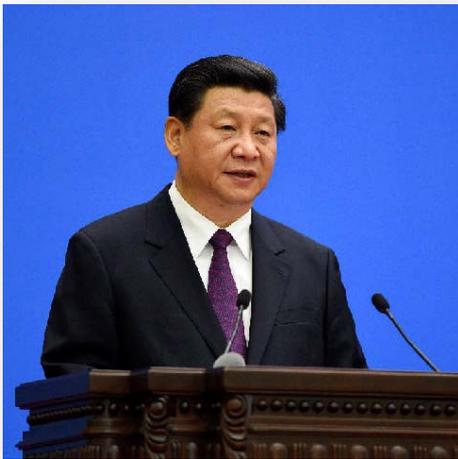


# Urbanization dynamics along the Belt and Road

Linlin Lu

*Key Lab. of Digital Earth Science*  
*Institute of Remote Sensing and Digital Earth, Chinese Academy of*  
*Sciences*  
Beijing, China

# The Belt and Road Initiative



- When Chinese President Xi Jinping visited Kazakhstan in September 2013, he proposed the initiative of jointly building the **Silk Road Economic Belt**. In the same year in October, he proposed the initiative of jointly building the **21st-Century Maritime Silk Road** when he visited Indonesia.
- In March 2015, the National Development and Reform Commission, Ministry of Foreign Affairs and Ministry of Commerce jointly released the “Vision and Actions on Jointly Building Silk Road Economic Belt and 21st-Century Maritime Silk Road” (the Belt and Road Initiative).

The Belt and Road region includes more than 60 countries, which are located in Asia, Europe, and North Africa.



# Digital “Belt and Road” Initiative (DBAR)

*An International Research Program for  
the **Sustainable Development** of the Belt  
and Road Region Using **Big Earth Data***

# Vision of DBAR

➤ Advance scientific knowledge on the Earth System processes determining the state and the evolution of hot-spots in the B&R countries, particularly the areas impacted by the construction of the Belt and Road.

➤ Develop and implement an effective mechanism for multi-lateral cooperation involving many countries in the B&R region.

➤ Identify and address “show-stoppers” in current human and technological resources that may hinder the progress of the initiative.

# DBAR Objectives

- **Scientific contributions**

To address **knowledge gaps** in Earth System processes, which are impeding the attainment of **the SDG targets in the Belt and Road countries**.

- **Facilitating platforms**

To promote **advanced science and decision support services** to extract information from massive and diverse data in the light of Big Earth Data.

- **Stakeholders**

To enhance capacity building and technology transfer towards **partnerships and research networks**.



# Research Design

- Design and develop an **ICT infrastructure** to support remote discovery, access, processing and analysis of EO data in a virtual (cloud) environment.
- Research on **Earth System Science** primarily based on EO data.
- Interaction within communities of scientific and professional **stakeholders**.
- Dissemination of **SDG–relevant outcomes**.



# DBAR Foci and linkage with UN SDGs



TRANSFORMING OUR WORLD:  
THE 2030 AGENDA FOR  
SUSTAINABLE  
DEVELOPMENT



United Nations



Framework Convention on  
Climate Change

*Agriculture and  
Food Security*



SDG-2  
SDG-2.4



*Climate Change  
and Ecosystem*



SDG - 15  
SDG - 15.1  
SDG - 15.3



*Coast and  
Marine*



SDG - 14  
SDG - 14.2  
SDG - 14.5



*Disaster Risk*



SDG - 11.5



*Infrastructure*



SDG - 9  
SDG - 9.1  
SDG - 9.5



*Water Resources  
and Water Security*



SDG-6.4  
SDG-6.5



*Urban  
Development*



SDG - 11



*Natural and  
Cultural Heritage*



SDG - 11  
SDG - 11.4



futureearth  
research for global sustainability

Societal Benefit Areas

GEO GROUP ON  
EARTH OBSERVATIONS  
Strategy Plan for 2016-2025

www.dbelitroad.org

# Framework of DBAR



# DBAR: Hand in Hand Program



Countries along the Belt and Road



International programs



Pan-Eurasian Experiment  
PEEX



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



International organizations



Let countries along the Belt and Road benefit from DBAR

# 1<sup>st</sup> DBAR Meeting in December, 2016



- *DBAR Science Plan*
- *DBAR Science Committee*
- *Working groups*
- *Explore better scientific approaches to serve sustainable development along the Belt and Road.*



