

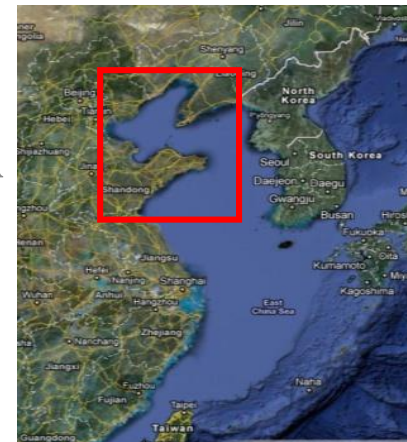


Applications of Marine Observation Data and Numerical Models in North China Sea

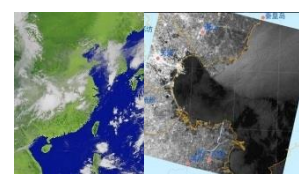
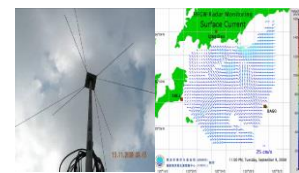
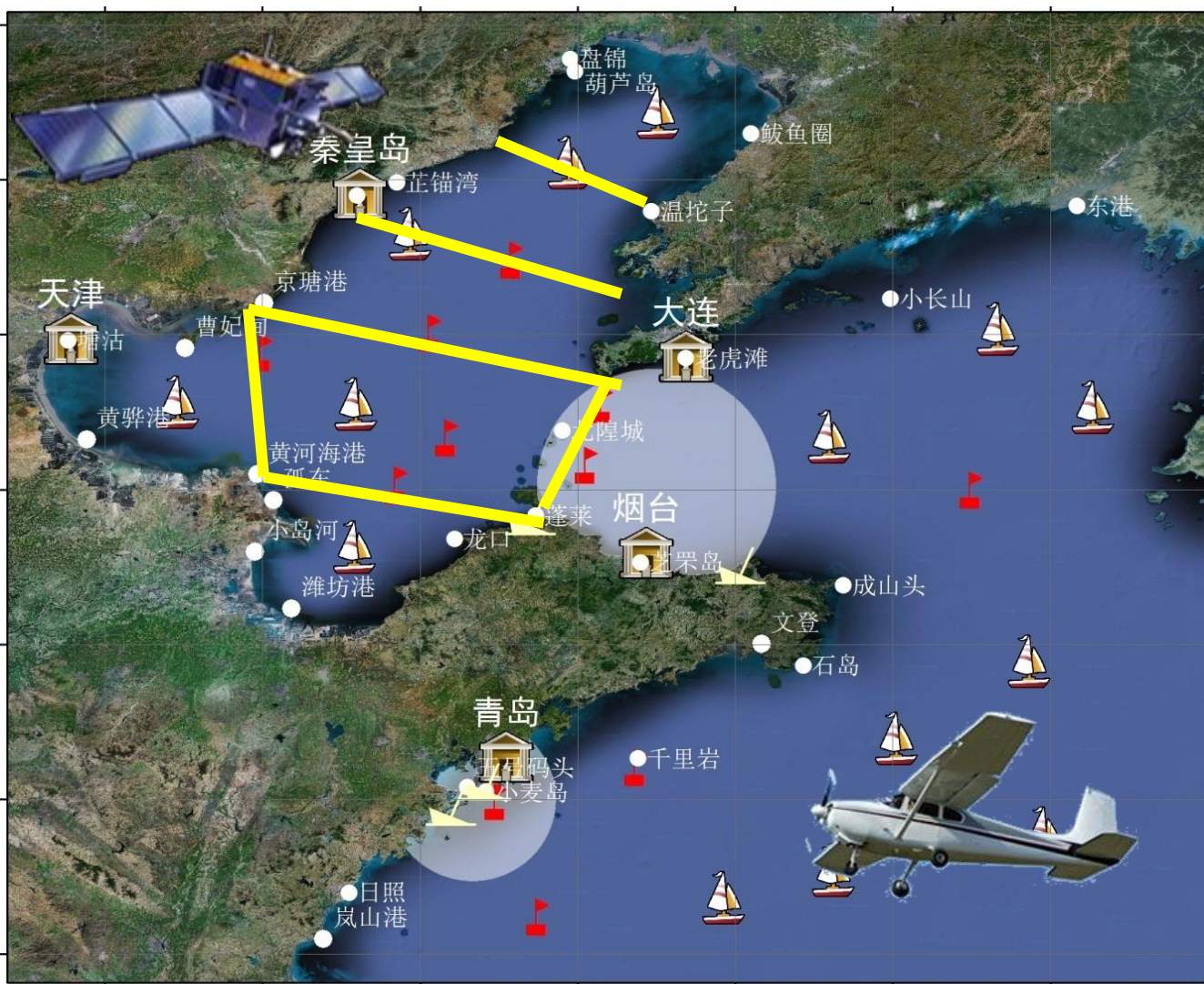
LI Rui

