



United Nations
Educational, Scientific and
Cultural Organization



International Centre on Space Technologies for
Natural and Cultural Heritage
under the auspices of UNESCO

DBAR Initiative and UNESCO Sites

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Sept. 12, 2016 Huangshan, China



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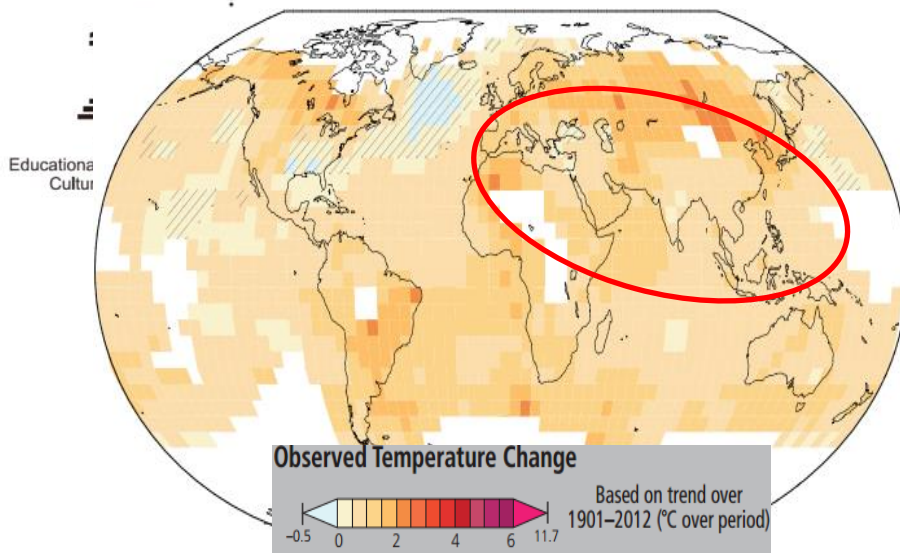
Outline

- 1. DBAR: Digital Belt and Road**
- 2. UNESCO Sites along Belt and Road**
- 3. Approach to DBAR's UNESCO Sites**
- 4. Challenges and Opportunities**

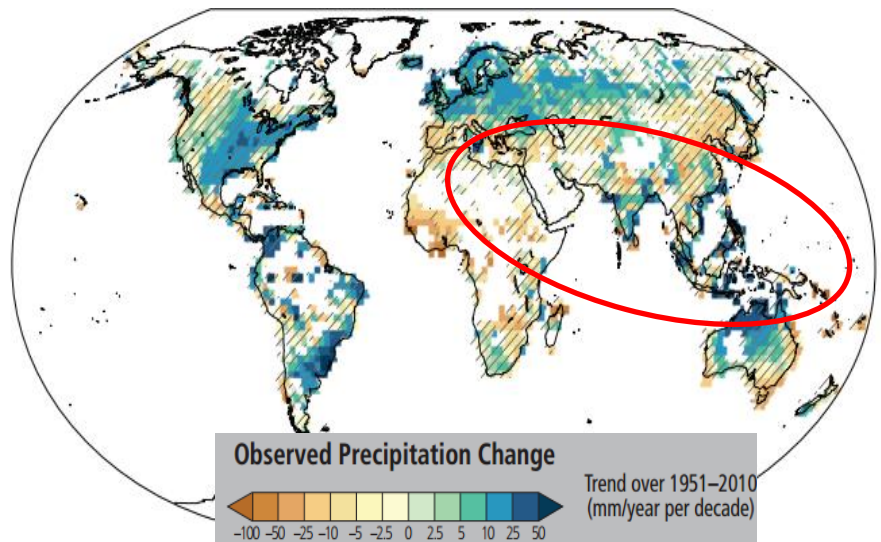
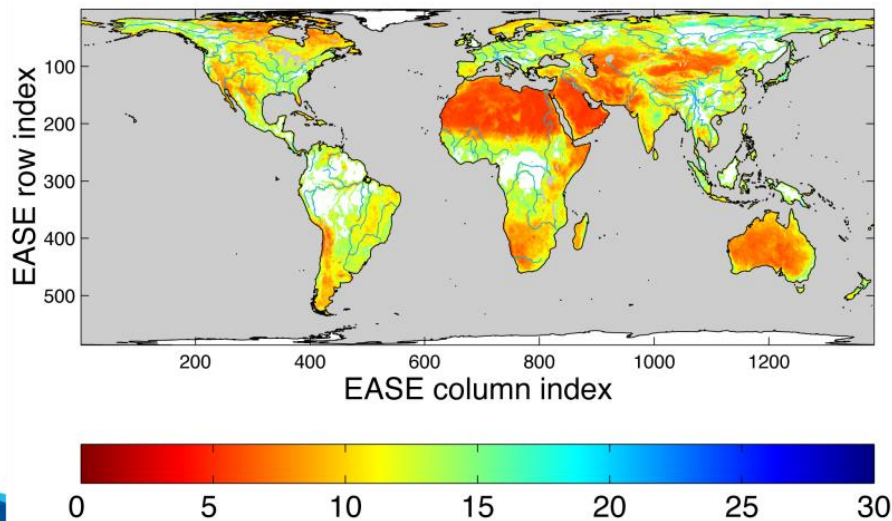
One Belt and One Road



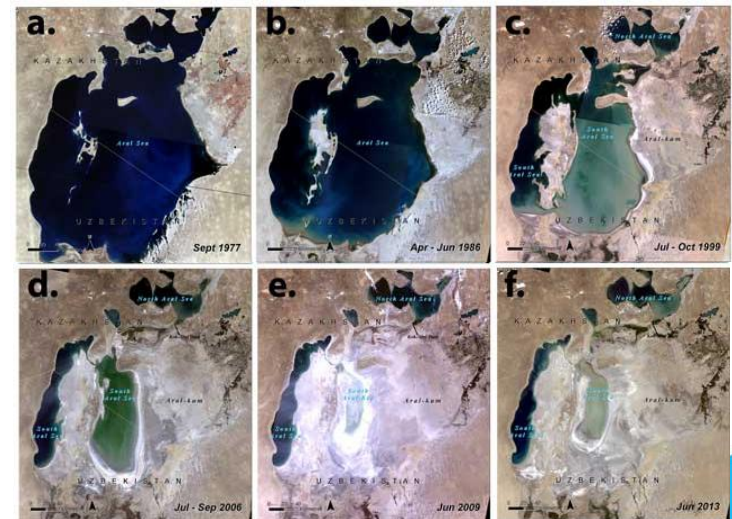
The B&R region covers a vast area and involves many countries and a large population, facing numerous problems related to sustainable development.



Observed changes in annual average surface temperature from 1901-2012. (IPCC, 2014)
AMSR-E soil moisture (%)



Observed changes in average precipitation from 1951-2010. (IPCC, 2014)



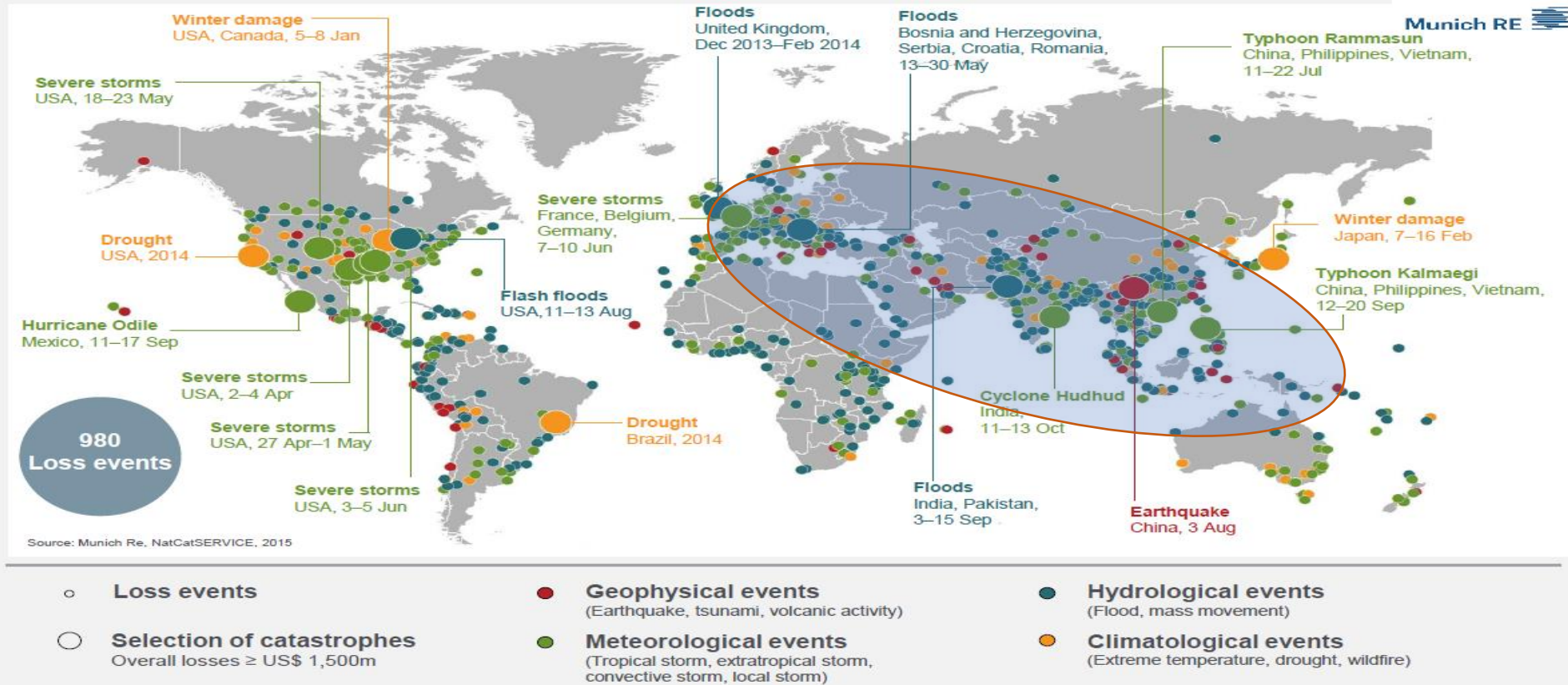
Aral sea change

Most regions along the Belt and Road are becoming warmer and drier and the changes vary in different regions.