The first group members of the Science Committee are awarded letters of appointment



# Forthcoming 2<sup>nd</sup> DBAR Meeting



DBAR



RSATSA

The 2nd international conference of Digital Belt and Road (DBAR 2017)

## Important Dates:

- 31 May 2017 Abstract submission deadline
- 03 July 2017 Notification of acceptance
- 30 Sept 2017 Full paper submission deadline

## Enquiry:

Institute of Space and Earth Information Science,  
The Chinese University of Hong Kong  
Tel: (852) 3943 4405  
Fax: (852) 2603 7470  
Email: [iseis@cuhk.edu.hk](mailto:iseis@cuhk.edu.hk)



香港中文大學太空與地球信息科學研究所  
INSTITUTE OF SPACE & EARTH INFORMATION SCIENCE CUHK



## Organizers:



# The DBAR Urban Working Group

## DBAR-UrBAN

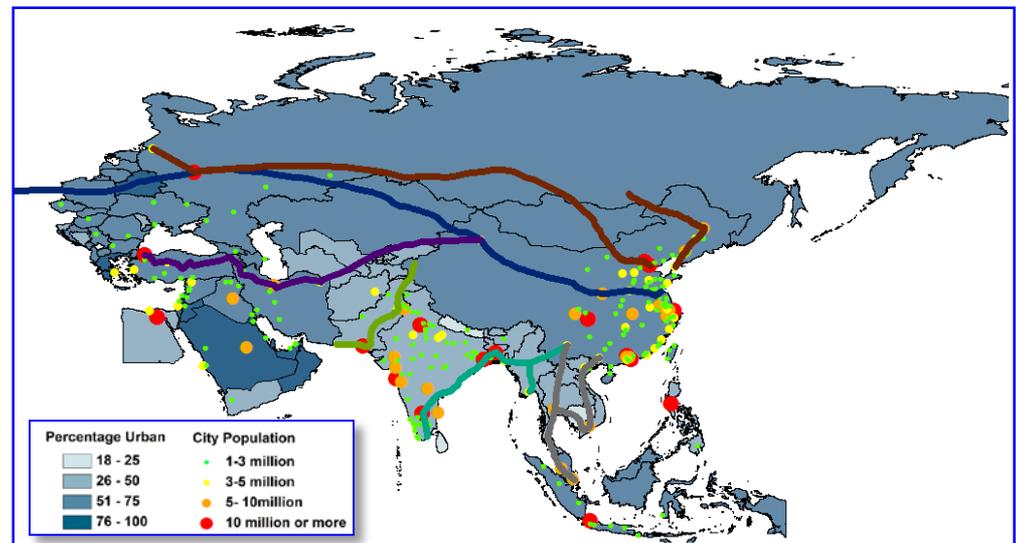


