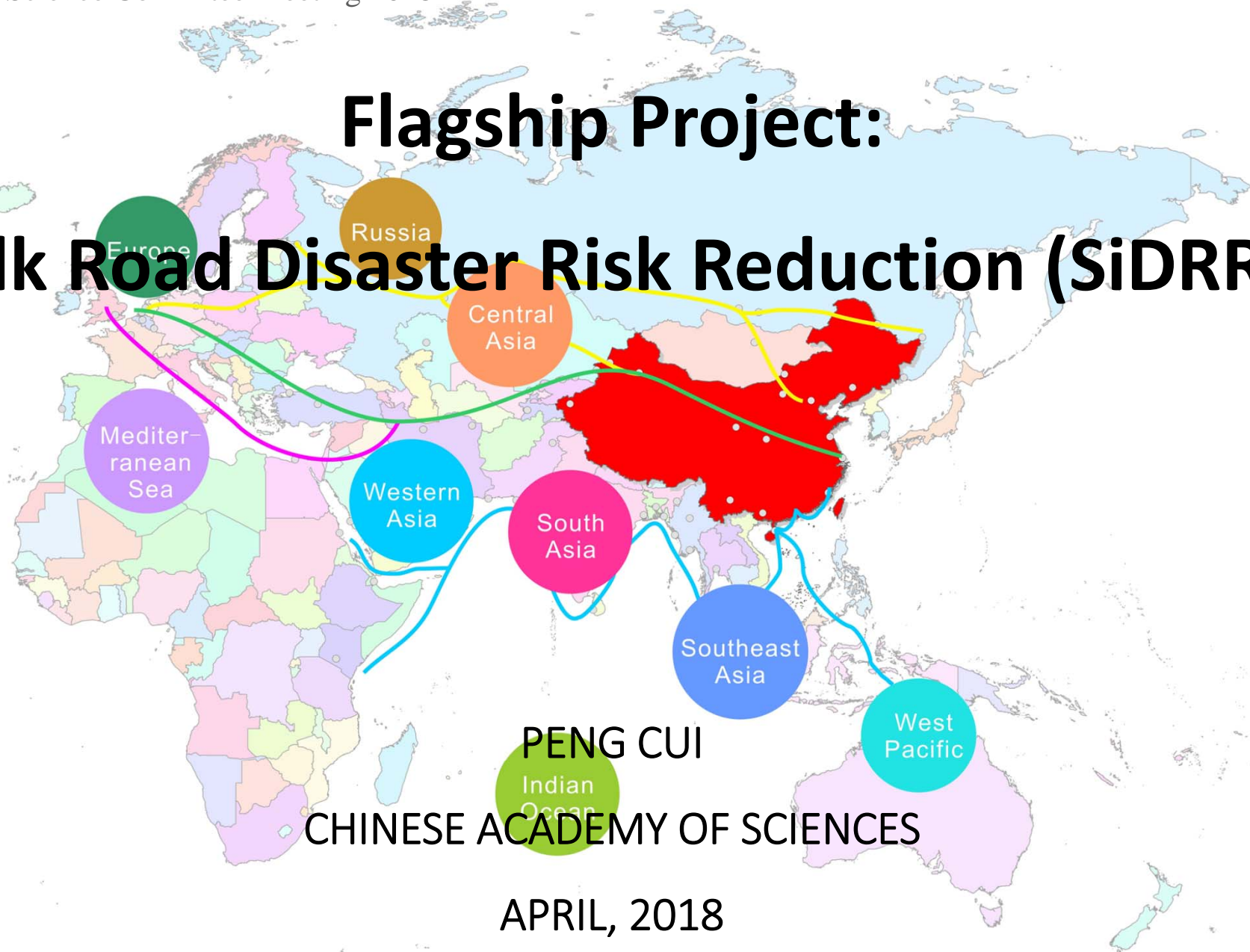


# Flagship Project: Silk Road Disaster Risk Reduction (SiDRR)



PENG CUI

CHINESE ACADEMY OF SCIENCES

APRIL, 2018

# Outline



**Background**

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**Objective and Vision**

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**Progress and Achievement**

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**Highlight of SiDRR**

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# 1. Background



May 2017, The International Forum of Belt and Road identified the priority of Belt and Road Initiative:

- ◆ Deepen policy **connectivity**
- ◆ Enhance infrastructure **connectivity** ←
- ◆ Increase trade **connectivity**
- ◆ Expand financial **connectivity**
- ◆ Strengthen people-to-people **connectivity**

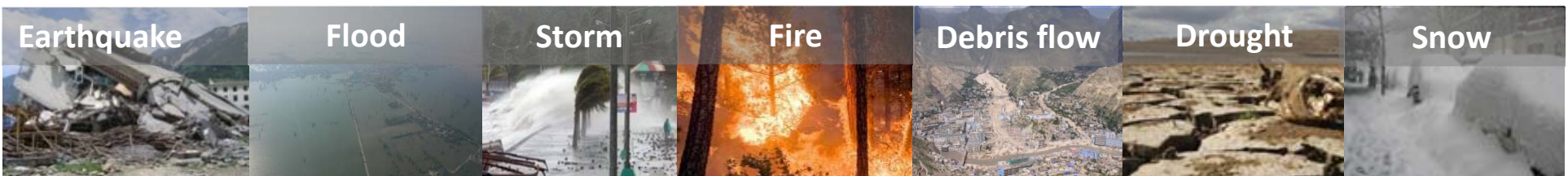
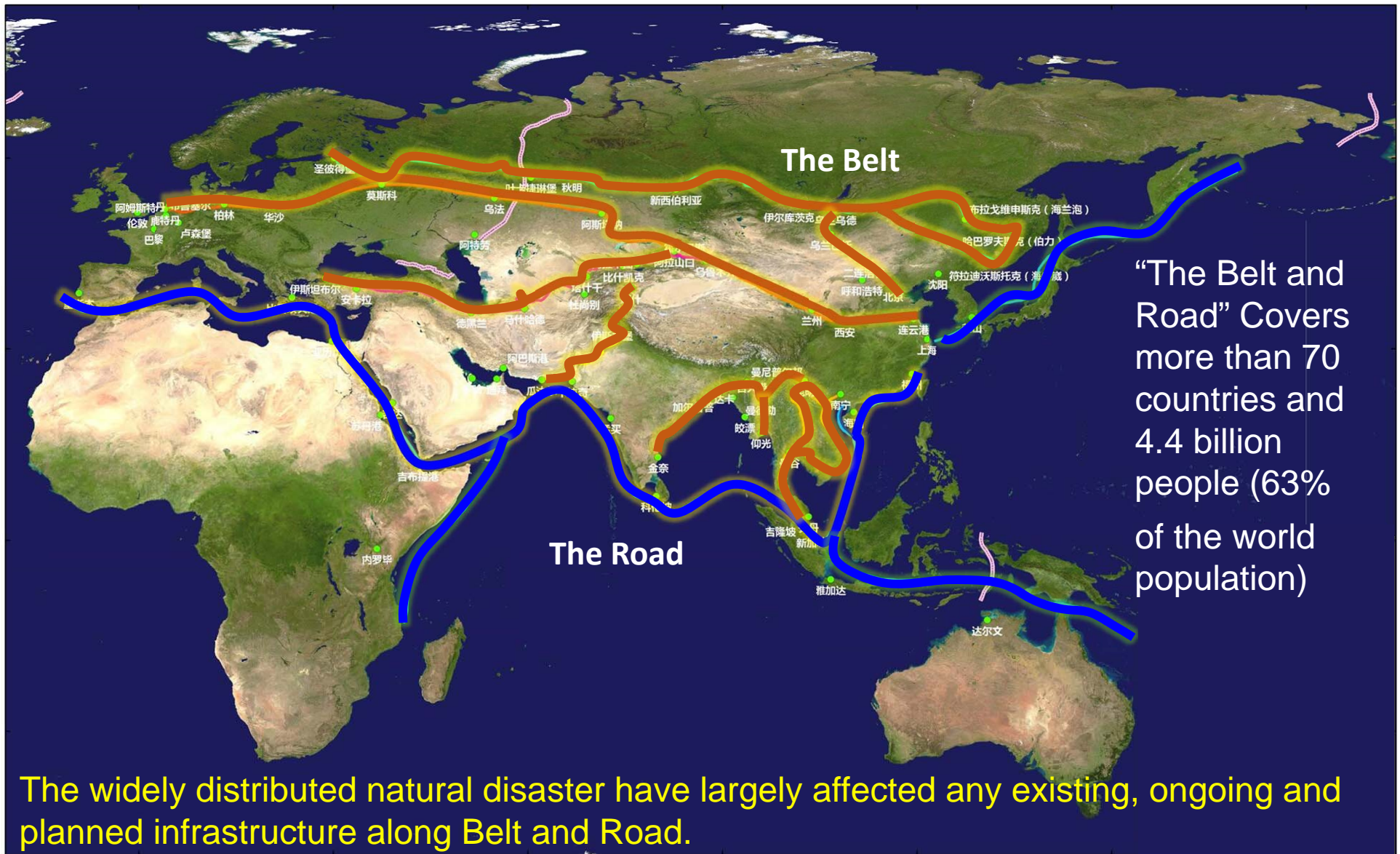