High Occurrences of Hazards along Belt and Road

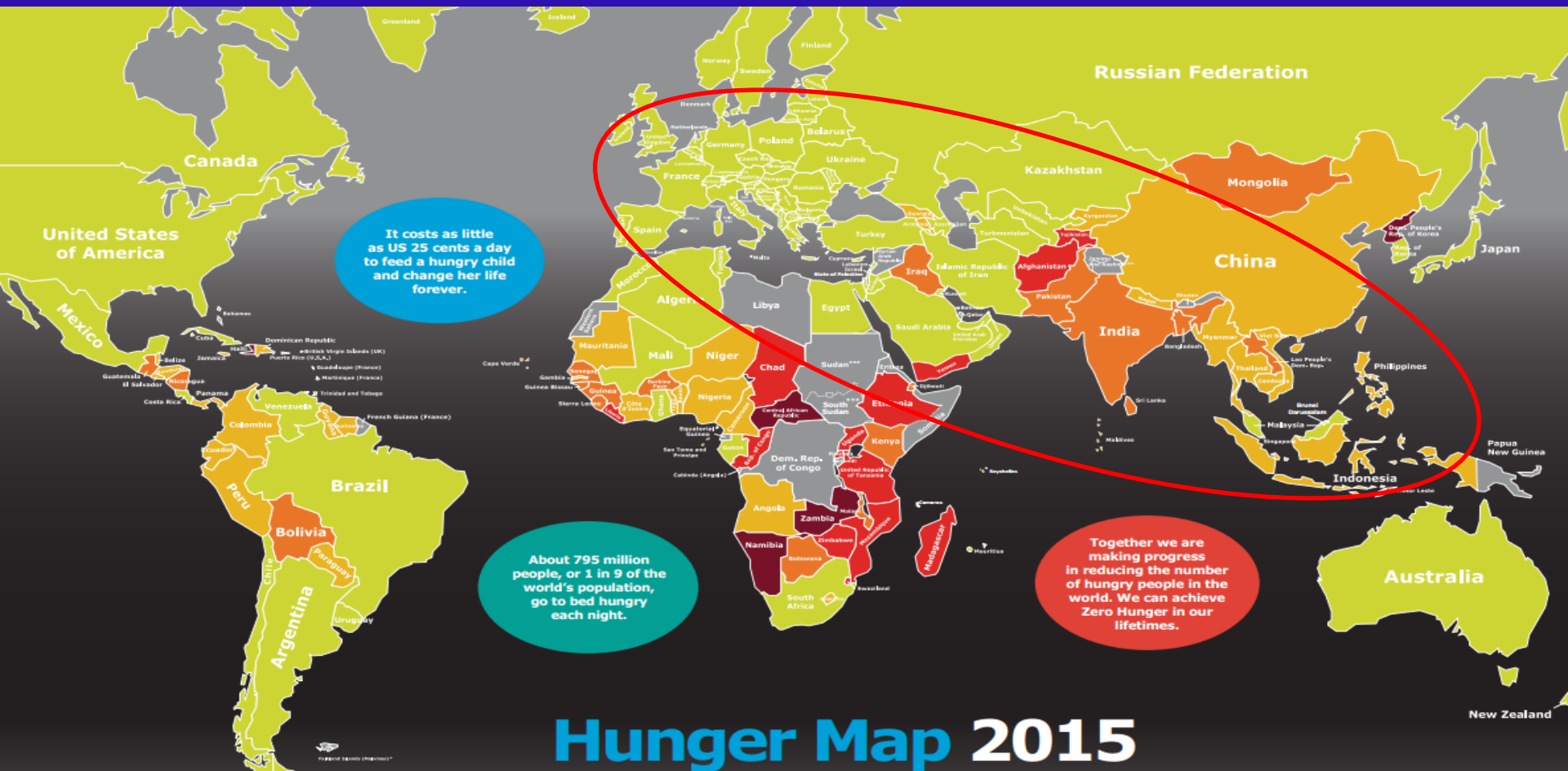
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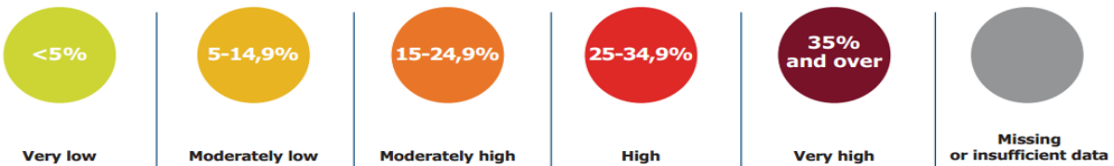
The **85%** of major natural hazards occurred in Asia region;
More than **85%** of natural hazards are earthquake, flood and draught,
storm surge.

One in nine people are undernourished in the world. Global change poses severe and distinct threats to food security in the countries along the Silk Road. The 60% of population produced 50% food.



Hunger Map 2015

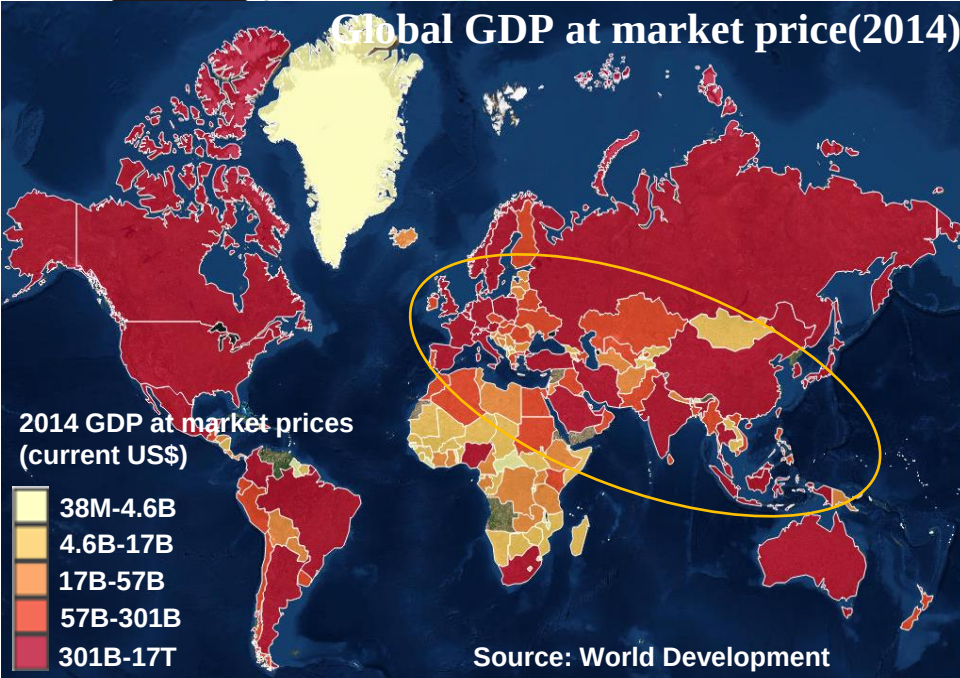
Prevalence of undernourishment in the population (percent) in 2014-16



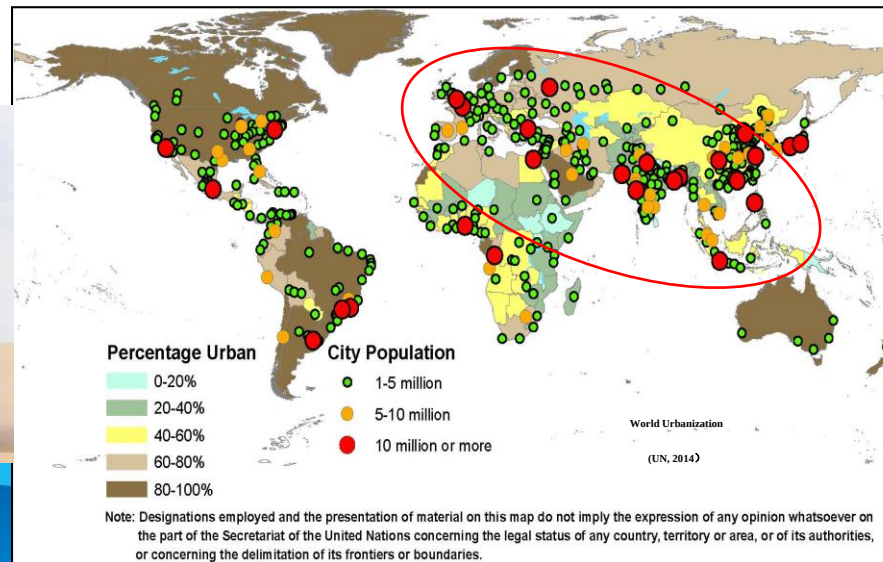
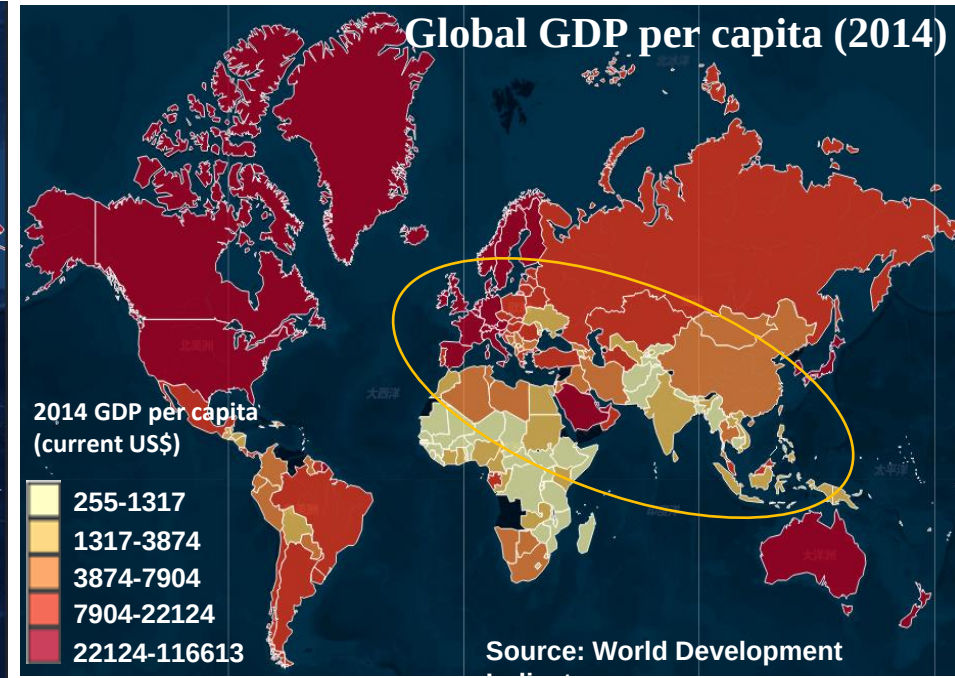


Unbalanced Economic and Urban Development

Global GDP at market price(2014)

