



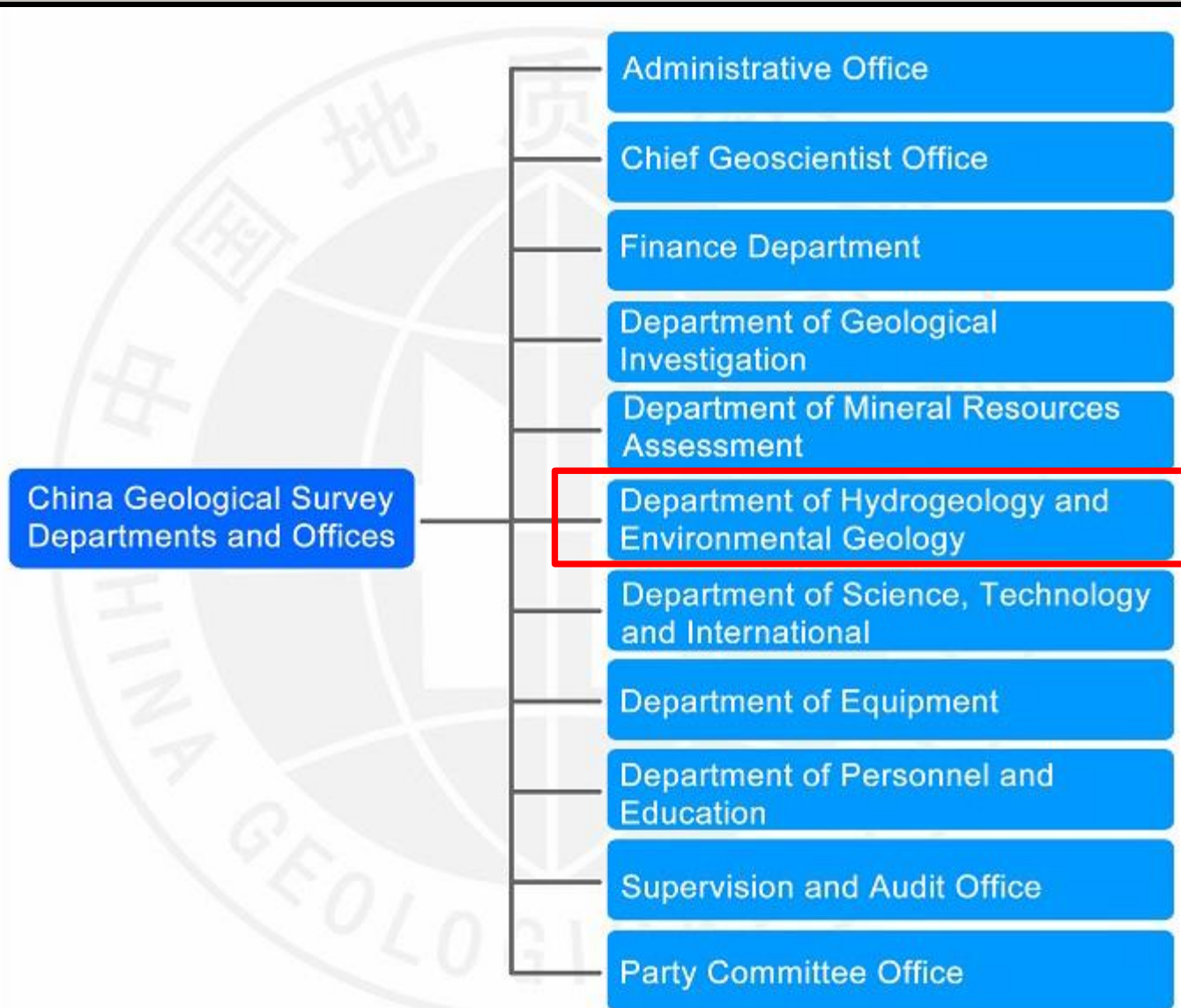
New Achievements of Hydrogeology and Environmental Geology Investigation in 2017

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2017.09.23



Main Task





Related originations

Six Centers, CGS

Guangzhou Marine Geological Survey

Qingdao Institute of Marine Geology

China Aero Geophysical Survey & Remote Sensing Center

Institute of Geophysical and Geochemical Exploration

Institute of Geomechanics

China Institute for Geo-environmental Monitoring

Center for Hydrogeology and Environmental Geology

The Institute of Hydrogeology and Environmental Geology

Institute of Karst Geology

Institute of Exploration Technology



Main Task

• Hydrogeology

- regional hydrogeology
- ground water exploitation
- ground water pollution
- ground water monitoring
- geothermal resources

• Geological disaster

- Landslide
- land Subsidence
- Karst collapse investigation
- Active fracture

• Environment geology

- Urban geology
- Geology on Global climate change
- Mine Geological Environment
- Soil Geochemistry
- Geological relics

• Comprehensive research

- Strategic and Planning Research
- Carrying Capacity of Resources and Environment
- Comprehensive research
- Information system construction



Outline

- 1. Urban geology**
- 2. Coastal geology**
- 3. Hydrogeology**
- 4. Geohazard**
- 5. Enviromental geology**



Outline

1. Urban geology



Geology survey on 1:50000 scale

	2017 (km2)	Totle()
hydrogeology	33, 000	540, 000
Environmental geology	50, 000	200,000
Geohazard & Engineering geology	14, 000	269,000



中国城市地质调查报告

Chinese urban geological survey report

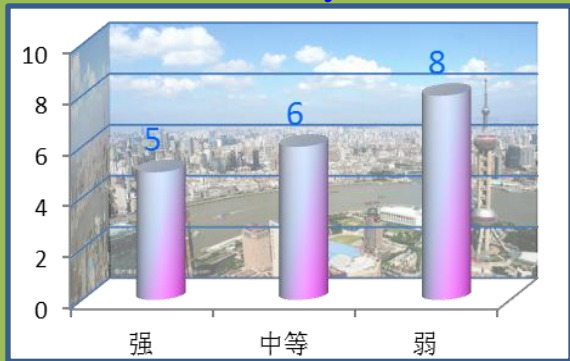
对我国19个城市群资源环境条件、337个地级以上城市发展的优势地质资源和重大地质问题进行了分析，取得了三个方面认识和宏观判断：

We analyzed resources and environment condition of 19 urban agglomerations, advantages of development, geological resources and major geological problems of 337 prefecture-level cities, and obtained three aspects of cognition and macro judgment .

3大资源环境条件

3 types of resources and environment condition

- ◆土地资源 land resource
- ◆水资源 water resource
- ◆地质环境安全 geological environment safety



城市群承载能力

carry capacity of urban agglomerations

4大地质资源优势

4 advantages of geological resources



地下空间
Underground space



浅层地热能
Shallow geothermal energy



地质遗迹
Geological relics



地下应急水源地
Underground emergency water source

资源集约 Resource intensive

绿色低碳 low-carbon

生态宜居 ecological and livable

供水安全 Water supply safety

5大地质问题

5 major geological problems

◆滑坡崩塌泥石流

Landslide, collapse and debris flow

72个城市 (威胁人口>1000人)
72cities, threatening over 1000 people

◆地面沉降 land subsidence

102个城市 102 cities

◆岩溶塌陷 karst collapse

41个城市 41 cities

◆活动断裂 Active faults

42城影响较大 effecting 42 cities

◆水土污染 Water and soil pollution

“三致”有机物超标54城

"Three chemicals" exceeded the standard in 54 cities



城市地质调查实施方案（2017-2030年）

Urban geological survey and implementation plan

形势需求
Demand

◆ 全过程 Whole-process

Planning, construction and management
(规划、建设、管理)

◆ 宽领域 Wide-field

Space, resources, environment, disaster
(空间、资源、环境、灾害)

◆ 多层次 Multi-level (城市群、大中城市、小城镇)

Urban agglomerations, large and medium cities, small towns

主要任务
Main task

1. 城镇规划建设区基础性综合地质填图;
Basic comprehensive geological mapping of town planning and construction area
2. 多要素城市地质调查试点;
Multi factor urban geological survey pilot
3. 城市地下空间探测与安全利用;
Detection and safe utilization of urban underground space
4. 城市地质调查技术标准体系建设;
Construction of technical standard system of urban geological survey
5. 城市地质工作创新与科普宣传。
Innovation of urban geological work and popularization of Science

- 按照“创新、协调、绿色、开放、共享”的发展理念;
- According to the concept of "innovation, coordination, green, opening and sharing"
- 依据新型城镇化和生态文明建设的新要求, 开展“空间、资源、环境、灾害”多要素调查;
- According to the new requirements of the new urbanization and ecological civilization construction, multiple factors investigation of "space, resources, environment and disaster" should be carried out;
- 服务城市规划、建设和运行管理全过程, 支撑城市集约、智能、绿色、低碳、安全发展。
- Service city planning, construction and operation management throughout the process, supporting urban development in intensive, intelligent, green, low-carbon, safe mode.

思路 design



城市地质调查规范

Code for Urban Geological Investigation

主要内容 Main Content

1 城市地质调查的基本要求

Basic requirements of urban geological survey

2 工程建设与地下空间开发条件调查

Investigation on the conditions of construction and underground space development

3 地质资源调查

Geological resources survey

4 土地和地下水环境调查

Land and groundwater environment survey

5 地质灾害调查

Geological disaster investigation

6 地质资源环境监测预警

Geological resources, environmental monitoring, early warning

7 城市地质信息服务与决策支持系统建设

Construction of urban geological information service and decision support system

调查成果 Survey results

成果与服务产品

Results and service products

- 专业地质调查报告及图件；
Geological survey report and map
- 城市三维地质模型；
Urban 3D geological model
- 城市资源环境监测预警网络；
City resources and environment monitoring and warning network
- 城市地质信息服务与决策支持系统。
Urban geological information service and decision support system

应用成果 Application result

服务国土规划、土地利用规划、城市总体规划、控制性详细规划，以及城市建设、运行管理的产品

Products serving land planning, land use planning, urban master planning, regulatory detailed planning, and urban construction, operation and management

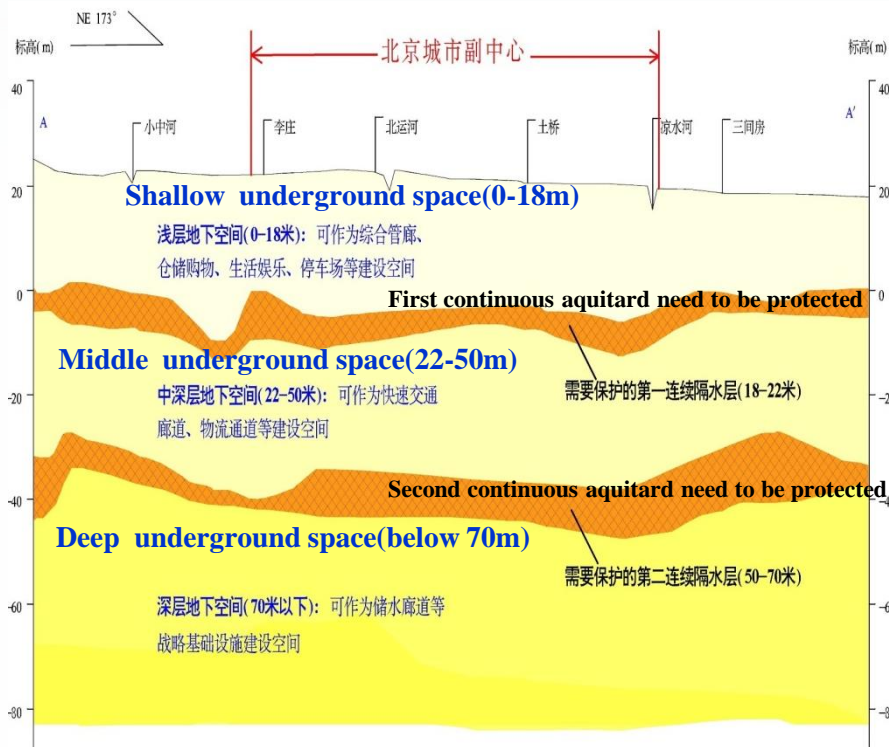


北京城市副中心规划建设地质调查

Geological survey of Beijing subsidiary administrative center

地调局组织开展了1:5万水工环综合地质调查、地面沉降和活动断裂调查等工作；北京市组织实施了北京市通州行政办公区地质条件适宜性评价、城市副中心地区重大地质问题调查评价和深部地热资源勘查等项目工作。

CGS has carried out the comprehensive geological survey of 50,000 scale, land subsidence and activity fracture investigation, etc. Beijing municipal government has carried out the projects of geological conditions suitability evaluation of Beijing Tongzhou administrative office area, investigation of major geological problems in Beijing subsidiary administrative center and deep geothermal resources exploration.



