渤海 黄海 东海

海洋图集

地质 地球物理

海 洋 出 版 社

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海洋图集编委会 编

MARINE ATLAS

OF

BOHAI SEA

YELLOW SEA

EAST CHINA SEA

GEOLOGY AND GEOPHYSICS

EDITORIAL BOARD FOR MARINE ATLAS

海洋出版社

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海洋地质地球物理图集

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《渤海、黄海、东海海洋图集》

前　　言

海洋在我国社会主义现代化建设中具有重要的作用，国家一贯十分重视海洋工作。早在一九五八年即曾组织各方面力量进行了全国性大规模的海洋普查。在此后的三十年间，国家海洋局及各有关部门根据国家经济建设和国防建设的需要，对我国周围海域又陆续进行了大量规模不等、内容广泛的海洋调查、监测和科学研究工作，获得了大量的调查观测资料和丰硕的科学研究成果。随着我国社会主义建设事业的发展，海洋开发活动日益增多，对海洋的管理和保护日趋迫切。根据这种形势，为满足我国海洋科学研究、开发、管理、保护、教学以及维护海洋权益的需要，并反映建国以来各有关部门在海洋调查和科学研究方面的成果，国家海洋局组织编辑出版这套《渤海、黄海、东海海洋图集》，以供各界使用。《南海海洋图集》将于以后组织编辑出版。

《渤海、黄海、东海海洋图集》由《地质及地球物理》、《化学》、《生物》、《水文》和《气候》五本专业图册组成。

为确保本套海洋图集的质量，我们尽可能搜集了国内外现有的海洋观测资料，经过校对、分析、对比和质量控制，按照以国内资料为主、国外资料为辅的原则，进行精心筛选采用。对缺乏资料的海区，国家海洋局组织了必要的海上外业补测。图集所用资料大体上截止至一九八七年底。为提高本套图集的整体性，我们从资料处理、分析、评价的方法与标准到图集的内容、格式、表现方法等方面，均作了统一的规定。要求做到科学性、系统性、实用性的统一，在保证科学性前提下力求美观。

参加本套海洋图集编辑出版工作的有国家海洋局第一海洋研究所、第二海洋研究所、第三海洋研究所、海洋科技情报研究所、海洋环境保护研究所、东海分局、北海分局、海洋环境预报中心、海洋出版社等单位。编辑工作得到中国科学院海洋研究所、南海海洋研究所，青岛海洋大学，地质矿产部石油地质海洋地质局，以及农业、交通、石油等部门和其他高等院校的热情支持和大力协助，特此致以衷心的感谢。对图集中存在的不足，热诚希望给予批评指正。

《渤海、黄海、东海海洋图集》编辑委员会

一九八九年七月

Preface

As the ocean plays an important role in China's socialist modernization drive, the Chinese government has all along attached great importance to the marine undertaking. As early as in 1958, a nationwide, large-scale marine survey was conducted, mustering strength from all walks of life. In the subsequent 30 years, the State Oceanic Administration of China (SOA) and the relevant organizations, in the light of the needs of the national economic construction and the national defence, have successively carried out a large amount of marine survey, marine monitoring and scientific research on various scales and with substantial content in the surrounding waters of China, and obtained great quantities of surveying and observational data, and rich scientific research results. With the development of China's construction, activities of ocean development are growing day by day, which makes the management and protection of the ocean increasingly urgent. In the light of this situation, and, in order to meet the needs in China's marine research, development, management, protection, education as well as safeguarding of rights and interests in marine affairs, SOA sponsored the editing and publishing of this series of "Marine Atlas of the Bohai Sea, Yellow Sea and East China Sea". This series also reflects the achievements in marine surveys and research made by other departments concerned since the founding of the People's Republic of China. The "Marine Atlas of the South China Sea"will come off later.

"Marine Atlas of the Bohai Sea, Yellow Sea and East China Sea" consists of five sub-atlases: "Geology and Geophysics","Chemistry","Biology","Hydrology"and "Climatology".

To ensure the quality of this series, we have collected as far as possible the marine observational data available both at home and abroad, which, through checking, analysis, comparison and quality control, have been carefully selected and adopted, on the principle of relying mainly on the domestic data while making the external data subsidiary. SOA had organized activities to make supplementary observation of the sea regions lacking data . The data used in this Atlas are basically as of the end of 1987 . To achieve the integrity of the series, unified rules have been formulated in terms of the contents, formats and elements description of the Atlas as well as the methods and standards for the data processing, analysis and evaluation. The unity of the Atlas has been required to be scientific, systematic and practical and we have done our best to make it artistic while ensuring its authenticity.