North China Sea Marine Forecasting Center, SOA

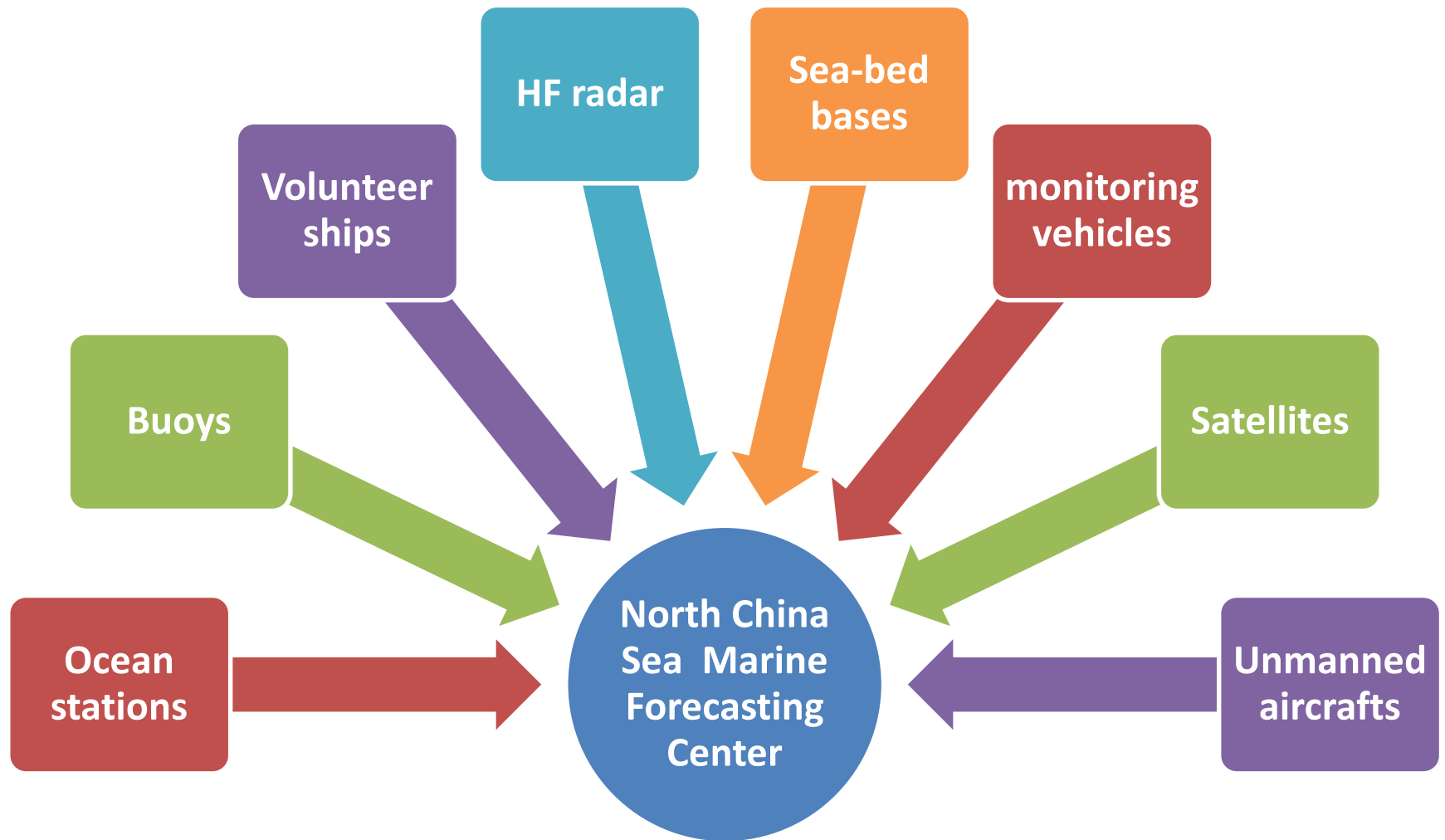
2017/6/2, Brussels, Belgium



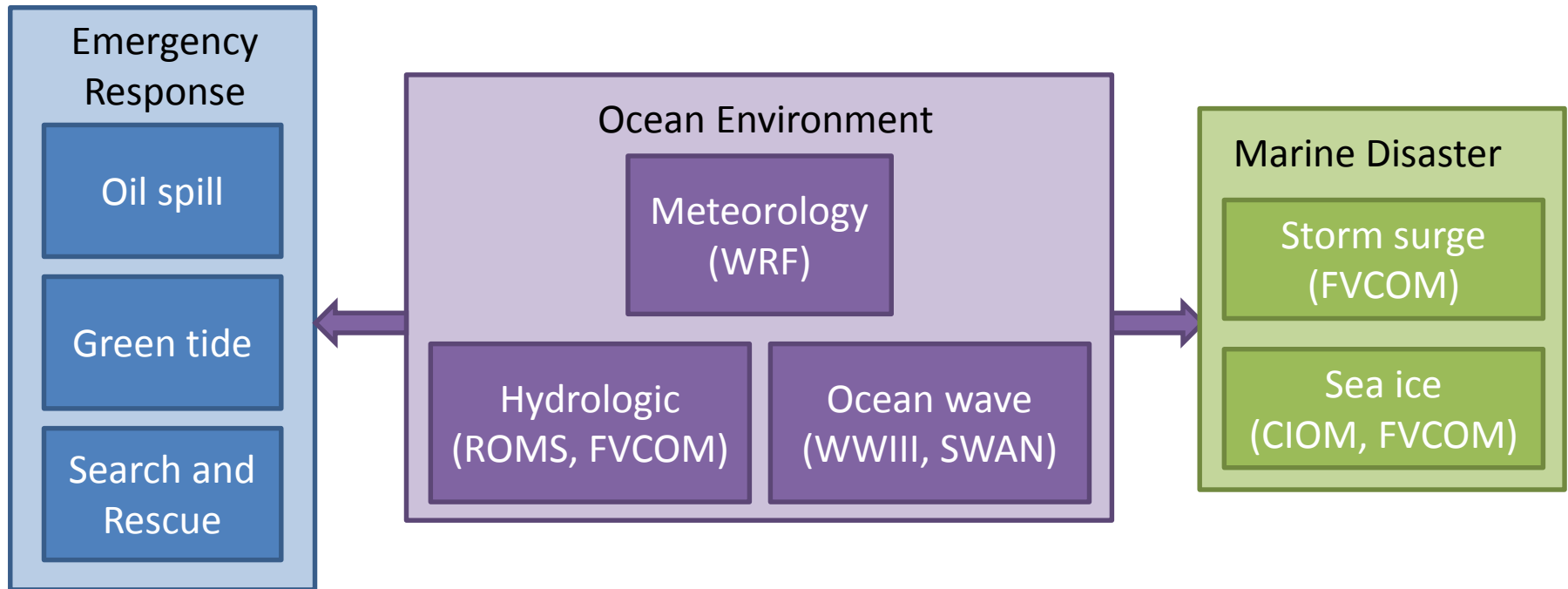
Observation network



Observation network



Numerical forecast system



Forecast item	Wind velocity	Wind direction	Tide level	Tidal current velocity	Tidal current direction	Current velocity	Current direction	Significant wave height	Sea surface temperature
24-h error	< 20%	< 20°	< 30 cm	< 30%	< 30°	< 25%	< 30°	< 30%	< 0.8°C

Application cases

- Green tide prevention in Yellow Sea
- Storm surge risk assessment for Shouguang
- Emergency response
- Sea ice response in Bohai Sea

Case 1

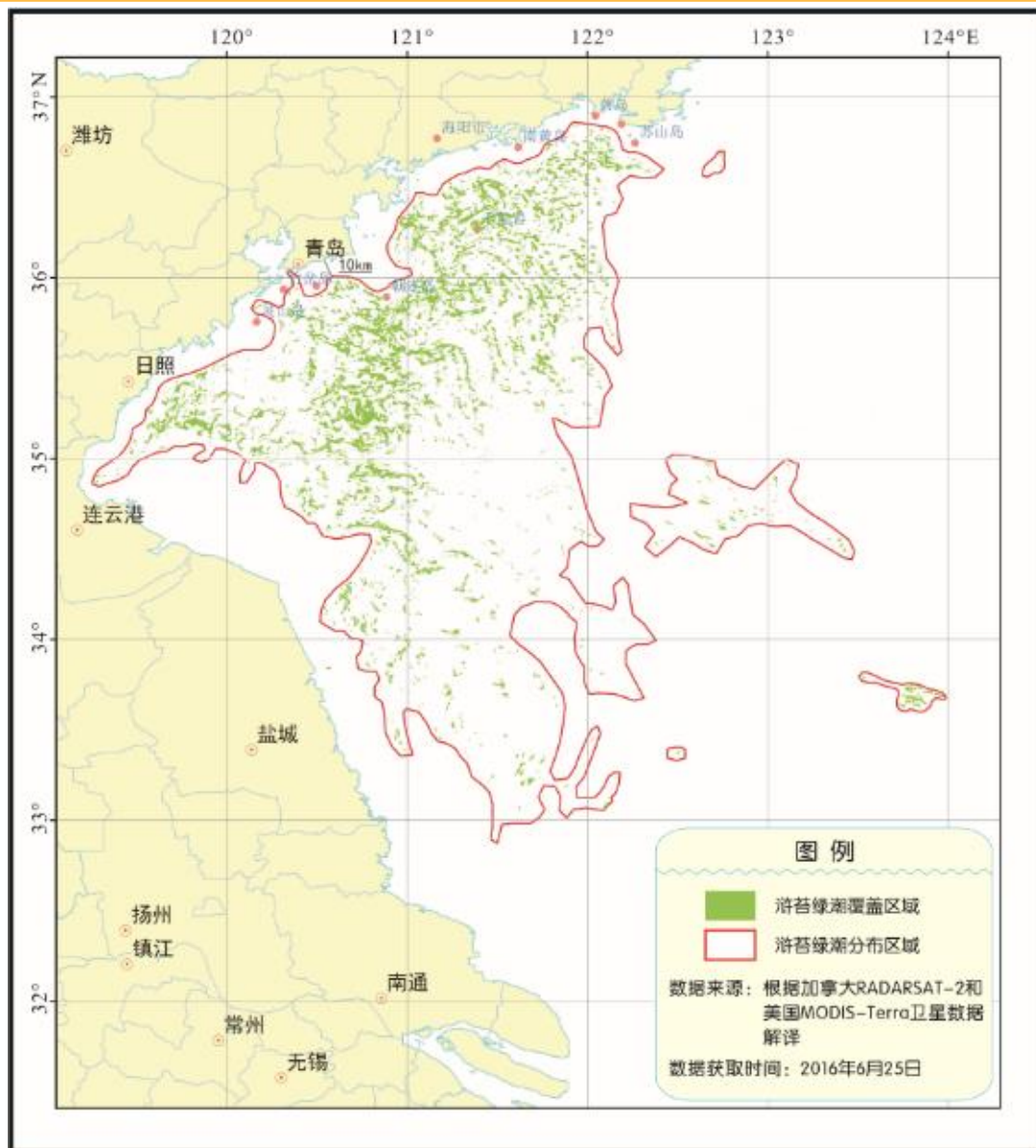
Green Tide in Yellow Sea

Green tide in Yellow Sea

- ❑ mostly caused by enteromorpha proliferation.
- ❑ flow on the sea surface and grow fast during summer.
- ❑ float from south Yellow Sea to southern Shandong coast
- ❑ affect the natural view of ocean and breaks the ecological condition.