“一带一路”国际合作高峰论坛  
BELT AND ROAD FORUM FOR INTERNATIONAL COOPERATION

2017年5月14-15日 中国·北京

14-15 MAY 2017 BEIJING, CHINA

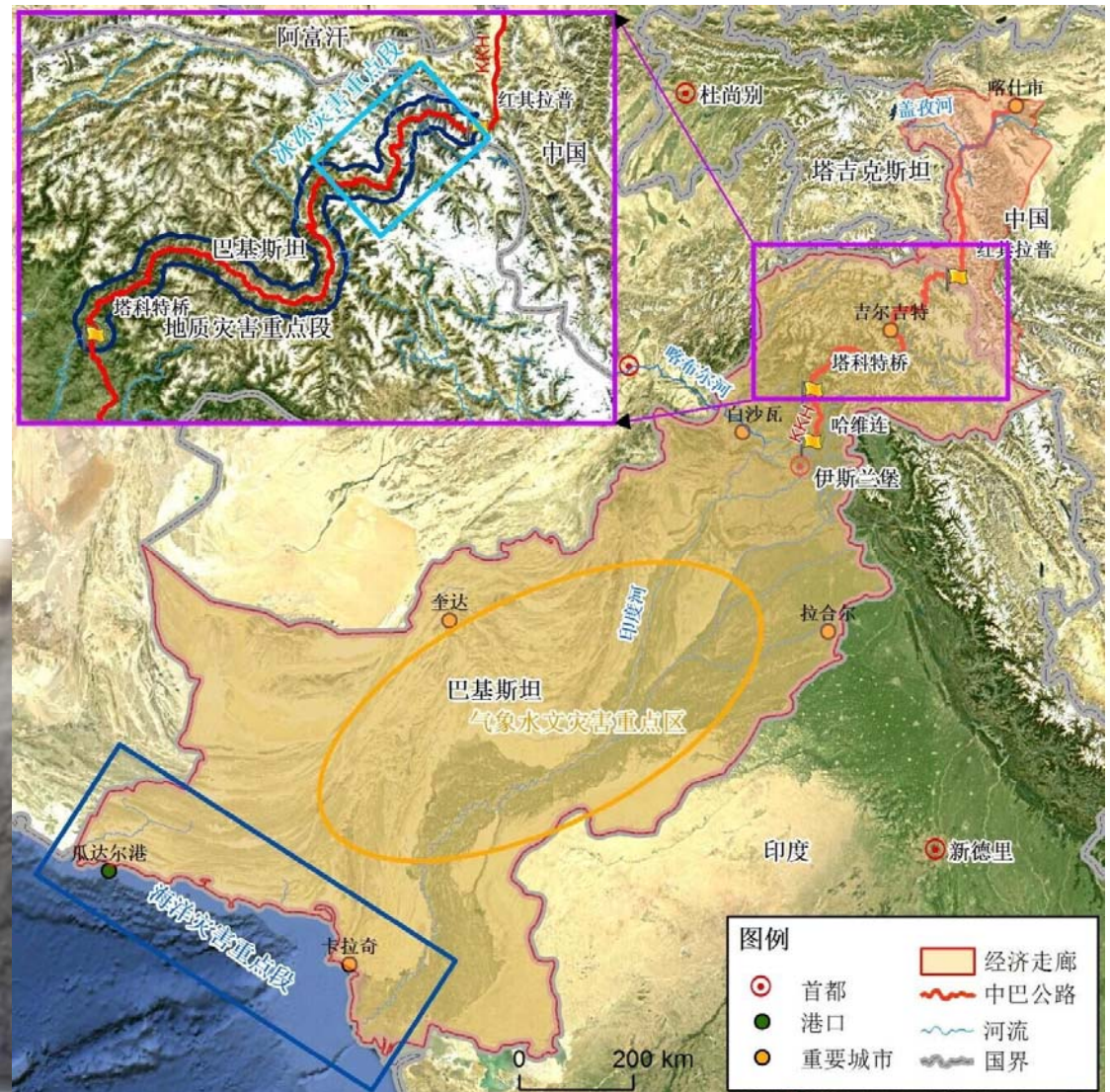




## China-Pakistan Economic Corridor

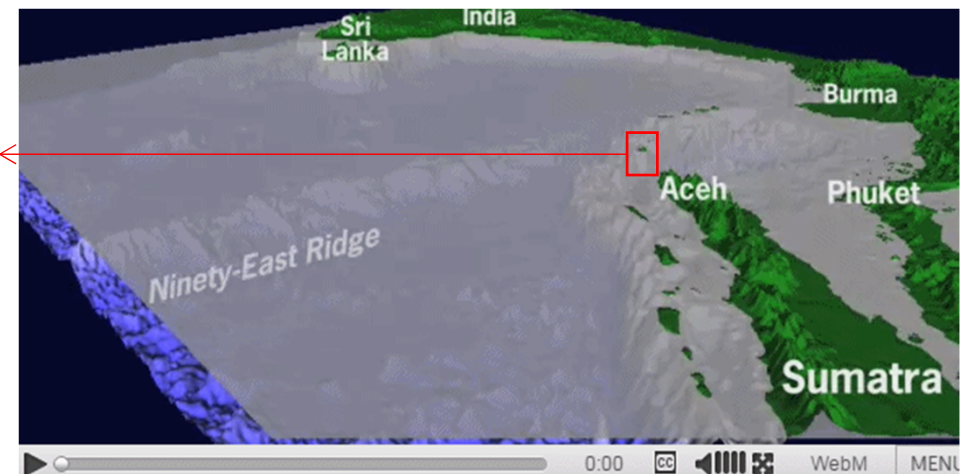
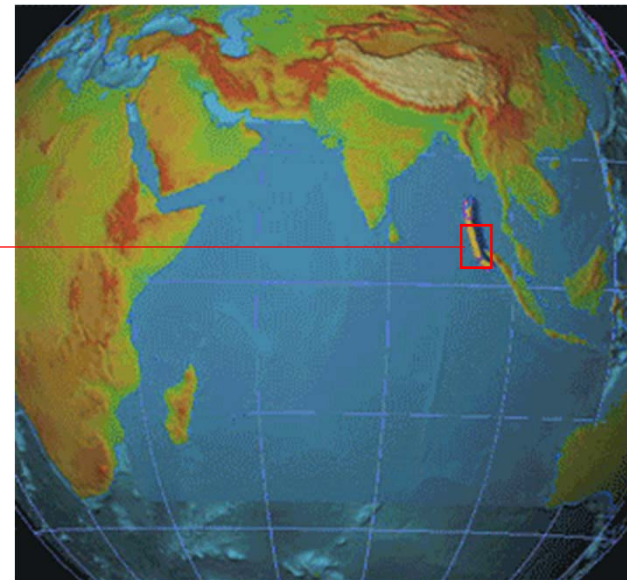
### Distribution of geo-hazards along HHK

Type of Geo-hazards	Number
Collapse	54
Landslide	2
Debris flow	177
Dammed lake	1
Granular mass flow	3400m

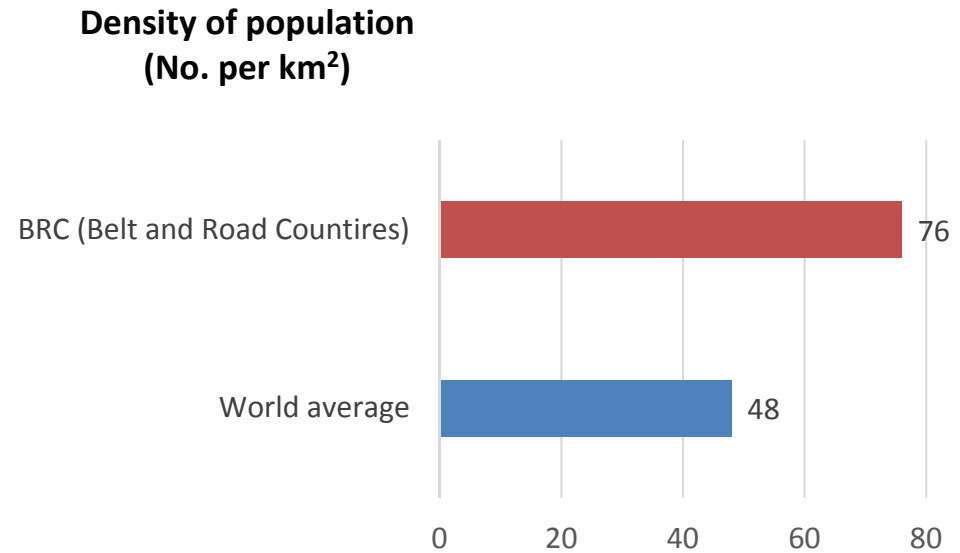
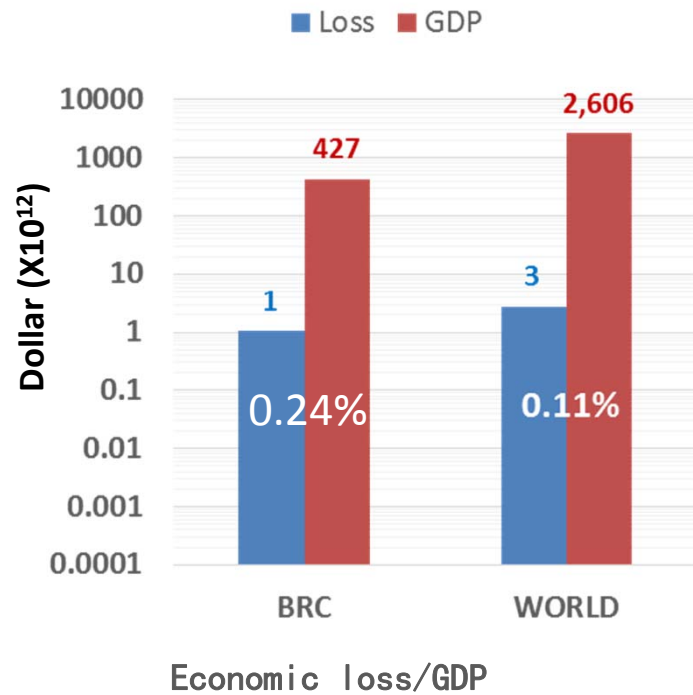


- Bangladesh-China-Indonesia-Myanmar Economic Corridor

Dec 2004, Earthquake at Indian Ocean induced Tsunami, affecting 14 countries, 300,000 casualties