Participants in the work of editing and publishing of the Atlas are the First Institute of Oceanography, the Second Institute of Oceanography, the Third Institute of Oceanography, the Institute of Marine Scientific and Technological Information, the Institute of Marine Environmental Protection, the East Sea Branch, the North Sea Branch, the National Research Center for Marine Environmental Forecasts, the China Ocean Press, etc., of SOA. The editing work has been enthusiastically and energetically supported by the Institute of Oceanology, the South China Sea Institute of Oceanology, of Academia Sinica, the Qingdao Ocean University, and the Bureau of Petroleum and Marine Geology of the Ministry of Geology and Mineral Resources as well as agricultural, transport and petroleum sectors and other related universities. We hereby extend to them our hearty thanks. Comments and criticisms on the shortcomings of the Atlas will be warmly welcome.

Editorial Board
July,1989

说　　明

一、本图册编绘了82幅地质、地球物理图件，它们分别为地形图、地貌图（海岸地貌和海底地貌）、沉积图（沉积物类型、碎屑矿物、粘土矿物、沉积物化学、有孔虫、介形虫、放射虫、孢子花粉）、地球物理图（重力和地磁异常）及大地构造图。这是一本渤、黄、东海区的基础性和综合性的海洋地质和地球物理图册。

二、本图册的编绘，是基于国家海洋局对该海区多年调查研究的成果，特别是1973年以来所获得的最新成果。

取样时，表层沉积物使用“曙光HNM1-2型”取样器，柱状样使用重力活塞取样管和振动活塞取样管，最长样长7.89米。调查测线和测点及定位精度根据国家海洋局编制的《海洋调查规范》（1975）中1／100万要求设计。共布设测点3450多个，其中东海区1950多个，黄海区1100多个，渤海区260多个，台湾海峡140多个。部分海区还做了拖网取样、旁侧声纳和浅层剖面仪测量。在船上，测定了pH、Eh、Fe^{3+}/Fe^{2+}，另外，各海区分析的项目和数量如下表所示：

分　析　项　目	渤海	黄海	东海	台湾海峡
粒　　度	208	854	1707	237
碎屑矿物	70	142	825	64
粘土矿物	85	90	140	84
沉积物化学	770	784	572	140
有孔虫、介形虫、放射虫	63	99	424	40
孢子花粉	110	191	1025	93

东海的地球物理调查是在1977年和1980年两个航次中进行的。调查测线根据国家海洋局制定的《海洋调查规范》（1975）中1／100万的要求设计。地球物理调查测线总长26000多公里。重力测量使用西德产的GSS-2型海洋重力仪，地磁测量使用国产CHHK-1型质子旋进磁力仪。重力测量精度为$2.54\times10^{-5}m/s^2$，地磁测量精度为7.7-9.3nT。

在上述调查中均进行水深测量，水深测量剖面长度超过5万公里。这些资料成为编制地形图和海底地貌图的基础。

根据1981—1986年全国海岸带调查1／20万的成果图件缩编了海岸地貌图。

除上述调查成果外，还收集了有关的资料和图件，例如：由国家测绘总局编绘的1／100万全国重力异常图，由地质矿产部编绘的海区和邻近陆地航空磁测图，由东京大学海洋研究所编绘的西太平洋重力图和地形图以及由东亚和远东矿产资源委员会的报告所提供的日本、朝鲜及我国台湾省的有关资料等等。

为编制大地构造图，曾参考了中外地质学家的有关资料和观点，对海区丰富的资料，经过认真分析、对比，确定大地构造分区。同时图上表示了从公元前780年以来的强震（大于6级）。

上述资料本身，已满足编制小比例尺图幅的要求。

但在国家海洋局调查区域以外地区资料精度稍低，它们是从有关文章中收集的。

三、根据1958-1960年全国海洋普查，在1963年曾出版过海洋环境图集。但迄今为止，它不仅资料较老，而且缺少地质地球物理图册。随着海洋经济和海洋科学的发展，我们越来越感到出版一本完整系统的海洋环境图集是十分必要的。过去在海区所进行的大量调查研究工作也为我们编制图集打下了基础。

在编图过程中，确定了如下原则：

1、凡是有环境意义的地质地球物理图件，尽可能收集进来，以便使图册成为完整的综合性的图册。

2、本图册使用墨卡托投影，基准纬线为北纬30°，成图比例尺分别为1／100万、1／500万、1／700万。

3、编图范围主要集中在海洋局调查过的区域。其邻近地区凡能收集到资料的也尽量编绘。

四、本图集由国家海洋局第一、第二、第三海洋研究所和环保所负责编绘。由国家海洋局第二海洋研究所负责汇总、完善。由国家海洋局海洋科技情报研究所负责编制，海洋出版社出版。我们尽可能设法使该图册能反映国家海洋局在该海区的调查研究的水平和成果，以及反映地质地球物理要素在海区的分布特征和规律。本图册可供科研、教育及有关的海洋管理和生产部门以有益参考。

Introduction

1. 82 maps of marine geology and geophysics have been compiled in this atlas. They are maps of topography, geomorphy (coastal geomorphy and submarine geomorphy), sedimentology (sediment types, clastic minerals, clay minerals, chemistry of sediment, foraminifera, ostracoda, radiolaria, sporopollen), geophysics (gravitational and geomagnetic anomalies) and geotectonics respectively in the Bohai Sea, Yellow Sea and East China Sea. It is a basic and synthetic atlas of marine geology and geophysics covering these sea areas.

