



UNITED NATIONS
WORLD GEOSPATIAL INFORMATION CONGRESS

Forum conducted by the UN-GGIM Academic Network

A Sustainable and Resilient World: Capacity Building and Geospatial Research for Implementing the SDGs

11:00 - 12:00

Wednesday 21 Nov 2018

Deqing, China

Sharing and Utilizing Night Light Remote Sensing Images of Luoja 1-01 (LJ1-01) for SDGs

Prof. Huayi Wu

Vice Director, LIESMARS, Wuhan University

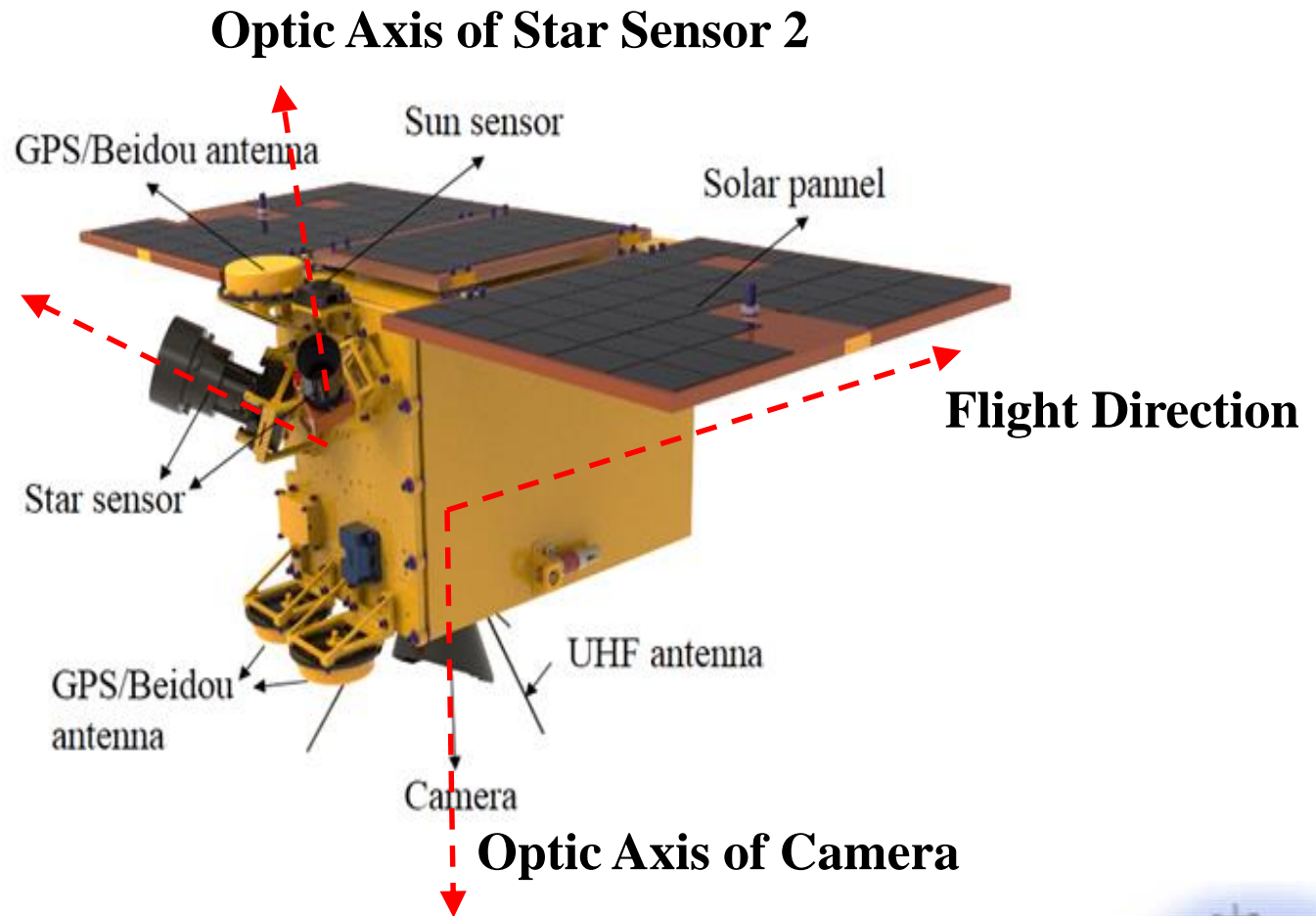


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Luoja 1-01 Night-time Light Remote Sensing Satellite