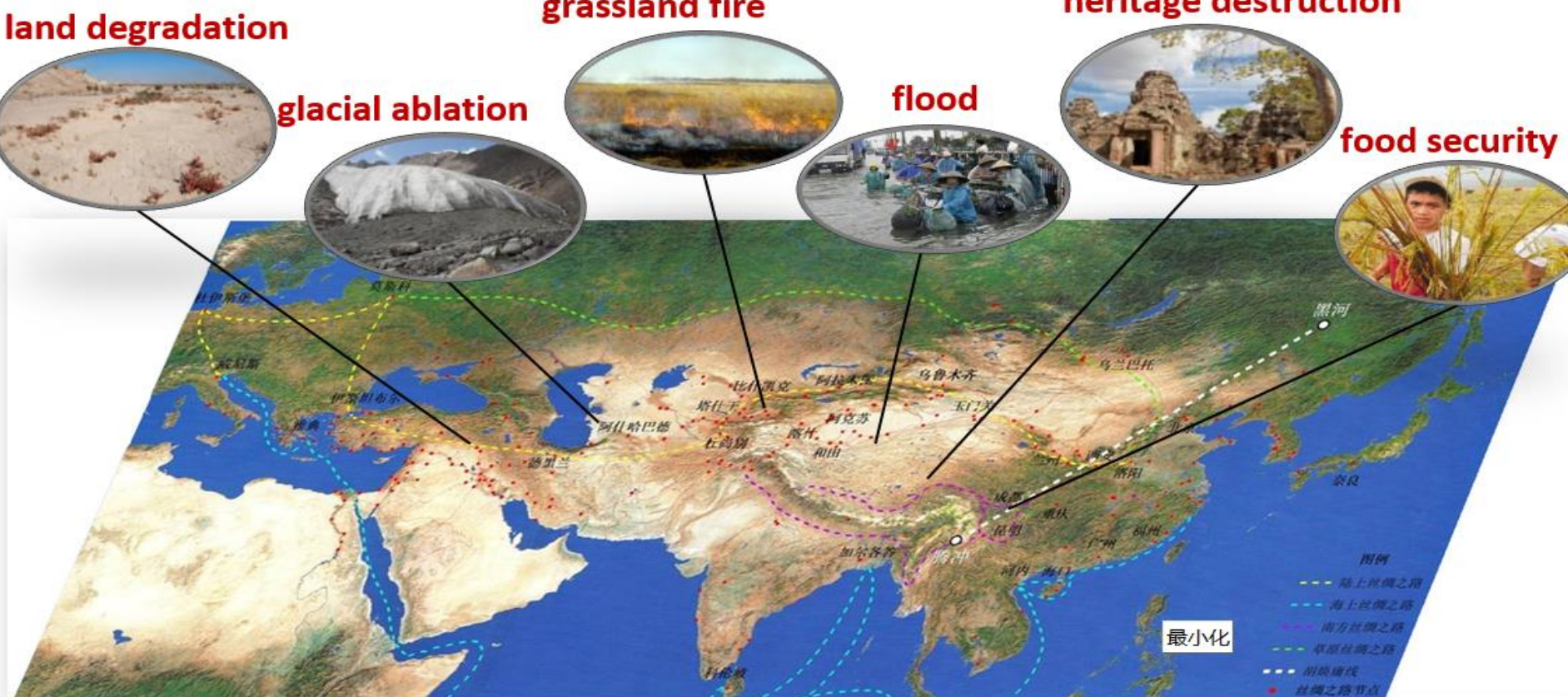


Global GDP per capita (2014)



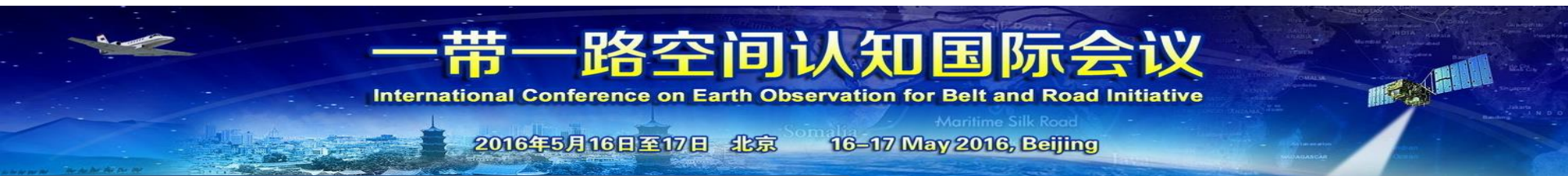


EO Technologies for Belt & Road



Earth Observation supports to understand B&R

“Digital Belt and Road (DBAR)” Initiative



DBAR has been given the fullest support by more than 20 countries

Beijing Declaration on Earth Observation for Belt and Road

May 17, 2016

We, scientists, researchers, academics, engineers, educators and administrators from more than 20 countries, and representatives of international organizations, met in Beijing, China, at the International Symposium on Earth Observation (EO) for Belt and Road (EOBAR), co-hosted by the Division of Earth Sciences of the Chinese Academy of Sciences (CAS) and related ministries, commissions, and international organizations, on 16 and 17 May 2016.

Background



PEEX and DBAR are sister initiatives

PEEX and DBAR (Digital Belt and Road) are **sister initiatives** having common interests. To get funding and visibility for both of the initiatives we should actively utilize PEEX and DBAR contact networks in a frame of UNESCO, ICSU-Future Earth, EU Commission, WMO organizations and nationally in Finland and in China. The Chinese Academy of Sciences is already interested in to fund DBAR (negotiation in process).



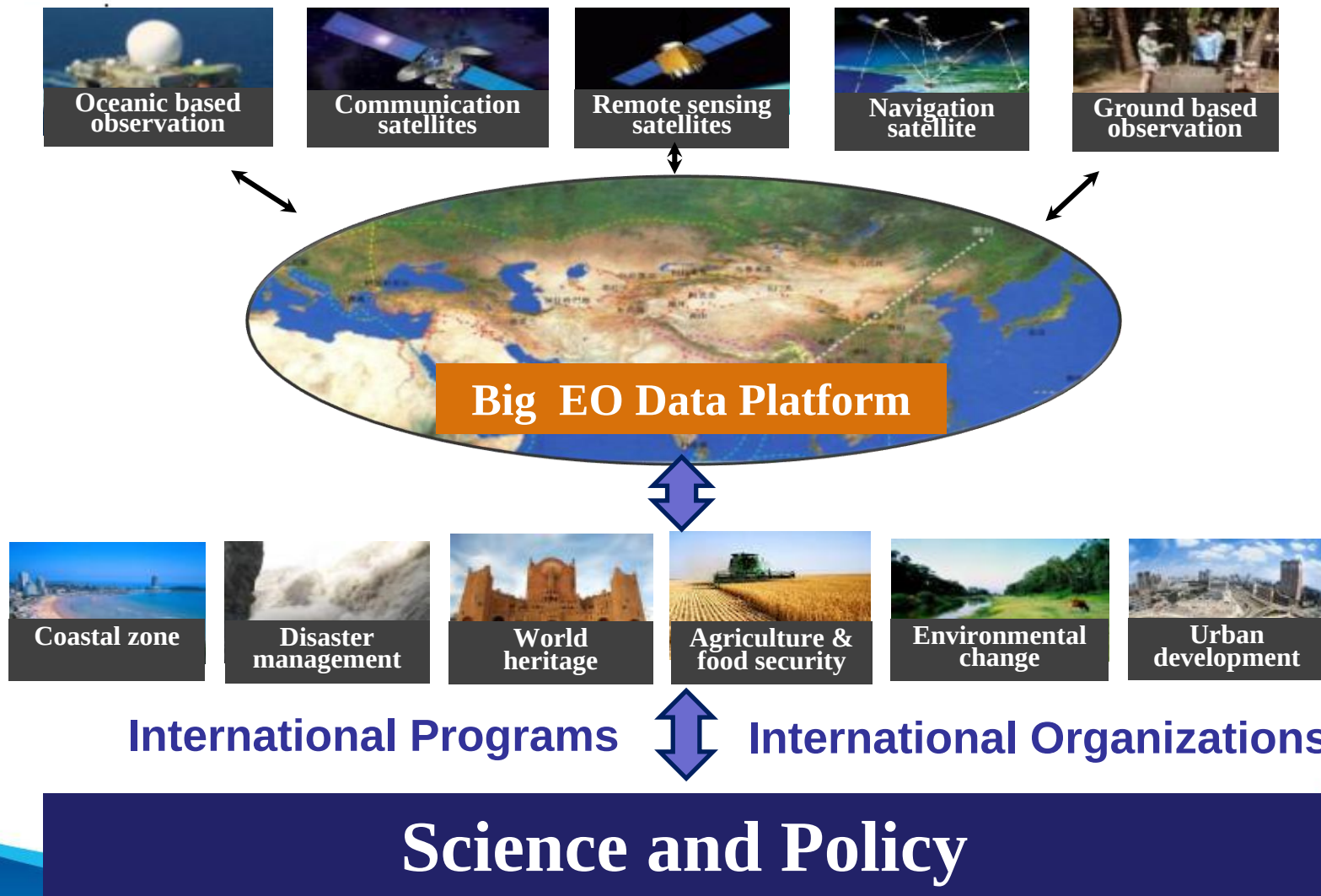


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Conceptual Framework of DBAR





DBAR Initiative

An international science program for promoting cooperation with countries along the Belt and Road to advocate and demonstrate the applications of big Earth data in support of the sustainable development of people and economies at local, national and regional levels.



DBAR: 10 Years Initiative

DBAR

1 Data/Platform

2 Project/WGs/RCs

3 S&T Network

EO Data Gateway



Observing Infrastructure



New Big Data Science Mode



Institutional & Human Capacity



Science-Based Policy Making





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Countries along Belt and Road



DBAR



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International organization



International program



Pan-Eurasian Experiment

Let countries along the Belt and Road benefit from DBAR

www.unesco-hist.org



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UNESCO Sites



World Heritage



105

2

Biosphere Reserve



669

Global Geopark



120

[illegible][illegible]

The first half of each session gives students an overview of the course and the second half of each session gives students an overview of the course and the second half of each session gives students an overview of the course.

The Kertala Papermill, producing structural timber products, is part of the

Convention concerning the Protection of the World Cultural and Natural Heritage, adopted by the United Nations Educational, Scientific and Cultural Organization, at its General Conference, Paris, 16 November 1972

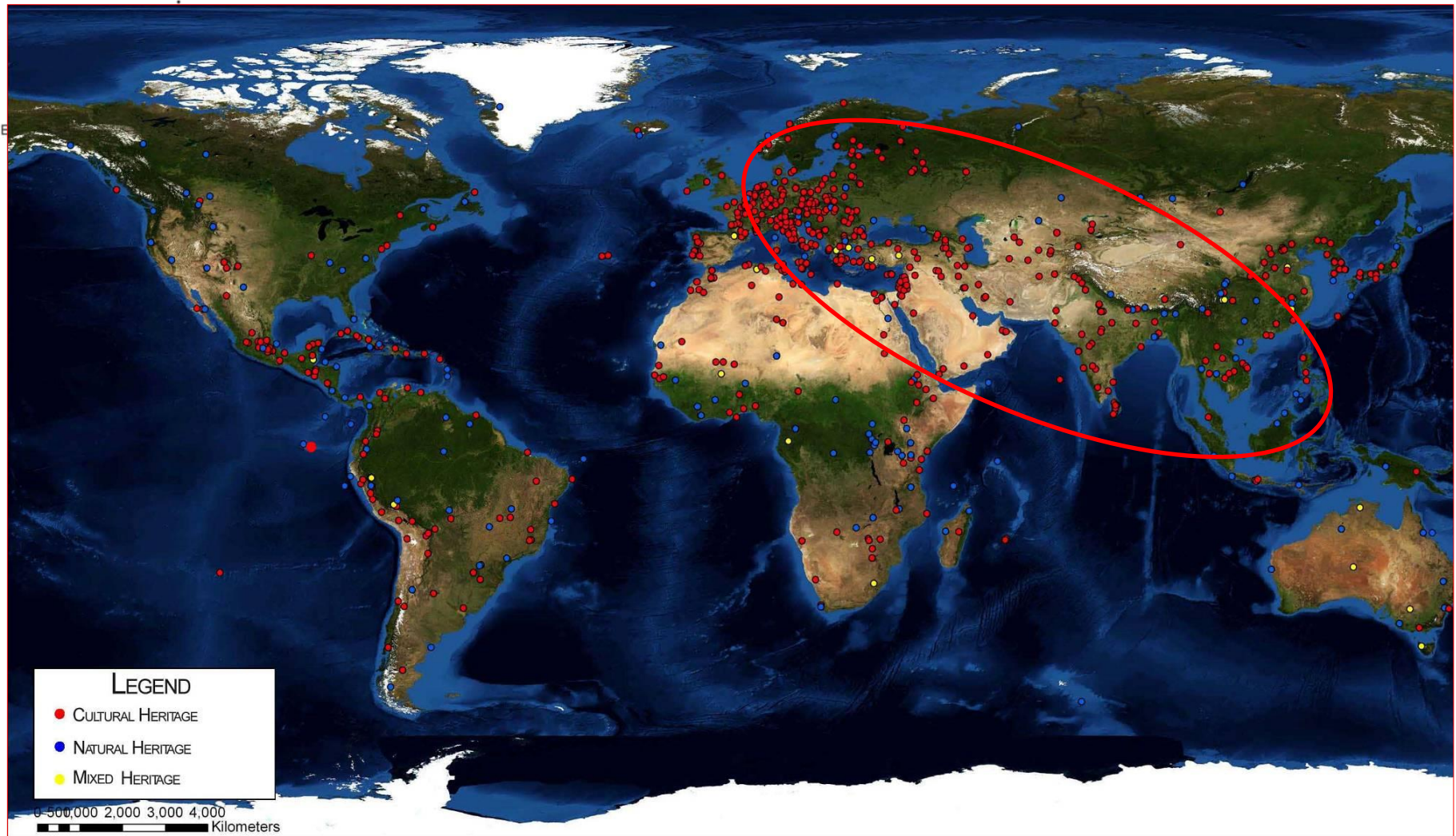
The David Center, a not-for-profit LGBT membership org and 501(c)(3) nonprofit, is one of the world's largest LGBT orgs. The David Center will carry out projects in the future so it can do more work, including publishing, space of LGBT issues.