2. This atlas is based on the positive results of survey and research made by the State Oceanic Administration (SOA) for many years, especially based on the newest survey achievements since 1973.

Surface sediments were sampled by using "Shu Guang HNM1-2" sampler and cores by piston gravity corer and vibratory piston corer. The longest core is up to 7.89m. The designing of survey lines, stations and accuracy of positioning was based on the Specification of Oceanographic Survey issued by SOA(1975) in which the quality requirements of the map on 1:1 000 000 was determined. There are over 3450 survey stations in all, of which over 1950 stations were located in the East China Sea, over 1100 stations in the Yellow Sea, over 260 stations in the Bohai Sea, and over 140 stations in the Taiwan Strait. In some areas, dredgeing sampling, shallow seismic profiles and scan-side sonar were also used The pH, Eh, Fe^{3+}/Fe^{2+} were determined on board, in addition, number of samples and items analyzed are as follows:

Analytical item	Bohai Sea	Yellow Sea	East China Sea	Taiwan Strait
grain size	208	854	1707	237
clastic mineral	70	142	825	64
clay mineral	85	90	140	84
chemistry of sediment	770	784	572	140
foraminifera, ostracoda, redioloria	63	99	424	40
sporopollen	110	191	1025	93

The geophysical survey for the East China Sea were carried out during the cruises of 1977 and 1980 .The designing of survery profiles were based on the Specification of Oceanographic Survey issued by SOA (1975) in which the quality requirements of the map on1:1 000 000 was determined. The survey profiles amount to 26000km in length. GSS-2 sea gravimeter made in F.R.G. was used in gravity measurements and CHHK-1 proton free-precession magnetometer, made in China, in geomagnetic measurements. The accuracy of gravity measurement is $2.54 \times 10^{-5} m/s^2$, and that of the geomagnetics 7.7-9.3 nT.

Bathymetric surveys were carried out during above cruises. The profiles amount to more than 50000km. These data are the base for drawing up topographic and submarine geomorphologic maps.

According to the maps on the scale of 1:200 000 resulted from coastal zone investigation in China, the maps of coastal geomorphy were drawn.

Except above results, relevant data and maps were collected, such as the gravity maps of China on the scale of 1:1 000 000 compiled by the State Surveying and Mapping Bureau, airborne geomagnetic maps over the sea and adjacent land area by the Ministry of Geology and Mineral Resources, maps of gravity anomalies and bottom topography in the Western Pacific edited by the Ocean Research Institute, University of Tokyo, and information about Japan, Korea and Taiwan Island provided by the reports of C.C.O.P and so on .

For drawing geotectonic map, the Chinese and foreign geologist's views and informations about geotectonics were refered to. Based on a wealth of data of the sea area, the geotectonics provinces were determined through analyzing and comparing. Strong earthquakes (>6 degree)since 780 B.C. were shown in the map of geotectonics.

Above data themselves have satisfied the accuracy of drawing small scale maps.

But outside of the survey area of SOA, the accuracy of data is lower, because they were collected from re-

lated articles.

3. Based on the oceanic general investigation during 1958–1960, the Atlas of Oceanic Environment was published in 1963. But up to now, these date are not only older, but also the atlas on geology and geophysics is absent. With the development of marine economy and science, we have become much aware of the importance of republishing a complete and systematical marine environment atlas. A great amounts of survey and research in the sea area in the past provided the base for us to draw this atlas.

In the course of drawing this atlas, following principle were set up:

(1) All geologic and geophysical maps which have environmental significance should be collected in this atlas as far as possible, so that it can be a complete and synthetic one.

(2) In this atlas Mercator projection would be used. The standard parallel is 30 ° N. The scales of resulting maps would be 1:1 000 000, 1:5 000 000, 1:7 000 000 respectively.

(3) Mapping range would mainly be limited to the areas surveyed by SOA. Maps of the adjacent areas would be drawn based on the collected informations.