Green tide distribution 2016/6/25

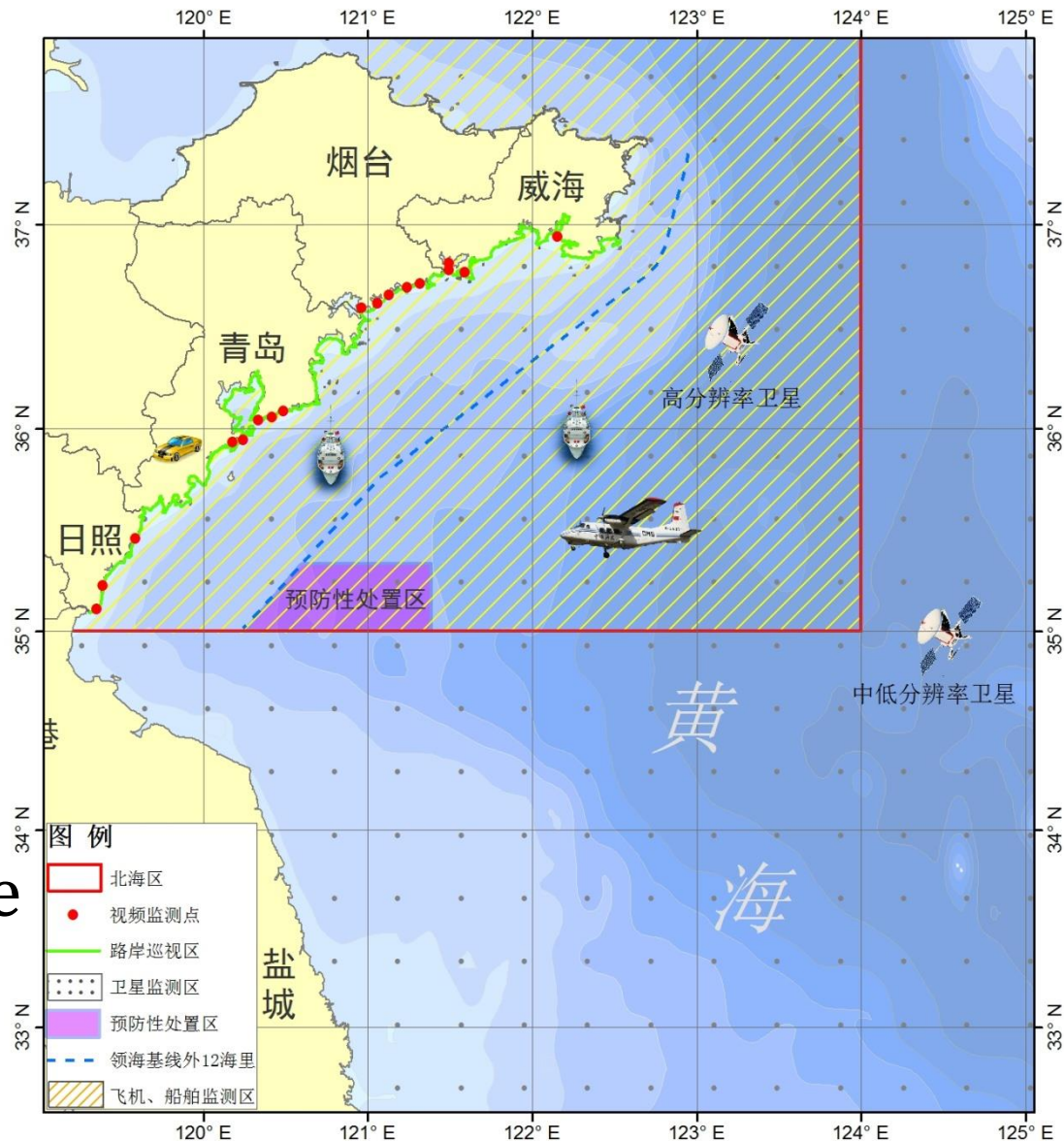


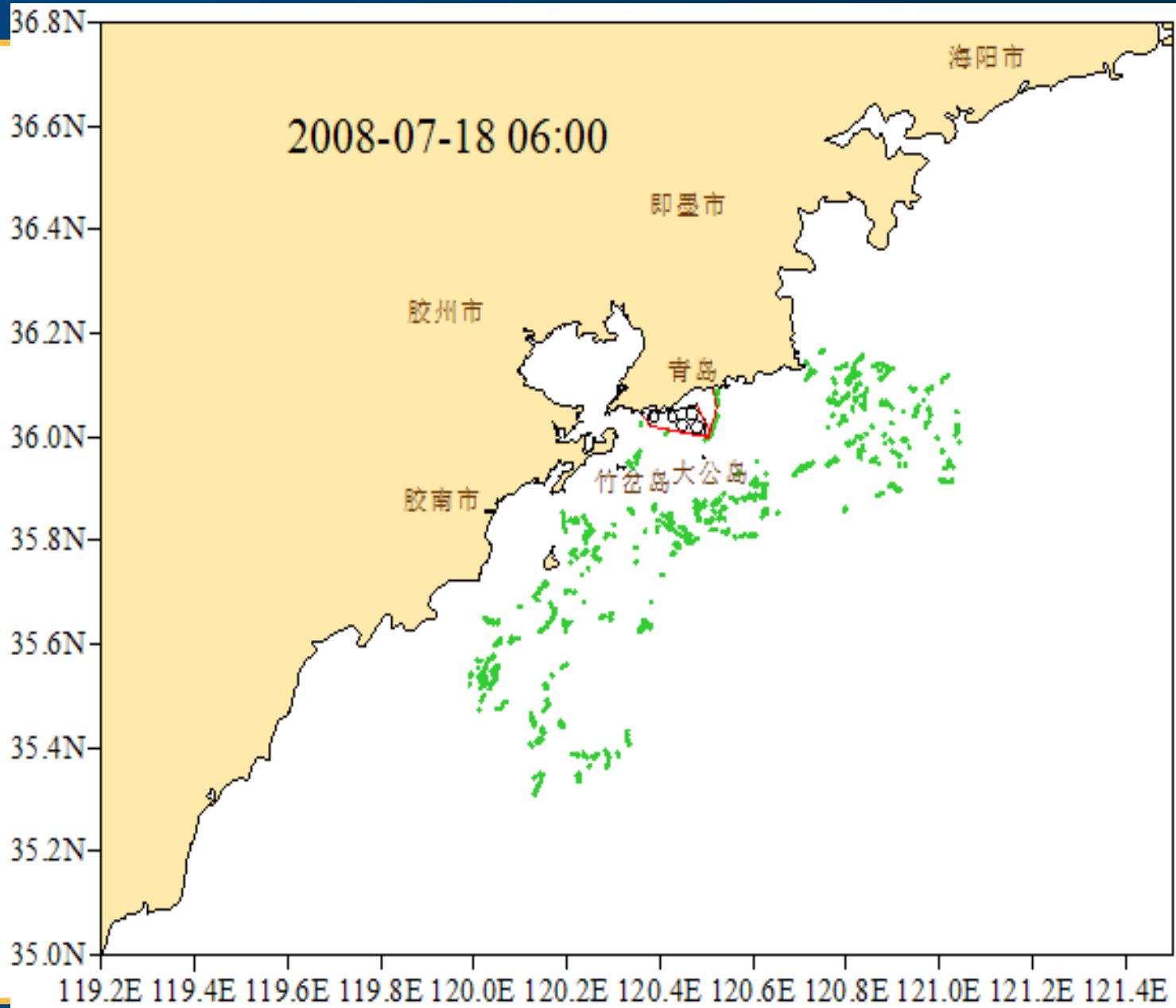
Green tide near Qingdao



Green tide monitoring

- Satellite
 - optical satellite
 - SAR
- Aircraft
 - SAR
 - spectrometer
 - photograph
- ship
- coastal surveillance
- Real-time video