主要成果(Major Achievements):

- 岩土体性质与地基土条件
Soil property and foundation condition
- 地下水资源赋存条件与开发利用条件
Distribution and utilization condition of groundwater resources
- 地热资源赋存条件与开发利用条件
Distribution and utilization condition of geothermal resources
- 地面沉降现状与原因
Status and cause of land subsidence
- 活动断裂及地裂缝分布
Distribution of activity fracture and ground fissure
- 岩溶塌陷发育条件与风险
Development condition and risk of karst collapse
- 土壤与地下水污染状况及原因
Pollution status and causes of soil and groundwater

雄安新区四大工作目标

Four Goals

1 构建世界一流的“透明雄安”

Build a world-class “Transparent Xiongan New Area”

2 打造地热资源利用的全球样板

Make a global model for geothermal resources utilization

3 建成多要素城市地质调查示范基地

Build a multi-factor demonstration base of urban geological survey.

4 为雄安新区规划建设运行管理提供全过程地质解决方案

Provide geological solutions for planning, construction, operation and management of the Xiongan New Area.



雄安新区地质调查

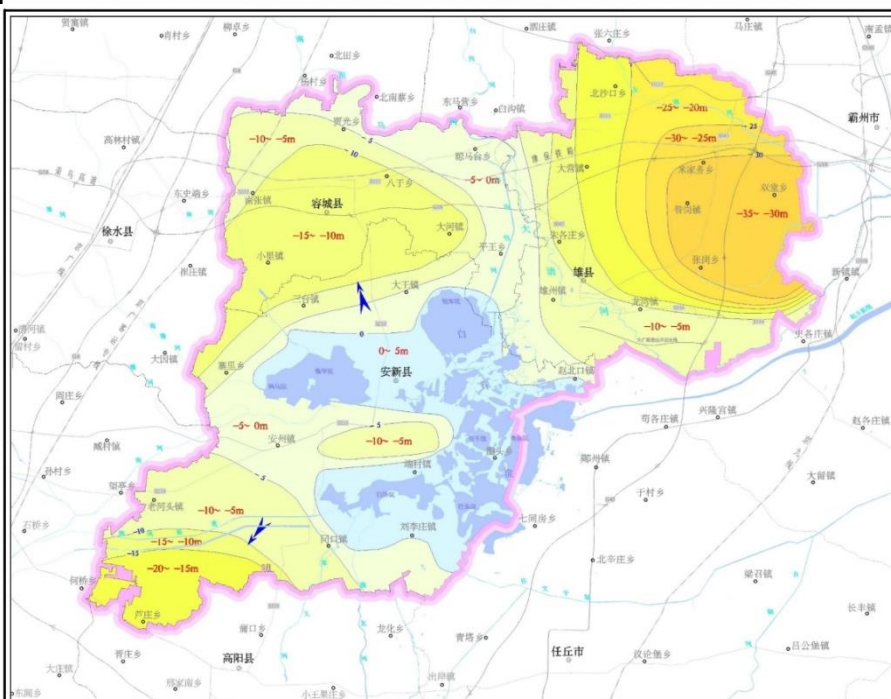
Geological survey of Xiongan New Area

地调局组织开展了工程地质、土地质量、地下水与地面沉降、浅层地温能等调查。

CGS has carried out engineering geology investigation, land quality investigation, groundwater and land subsidence investigation, shallow geothermal resources investigation.

主要成果(Major Achievements):

- 雄安新区建设场地稳定性和工程建设适宜性;
Construction site stability and engineering construction suitability of Xiongan New Area
- 重点调查区地下空间开发利用条件;
Development and utilization conditions of underground space in key area
- 重点调查区土壤环境及绿色富硒耕地;
Soil environment and green rich selenium cultivated land in key area
- 地下水质量与超采状态;
Groundwater quality and overexploitation
- 浅层地温能开发利用条件。
Development and utilization condition of shallow geotherm





成都城市地质调查

Chengdu Urban Geology survey

成都市地下空间利用主要地区

Main areas of underground space utilization

东进
ADVANCE
EXTENSION

中优
RECONSTRUCTION
OPTIMIZATION

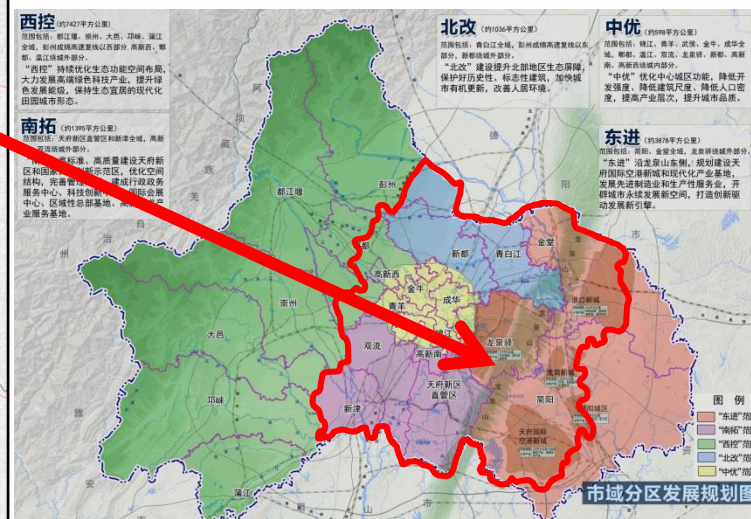
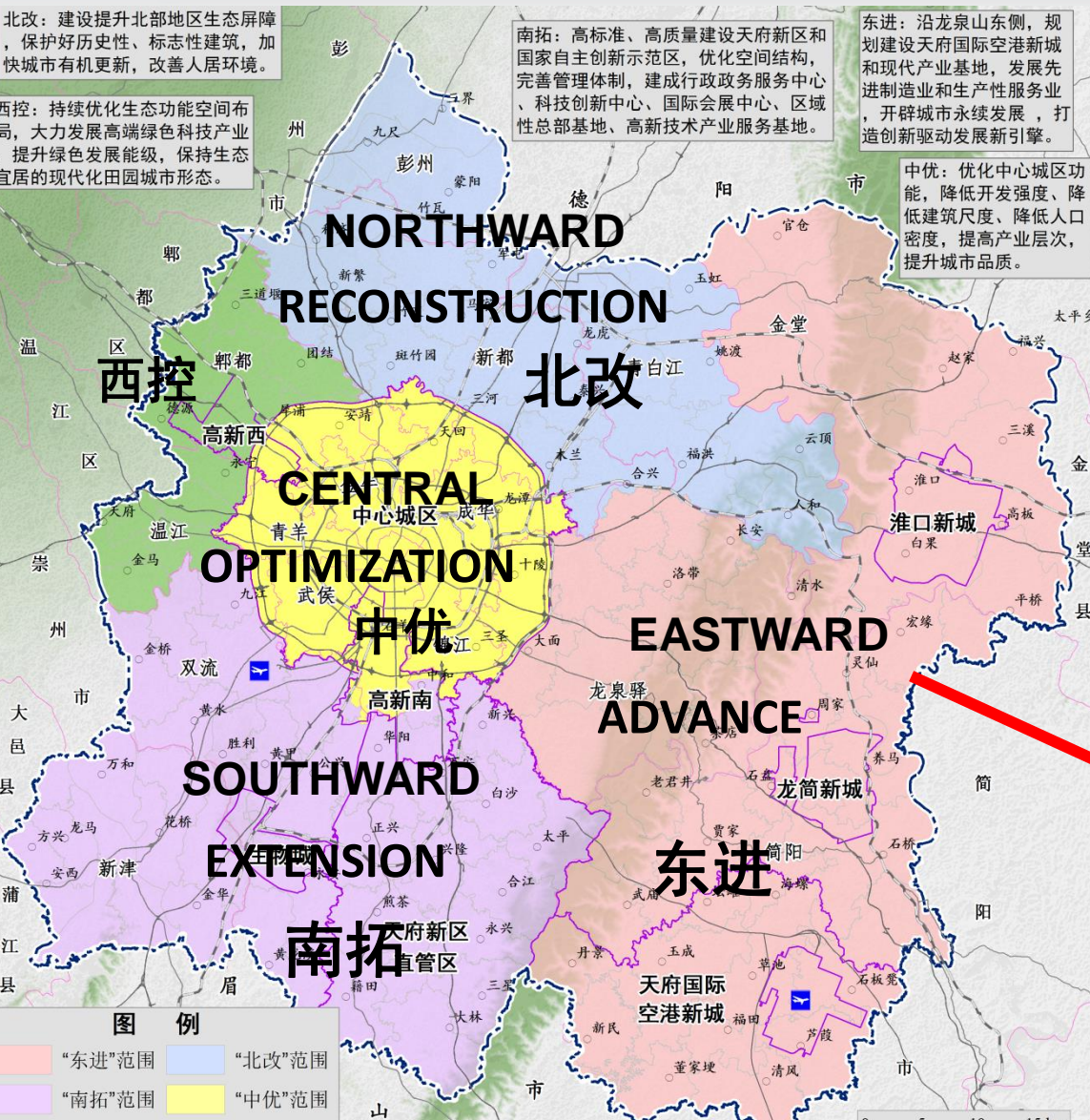
北改: 建设提升北部地区生态屏障, 保护好历史性、标志性建筑, 加快城市有机更新, 改善人居环境。

西控: 持续优化生态功能空间布局, 大力发展高端绿色科技产业, 提升绿色发展能级, 保持生态宜居的现代化田园城市形态。

南拓: 高标准、高质量建设天府新区和国家自主创新示范区, 优化空间结构, 完善管理体制, 建成行政政务服务中心、科技创新中心、国际会展中心、区域性总部基地、高新技术产业服务基地。