4. This atlas was compiled by First, Second, Third Institutes of Oceanography, and Institute of Marine Enviromental Protection of SOA. The Second Institute of Oceangraphy is responsible for gathering and consummating all of maps. Institute of Marine Scientific and Technological Information of SOA is responsible for publication of the atlas. We try to make this atlas reflects as far as possible the level and achievements of survey and research in this area by SOA as well as the distribution features and patterns of geologic and geophysical factors. This atlas may provide a benefiting referrence for institutes, universities and the concerned units of marine administration and production.

目　　录

总　　图

地　　貌

底　质　类　型

碎　屑　矿　物

粘　土　矿　物

沉　积　物　化　学

有孔虫　介形虫　放射虫

孢粉　　硅藻

重　　力

地　　磁

构　造　分　区

CONTENTS

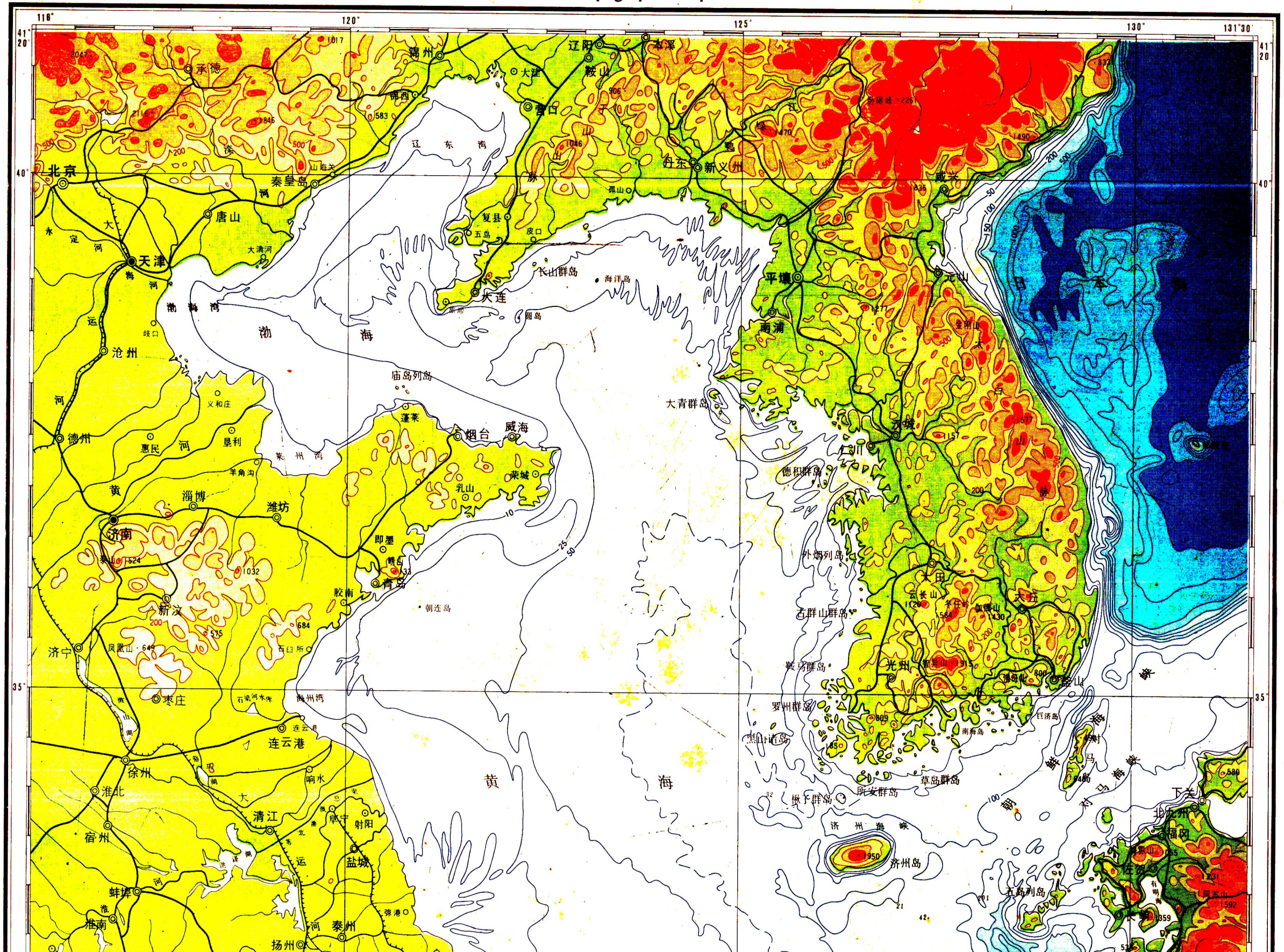
总　　图

GENERAL MAP

（1）

地　形　图

Topographic Map



1

1:5 000 000 (基准纬线 30°)