The Australian Postmark is a unique, one-of-a-kind, style and look, with a distinctive design. The Postmark is a unique, one-of-a-kind, style and look, with a distinctive design. The Postmark is a unique, one-of-a-kind, style and look, with a distinctive design.



The June 4 Report, which emphasizes high fuel costs, says that Markham, pointing a finger toward his two oldest daughters, saying, "My, my, my, I wish you'd go out and get some more money, because I'm not the only one who's not getting paid for my work," and his wife saying she isn't getting paid for it, the speech, and subsequent attack on the





Remote Sensing Image Map, Showing Locations of the 1052 world heritages in the world



World Network of Biosphere Reserves 2013-2014

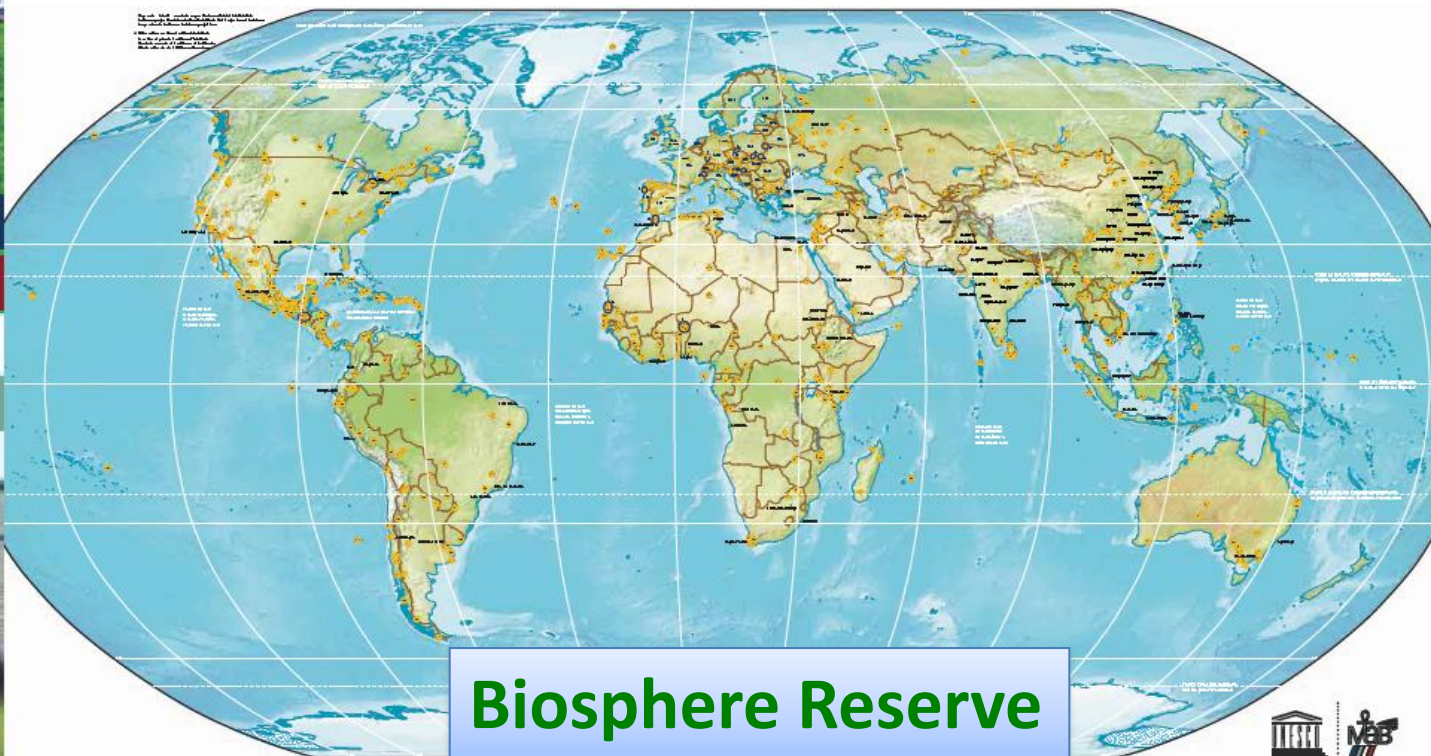
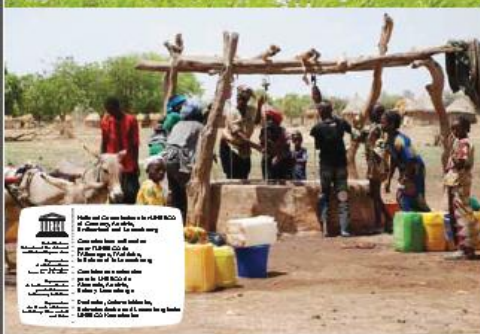
621 UNESCO biosphere reserves in 117 countries

Réseau mondial des réserves de biosphère 2013-2014

621 réserves de biosphère de l'UNESCO dans 117 pays

Red Mundial de Reservas de Biosfera 2013-2014

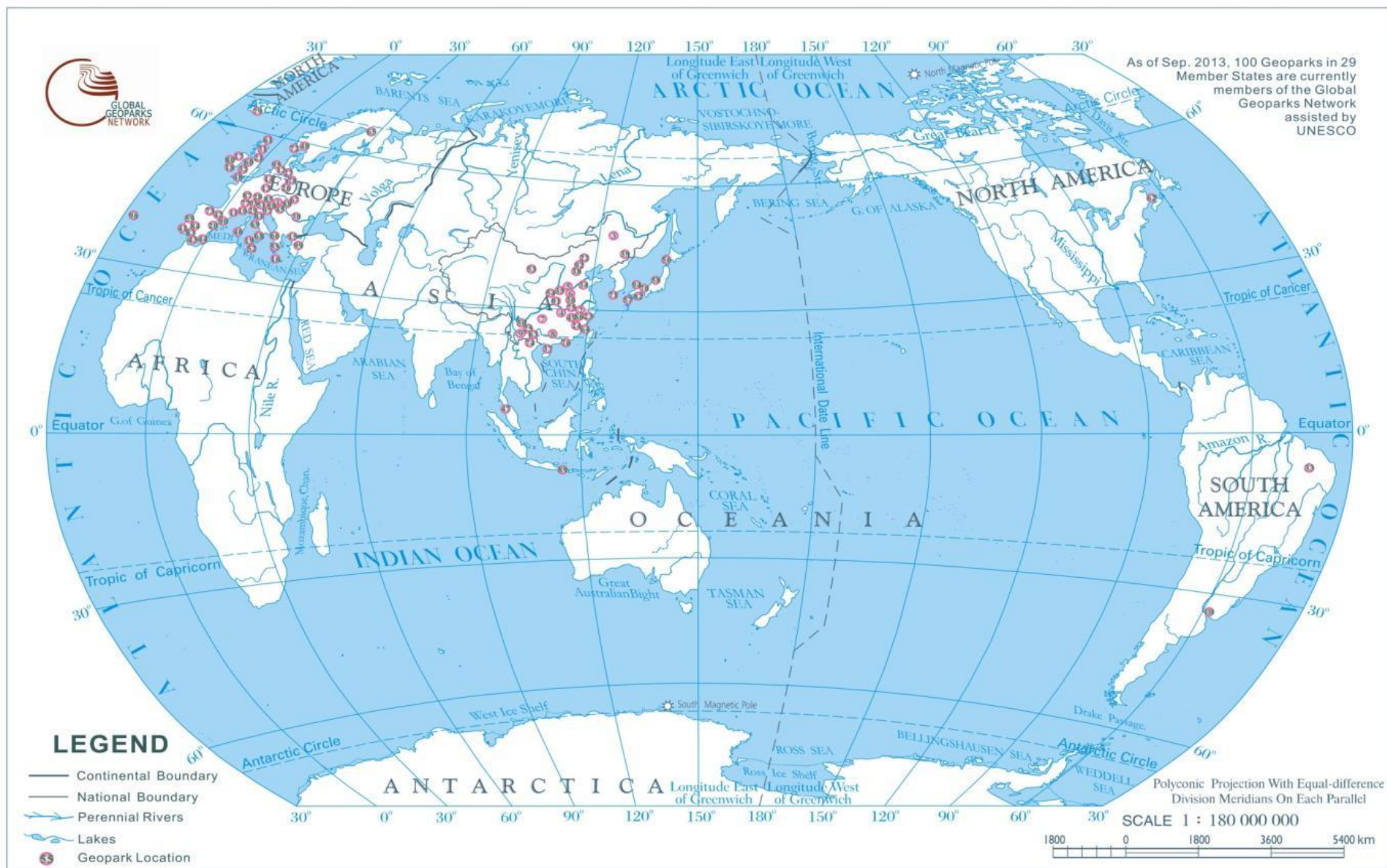
621 reservas de biosfera de UNESCO en 117 países



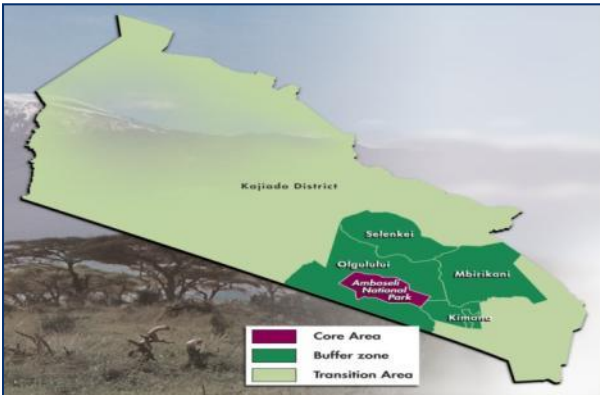
Biosphere Reserve

[illegible]

Distribution of GGN Members



Situations and Challenges



Earthquake
Landslides
Flood
Forest fire
Global change

.....

Resource over-exploitation
Deforestation
Land encroachment
Hydroelectric project
Pollution
Urbanization
Uncontrolled tourism

.....

Natural
influence

Human
induced



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Situations and Challenges

**Number ever
increasing**

World Heritage sites,
Biosphere Reserves
and Global Geoparks

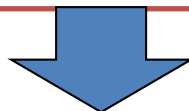


Various characteristics

Spatial scale, categories,
evolution, impacts, etc.