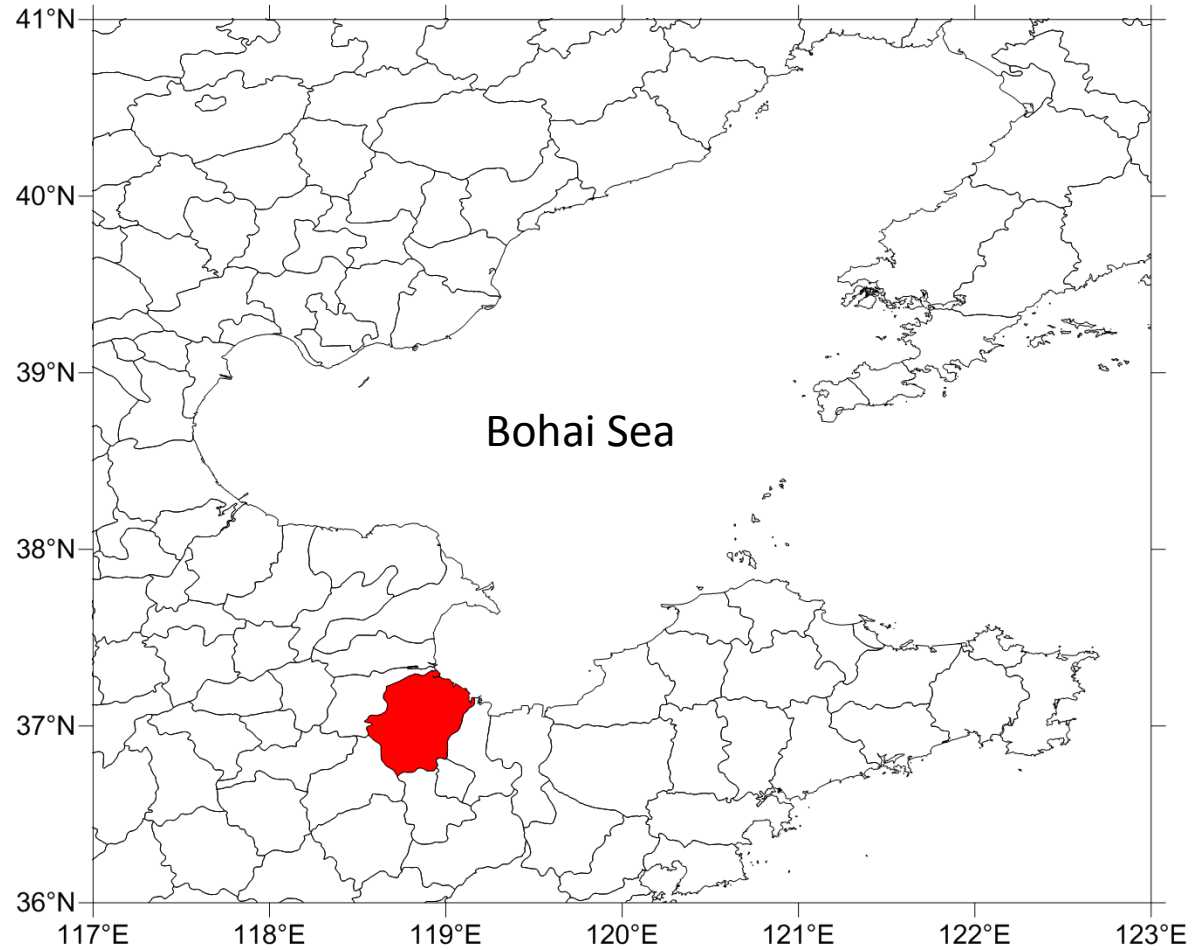




Case 2

Storm Surge Risk Assessment

Shouguang, Shandong, China



Extratropical storm surge in Shouguang, Shandong, China

2010/9/21



2013/10/12



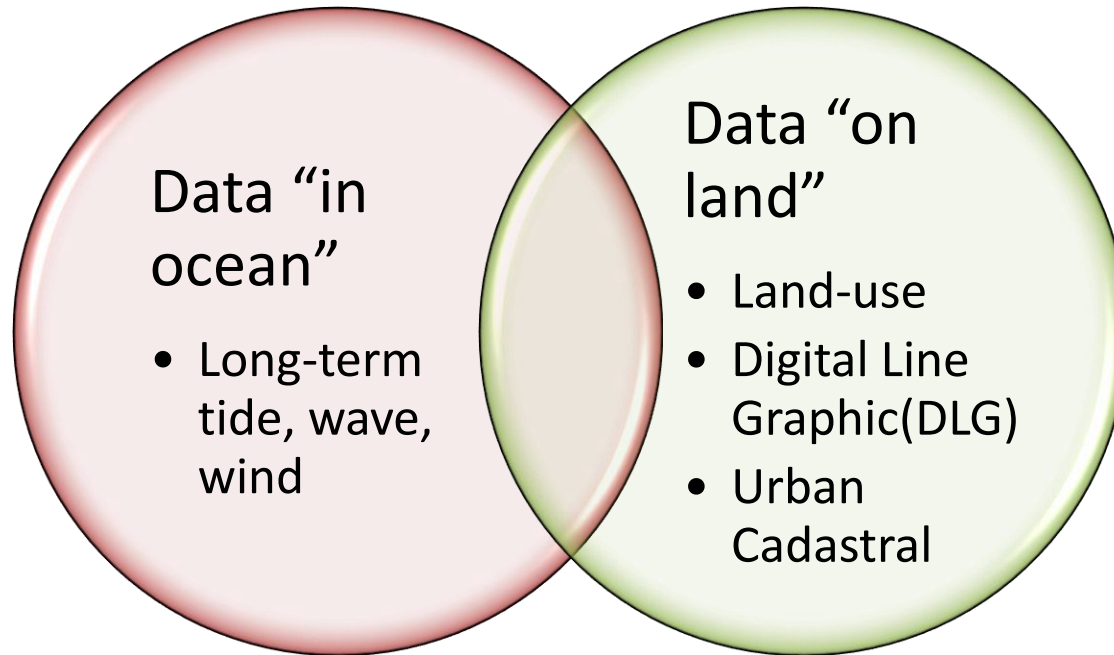
中国寿光网
WWW.SGNET.CC

2015/10/18



中国寿光网
WWW.SGNET.CC

Data type and acquisition



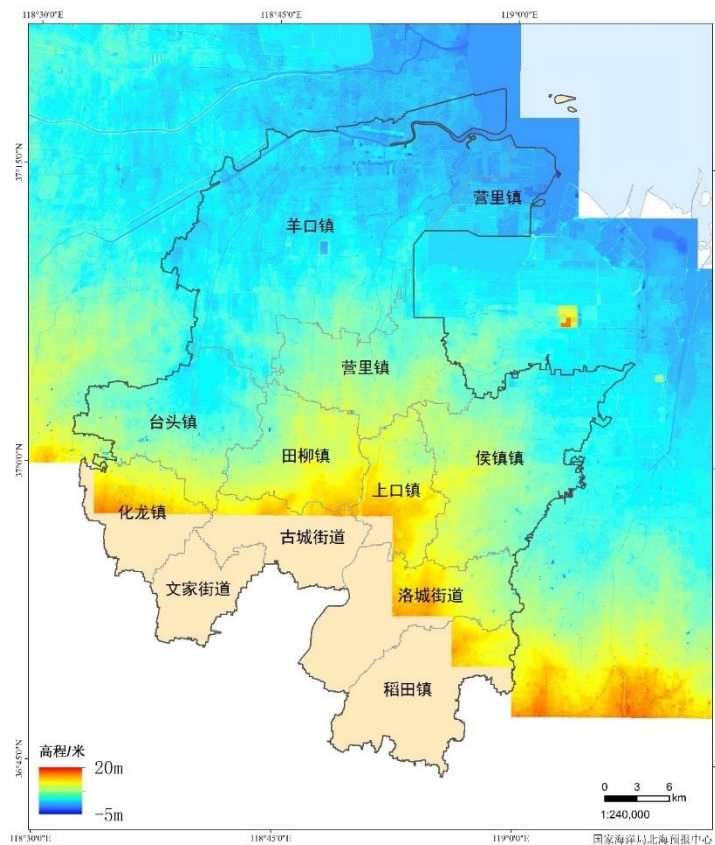
Problems: data acquired from different departments

- Data "in ocean": State Oceanic Administration
- Data "on land": Department of Land and Resources