东进: 沿龙泉山东侧, 规划建设天府国际空港新城和现代产业基地, 发展先进制造业和生产性服务业, 开辟城市永续发展, 打造创新驱动发展新引擎。

中优: 优化中心城区功能, 降低开发强度、降低建筑尺度、降低人口密度, 提高产业层次, 提升城市品质。



图例

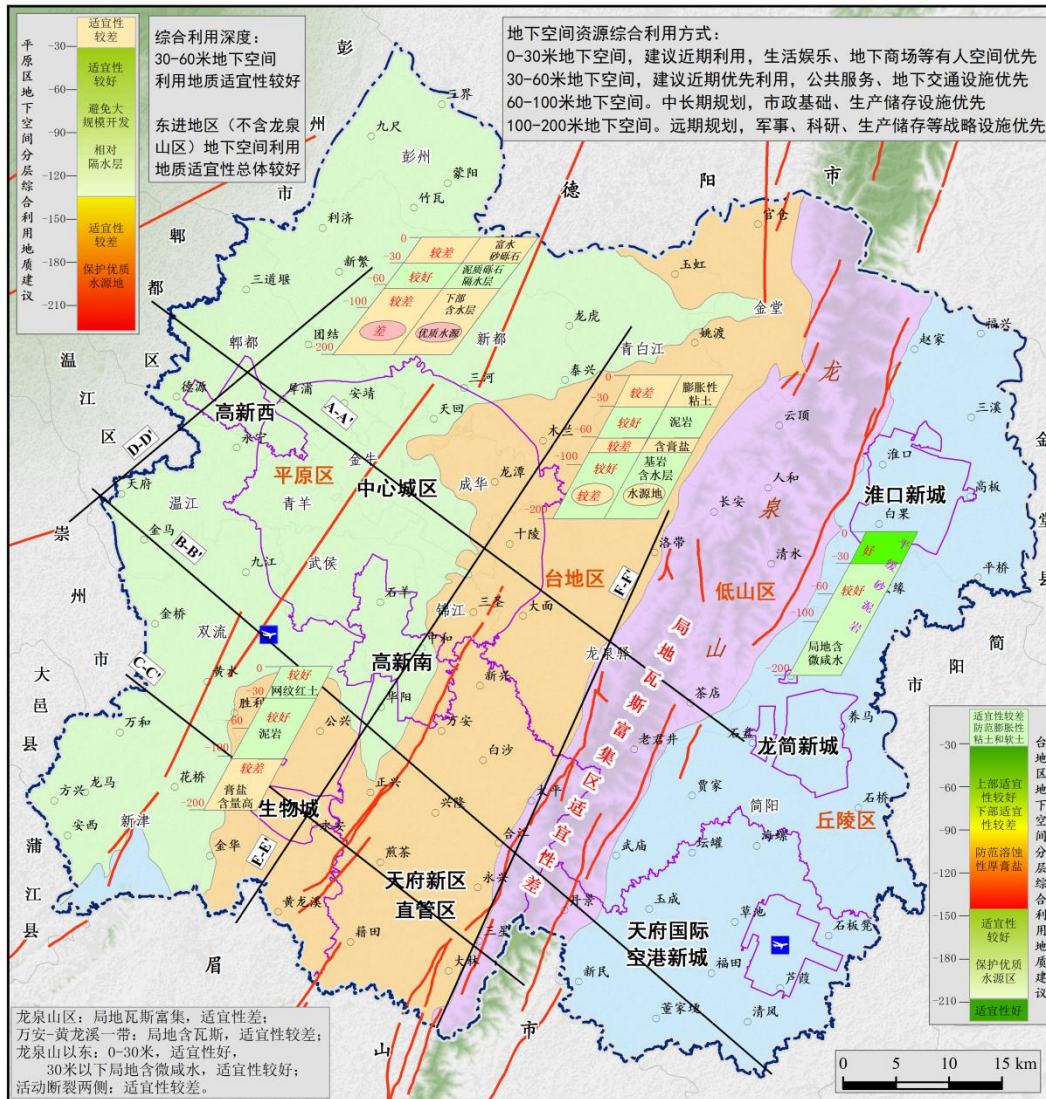
- “东进”范围
- “北改”范围
- “南拓”范围
- “中优”范围
- “西控”范围

0 5 10 15 km



成都城市地质调查

Chengdu Urban Geology survey



“东进”范围:

- 0-30米适宜性好
- 30米以下适宜性较好

ADVANCE EARSWARD:

- Above 30 meters, THE BEST
- Below 30 meters, THE BETER

龙泉山区: 局地瓦斯富集区适宜性差

Longquan mountain:
Gas enrichment, THE WORST

其他地区: 30-60米适宜性较好

Other areas:

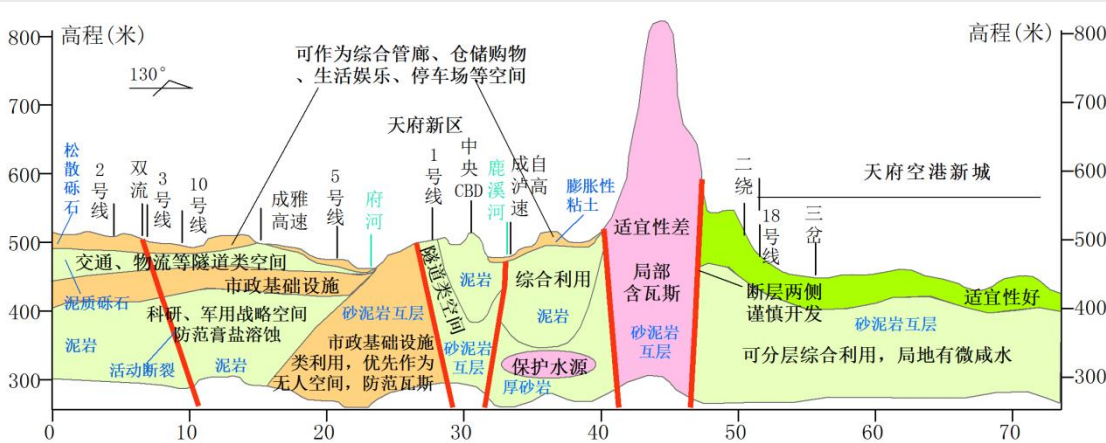
30 to 60 meters, THE BETER

30 to 60 meters is THE BETER depth for Underground space utilization



成都城市地质调查

Chengdu Urban Geology survey

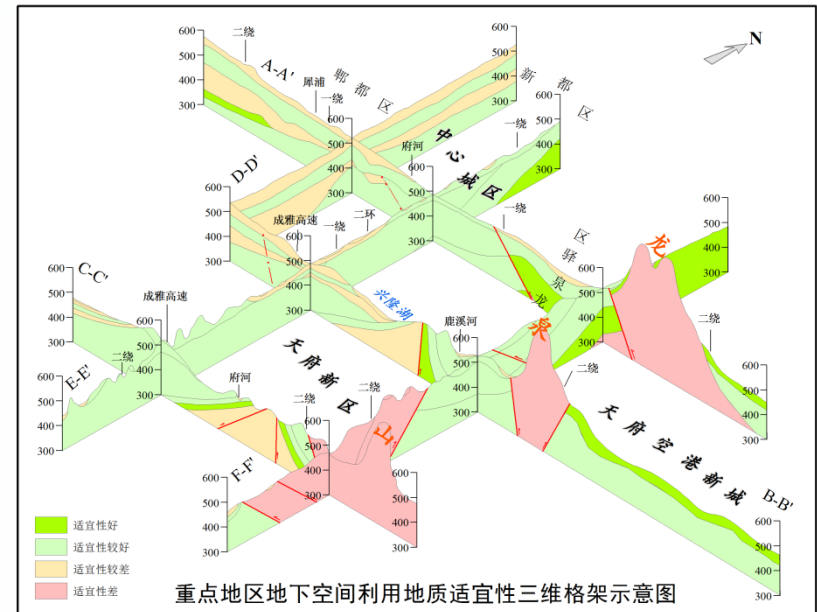


0-30米：近期，有人空间
Above 30 meters: SHORT-TERM, Manned space

30-60米：近期优先，交通设施
30 to 60 meters: SHORT-TERM, Traffic, Logistic

60-100米：中期，市政基础
60 to 100 meters: MID-TERM, Municipal infrastructure

100-200米：远期，生产储存
100 to 200 meters: LANG-RANGE, Production storage facility



重点地区地下空间利用地质适宜性三维格架示意图



Outline

2. Coastal geology

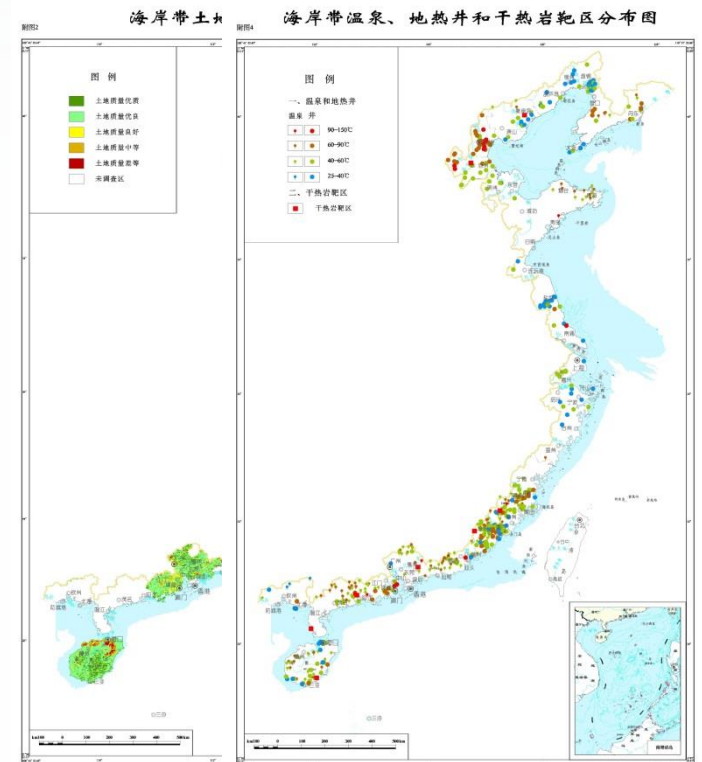
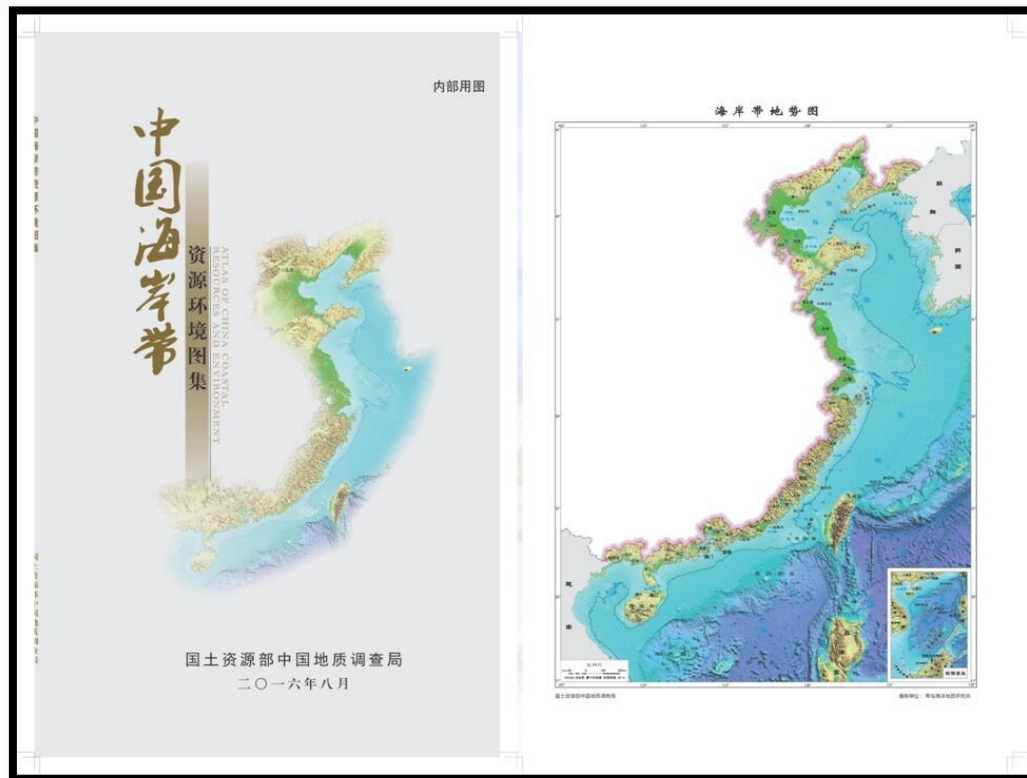