Observation difficulty



**Calling for new technologies
to support monitoring and conservation of UNESCO Sites
for sustainable development**



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Cultural heritage protection along the Belt and Road is not optimistic, as mainly impacted or damaged by the environment change, weathering and pests, human activities and over-tourism, wars and illegal excavation.





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World Heritage Conservation

(Cambodia, China, Italy, Mongolia, HIST)

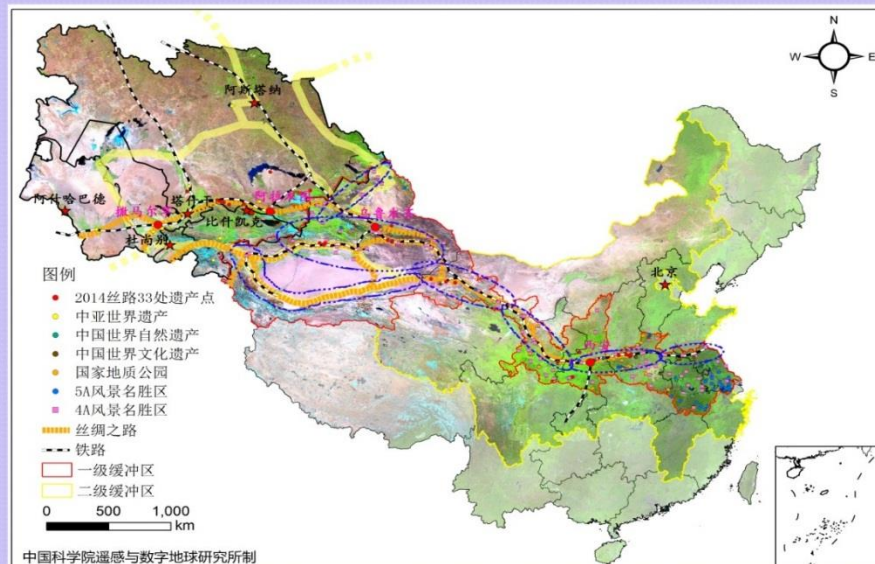
***Environmental change in world heritage site**

***EO database for world heritage**

***Angkor Site conservation**

***3D simulation and reconstruction**

Proposed a Tourist Economic
Zone Based on Earth Observation



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អង្គការ
APSARA



REAS
Remote Sensing for
Environment of Angkor Site



istituto di
metodologie per
l'analisi ambientale

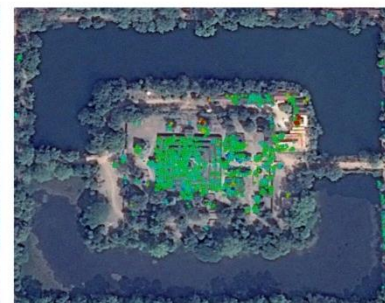


(e)

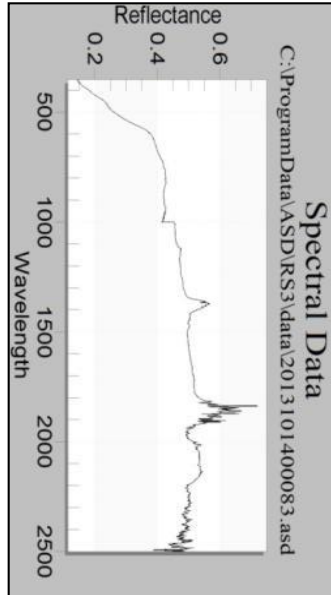
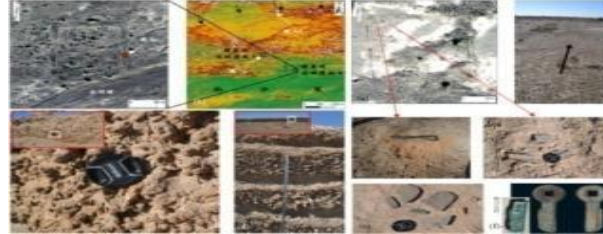
Annual def. rates



(f)

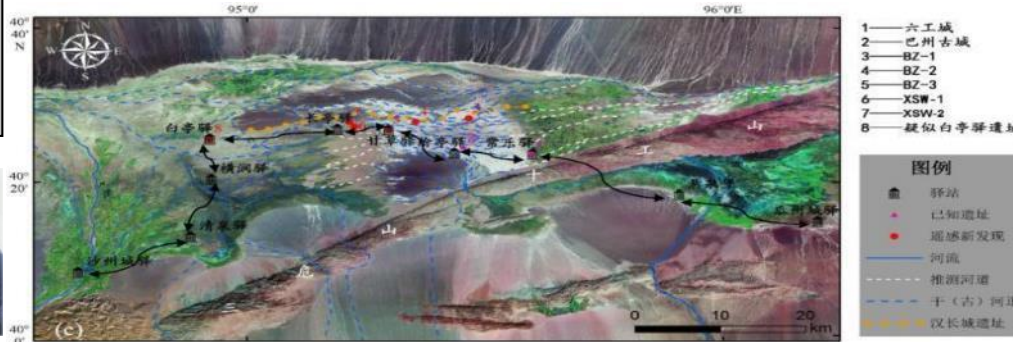
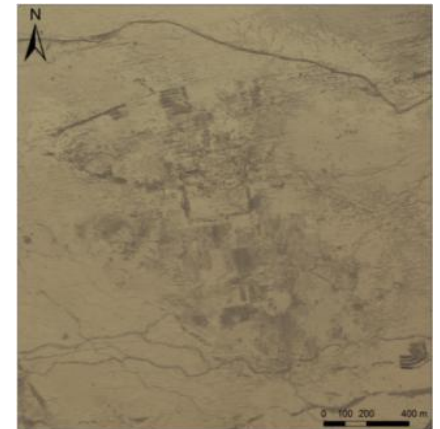


org

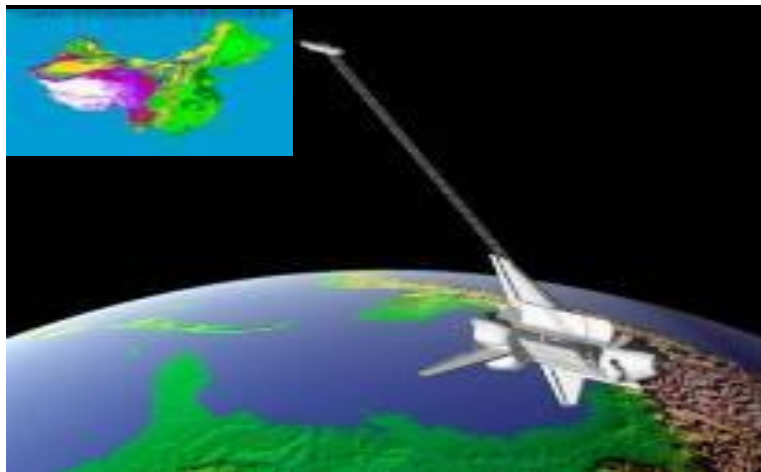
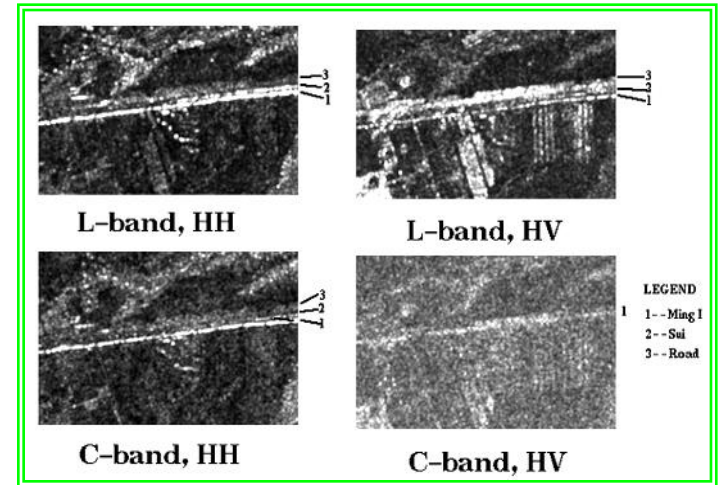
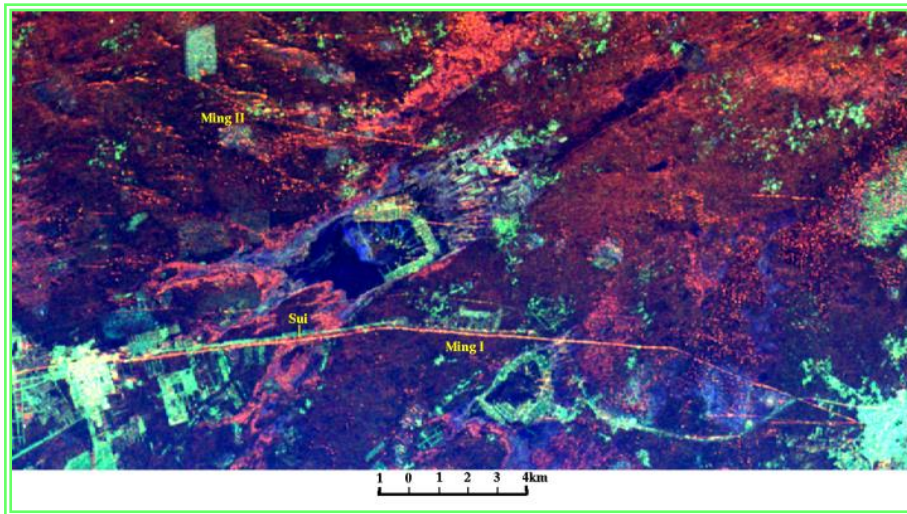


➤ 6 ancient city, 2 settlements, 1 canal and 1 road were detected based on optical remote sensing and historical documents.

➤ The direction and distribution of post roads have been simulated in Empress Wu Tianshou 2nd year (691 AD).