Data

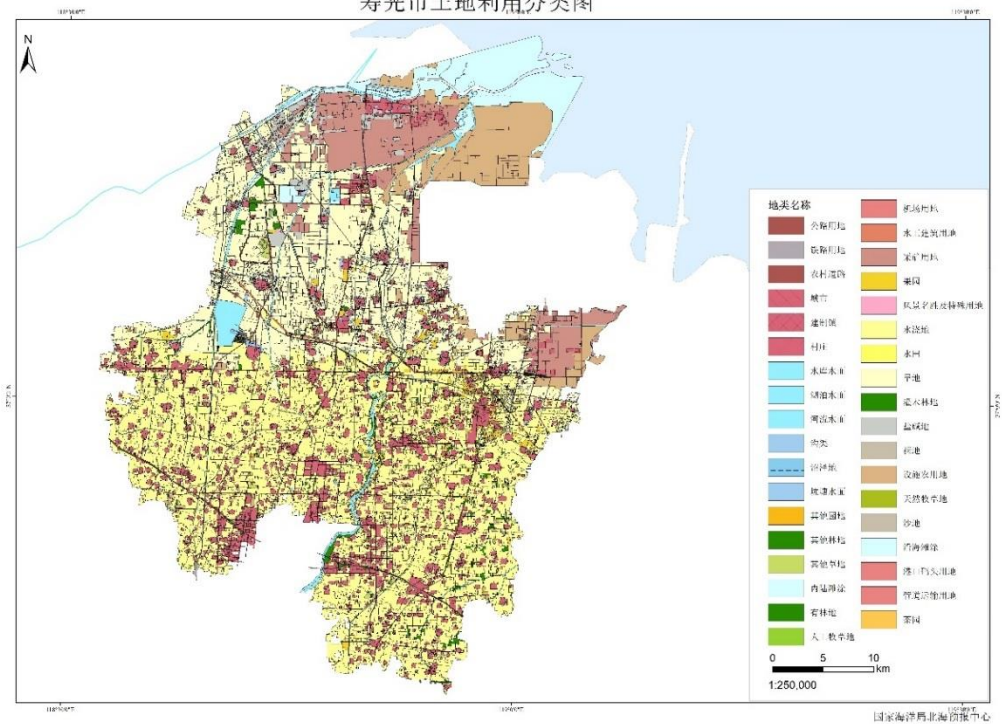
Land altitude(1:50,000)

寿光市高程图

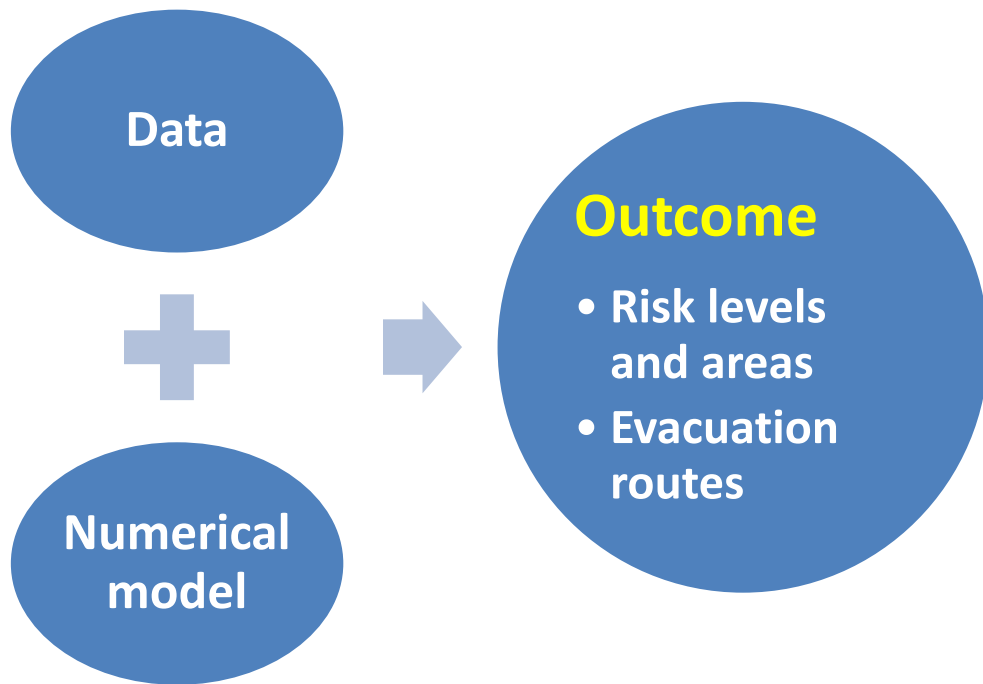


Land use(1:5,000)

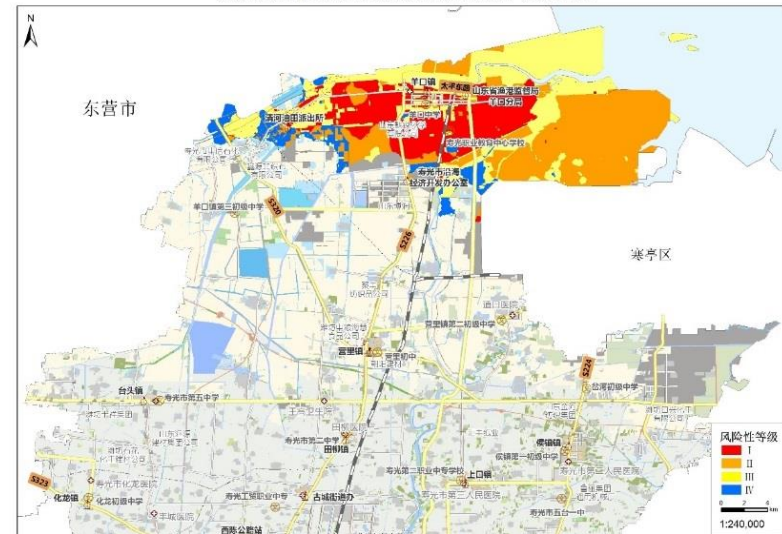
寿光市土地利用分类图



Storm surge risk assessment

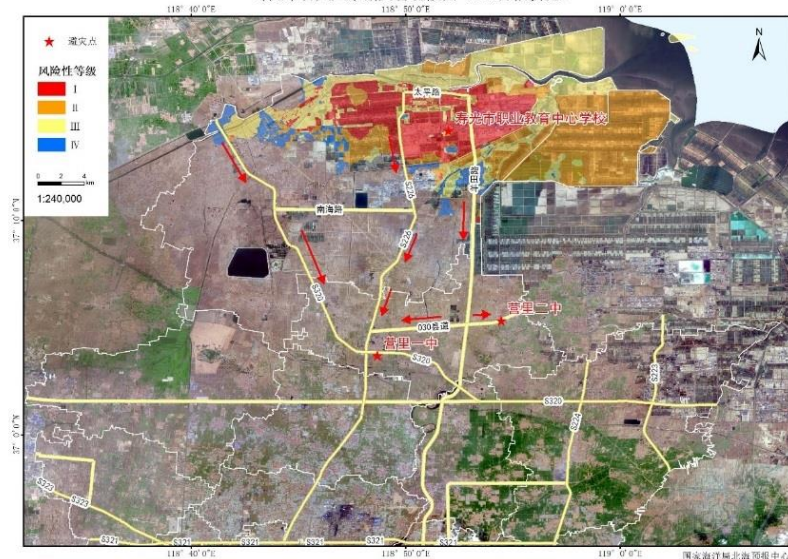


潍坊市寿光市台风风暴潮溃堤风险性等级图(940百帕)



国家海洋局北海预报中心

寿光市台风风暴潮灾害疏散图(940百帕洪堤)