Optic Axis of Star Sensor 2



Launched on June 2, 2018, By Wuhan University

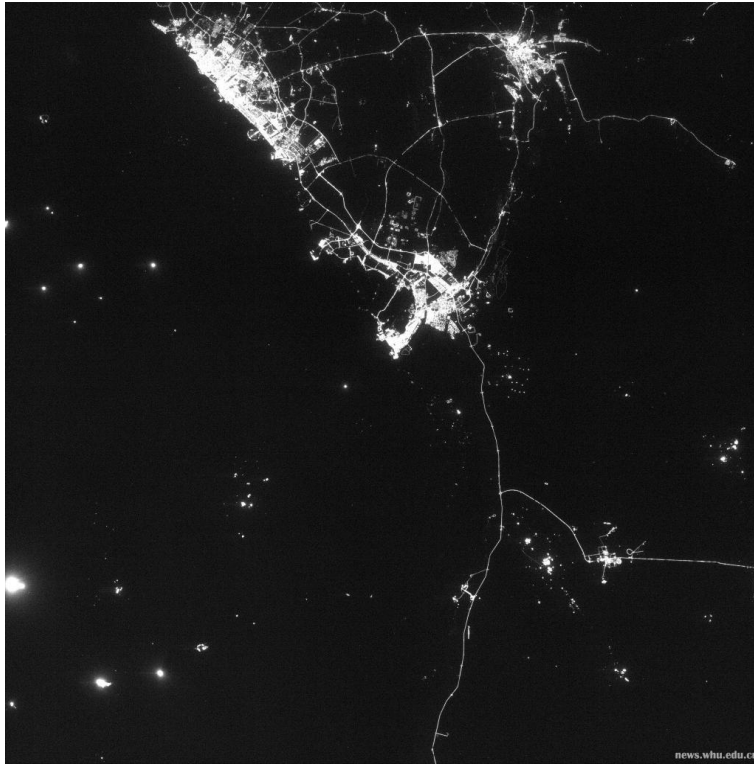


Main Technical Parameters

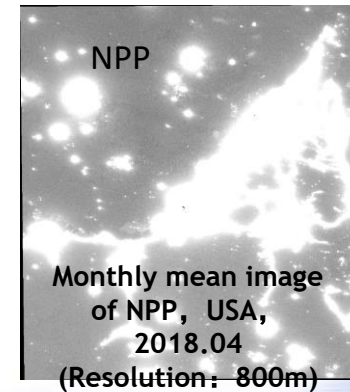
- **Orbit type:** Sun-synchronous orbit
- **Orbit height:** 645 km
- **Ground pixel resolution:** 130m@645km(sub-satellite point)
- **Imaging spectrum segment:** 480nm~800nm
- **Ground bandwidth:** 260km×260km@650km
- **Imaging mode:** Luminous mode + Daytime mode
- **Motorized capacity:** pitching axis greater than 0.9°/s
- **Three axis stabilization:** Better than 0.1°/s
- **Attitude determination accuracy:** better than 0.05°
- **Total satellite weight:** <25kg
- **Measurement and control:** UHF TT&C system, Clear transmission mode
- **Data transmission:** X-band, 50Mbps
- **Designed life:** 6 Months