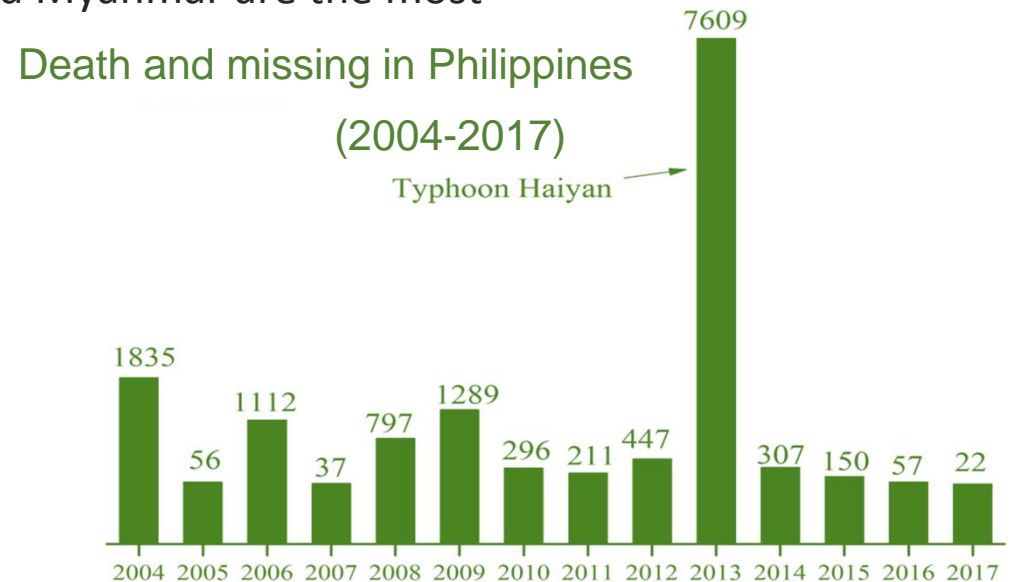
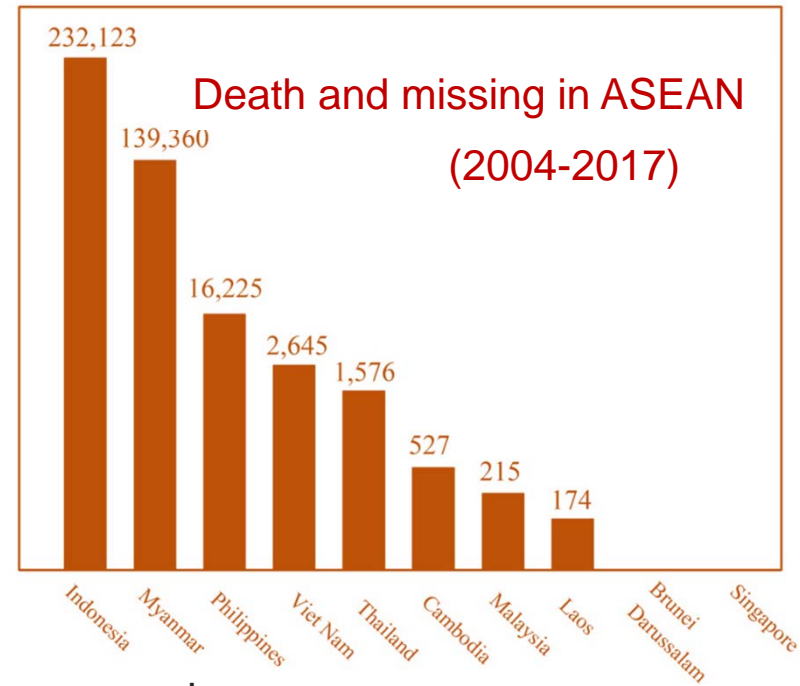
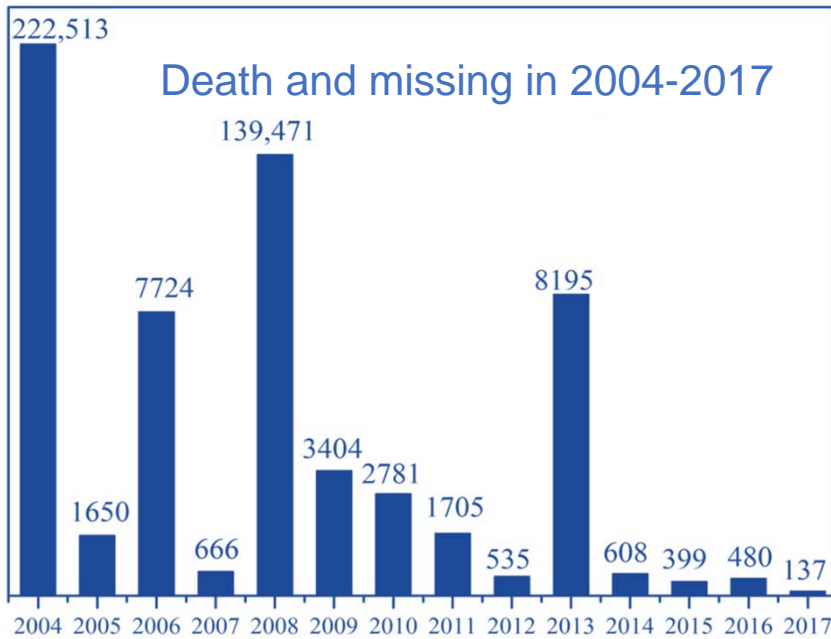
# Economic loss due to natural hazards occurred during 1995-2015



- Economic loss due to natural hazards in the “belt and road” is two times of world average level;

**Many countries in the “Belt and Road” are developing countries. Natural hazards can give a great impact to the local society**

# Human Casualty — ASEAN





## 2. Objective and Vision

### 1. Big Challenges:



Geophysical



Meteorological



Hydrological



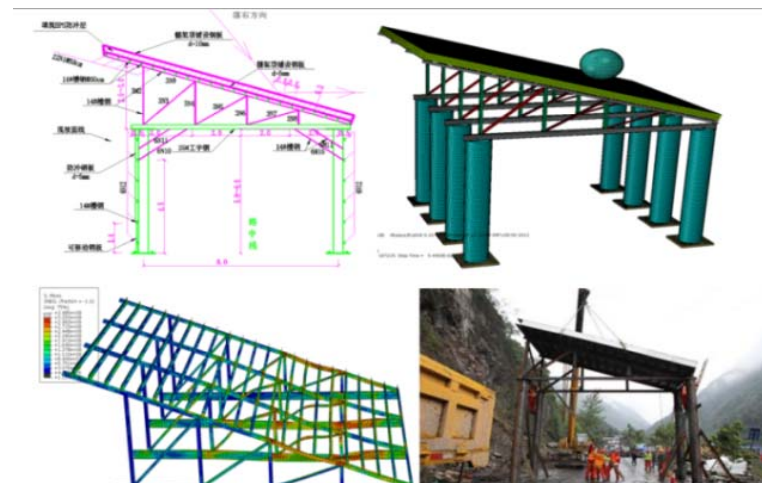
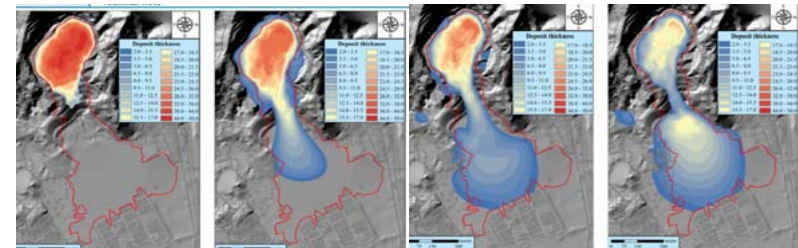
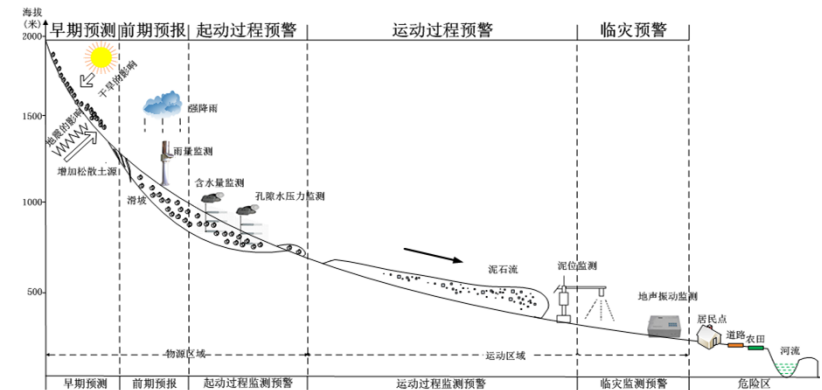
Climatological

- Lack of background (natural hazards) data
- Unclear the new characteristics of hazards
- No scientific hazards risk assessment
- Hazards reduction technologies, standards, norms are not uniform
- Lack of information sharing and coordination mechanism

**Earthquake, Tsunami, Flood, Landslide, Rock fall, Debris flow, Snow avalanche, Dammed lake, GLOF....**

## 2. Research Contents:

- ① Background survey technology and hazards database construction
- ② Dynamic evolution of the natural hazards and the development trend in future
- ③ Natural hazards monitoring and early warning (Sky-land integration )
- ④ Hazards risk assessment at different spatial and temporal scales
- ⑤ Key technologies of prevention and control of giant natural hazards for major projects
- ⑥ Active mitigation policy and effective multi country coordination mechanism
- ⑦ Hazards mitigation methods for less developed countries and regions



### 3. Aims and Vision

- 01 | Identify and forecast natural hazards to improve natural hazard resilience and decrease the life and economic losses
- 02 | Expand the application and promotion of disaster prevention and reduction technologies, and to enhance disaster risk governance
- 03 | Promote scientific cooperation and Establish international cooperation mechanism for hazard mitigation and management