## Background and context

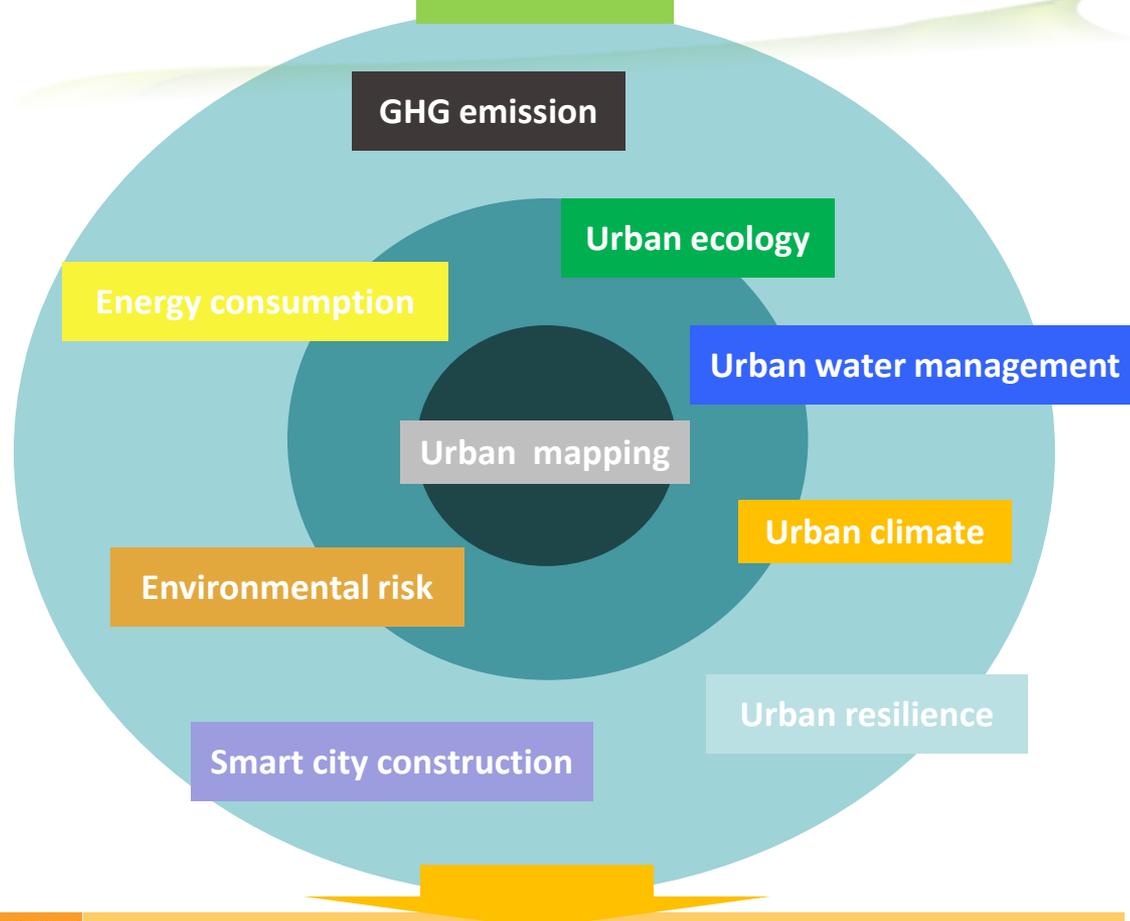
- Urban development across the world has **profound effects** on environment, biodiversity, ecological processes and regional sustainability.
- The cities along the Silk Road and Maritime Silk Road are **transport, industrial, and economic hub** between countries in the Belt and Road region, as well as drivers of national and regional economic development.
- However, the lack of a comprehensive **urbanization policy** can lead to social and environmental challenges.

### The Belt and Road Initiative

- jointly building economic corridors, relying on core cities along the Belt and Road
- jointly building smooth, secure and efficient transport routes connecting major sea ports along the Belt and Road