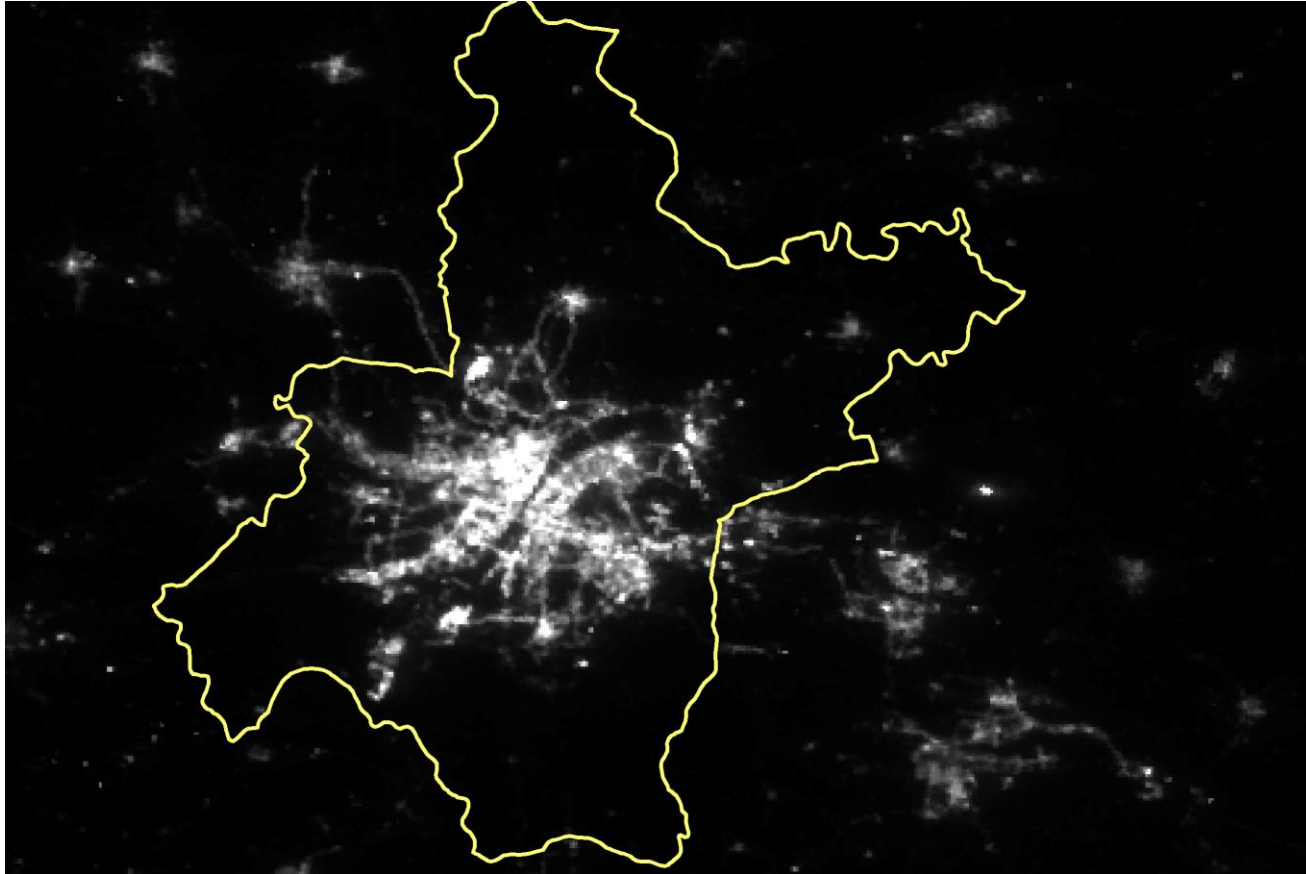
LJ1-01: the 1st Image



**The 1st image of LJ1-01
UAE's Abu Dhabi and Dubai areas,
June.04, 2018.**



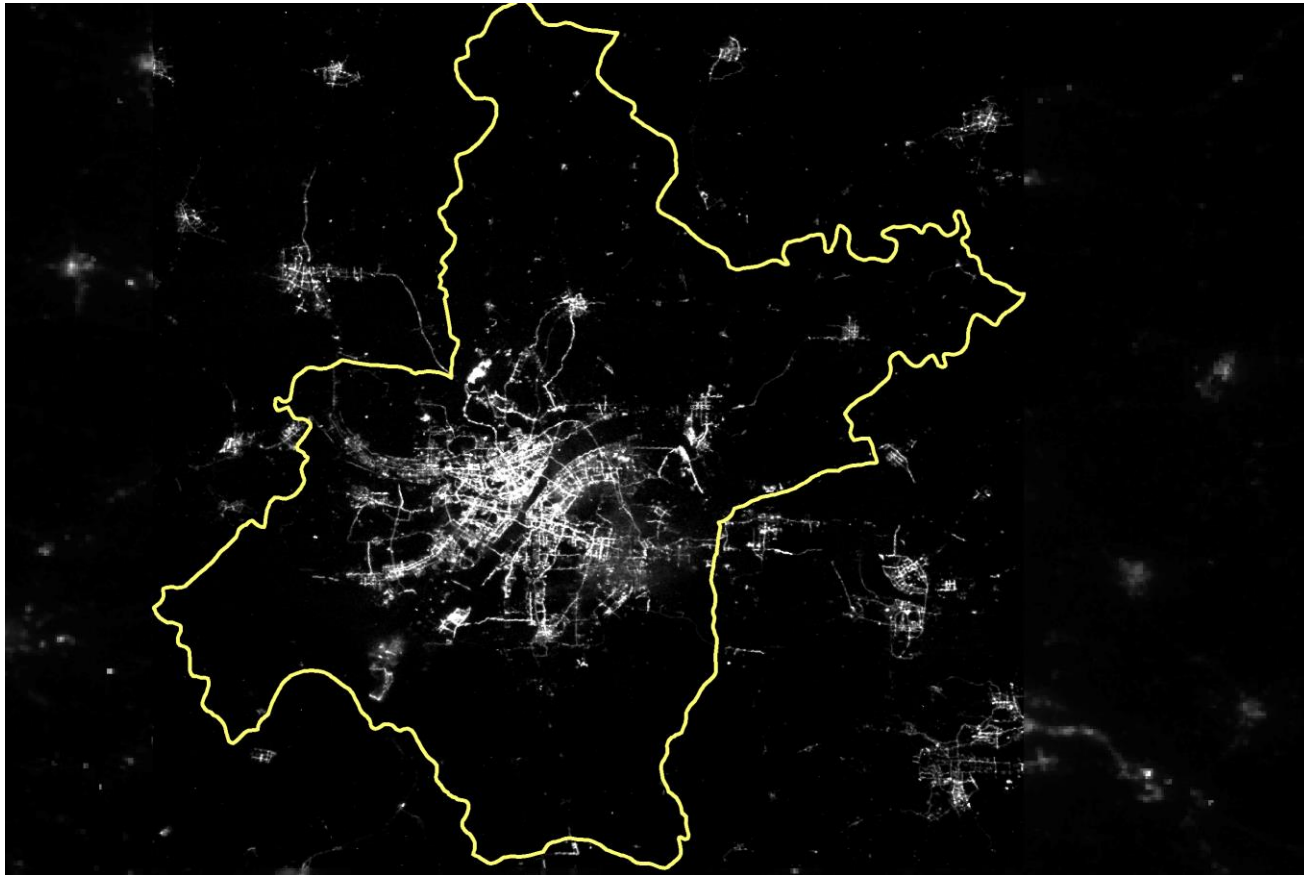
A Comparison



Nightlight remote sensing image of Wuhan by S-NPP/VIIRS