Sendai Framework for Disaster Risk Reduction

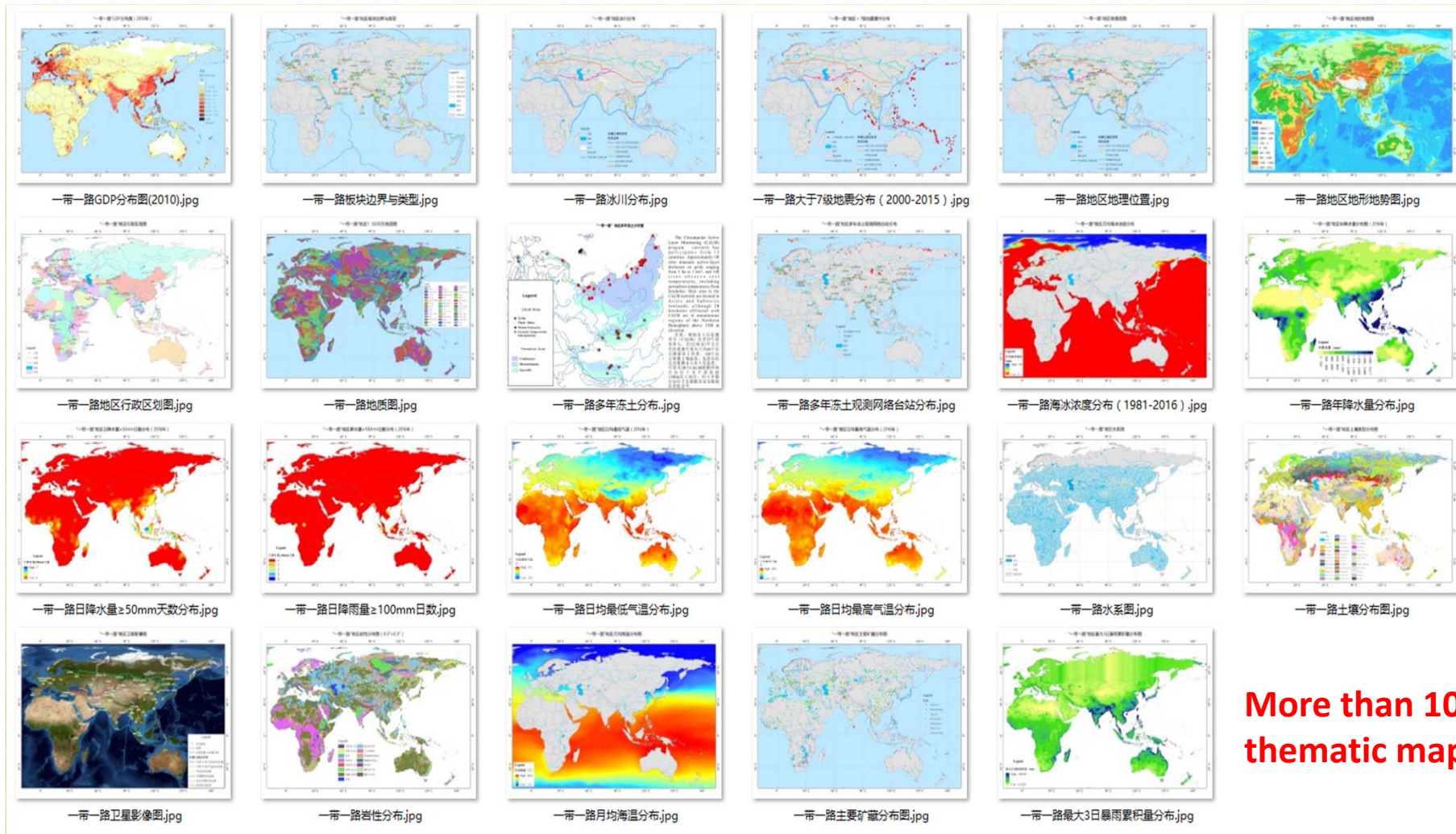
2015 - 2030



The aim of **SiDRR** share the same vision of **SFDRR** and **SDG** in terms of enhance the resilience against nature disaster and reduce the disaster risk

# 3. Progress and Achievement

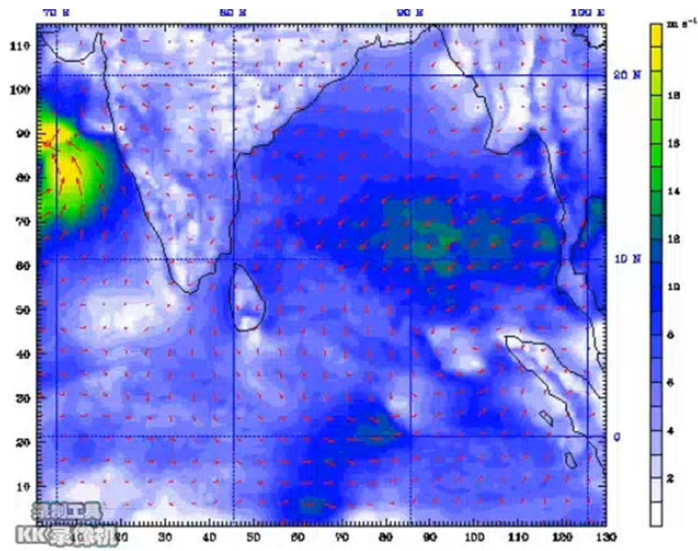
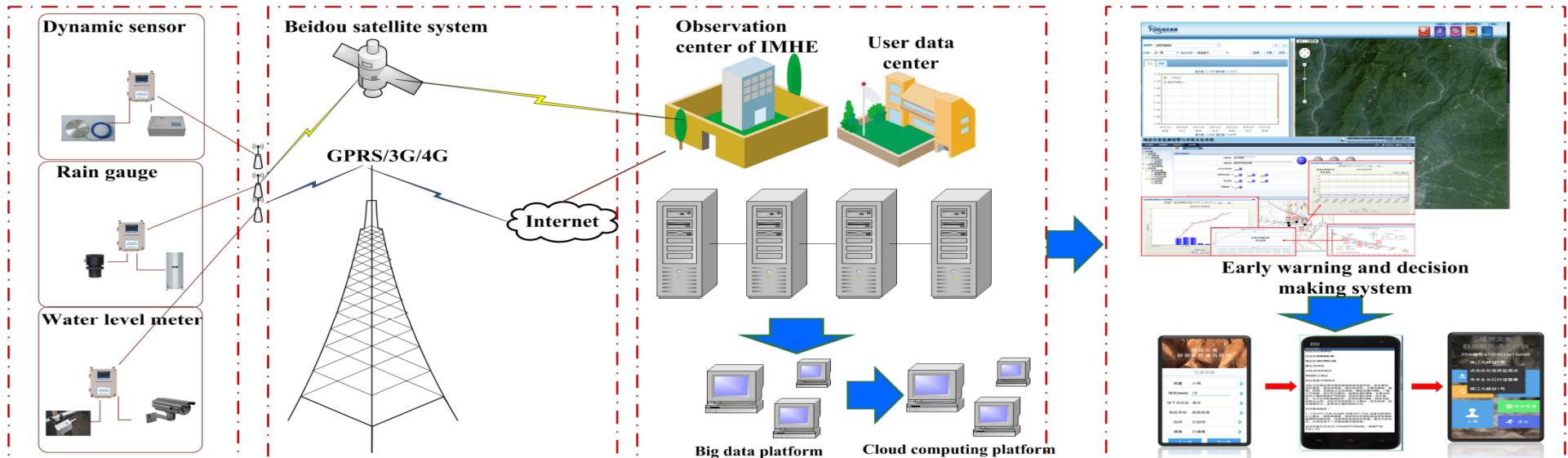
## (1) Establish the Natural Hazard Database of the B&R