国家海洋局北海预报中心

Risk assessment and response

Warning water level gauge



Warning water level gauge



Evacuation routes



Emergency supplies



Case 3

Marine Emergency Response

Oil spill monitoring and forecast

SAR images



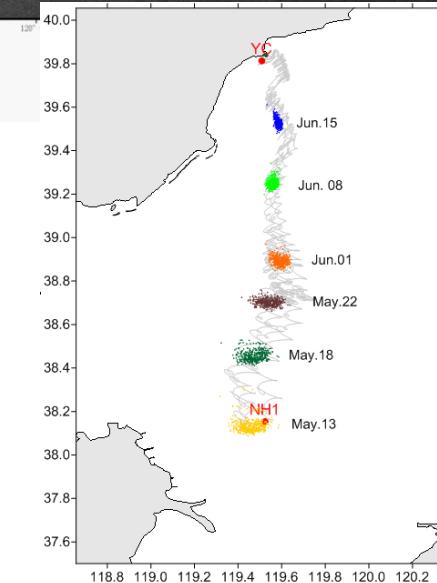
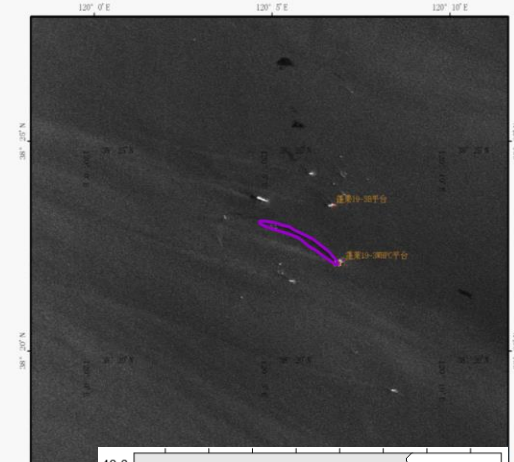
Forecast model

- 2-D Trajectory prediction model
- 2-D trajectory and fate prediction model
- 3-D trajectory and fate prediction model

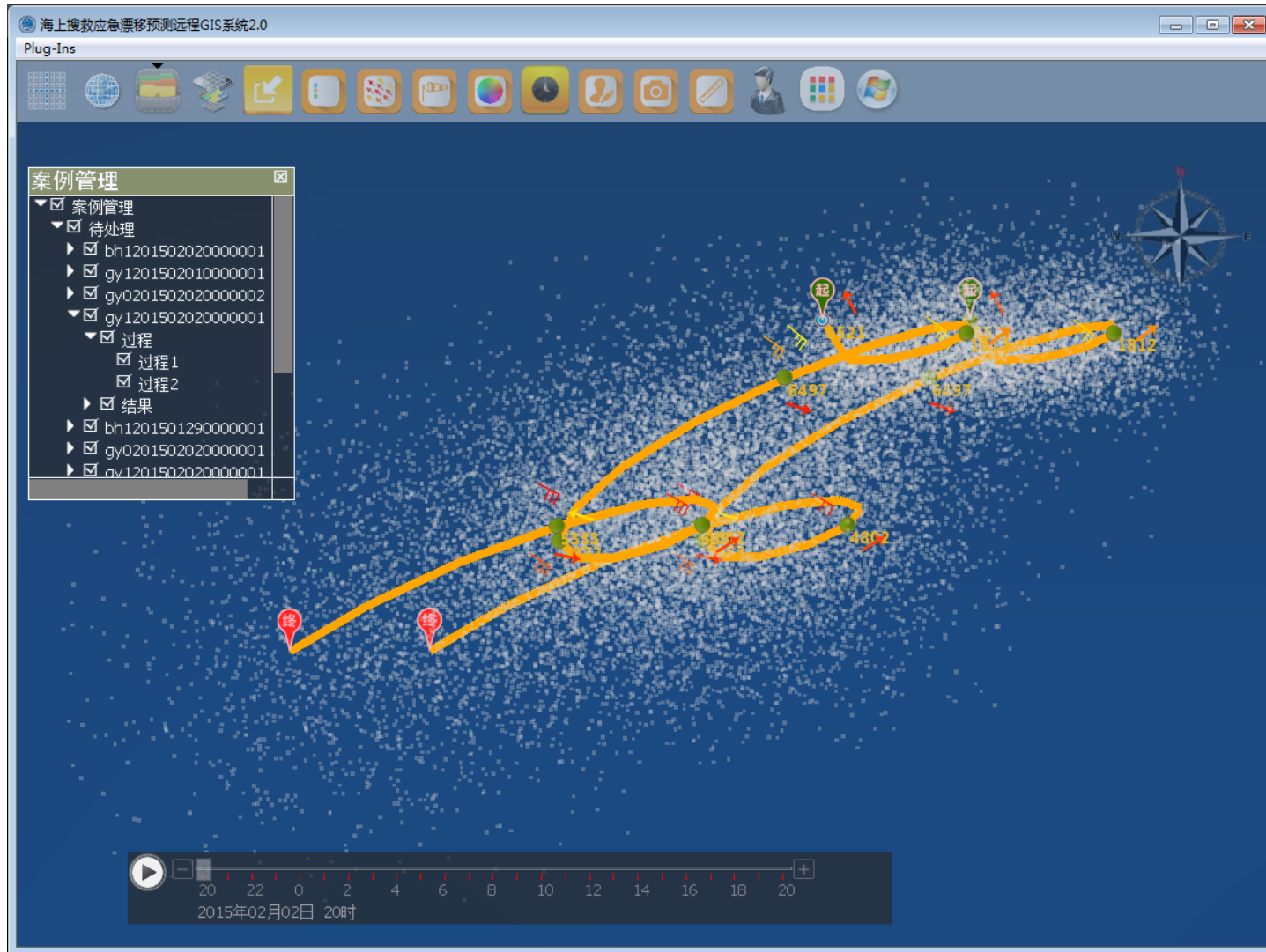
Source tracing model

- 2-D source tracing model
- 2-D source tracing probability model

2011年7月24日卫星遥感影像图



Search and rescue

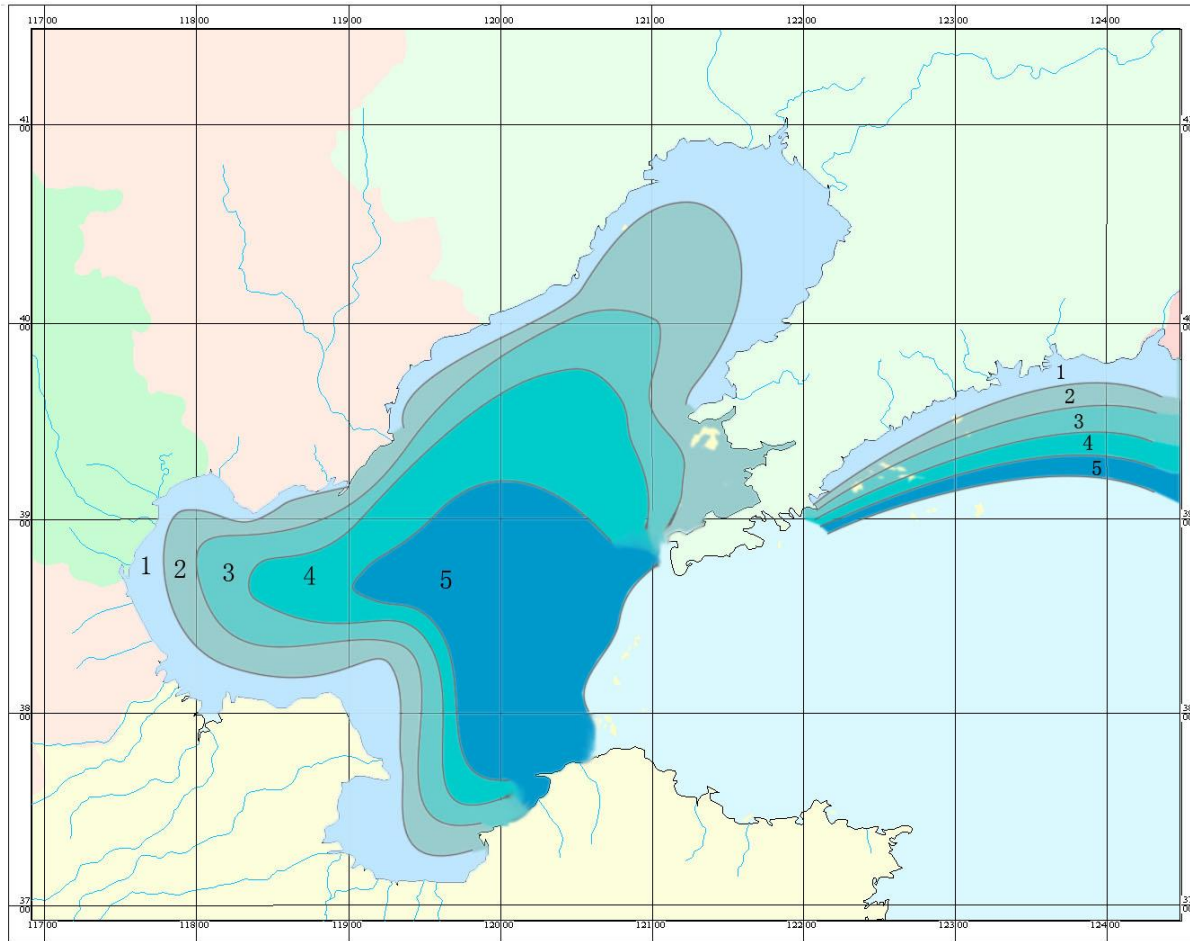


Case 4

Sea Ice Monitoring and Forecast in Bohai Sea

Sea ice in Bohai Sea

- 5 ranks:
(1)light (2)less light (3)normal (4)less serious (5) serious



Sea Ice Monitoring

Approaches



- Shoreline survey
- Aircraft
- Ships, buoys and oil platform
- Vehicle-based radar
- Satellite
- Field survey