Archaeology in Gua-Sha village sections along the One Belt

[illegible][illegible]

Great Wall detection in Sui and Ming Dynasties using SIR-C/X SAR technology



Ed

Multisource data:

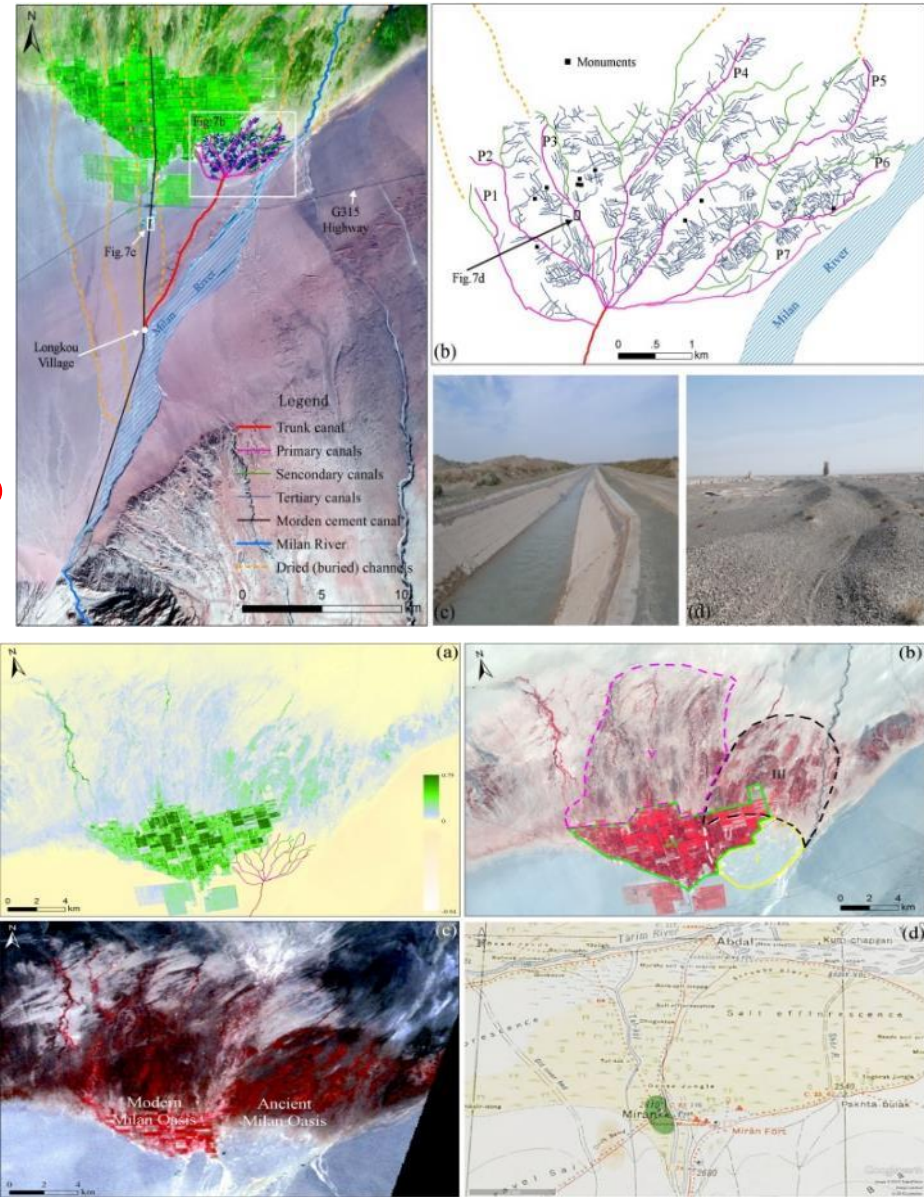
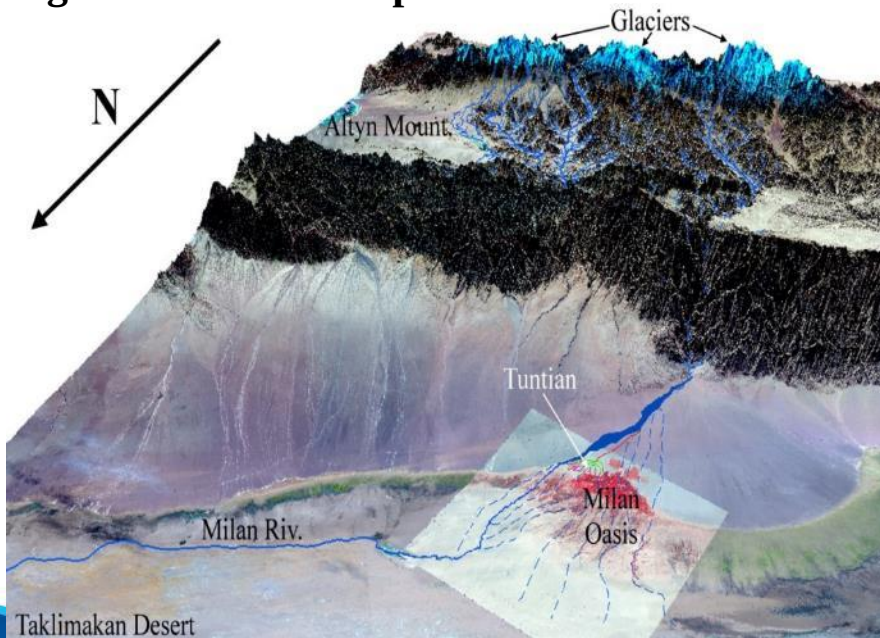
Remote Sensing: GF-1, GF-2, LS-8, LS-5, LS-1

Archaeological Map: Serindia, Innermost Asia

Historic Records: Hanshu, Shiji, Houhanshu

Field Investigation: GPS points, Ground photos

Uncovering the ancient *tuntia* (屯田) agricultural landscape at China's NW frontiers



Silk Road Responses to High Asia Glaciers in Turfan region

www.unesco-hist.org

Aleppo City

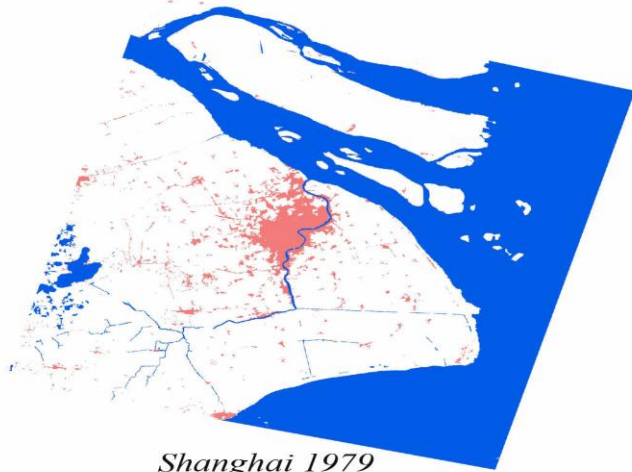


Apamea Site

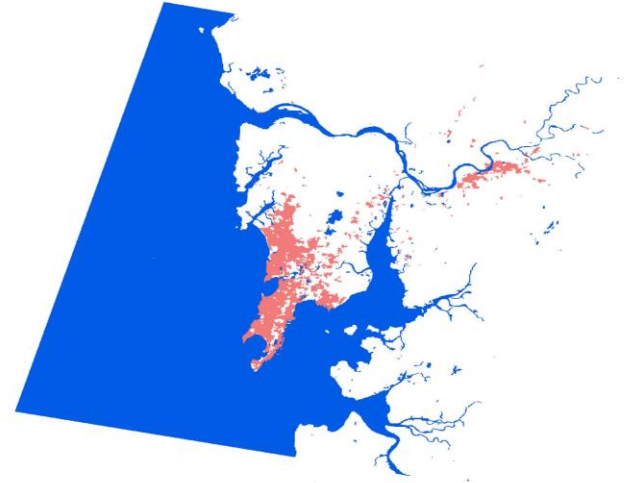


Focus on World Heritages in Syria Crisis

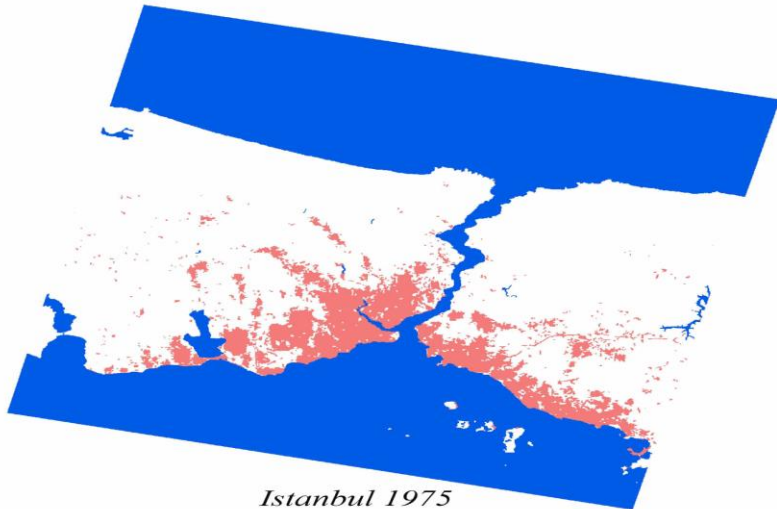
Change of urban impervious surface of megacities along the Maritime Silk Road from 1970s to 2015



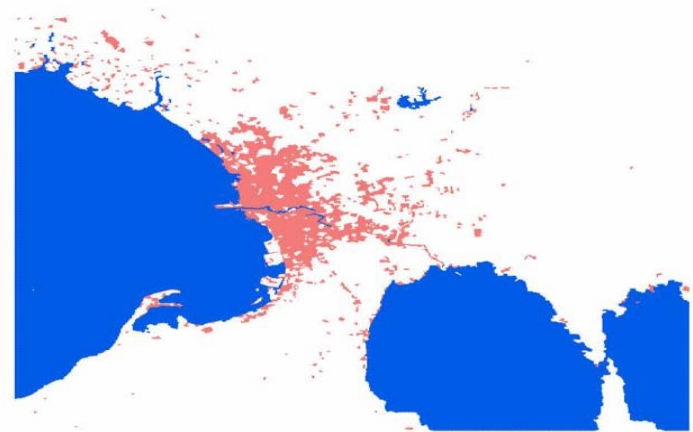
Shanghai 1979



Mumbai 1973



Istanbul 1975



Manila 1979



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Satellite images of important ports in the maritime silk road