# DBAR-UrBAN Framework

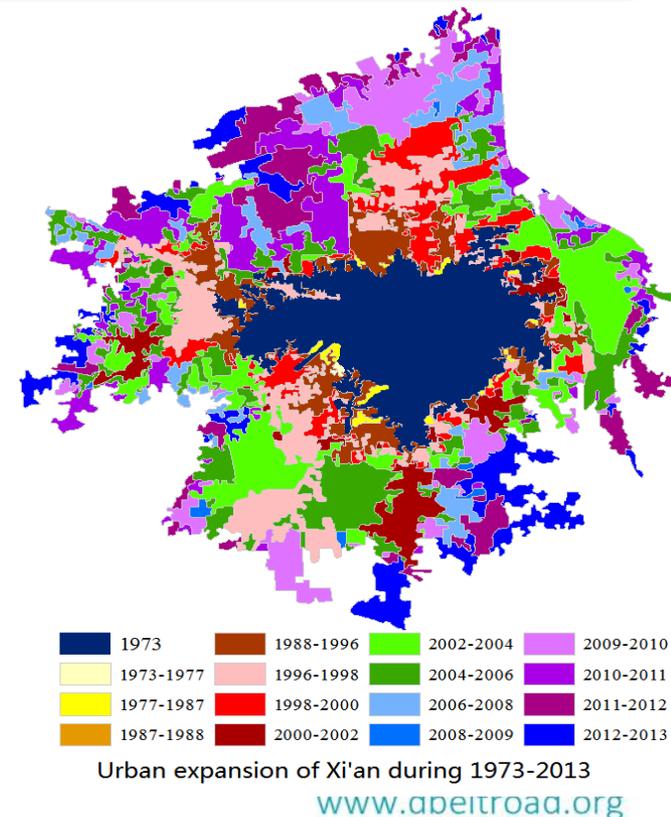


**Goal 11: Make cities inclusive, safe, resilient and sustainable**

# DBAR-UrBAN

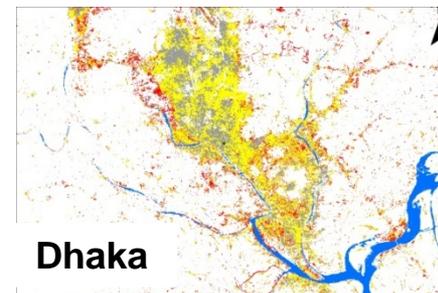
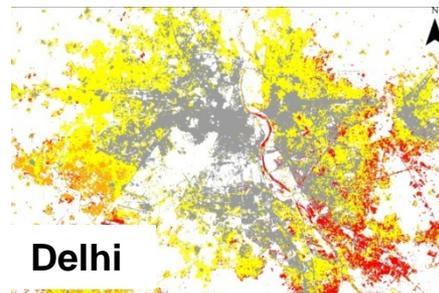
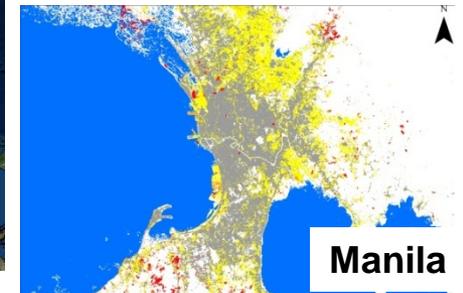
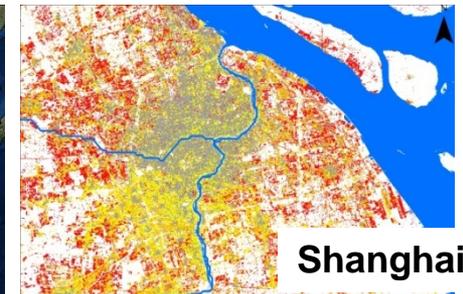
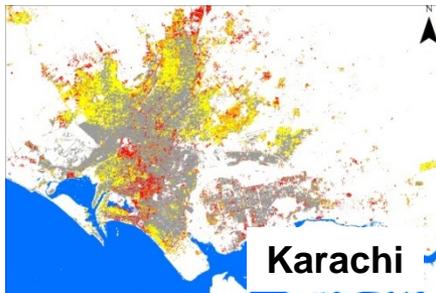
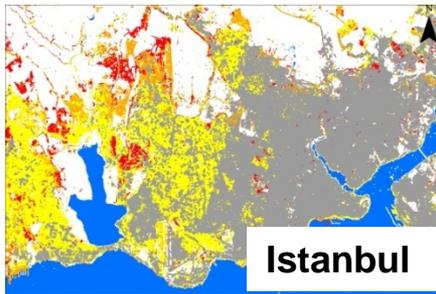
Urban expansion mapping of core cities based on multi-source remotely sensing images including **high resolution** images from Chinese satellites during the period of 1970s–2020s for implementation of the Belt and Road Initiative

This task will detect the urban expansion and its impacts on local land use of core cities along the Belt and Road based on multi-source remotely sensed images with high temporal frequency and accuracy.