Parameters



- Area
- Intensity
- Ice type
- Ice shape
- Drifting velocity and direction
- Ice thickness
- outline

Monitoring Approaches 1: Shoreline survey



**2014/2015 年度冬季，
潍坊沿海海域海冰监测**

冰情简报

(No. 3)

潍坊市海洋预报中心编 2015年1月22日

一、监测时间
2015年1月21日8时至16时，2015年1月22日08时至16时。

二、监测区域
 观测站1：寿光海域 (119° 1'46.3"E; 37° 16'3.7"N);
 观测站2：潍坊港海域 (119° 11'28.2"E; 37° 16'6.2"N);
 观测站3：昌乐海域 (119° 30' 3.4"E; 37° 7' 24.3"N);
 观测站4：莱阳威海湾 (118° 52' 30.6"E; 37° 16' 152' 9.12"N)。

三、冰情概况
 2015年1月21、22日，潍坊市监测人员根据《2014/2015年度冬季潍坊沿海海域海冰监测实施方案》对寿光海域（观测站1）、潍坊港海域（观测站2）、昌乐海域（观测站3）、莱阳威海湾（观测站4）进行了海冰观测。...

1. 寿光海域：...

2. 潍坊港海域：...

3. 昌乐海域：...

4. 莱阳威海湾：...

寿光老河口。

潍坊港。

昌乐。

Monitoring Approach 2: Aircraft



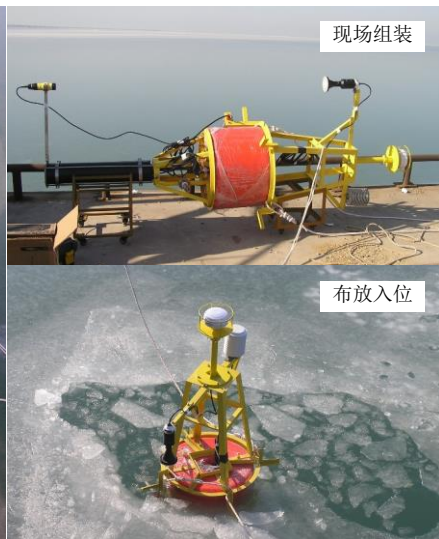
鲅鱼圈冰情



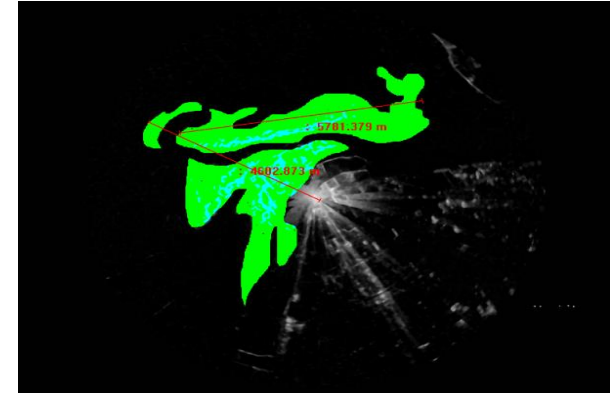
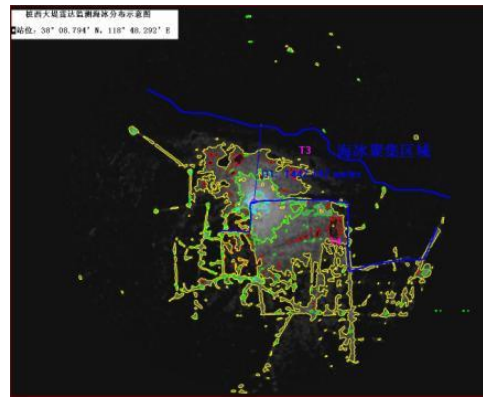
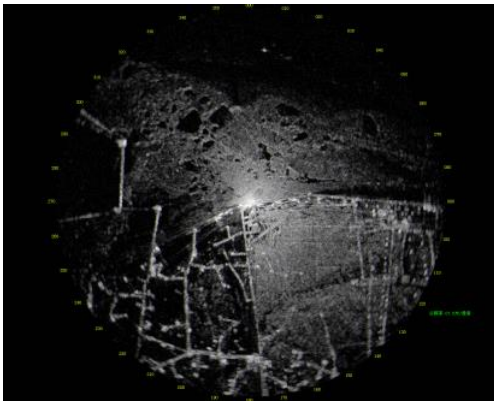
锦州9-3油田冰情



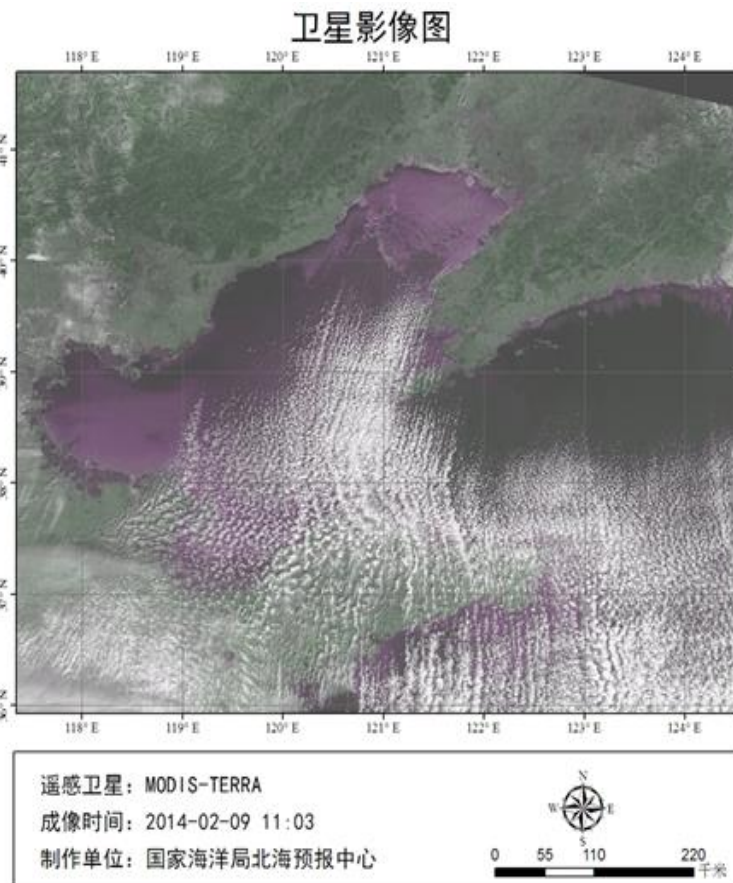
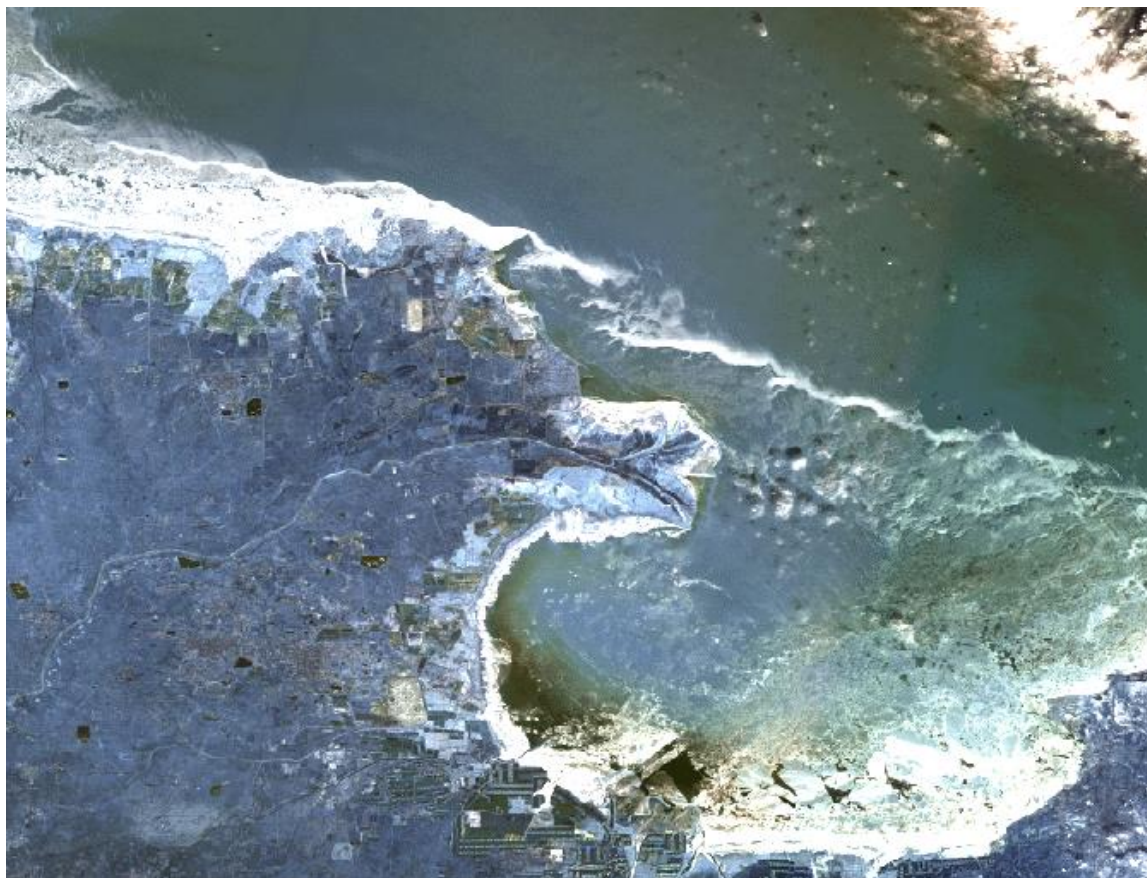
Monitoring Approach 3: Ships, buoys and oil platform