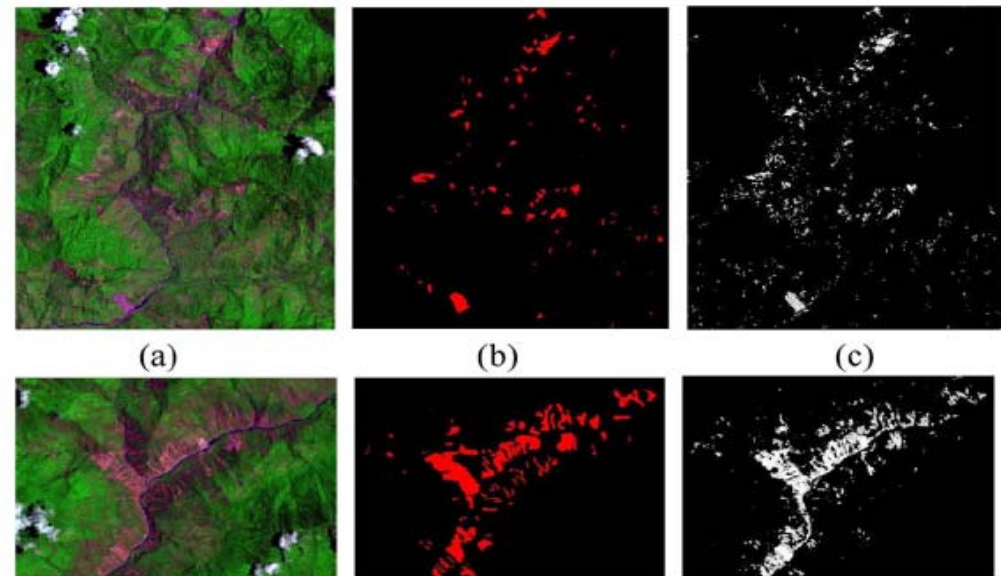
More than 100 thematic maps

## (2) Integrated platform for disaster monitoring and early warning

- Overall Schematics



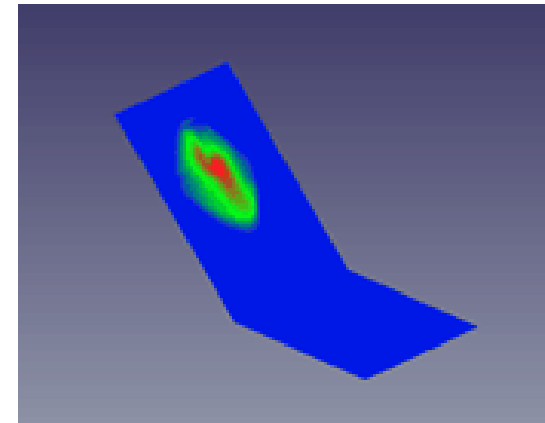
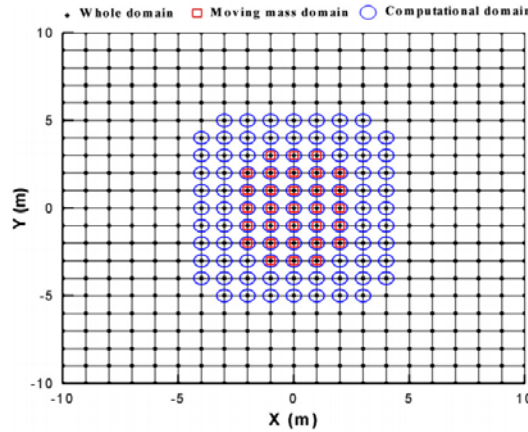
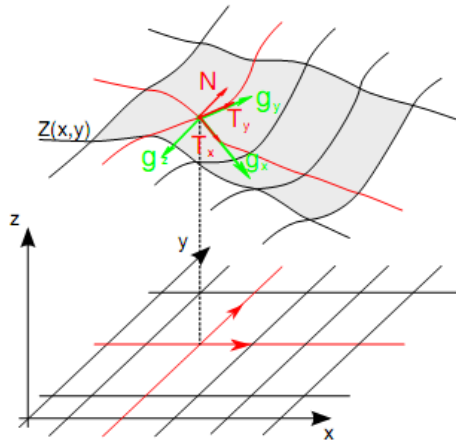
- Sri Lanka tropical cyclone forecast system



- Large Scale Landslide Monitoring system

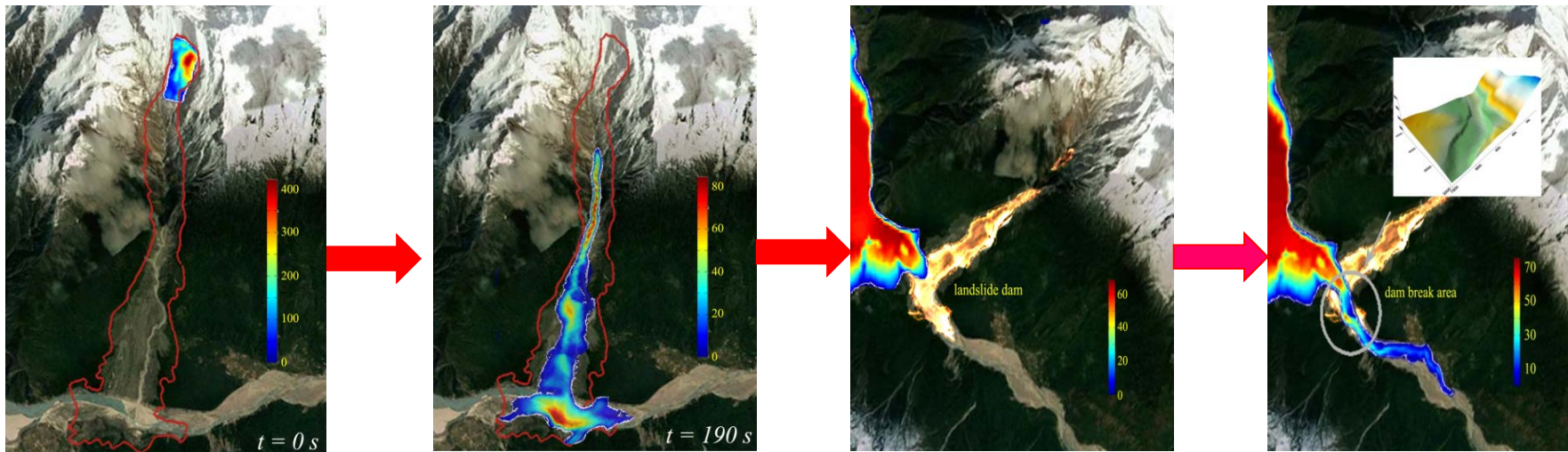
### (3) Disaster Chain Simulation:

Self-adopted parallel computation to deal with large scale simulation with complex topography



#### Case Study: Yigong disaster Simulation

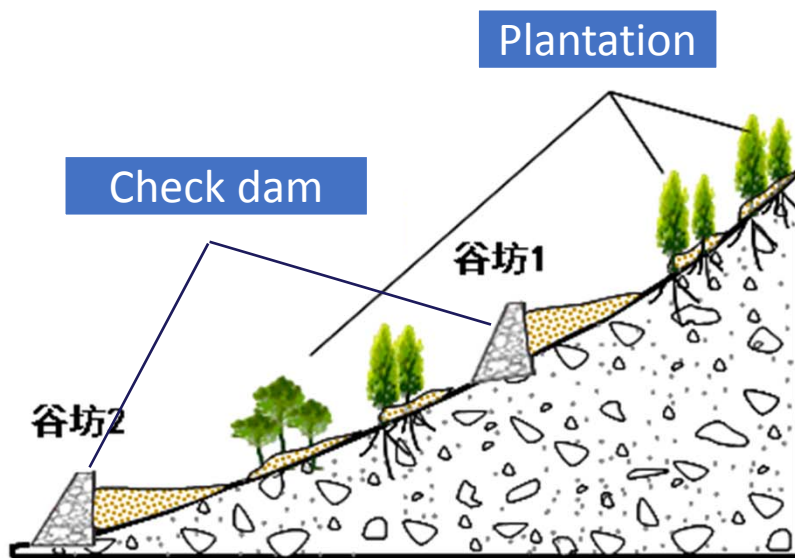
- The overall process: **Landslide- Dammed Lake- Outburst Flood**



# (4) Systematic Flood and Debris Flow Control

## Principle of Debris flow control

Based on the maximum sediment transportation capacity of river, control the material and energy of debris, limit the debris flow formation and discharge at watershed, reduce the damage.

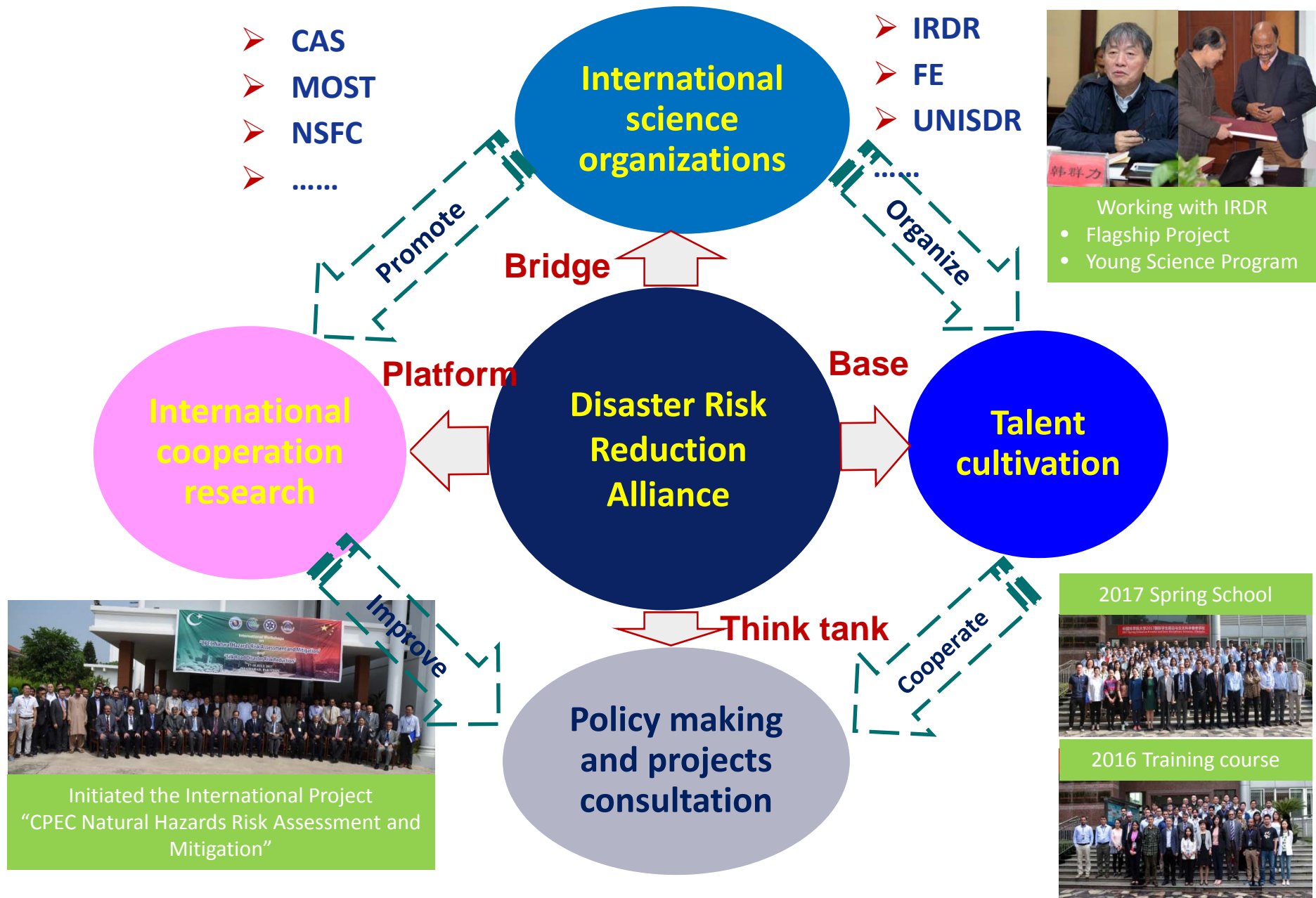


Initiation Control: Check dam and plantation

## Debris flow process control



# (5) Progress on establishing the disaster risk reduction alliance



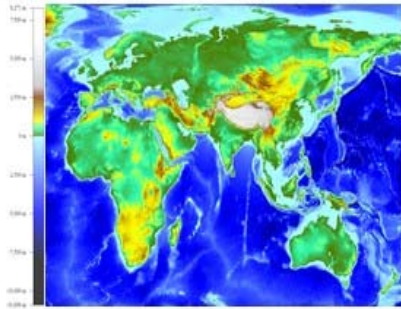


# 4. Highlight of SiDRR

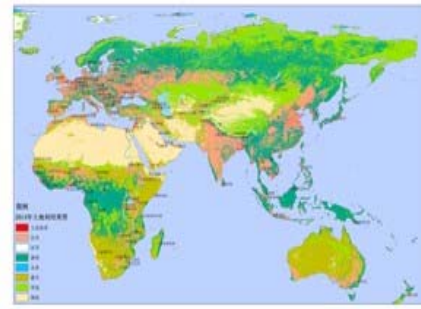
## Atlas: Disaster risk assessment in B & R