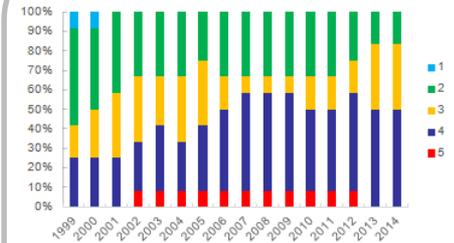
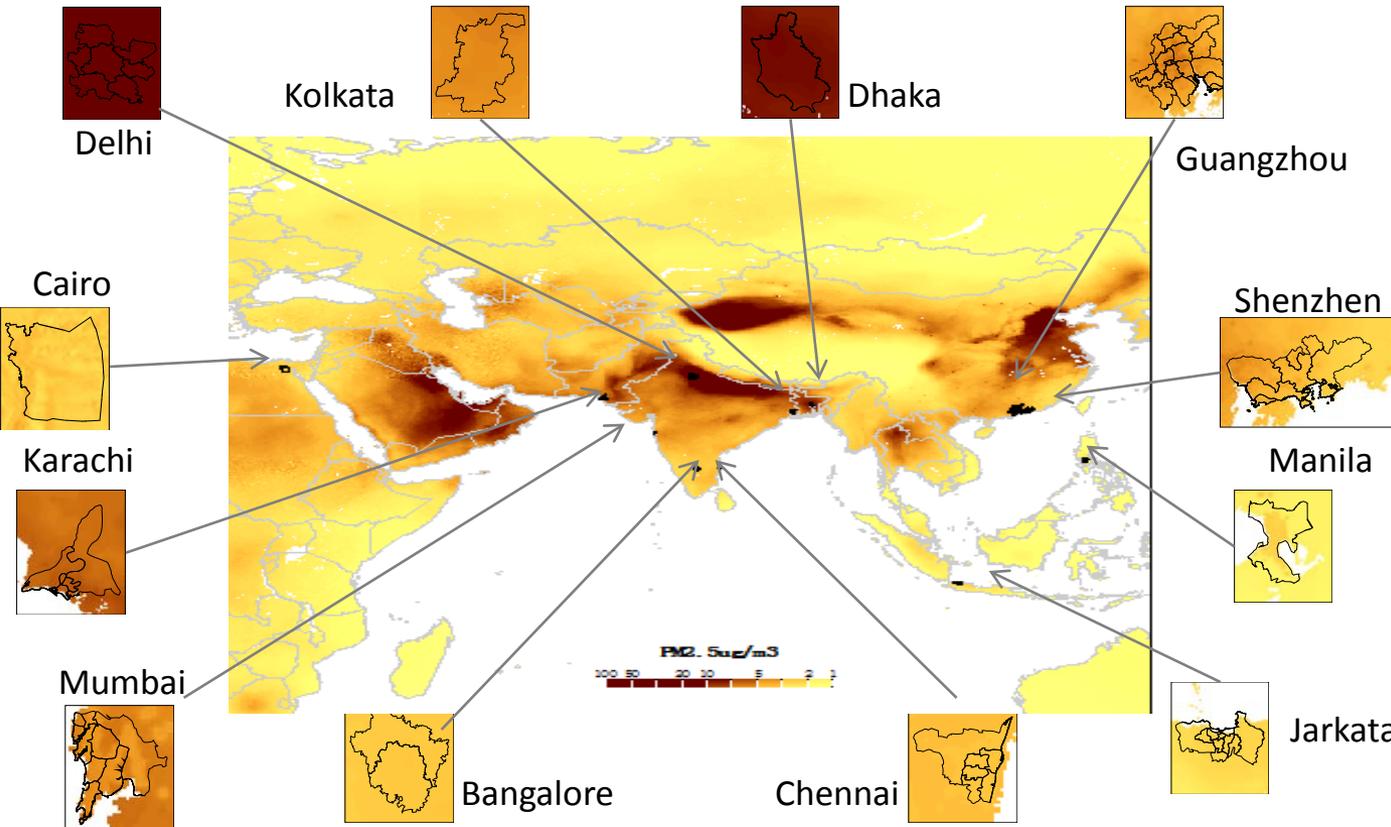
# DBAR-UrBAN