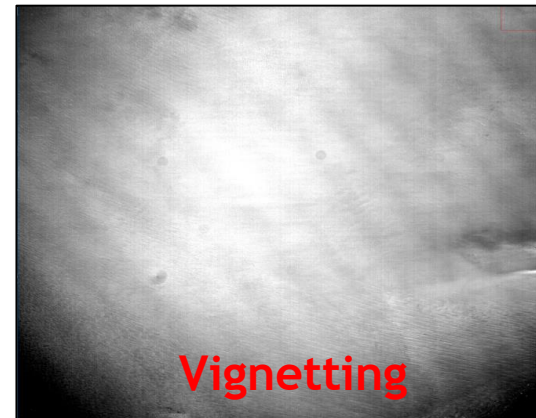
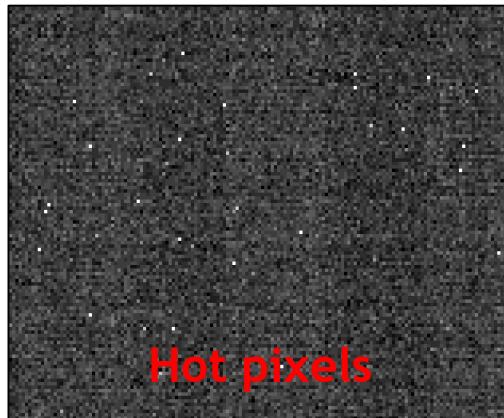
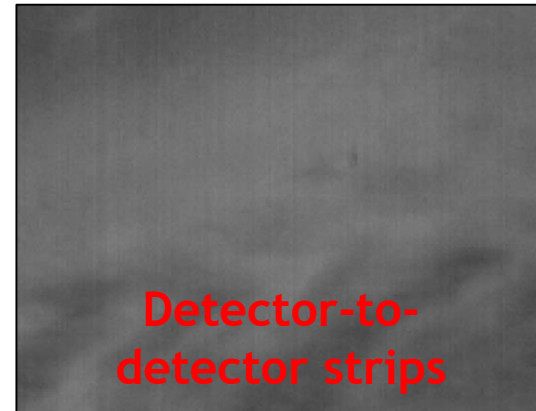
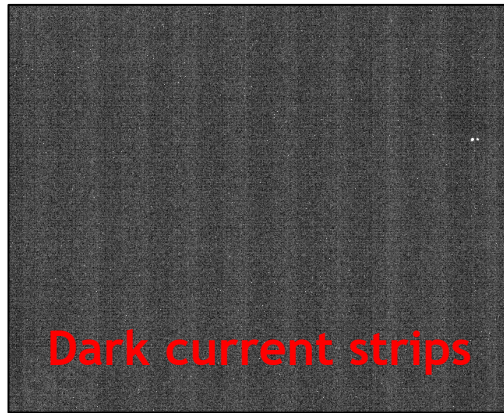
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Nightlight remote sensing image of Wuhan by LJ1-01