About Environment	About Disaster	Risk Assessment
<ul style="list-style-type: none"> <li>Location</li> </ul>	<ul style="list-style-type: none"> <li>Earthquake disaster</li> </ul>	<b>Overall disaster risk assessment</b> <ul style="list-style-type: none"> <li>Integrated disaster risk</li> <li>Individual disaster risk (Earthquake, Geo-hazards, Ocean disaster, etc.)</li> </ul>
<ul style="list-style-type: none"> <li>Geology and geomorphology</li> </ul>	<ul style="list-style-type: none"> <li>Geo-hazard</li> </ul>	
<ul style="list-style-type: none"> <li>Climate and hydrology</li> </ul>	<ul style="list-style-type: none"> <li>Flood</li> </ul>	
<ul style="list-style-type: none"> <li>Soil and plant</li> </ul>	<ul style="list-style-type: none"> <li>Drought</li> </ul>	<b>Risk assessment at representative region</b> <ul style="list-style-type: none"> <li>Disaster risk assessment of Economic Corridor</li> <li>Disaster risk assessment of Tibet Plateau</li> <li>Disaster risk assessment of Ocean disaster at Sir Lanka</li> <li>...</li> </ul>
<ul style="list-style-type: none"> <li>Land use</li> </ul>	<ul style="list-style-type: none"> <li>Ocean disaster</li> </ul>	
<ul style="list-style-type: none"> <li>Society and economic</li> </ul>	<ul style="list-style-type: none"> <li>Frost disasters</li> </ul>	
<ul style="list-style-type: none"> <li>Human and transportation</li> </ul>	<ul style="list-style-type: none"> <li>Disasters at city</li> </ul>	
<ul style="list-style-type: none"> <li>Port and city</li> </ul>	<ul style="list-style-type: none"> <li>Disaster chain</li> </ul>	<b>Risk assessment related to major engineering</b> <ul style="list-style-type: none"> <li>Disaster risk assessment along highway, railway, pipeline</li> <li>Disaster risk assessment at hydropower station</li> <li>...</li> </ul>
<ul style="list-style-type: none"> <li>Major engineering</li> </ul>		