全国海岸带资源环境图集的编制

Atlas of Coastal Resources and Environment

中国地质调查局会同沿海省（市）国土厅组织了全国海岸带图集的编制，支撑服务沿海城市群规划、重大工程建设、环境保护和减灾防灾。

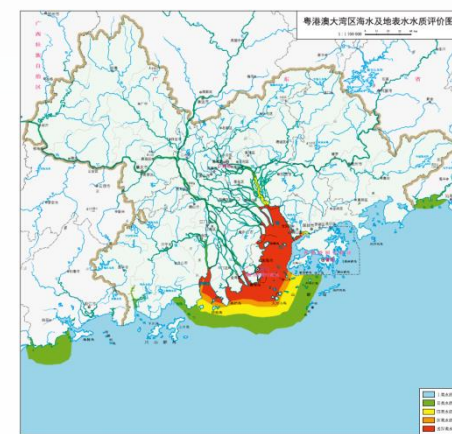
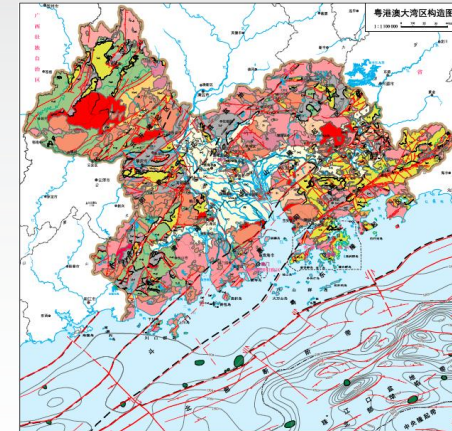
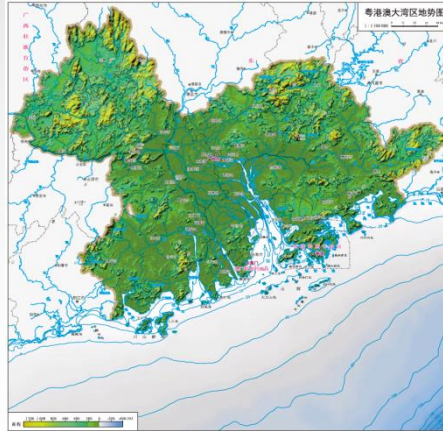
The Atlas of China coastal resources and environment map series were compiled with joint forces of CGS and coastal provincial authorities, to support the coastal integrated management, infrastructure planning, environment protection and hazard prevention.





粤港澳大湾区自然资源与环境图集编制

Atlas of Resources and Environment of the Guangdong-Hong Kong-Macao Great Bay

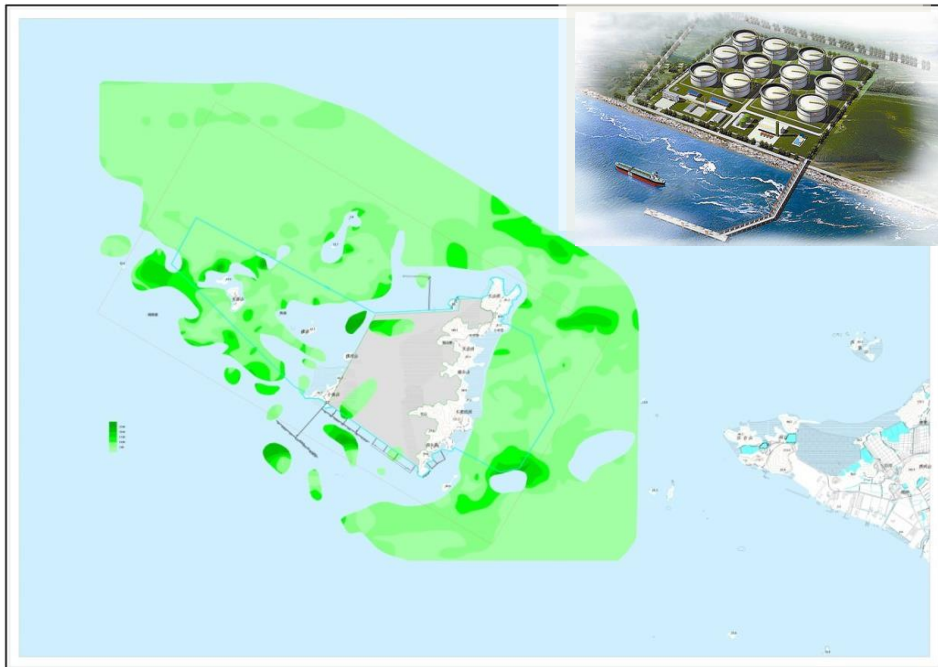


A series of maps of resources and environment of the GHM Great Bay area were compiled based on the long-term land and offshore investigated geo-information, to support the regional planning, infrastructure decision making, environment protection and hazard mitigation.



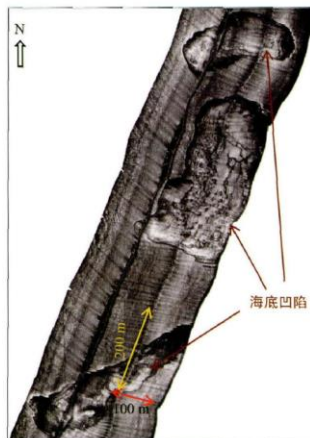
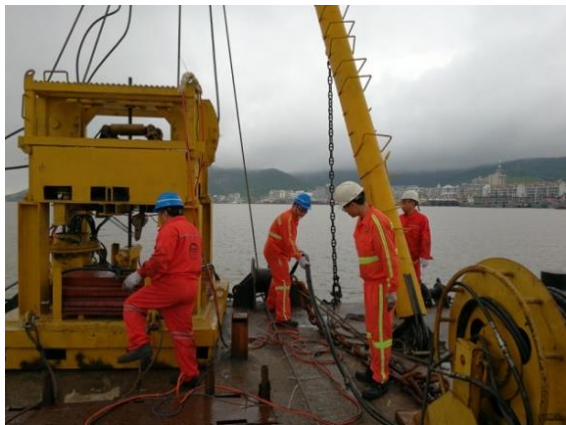
海底浅层气调查评价保障重大工程安全

Shallow gas investigation supports safety of major project



针对重大石化基地围填海区海底埋藏浅层气开展专题调查，查明浅层气分布范围、气体来源以及对土体力学性质的影响，评估对工程的影响，提出治理和监测建议，保障石化工程安全。

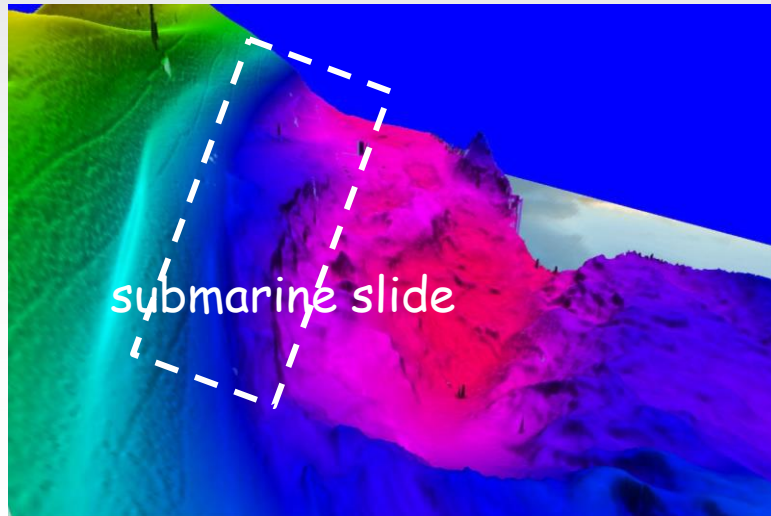
Investigation on seafloor shallow gas to reveal the distribution, resources and impact on the sediment geo-mechanical properties, to assess the risk of geo-hazard and provide the counter-measure for petrochemical project safety.





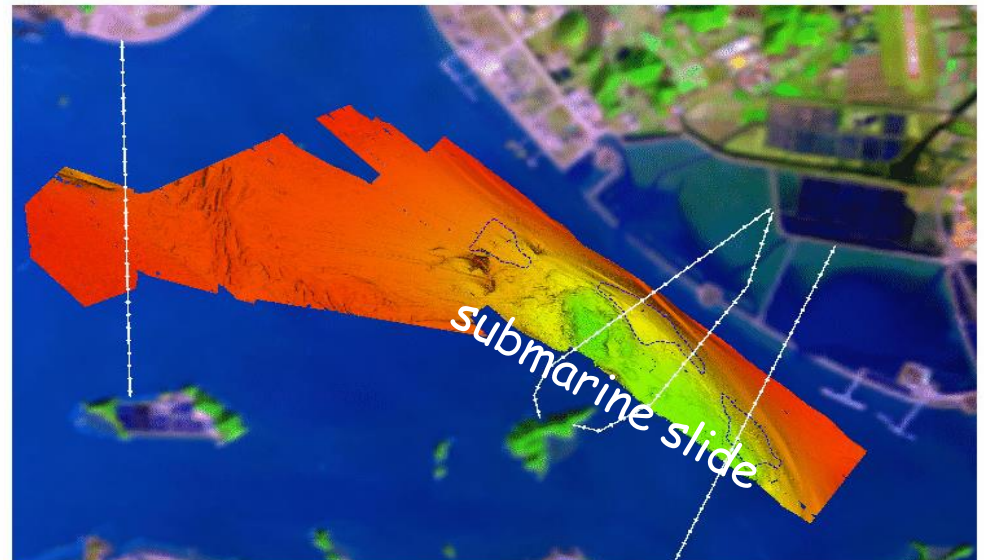
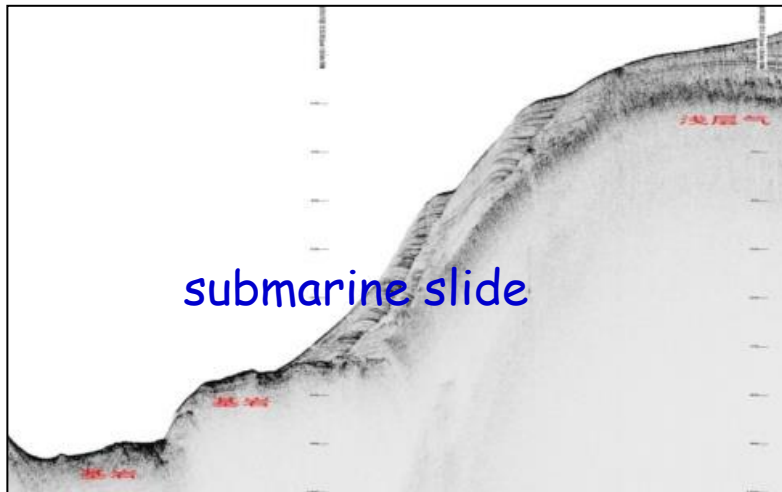
海底滑坡调查评价保障港口和海底管道安全

submarine slide investigation supports harbor safety



针对深水航道海底滑坡开展调查，查明滑坡体分布和致灾因素，预测滑坡体分布区域，评估对港口码头和海底管缆安全性的影响，提出治理和监测建议。

Investigation on seafloor slope sliding in the major harbor channels, to reveal the distribution of slides, the trigger mechanism and impacts on the safety of harbors, dikes and seafloor cables.





