamic ship's position daily as Fig. 7.9 Ship's position daily collection and sending curve.

One of the system since June 1, 2012 to October 31, 2013 to receive the National Marine Environmental Forecasting Center production of sea surface wind, wave warning report 1904, which forecast 1399, alarm 505, making 521 typhoon warning. By the Hainan Marine forecast surf forecast produced refined products 11,344, fine sea surface wind forecast products 11462 (Fig. 7.10).

7.6 Conclusion

By using BeiDou system to send the SMS of the marine environment report warning to the hands of fishermen to achieve a marine disaster early warning, which can effectively reduce property damage and casualties caused by tolls. The system is developed to achieve the integration and full use of existing resources, goals, both to tap the potential of the BeiDou system in the marine fisheries sector disaster early warning, but also for future expansion into other industries played a good role model, is the Big Dipper in the civil try an innovative application areas. The system will continue to deepen the subsequent increase forecast and warning products, such as the type and extension of the forecast period will be extended to the forecast and warning service levels in coastal cities and counties in Hainan Province, to expand the scope of services to provide a more comprehensive environmental protection services for the marine fisheries production safety.

References

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