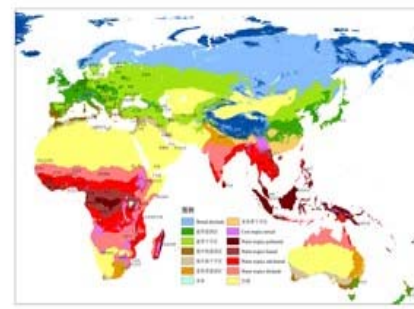
# About Environment



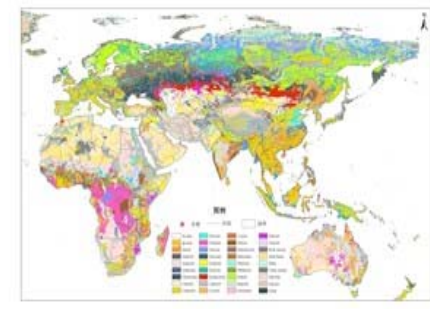
▲DEM



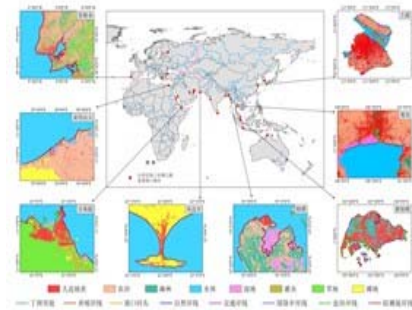
▲LUCC



▲Climate



▲Soil

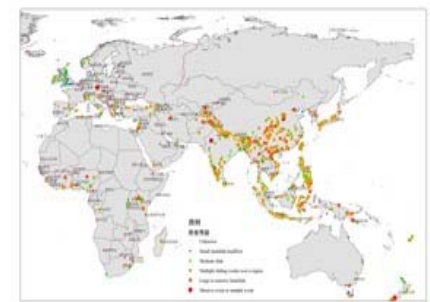


▲Main port

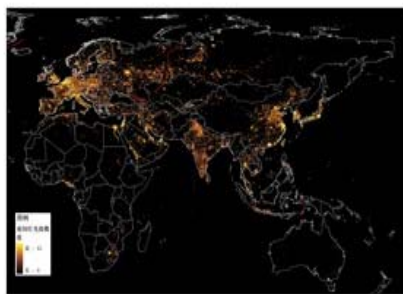


Location

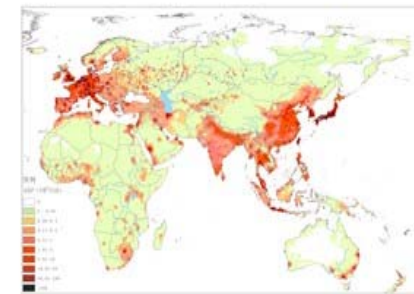
Basic data collecting



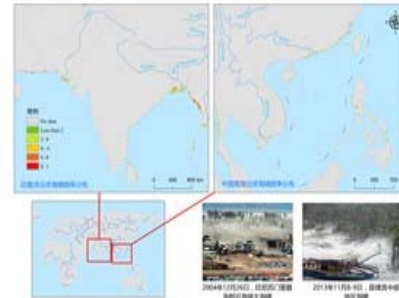
▲Geologic hazards



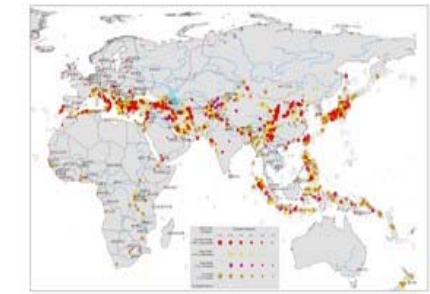
▲nighttime light image



▲GDP

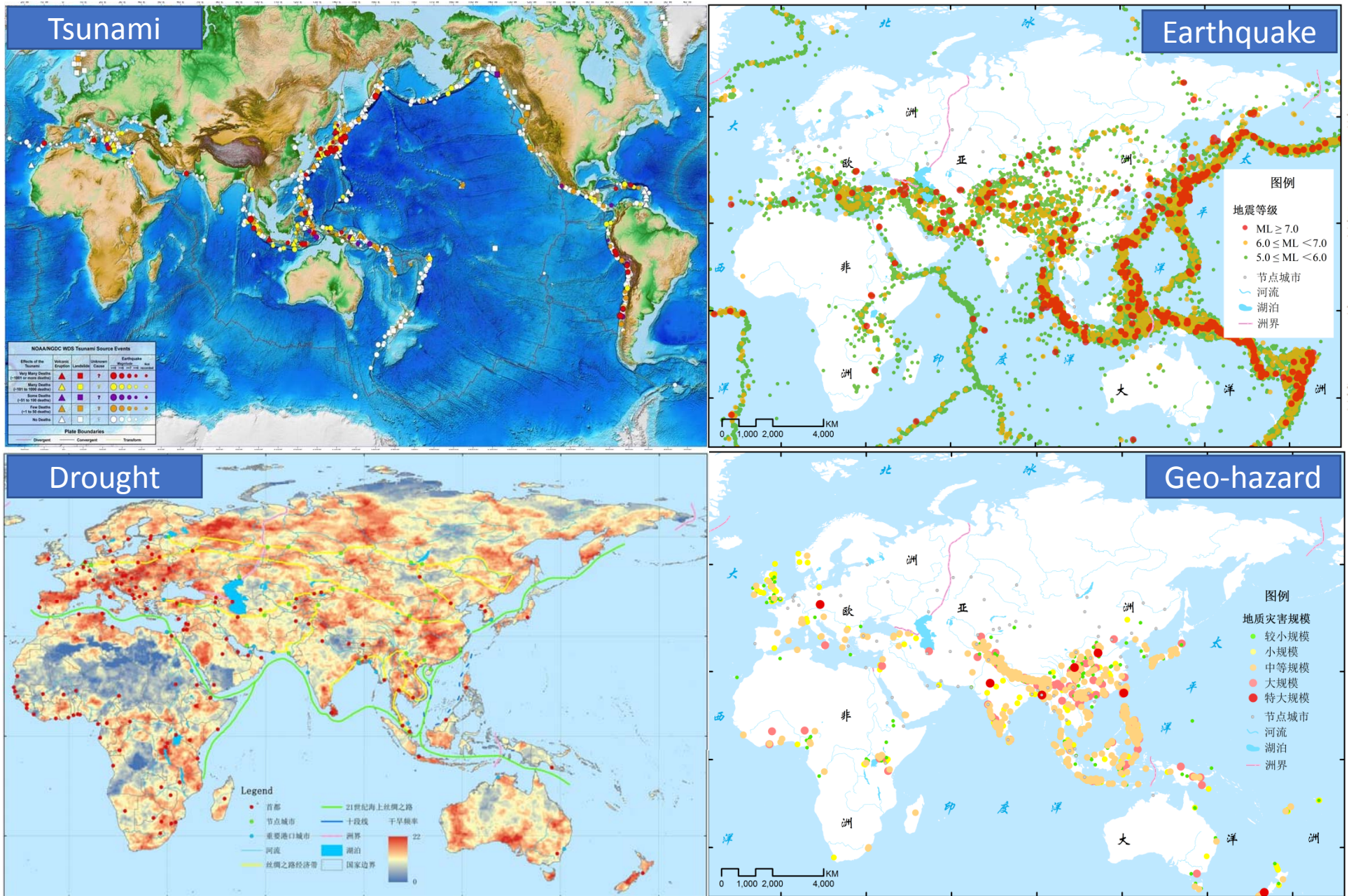


▲Marine disaster

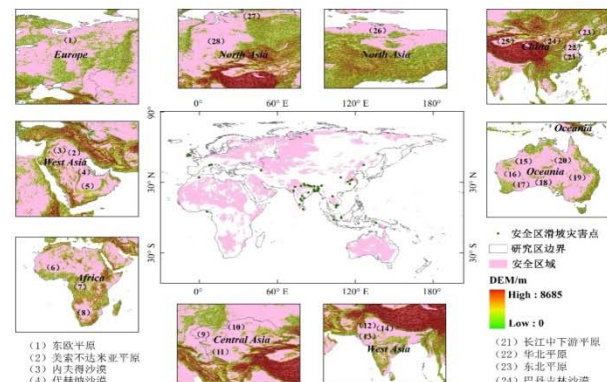
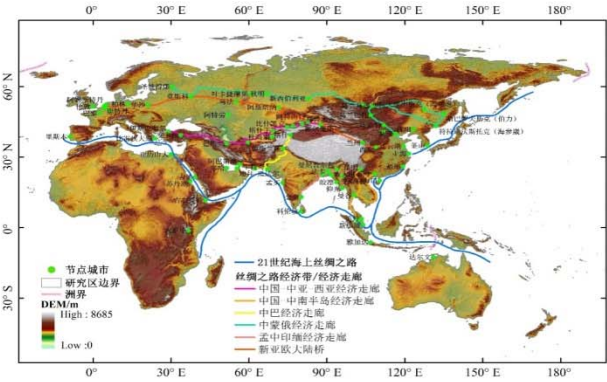


▲Significant earthquake

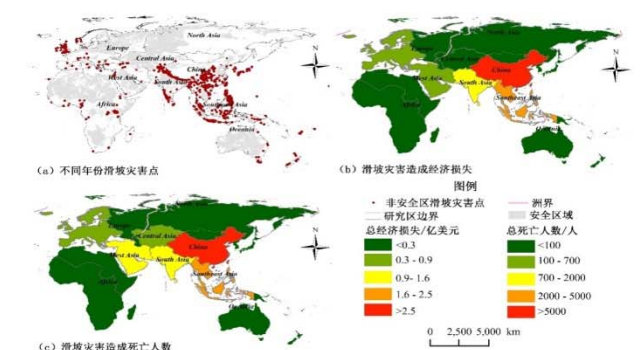
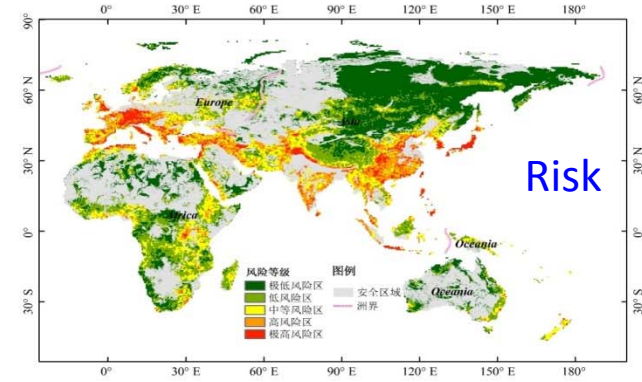
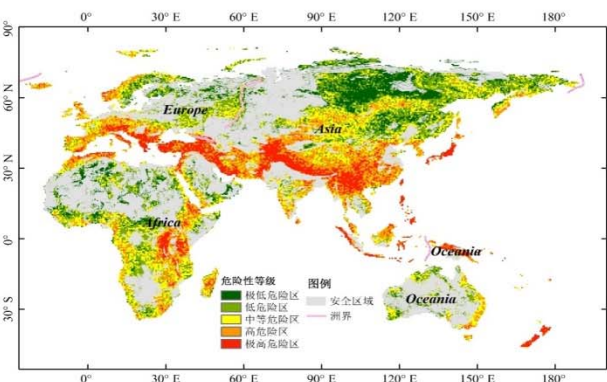
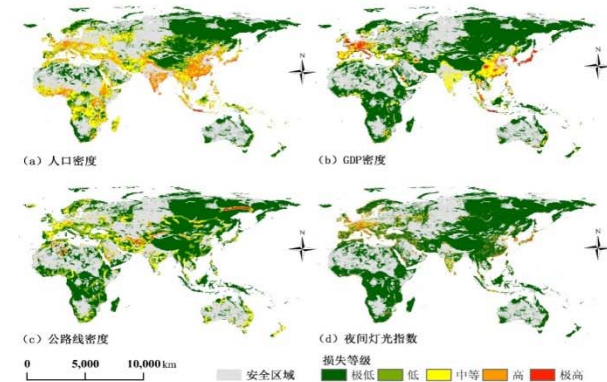
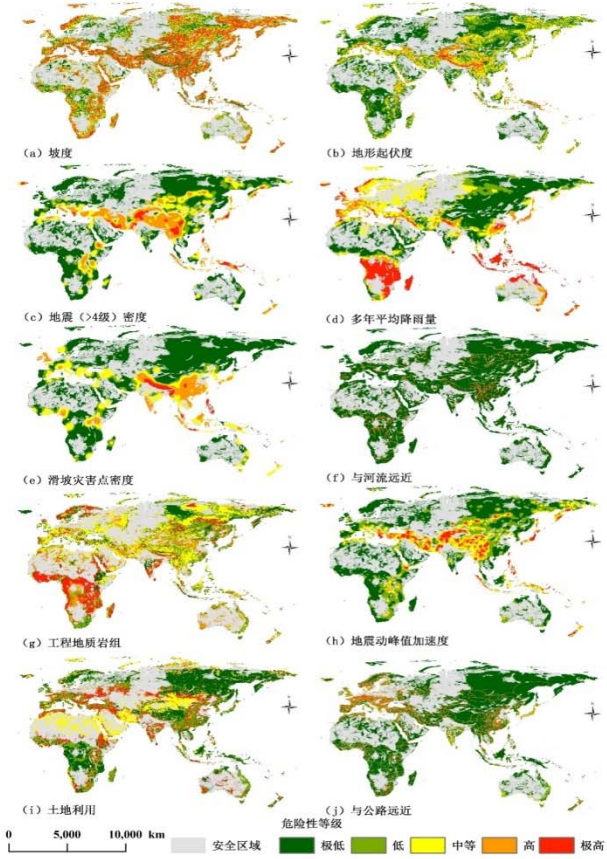
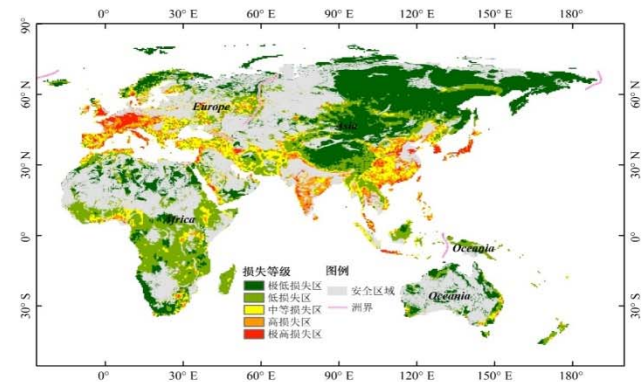
# About Disaster: Tsunami, Earthquake, Geo-hazard, Drought