Urban expansion and environmental change assessment from remote sensing data in megacities (pop. > 10 million) along the Belt and Road region from 1970s to 2020s with GHSL as baseline data



# DBAR-UrBAN

Urban expansion and environmental change assessment from remote sensing data in megacities (pop. > 10 million) along the Belt and Road region from 1970s to 2020s with GHSL as baseline data



Area proportion of 12 megacities under different PM2.5 concentration grades from 1999 to 2014. Grades 1, 2, 3, 4 and 5 correspond to less than 15ug/m<sup>3</sup>, 15-25ug/m<sup>3</sup>, 25-35ug/m<sup>3</sup>, 35-100ug/m<sup>3</sup> and greater than 100ug/m<sup>3</sup>, respectively.

Spatial distribution of annual mean PM2.5 concentrations in megacities along the Maritime Silk Road in 2014

# DBAR-UrBAN



Officially launched by Prof. BAI Chunli, the President of Chinese Academy of Sciences in May, 2017

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## Earth Observation for the Belt and Road

Big Earth Data

Remote Sensing of Urban Dynamics along the Belt and Road

### Preface

organizations, such as the International Council for Science (ICSU) and the United Nations Educational, Scientific and Cultural Organization (UNESCO), and countries such as Finland, Russia, Kazakhstan, Kyrgyzstan, Cambodia and Sri Lanka. It is designed to visibly provide a more accurate and extensive understanding of the Belt and Road through innovative international S&T cooperation on Earth observation, and to promote the development of big Earth data for the Belt and Road to support innovation in decision-making regarding such important issues as climate change, urban development, world heritage, natural disaster, food security and water resources. A scientific community with a shared future along the Belt and Road will be built by establishing a big data platform, exchanging information products and technological services, and integrating ground-based and space-based Earth observation networks.

Expanding the visual field of space-borne observation of the Belt and Road region, Asia, Africa and Europe. The North Pole Ground Station of the CAS Institute of Remote Sensing and Digital Earth started operation in December 2016. As China's first land satellite ground receiving station constructed overseas, it has greatly improved China's capacity for global data acquisition. By 2020, China will have built advanced Earth observation systems for land, ocean and atmosphere, giving support and services to decision-making in modern agriculture, disaster mitigation and prevention, resource and environment, and public security and securing the autonomy of information sources. With building a Green Belt and Road, a Digital Belt and Road, and a Friendship Belt and Road, we need to address numerous challenges regarding its environment, resources and disaster. It is important to have a comprehensive understanding of these issues and evaluate them in a scientific way. Space science and technology, including obtaining data in a macroscopic, accurate, objective manner, will support the Belt and Road Initiative from different perspectives.

Based on DBAR, this special issue, integrating the Belt and Road with Space Science and Technology, will comprehensively highlight the capacity and role of space technology in supporting the Initiative. The DBAR will provide strong support for sustainable development along the Belt and Road and make sustained, high-level contributions to the Initiative.

白春礼  
Bai Chunli  
中国科学院院长  
中国科学院 2017增刊 (Z1)

## Remote Sensing of Urbanization Dynamics along the Belt and Road

Lu Liuhui<sup>1\*</sup> Guo Haobang<sup>2</sup> Martin Pesaresi<sup>1</sup>

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<sup>2</sup> European Commission, Joint Research Centre (JRC), Spira (AN) I-29100

Comments: Rapid urbanization comes with a set of challenges such as increasing inequalities, migration, environmental degradation, risks from disasters and climate change. To cope with these problems, sustainable and inclusive model of urbanization should be implemented. DBAR Urbanization Task Force is a platform for international cooperation in science and technology to promote sustainable urban development in countries along the Belt and Road.

Lu Liuhui, Associate Professor in Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, is the co-chair of Urbanization Task Force of DBAR Initiative, member of GEO Human Planet Initiative and Global Urban Observation and Information Task.