Outline

3. Hydrogeology

中华人民共和国1/5万水文地质图样图（盆地-3D）

Hydrogeological map of China
Scale: 1:50 000

2. 综合柱状图

Comprehensiv
Geological Column

1. 主图

Major section

4. 镶图

sub map

3. 图例

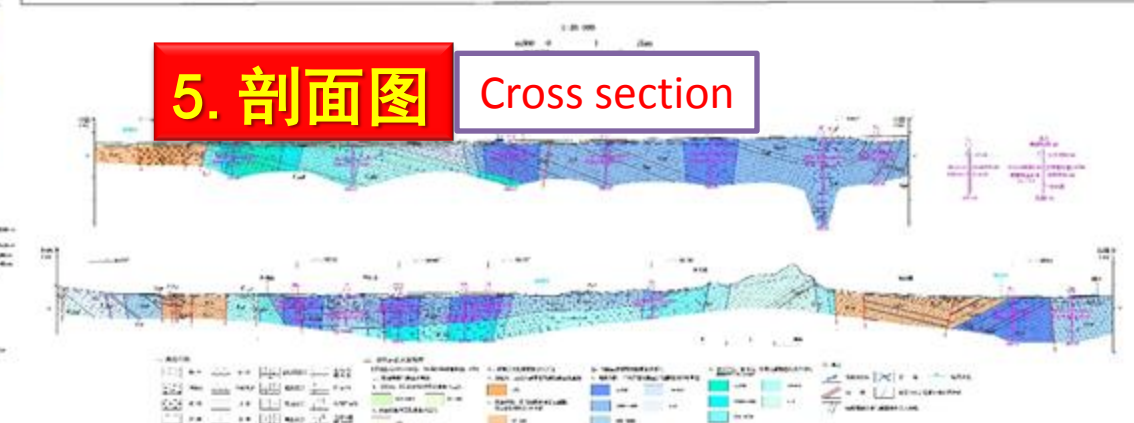
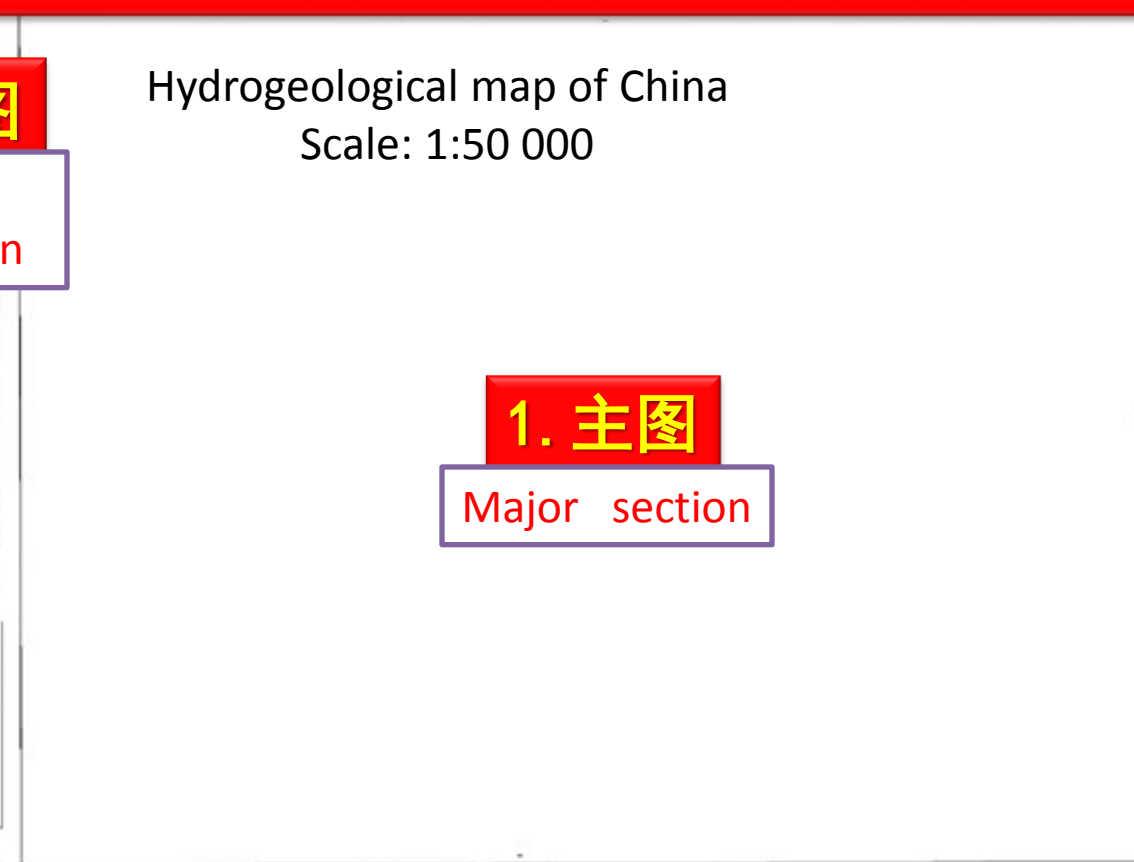
Legend

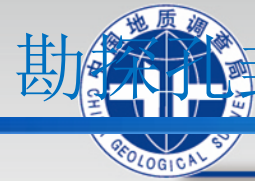
4. 镶图

sub map

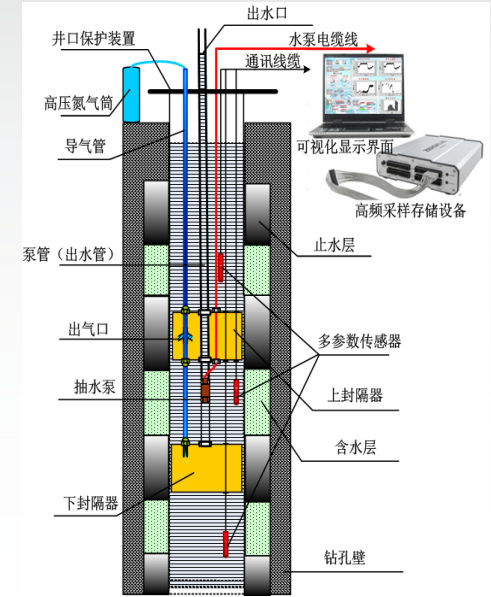
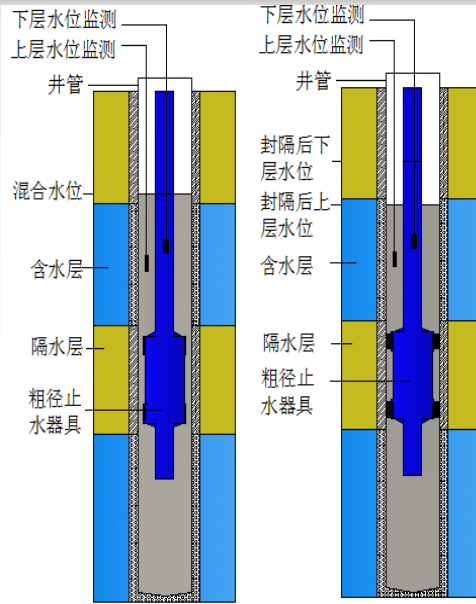
5. 剖面图

Cross section





封隔分层技术 *multiple layer packing technology*



分层获取参数分割洗井系统和可视化监测装置图

在黑河流域对大厚度第四系含水层实施了分层洗井，提高了洗井效率和效果，获取了关键的分层数据和参数。

Hydrogeological parameters with high precision have been obtained by multiple layer packing technology in the Heihe River.



国家地下水监测工程

National Groundwater Monitoring Project

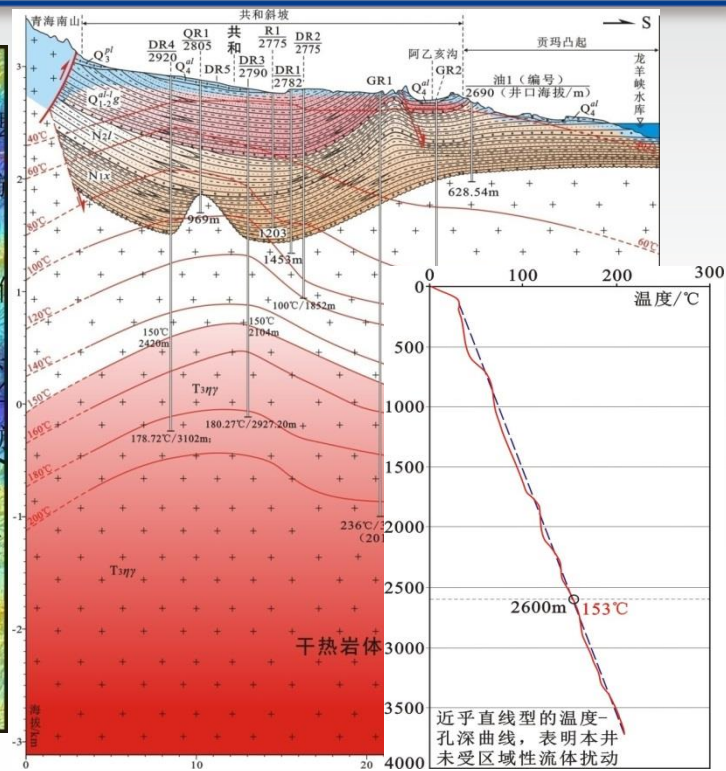
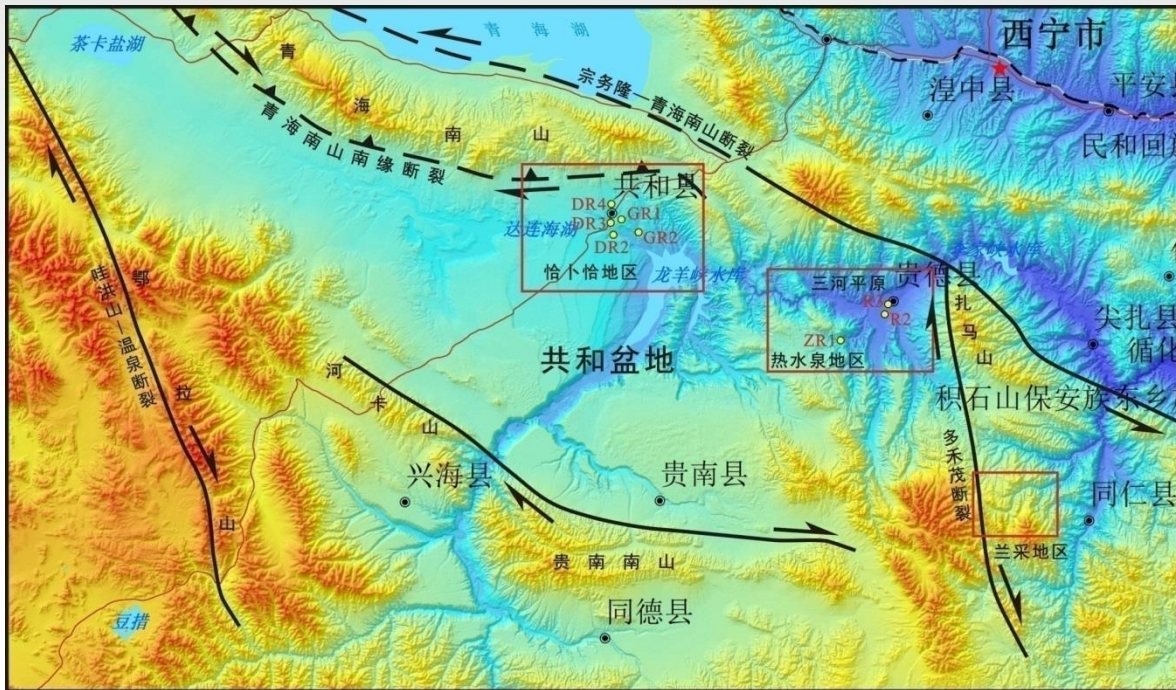


➤ 已建成监测站点9433个，正在施工站点113个，占工程站点建设总数的94%。

9943 groundwater monitoring sites have been built, account for 94% of the total.