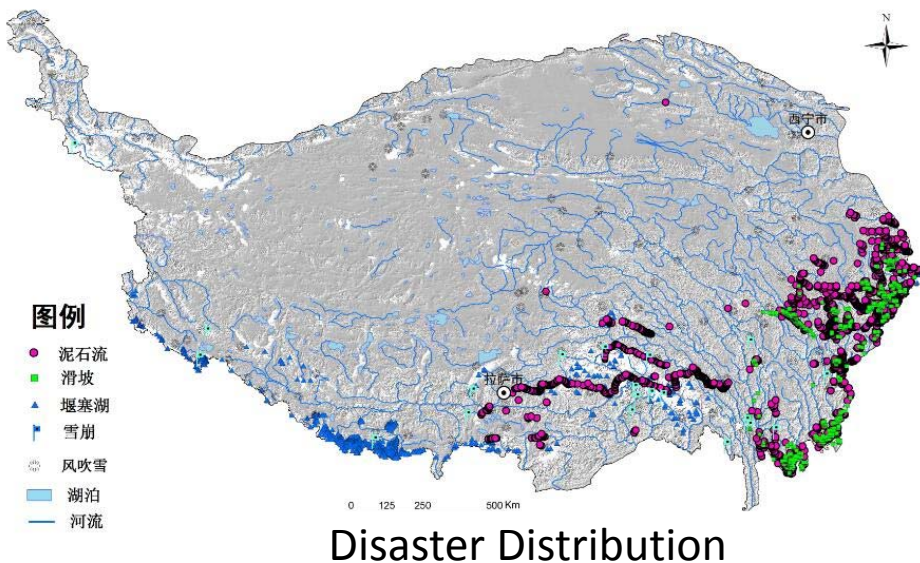
# Disaster Risk Assessment: Geo-hazard



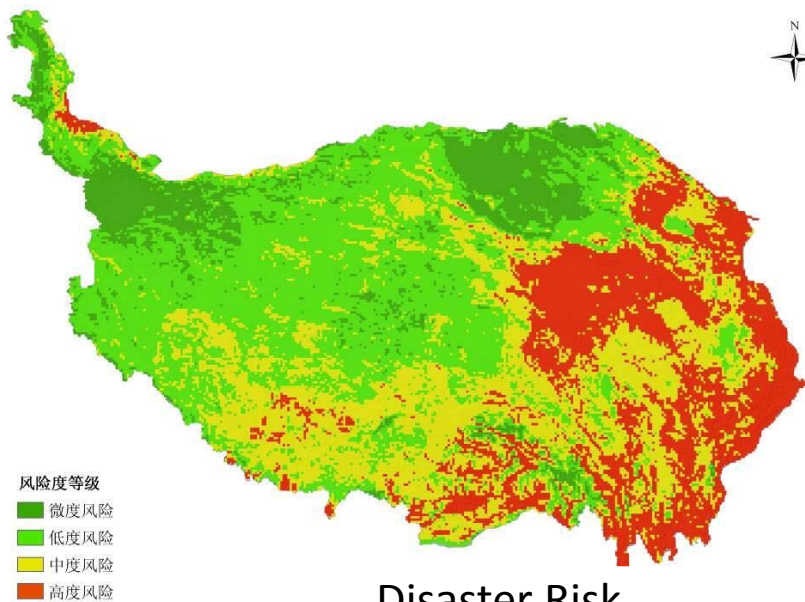
- (1) 东欧平原 (21) 长江中下游平原
- (2) 美索不达米亚平原 (22) 华北平原
- (3) 内夫得沙漠 (23) 东北平原
- (4) 代姆纳沙漠 (24) 巴丹吉林沙漠
- (5) 鲁卜哈利沙漠 (25) 塔克拉玛干沙漠
- (6) 撒哈拉沙漠 (26) 科雷马低地
- (7) 卡拉哈迪盆地 (27) 西伯利亚低地
- (8) 卡拉哈迪沙漠 (28) 西伯利亚平原
- (9) 图兰低地 (13) 印度大沙漠 (17) 维多利亚大沙漠
- (10) 图尔盖低地 (14) 恒河平原 (18) 纳拉伯平原
- (11) 卡拉库姆沙漠 (15) 大沙漠 (19) 澳大利亚大盆地
- (12) 印度河平原 (16) 吉布森沙漠 (20) 巴伐利亚地



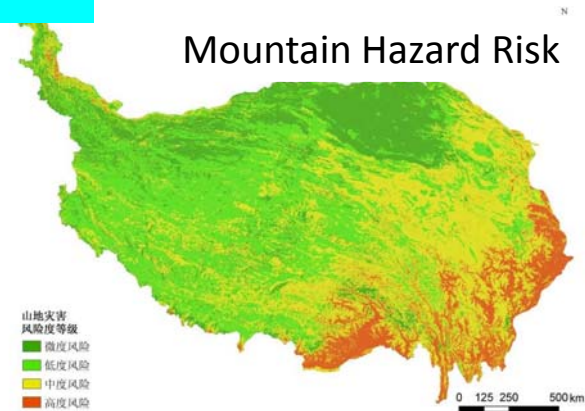
# Disaster Risk Assessment: Tibet Plateau



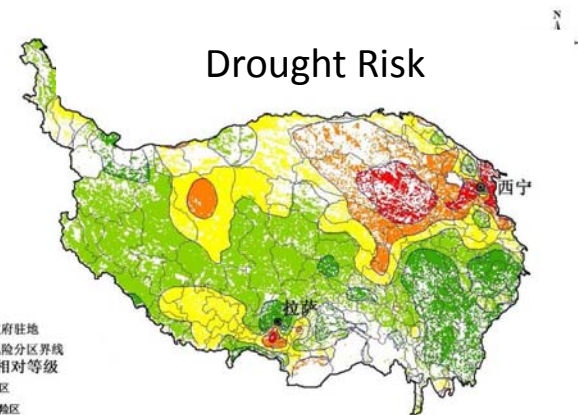
Disaster Distribution



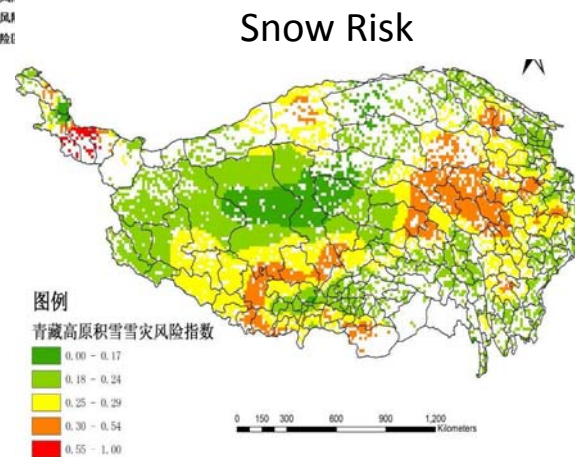
Disaster Risk



Mountain Hazard Risk

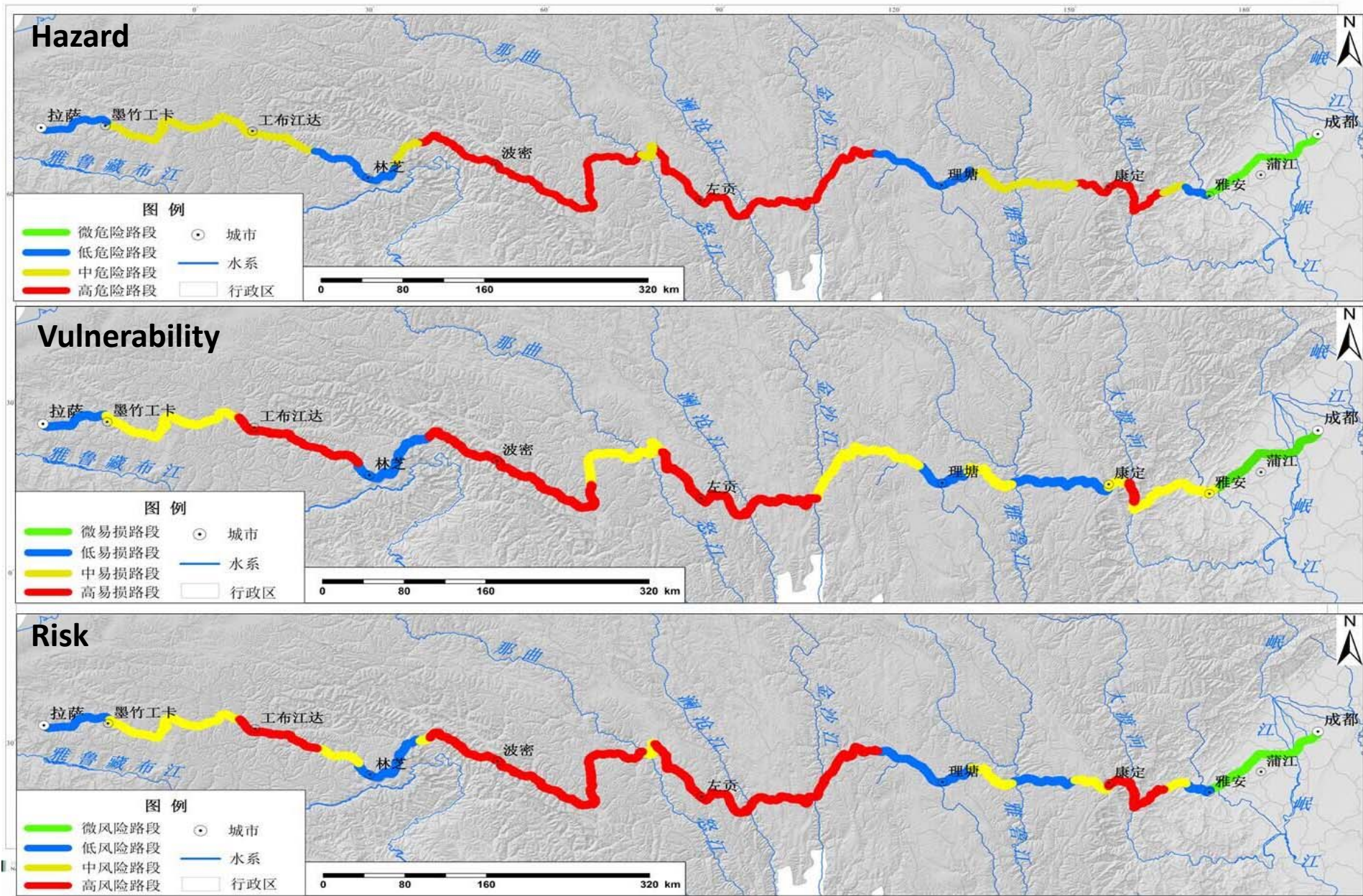


Drought Risk



Snow Risk

# Disaster Risk Assessment: Highway Corridor



## 5. Way Forward

- Establish **International Research Center (or Alliance) for Disaster Risk Reduction**
- Carry out the **risk assessment in in silk road areas.**
- Publish the "**Atlas of natural hazards risk along the Belt and Road**"
- Develop a set of natural hazards risk analysis and disaster prevention and control technology system
- Improve the resilience to natural hazards for developing countries

**SiDRR is an open, inclusive and multi-discipline program.**

**We welcome your participation!!**

Thank You!