Colombo, WV



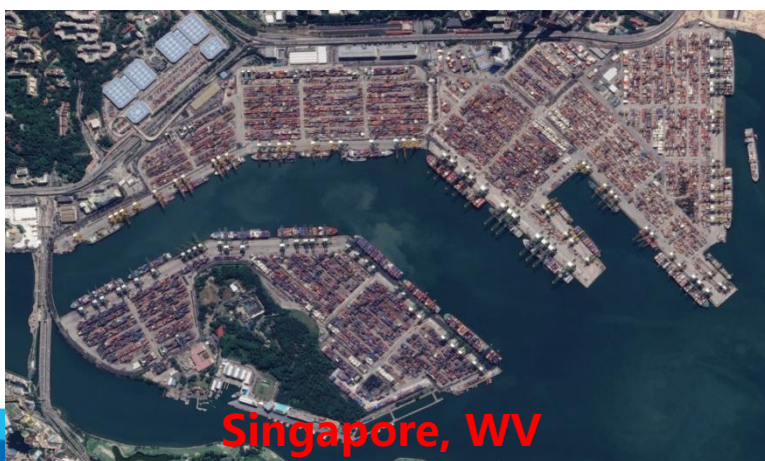
Quanzhou, WV



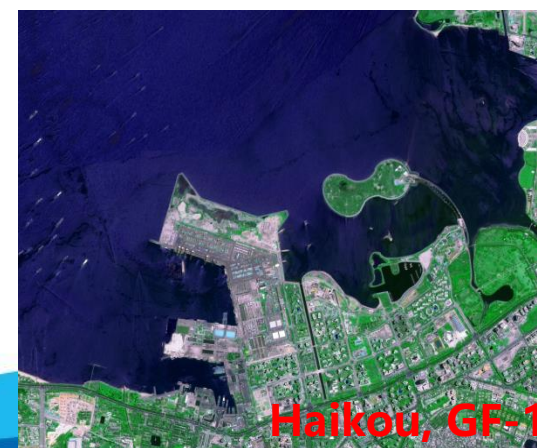
Sanya, GF-1



Kuala Lumpur., WV

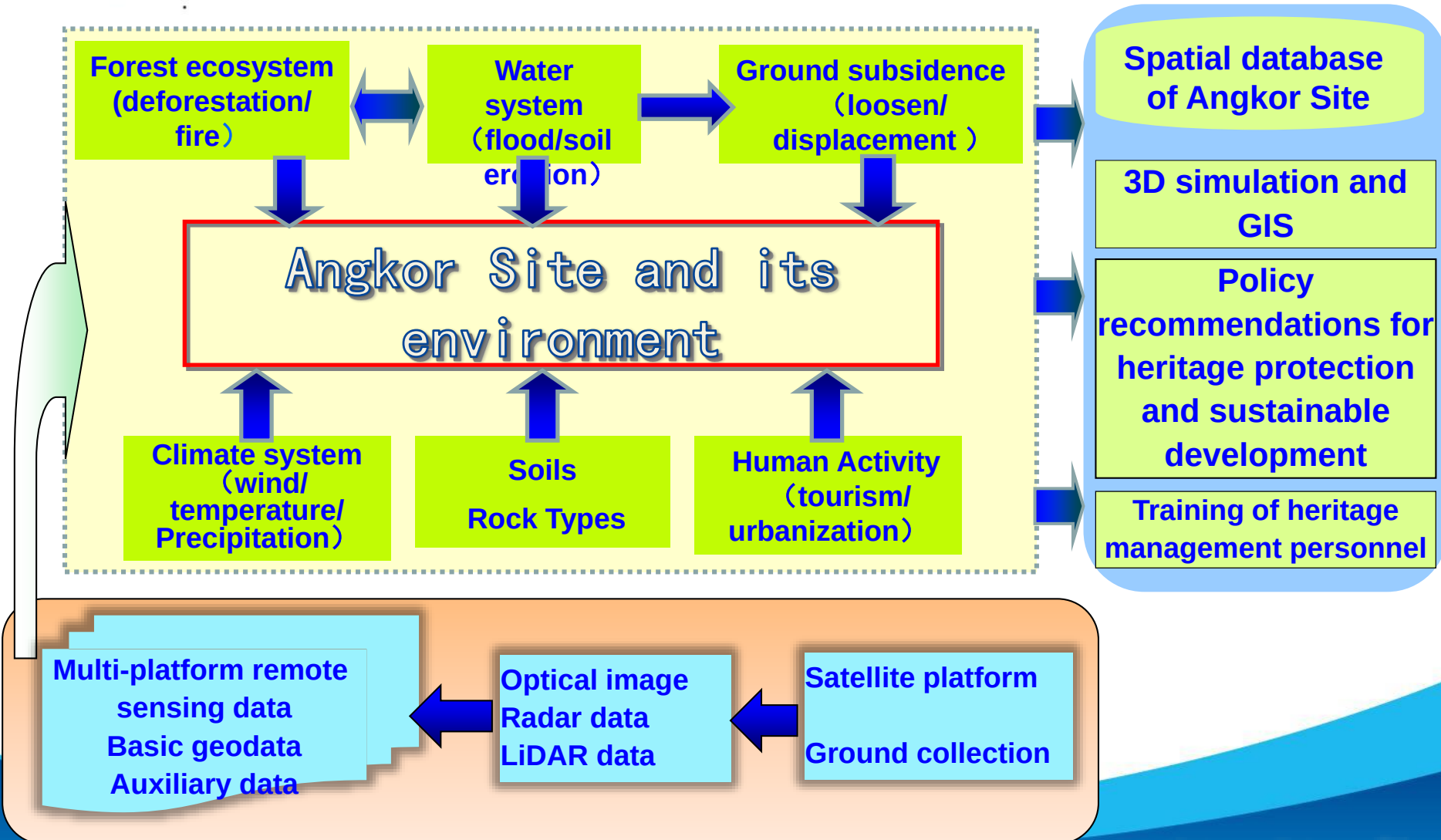


Singapore, WV



Haikou, GF-1

Remote sensing for environment of Angkor site



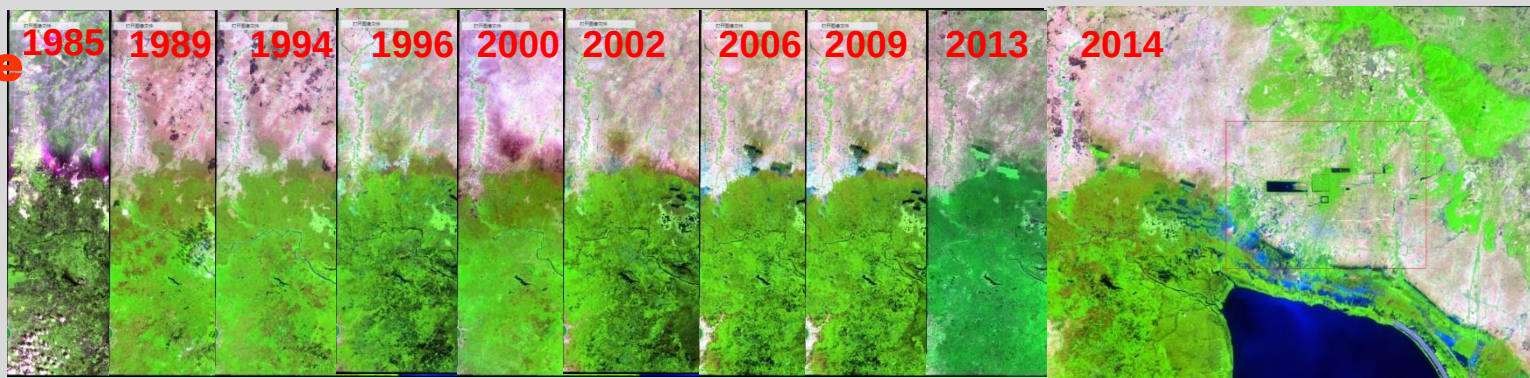


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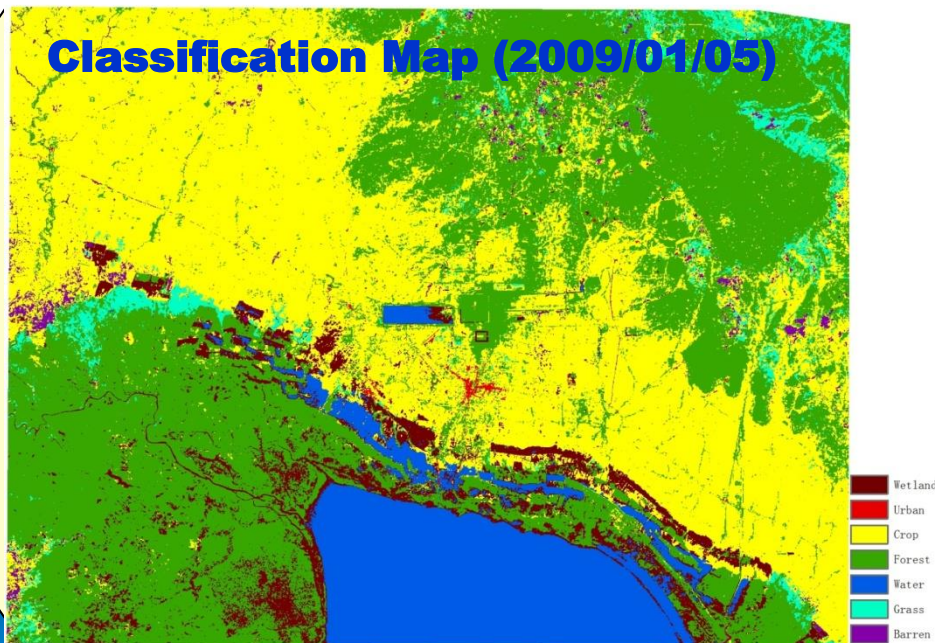
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Data source (1985-2014)

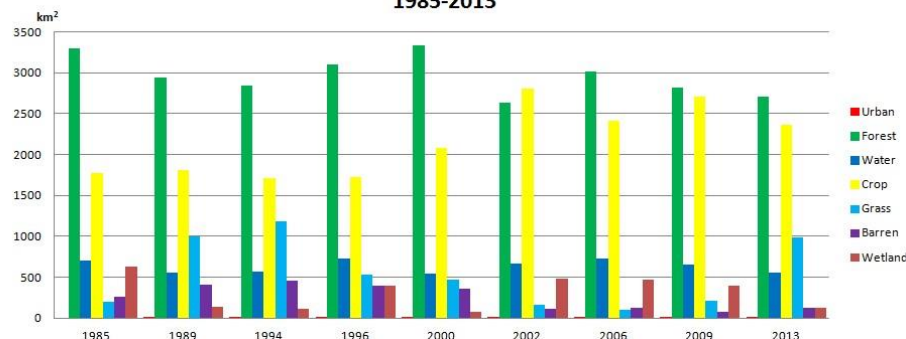
- Landsat MSS
- Landsat TM
- HJ-1A
- Landsat LOI



Classification Map (2009/01/05)



1985-2013



- Urban area: gradually increasing
- Forest area: unstable decreasing
- Water area : seasonal fluctuations



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Global Change Challenges



Island is submerged



Snow is melting



Typhoon



Flood

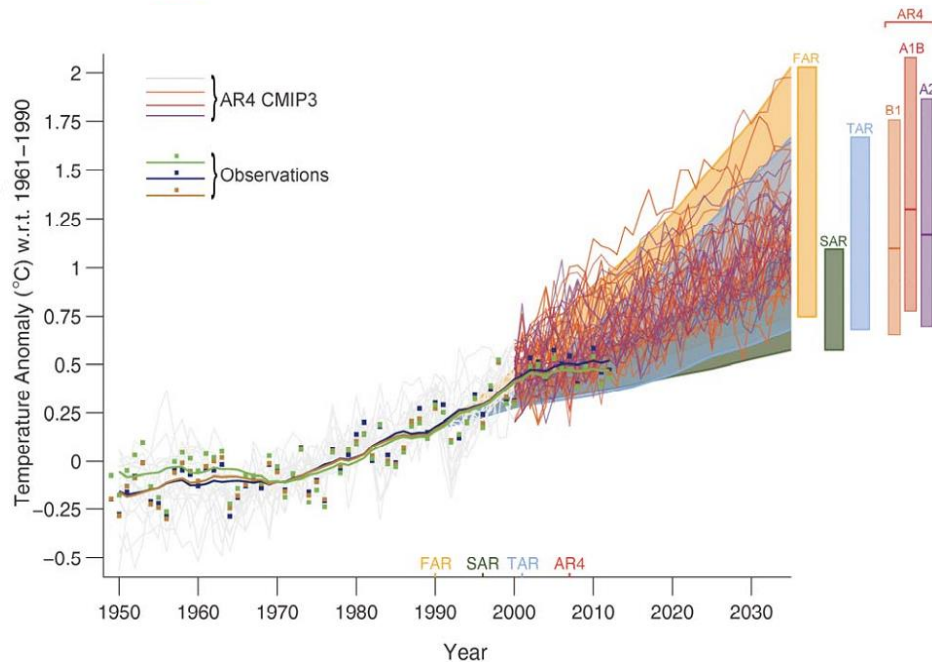


Drought

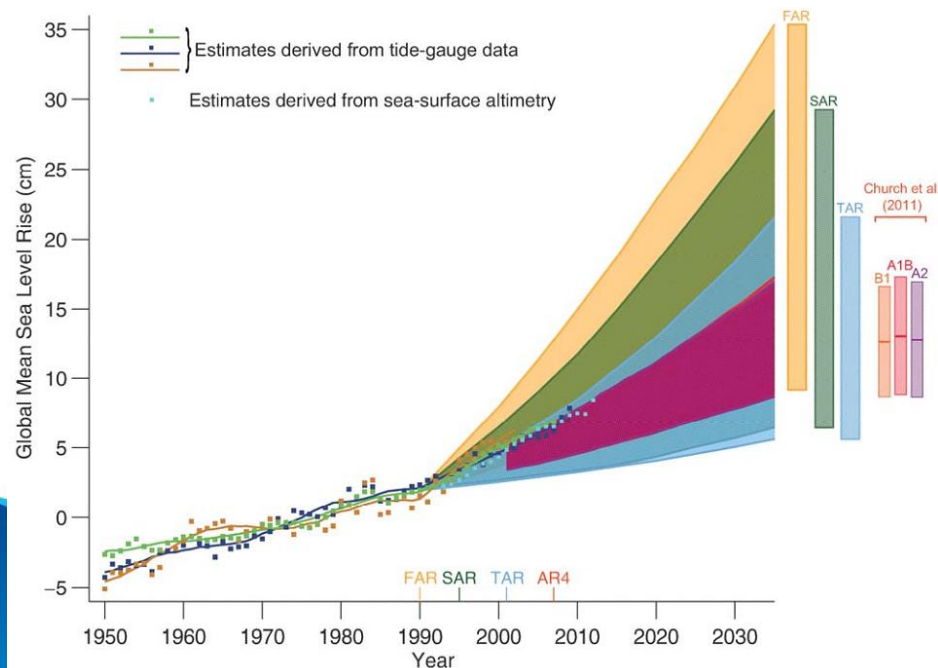


Snow Disaster

Global temperature anomaly and mean sea level rise



Estimated changes in the observed globally and annually averaged surface temperature anomaly since 1950 relative to 1961–1990.