干热岩勘查取得突破 *Hot Dry Rock Exploration*



在青海共和盆地3705米深处钻获236°C的高温干热岩体。

In the Qinghai Gonghe Basin, temperature of 236°C hot dry rock was drilled in the depth of 3705 meters.



Outline

4. Geohazard



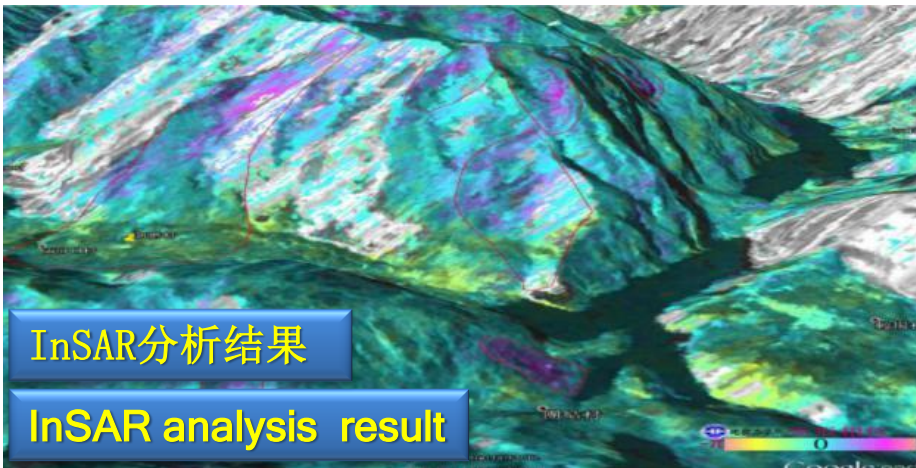
服务地质灾害防治管理

Support geological hazard prevention and control management



茂县滑坡救灾现场

Scene of Maoxian landslide relief



InSAR分析结果

InSAR analysis result

- 组织协调监测院、航遥中心、力学所、发展中心、成都中心、探矿工艺所等单位积极参与四川茂县叠溪滑坡应急救援工作。
- Arranged CGS subordinate institutes to participate in Maoxian Diexi landslide disaster emergency response and relief
- 组织航遥中心和力学所提供四川省遥感影像图，对重点区开展InSAR分析，支援四川地质灾害应急排查。
- Provided remote sensing images, InSAR analysis, landslide emergency screening.



服务地质灾害防治管理

Support geological hazard prevention and control management

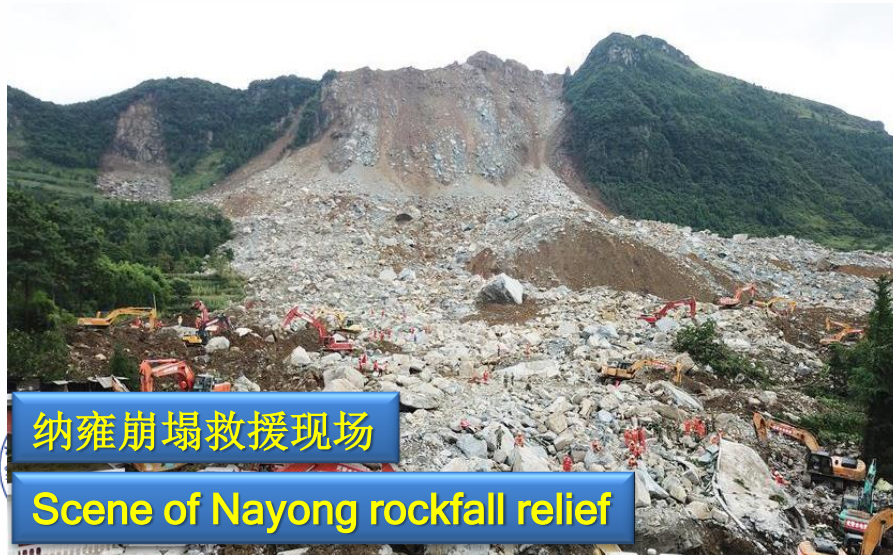


九寨沟地震现场

Scene of Jiuzhaigou earthquake



➤ 组织协调监测院、航遥中心、力学所、发展中心、成都中心、探矿工艺所、水环中心、岩溶所等单位积极参与四川九寨沟7.0级地震和贵州纳雍崩塌灾害应急工作，为灾区应急救灾提供技术支撑。



纳雍崩塌救援现场

Scene of Nayong rockfall relief

➤ Arranged CGS subordinate institutes participated in Jiuzhaigou Ms7.0 earthquake and Nayong rockfall disaster emergency response, provided technical support for disaster relief.

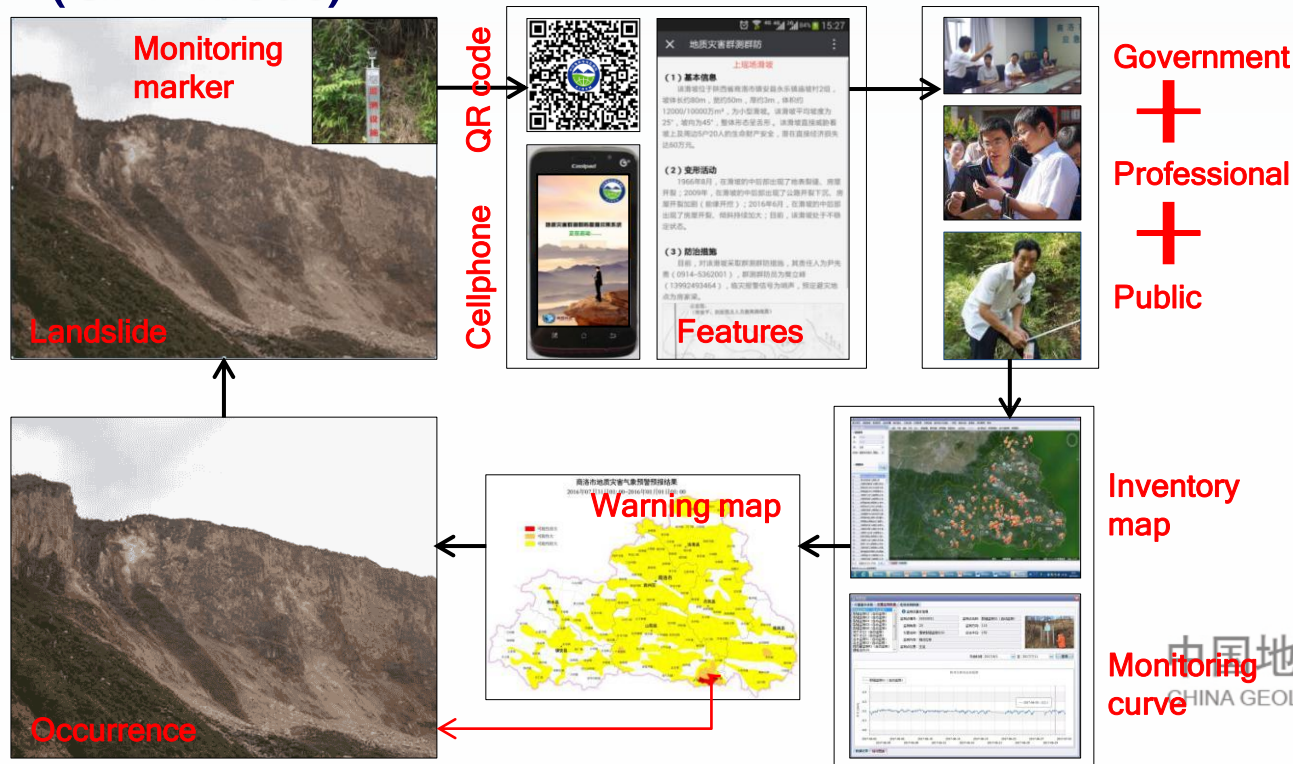


服务地质灾害防治管理

Support geological hazard prevention and control management

指导召开全国地质灾害监测预警现场会，初步建立基于物联网、信息化和大数据技术的地质灾害监测预警体系。

Guided holding National geological hazard monitoring and warning site meeting, preliminarily developed the geological hazard monitoring and early warning system based on internet of things, informatization and big data technologies (**GPP mode**).

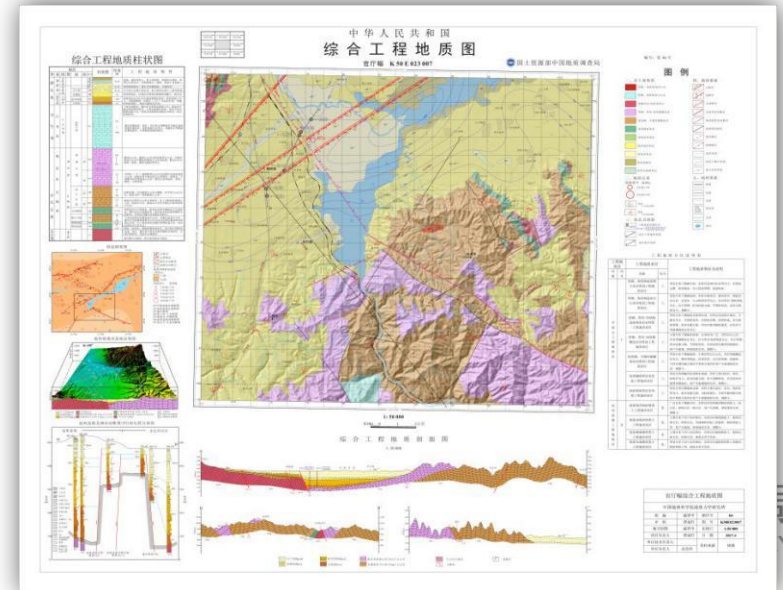
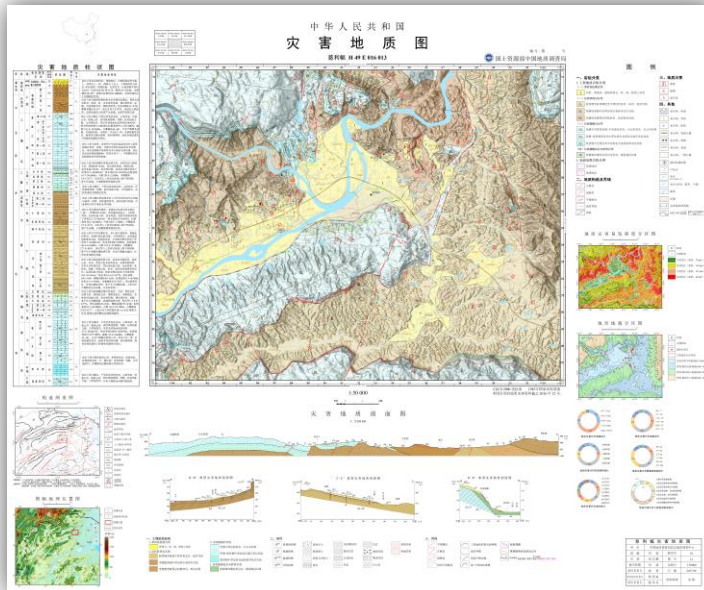




技术标准制修订

Technical standards formulating and revising

- 形成灾害地质图（初稿）和工程地质图（初稿）；
- Completed geohazard and related geological conditions map (draft) and engineering geological map (draft)
- 形成《灾害地质调查规范（1:50000）》和《工程地质调查规范（1:50000）》的征求意见稿。
- Completed exposure drafts of “Specification for geohazard and related geological conditions survey (1:50000)” and “Specification for engineering geological survey (1:50000)”