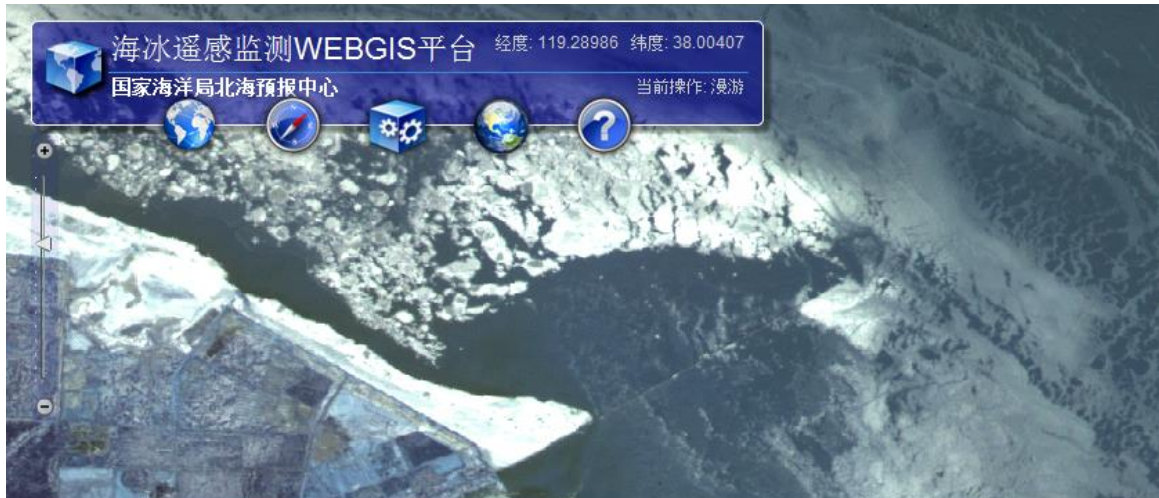
Monitoring Approach 4: Vehicle-based radar



Monitoring Approach 5: Satellite



WEBGIS platform



Monitoring Approach 6: Mechanical field survey



Sea ice forecast

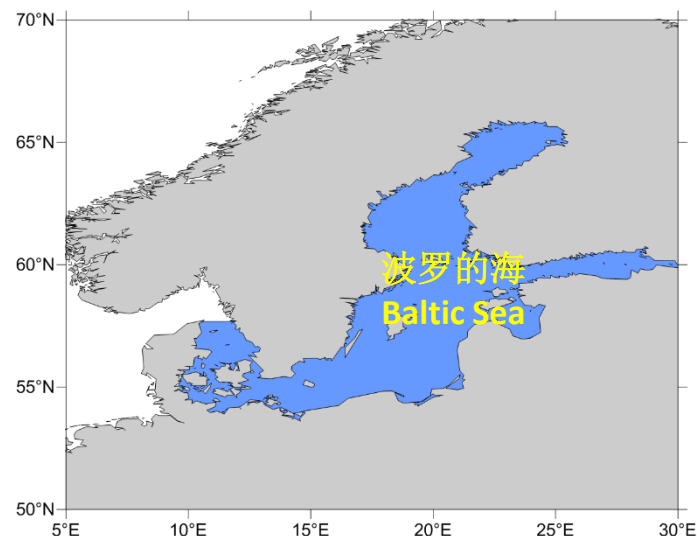
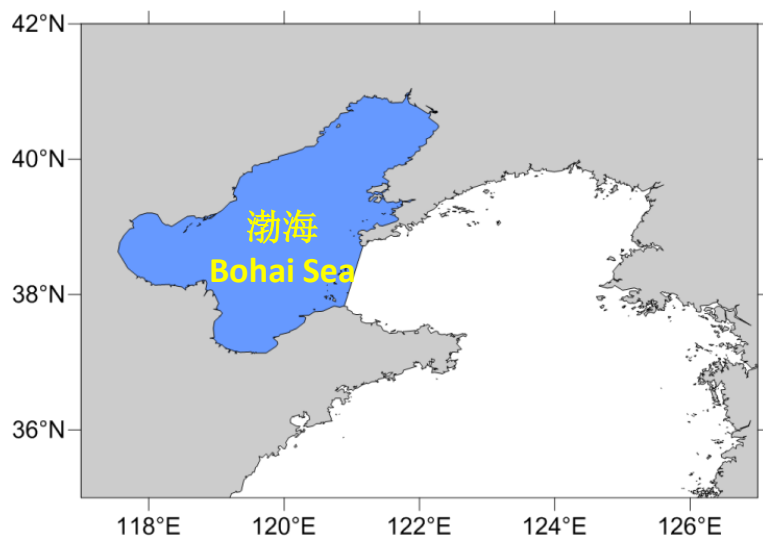
- Statistic forecast
 - 3 days
 - 10-15 days
 - Monthly
 - Yearly
- Numerical forecast
 - FVCOM
 - CIOM

Problems

- Ice thickness monitoring is inaccurate
- Numerical model accuracy still needs to be improved
- 10-15 days forecast is less accurate than short & long-term forecast

Future cooperation

- Similarities of Bohai and Baltic Sea
 - Enclosed seas
 - Shallow seas, mean water level less than 60 m
 - Weak water exchange with outer sea
 - Sea ice in winter
- **Looking forward to more cooperation**
 - **Workshops, technique exchange, etc.**





Thank you very much for your listening!

LI Rui

North China Sea Marine Forecasting Center, SOA

[E-MAIL: lirui@bhfj.gov.cn](mailto:lirui@bhfj.gov.cn)

TEL: +86 532 5875 0655