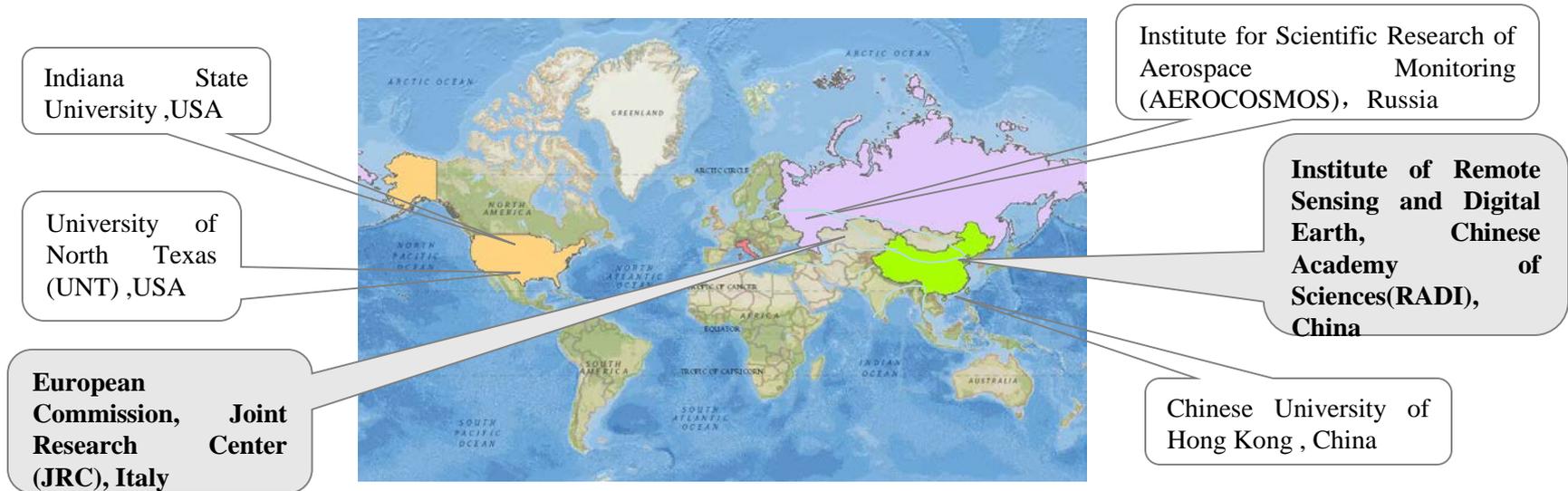
Comments: Earth observation is a promising measurement system to address the assessment of human settlements from local to national and global scale. The Global Human Settlements Framework produces global spatial information about the human presence on the planet over time. As detailed, measurable and globally consistent descriptions of human habitat, it can support global assessment on urbanization trends and dynamics and enable the implementation of the New Urban Agenda.

Comments: The Belt and Road region is comprised of more than 60 countries in the world. How these countries develop affects not only their residents but also the global economy. New forms of data allow better monitoring and understanding of urban trends. With improved understanding of what is happening on the ground, policy makers will be better able to promote sustainable urban development as well as improving resilience. Already spatially linked, the Digital Belt and Road Initiative provides a platform for collaboration on these important topics.

Comments: As the world's population continues to urbanize, it is important for urban development to be guided by a sustainable planning and long-term management vision. The sustainable and environmental design of land use and urban spaces can create a balance between the built and natural systems to improve urban human living. Through a close collaboration of international partners, it makes the DBAR Urbanization Task Force will continue to work on urban data development to facilitate cross-disciplinary knowledge sharing towards a more sustainable future along the Belt and Road.

# DBAR-UrBAN

## DBAR-UrBAN members: 6 organizations, 4 countries



### Co-Chairs :

- LU Linlin, *Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences (RADI), China; [lull@radi.ac.cn](mailto:lull@radi.ac.cn)*
- Martino PESARESI, *European Commission, Joint Research Center (JRC), Italy*

**Call for Members and Participants!**



# Thanks

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