Outline

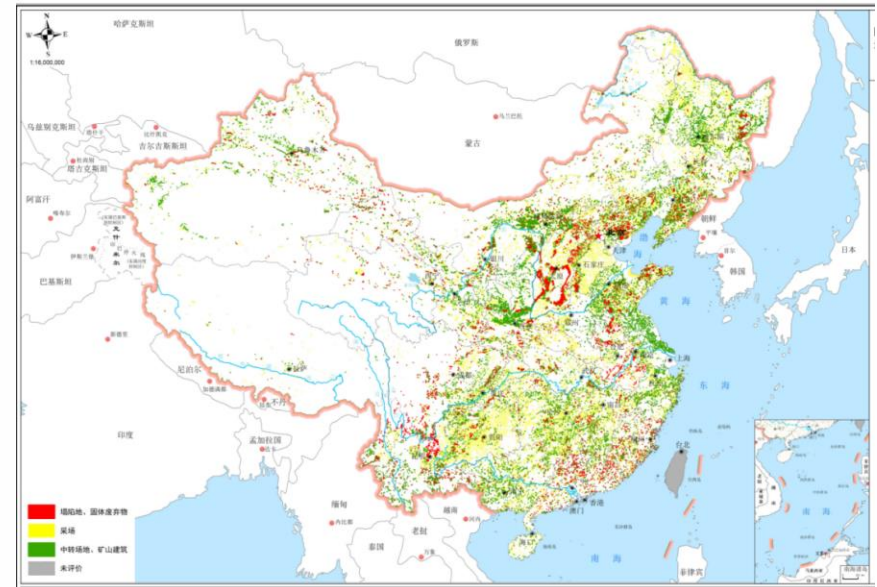
5. Enviromental geology



服务矿山地质环境管理

Support mine geological environment management

- 核算2015年和2016年全国矿山土地损毁面积和2016年度各省矿山地质环境恢复治理面积，已上报部；
- Accounting national mining land damaged area (2015 - 2016), and mine geological environment restoration area of all provinces (2016);
- 指导编制全国及31个省土地损毁遥感解译图、《全国矿山地质环境调查监测报告(2016年)》；
- Guide mapping damaged land remote sensing interpretation maps of China and 31 provinces, and “National mine geological environment investigation and monitoring report (2016)”;
- 指导召开全国矿山地质环境调查监测技术方法研讨会，统一了矿山地质环境调查、监测技术要求。
- Guide holding National monitoring technique seminar of mine geological environment investigation, and unified the mine geological environment survey and monitoring technical requirements.

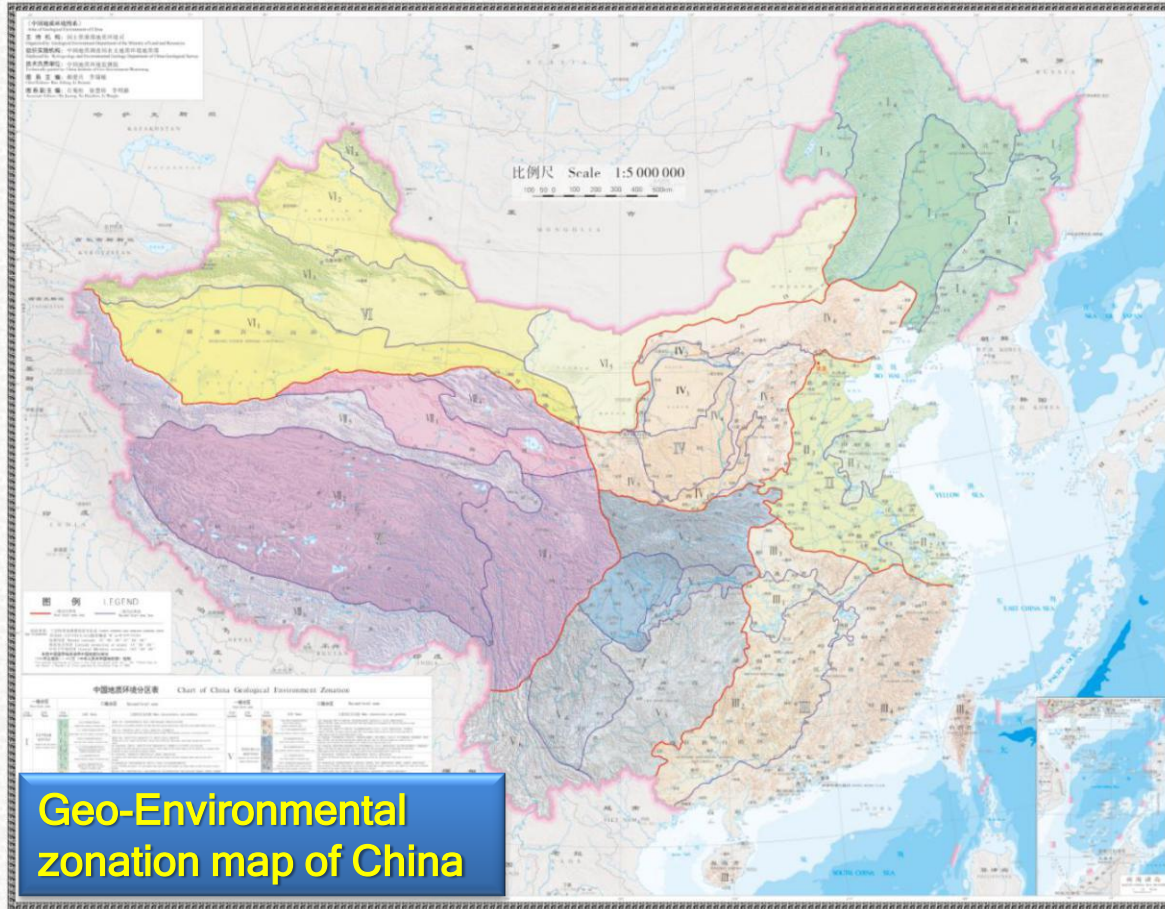




推进全国地质环境图系编制与出版

Compile and publish the Atlas of Geological Environment of China

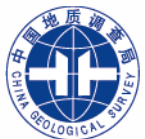
中国地质环境分区图 GEO-ENVIRONMENTAL ZONATION MAP OF CHINA



Geo-Environmental zonation map of China

➤ 编制完成《中国地质环境分区图》等10张图件与说明书；完成10张图出版前期工作。

➤ Compiled 10 maps and instructions that includes the Geo-Environmental zonation map of China, etc. Completed the pre-publication.