Estimated changes in the observed global annual mean sea level since 1950 relative to 1961–1990.

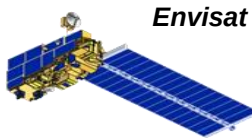


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QuikScat

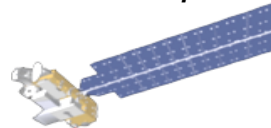
SORCE
HI-ST

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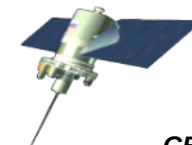


Envisat

Aura/Aqua/Terra



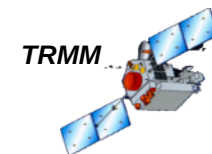
Sage



CBERS



SPIN-2

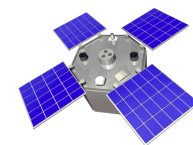


TRMM

DMC



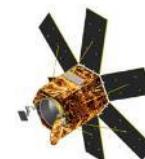
ACRIMSAT



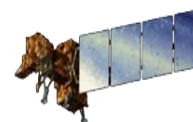
Toms-EP



EROS A1



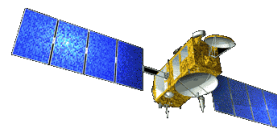
Landsat 7



ALOS



Jason



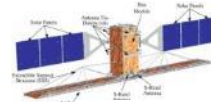
UARS



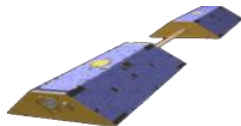
QuickBird



Radarsat



Grace



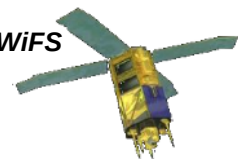
ERBS



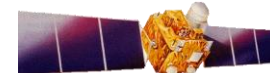
SeaWinds



SeaWiFS



SPOT 4, 5



Earth Observation Satellites over the World



Chinese Earth Observation Satellites

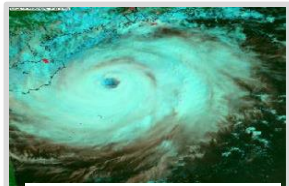
Satellite category		1988	1990	1997	1999	2000	2002	2003	2004	2007	2008	2009	2010	2011	2012	2013	2014	2015	Satellites to be launched before 2020
Meteorological satellite	FY-1 polar orbit satellite	FY1A	FY1B		FY1C		FY1D												8 service satellites and 2 experimental satellites
	FY-2 stationary orbit satellite			FY2A		FY2B			FY2C	FY-2D	FY-2E				FY-2F		FY-2G		
	FY-3 polar orbit satellite										FY-3A		FY-3B			FY-3C			
	Satellites operating on orbit										FY-2E FY-3A		FY-3B		FY-2F	FY-3C	FY-2G		
Ocean satellite	HY-1 ocean color satellite						HY-1A			HY-1B									8 satellites
	HY-2 ocean dynamics and environment satellite													HY-2A					
	Satellites operating on orbit									HY-1B				HY-2A					
Resource satellite	ZY-1 satellite				CBE RS-01									ZY-1 02C			CBE RS-04		5 satellites
	ZY-2 satellite							CBE RS-02		CBER S-02B									
	ZY-3 satellite														ZY-3				
	Satellites operating on orbit													ZY-1 02C	ZY-3		CBE RS-04		
Environmental and Disaster mitigation satellite	HJ-1										HJ-1A/1B				HJ-1C				8 satellites
	“2+1” satellites operating on orbit										HJ-1A/1B				HJ-1C				
High resolution Earth observation systems	GF-1 satellite															GF-1			4 satellites
	GF-2 satellite																GF-2		
	GF-4 satellite																	GF-4	
	Satellites operating on orbit															GF-1	GF-2	GF-4	Global coverage
BeiDou navigation and positioning satellite	Networked operation					Experimental satellite-1, 2		Experimental satellite-3		Experimental satellite-4, BeiDou-1		BeiDou-2	BeiDou-3,4,5,6,7	BeiDou-8,9,10	BeiDou-11,12,13,14,15,16			BeiDou-17,18,19,20	Global coverage



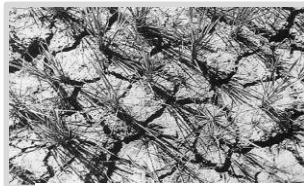
United Nations
Educational, Scientific and
Cultural Organization



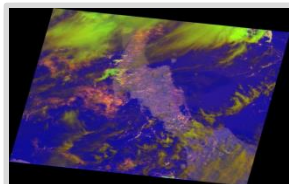
International Centre on Space Technologies for
Natural and Cultural Heritage
under the auspices of UNESCO



Climate
Change



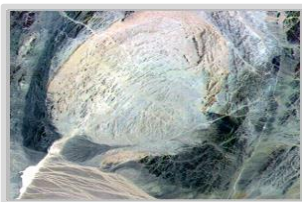
Disaster
Monitoring



Ocean Resource
Exploration



Pollution
Monitoring



Mineral Survey



Urban Fine
Management

High Resolution Satellites

GF-1

- one **2m** panchromatic/**8m** multi-spectral camera
- one **16m** multi-spectral medium-resolution and wide-view camera
- into orbit on **26th April 2013**

GF-2

- one **1m** panchromatic/**4m** multi-spectral camera
- designed lifespan of over 5 years
- into orbit on **19th August 2014**

GF-3

- multi-polarized **C-band SAR** at meter-level resolution
- designed lifespan of 8 years.

GF-4

- **50m staring camera**, operating on the geo-synchronous orbit
- capacity for high temporal resolution remote sensing monitor at minute-level

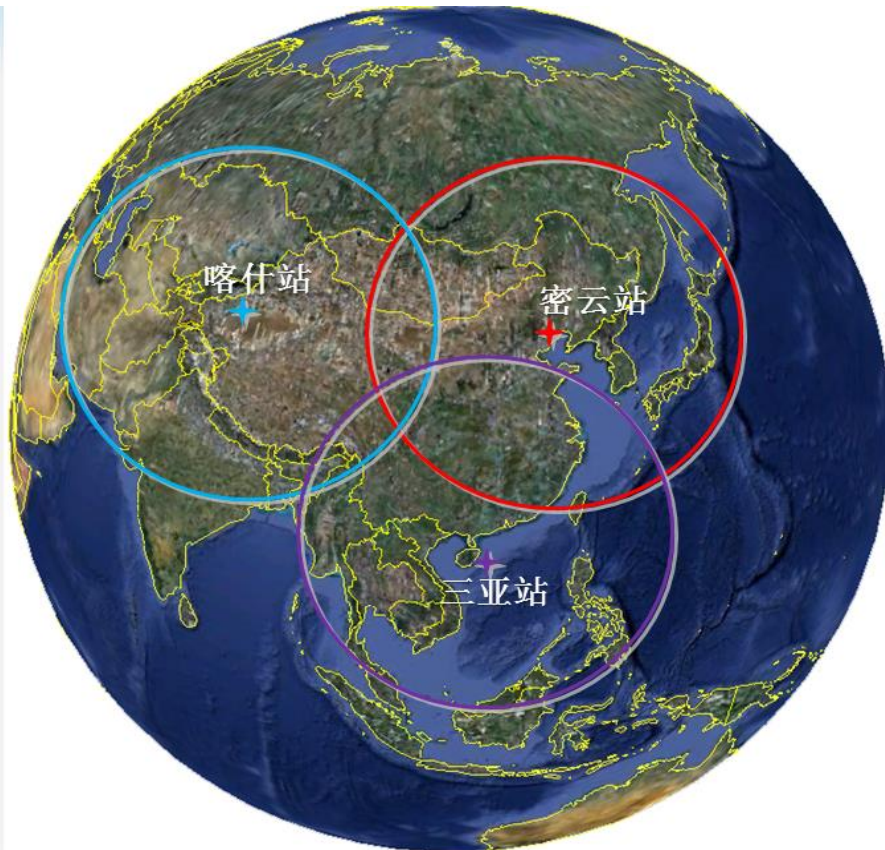
GF-5

- visible and short-wave infra **hyper-spectral** camera,
- **spectral imager**, greenhouse gas detector, atmospheric environment infrared detector



EO Satellite Receiving Stations

- The **ground receiving station of RADI, CAS**, can receive the remote sensing data of **16** domestic and international satellites covering **70% of Asia**.
- We have internationally advanced 2x600 Mbps receiver technology and a three-station 1G/155M transmission system.



Miyun, Beijing



Kashgar, Xinjiang



Sanya, Hainan

BIG DATA for BIG UNESCO SITES

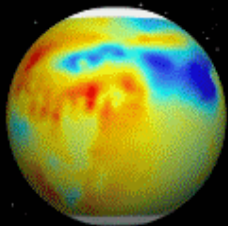
DISCOVERIES along BELT and ROAD

Visual Planet

Explaining, understanding, projecting Global Change trends, drivers and processes and their interactions.

Global Development

Providing the knowledge for sustainable global development.



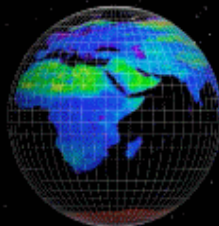
二氧化碳浓度

Carbon Dioxide



全球植被

Vegetation



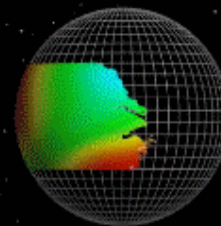
地表反照率

Albedo



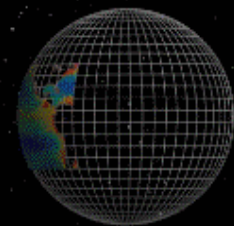
地表短波净辐射

Radiation



降雨

Precipitation



叶绿素浓度

Chlorophyll



United Nations
Educational, Scientific and
Cultural Organization



International Centre on Space Technologies for
Natural and Cultural Heritage
under the auspices of UNESCO

Thank you !

www.unesco-hist.org