中国地质调查局
CHINA GEOLOGICAL SURVEY

中国地质调查局
CHINA GEOLOGICAL SURVEY



推进全国地质环境图系编制与出版

Compile and publish the Atlas of Geological Environment of China

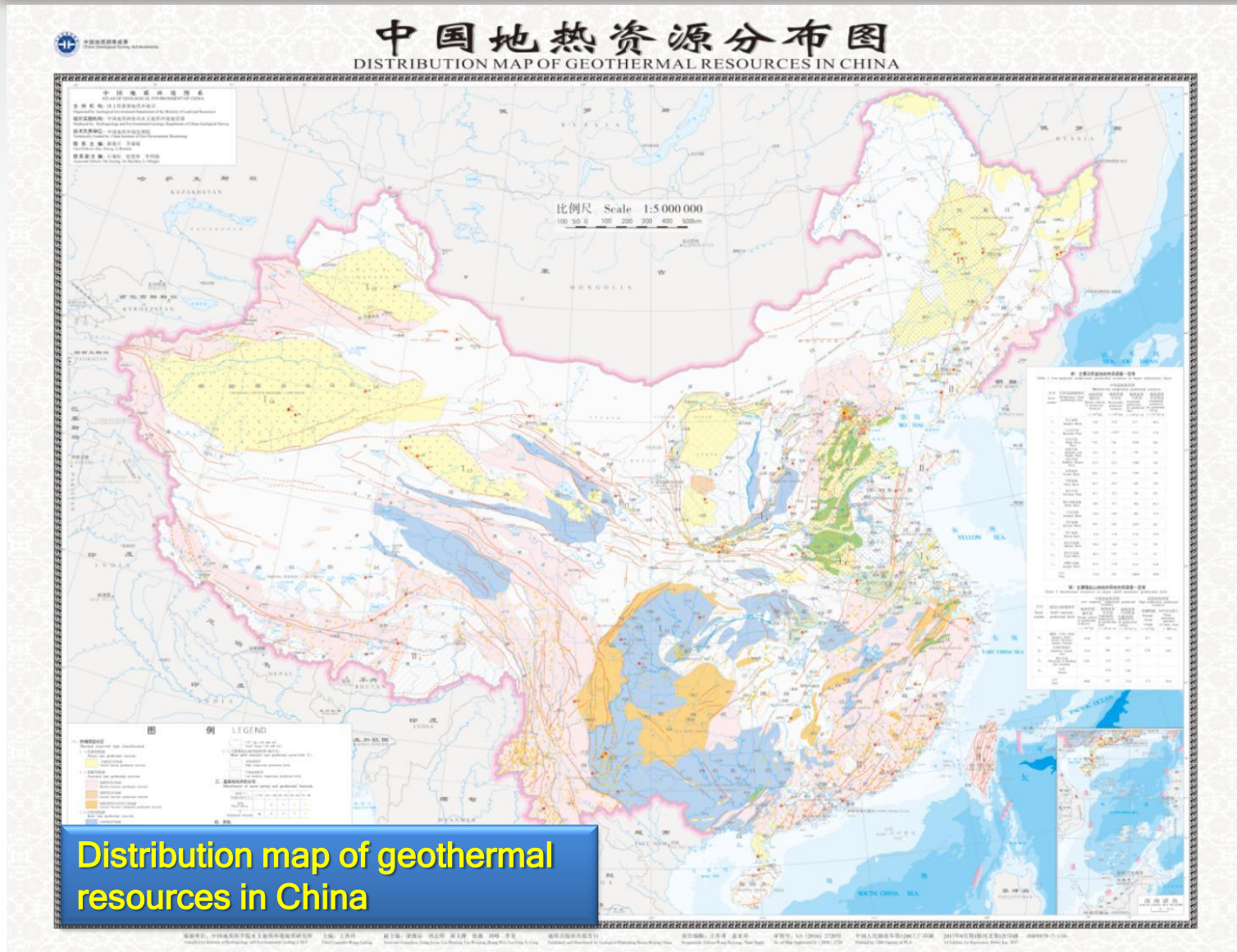


Distribution map of active faults in China and its adjacent sea area



推进全国地质环境图系编制与出版

Compile and publish the Atlas of Geological Environment of China

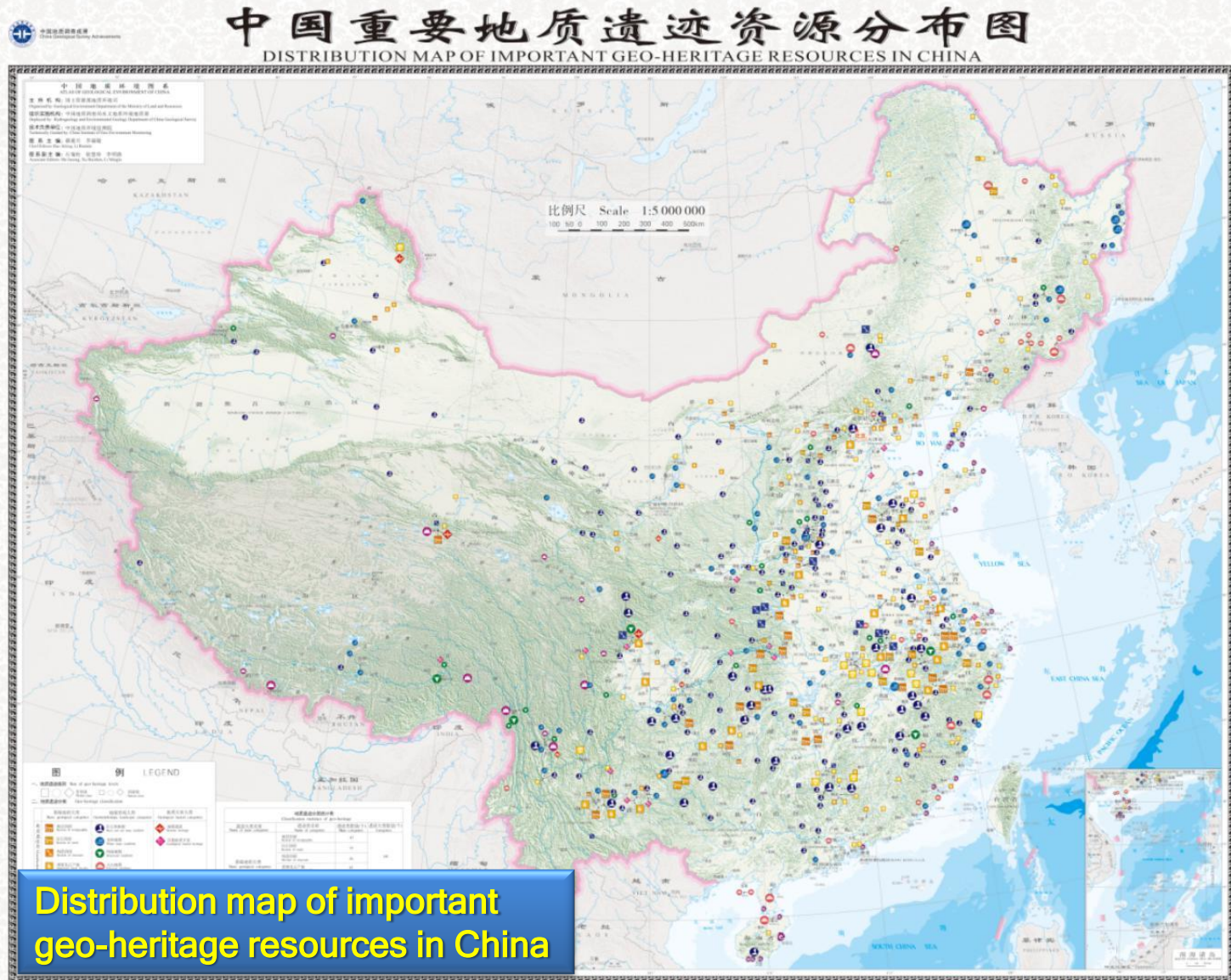


Distribution map of geothermal resources in China



推进全国地质环境图系编制与出版

Compile and publish the Atlas of Geological Environment of China



Distribution map of important geo-heritage resources in China



支撑国土规划和土地质量管理

Support land planning and land quality management

- 支撑部新一轮土地利用总体规划修编，参与编制完成《全国国土空间开发适宜性评价研究报告》；
- Support the new edition of land use general planning revision, participate compile “Research report of national land spatial development suitability evaluation”；
- 指导召开长江经济带资源环境承载力评价方法研讨会；
- Guide holding evaluation technique seminar of the Yangtze river economic belt resource environmental bearing；
- 起草完成有益元素富集土地认定标准和标识（初稿）。
- Draw up “identifying standards and identification of useful elements enrichment land (draft).





国际大科学计划 *International Big Scientific Plan*



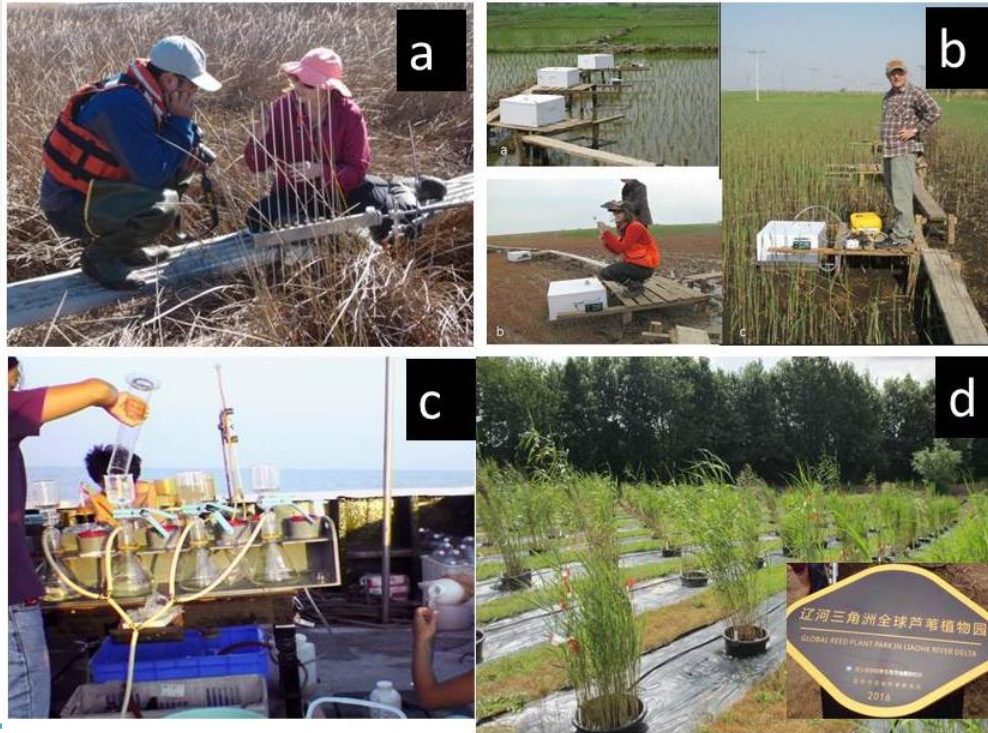
来自美国、巴西等11个国家的科学家加入全球岩溶国际发科学计划

The scientists from 11 countries including the US and Brazil who were present at the announcement jointly signed the letter of support for the Big Scientific Plan



滨海湿地国际合作

International cooperation in coastal wetlands



中国科学技术交流中心文件

国科交字 (2016) 129 号

关于国家重点研发计划“政府间国际科技创新合作”重点专项 2016 年度项目立项的通知

各项目承担单位:

国家重点研发计划“政府间国际科技创新合作”重点专项 2016 年度项目立项工作已经完成, 具体立项情况详见附件。

请你们会同各项参与单位, 根据《关于改进加强中央财政科技项目和资金管理的若干意见》(国发〔2014〕11号)、《关于深化中央财政科技计划(专项、基金等)管理改革的方案》(国发〔2014〕64号)、《科技部 财政部关于改革过渡期国家重点研发计划组织管理有关事项的通知》(国科发资〔2015〕423号)、《财政部 科技部关于中央财政科技计划管理改革过渡期资金管理有关问题的通知》(财教〔2015〕154号)、《中共中央办公厅 国务院关于进一步完善中央财政科研项目资金管理政策的若干意见》(中办发〔2016〕50号)



United States Department of the Interior
U.S. GEOLOGICAL SURVEY

Wetland and Aquatic Research Center
700 Capodanno Boulevard
Lafayette, Louisiana 70506
(337) 346-8100

December 30, 2015

Dr. Siyuan Ye
Key Laboratory of Coastal Wetland Biogeosciences, China Geological Survey (CGS)
Qingdao Institute of Marine Geology, M.I.R.
Fuzhou Road 62, Qingdao
CHINA

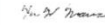
Dr. Ye,

I am writing in support of your research proposal entitled, "Precise assessments of carbon sequestration and the countermeasures for enhancing carbon sink in coastal wetlands". As a USGS scientist, and current collaborator with you through CGS, I know that your proposed research will be successful, and will continue to provide necessary data on carbon sequestration in Chinese wetlands.

I currently lead a research program within the USGS that focuses on greenhouse gas emissions and surface elevation changes in coastal wetlands. Through this proposal and in the spirit of the current agreement between the USGS and CGS (Project Annex No.6, CH-02.0600), I will continue to collaborate with you in developing study idea, experimental designs, writing manuscripts from past collaborative studies in the Liaohe Delta, facilitating new greenhouse gas and surface elevation change studies, and developing cross-continent comparisons related to wetland processes. My current internal USGS budget for greenhouse gas studies is approximately \$130,000 to \$160,000 USD annually, divided among several different internally funded research projects. From this funding, I will be able to commit - as an in-kind contribution - my time, staff time, analytical costs, and supplemental travel costs (if applicable) associated with USGS Wetland and Aquatic Research Center involvement in this collaboration with the Qingdao Institute of Marine Geology. Your research objectives are in-line with any other research that focuses on greenhouse gas emissions and surface elevation change in coastal wetlands of the US, including both marsh and forested wetlands in multiple coastal US states. Collaborations between our two agencies strengthens global understanding of carbon balance and ecosystem processes.

As we finalize the draft of our second collaborative scientific journal article together, I am reminded of how productive our research collaboration has been over the last 4 years. I believe we have much more exciting work to do. This collaboration works nicely because we are able to bring in-kind commitments from our respective agencies. I look forward to continuing this joint research together.

Sincerely,


Ken W. Kraus, Ph.D.
Research Geologist

辽河三角洲进行野外观测基地建设 Field observation bases in the Liaohe Delta

中美合作项目

Cooperation project of China and America

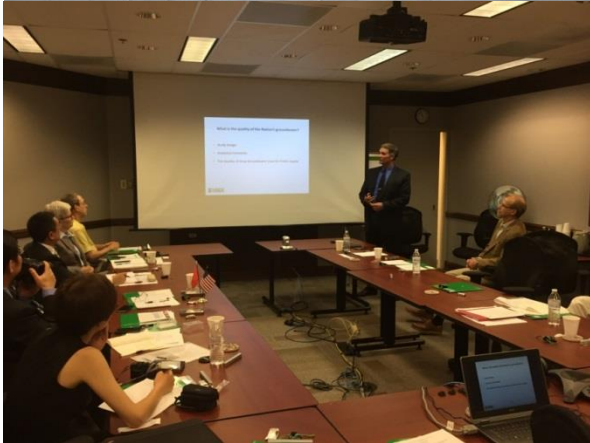
“滨海湿地固碳效率精确评价与加强碳汇对策”
“Precise assessment of carbon sequestration and the countermeasures for enhancing carbon sink in coastal wetlands”

与来自美国、丹麦、西班牙、新西兰、日本等国家的十余个世界顶级的湿地研究机构建立了广泛的合作。

Extensive cooperation has been established with more than ten top wetland research institutions.



国际合作研究 International cooperation research



➤ 中-美水文地质专家合作交流

➤ *Cooperation in hydrogeology survey between China and the*

➤ 中-意水文地质专家合作交流

➤ *Cooperation in hydrogeology survey between China and Italy*



国际合作研究

International cooperation research

- 中奥地质灾害防治合作 (AIT)
- CGS-AIT geohazard prevention and control cooperation



5月，奥地利联邦交通、创新和技术部7位专家来华，针对地质灾害防治工作进行了深入研讨，并明确在“吕梁山区城镇地质灾害调查”项目中开展评价与填图合作。

In May 2017, CGS and Austrian Ministry for Transport, Innovation and Technology hold in-depth discussion on geohazard prevention and control, resulting in assessment and mapping cooperation of landslide survey in Luling mountain cities and towns.



国际合作研究

International cooperation research

- 中德兰州滑坡风险评估与管理
- CGS-BGR landslide risk assessment and management cooperation in Lanzhou

2017年3月，中方一行6人，赴德国地球科学与自然资源研究所（BGR）开展合作研究。6月，德国（BGR）2人来华开展中-德2017年第二次联合工作。



In March and June 2017, CGS and Bundesanstalt für Geowissenschaften und Rohstoffe carried on bilateral visits, and discussed Lanzhou landslide susceptibility assessment result and following work arrangement.



**Thanks for your
attention!**