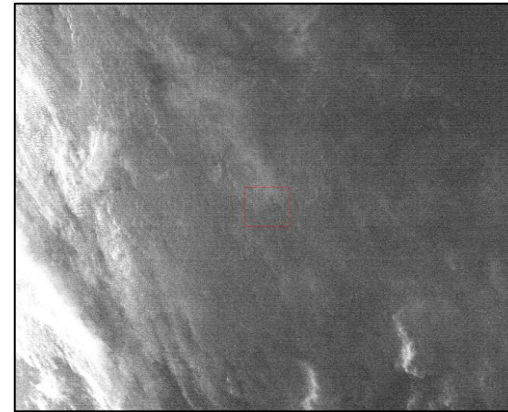
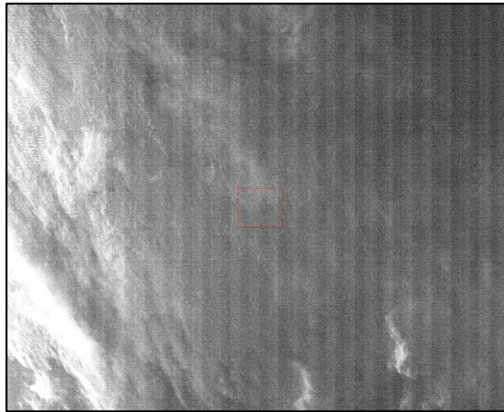
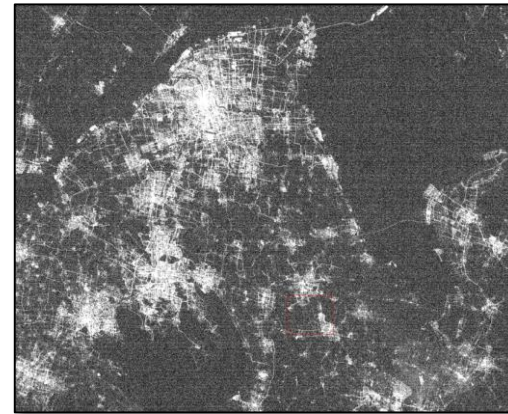
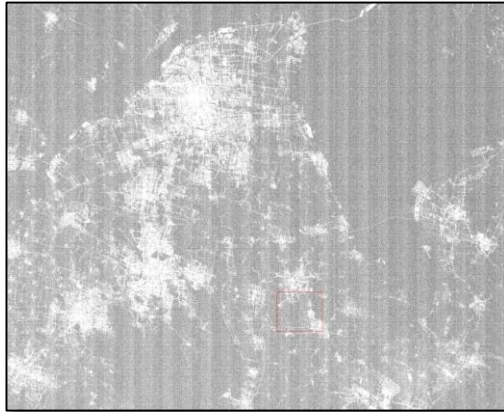
In-Orbit Testing



daytime calibration + nighttime correction



In-Orbit Testing

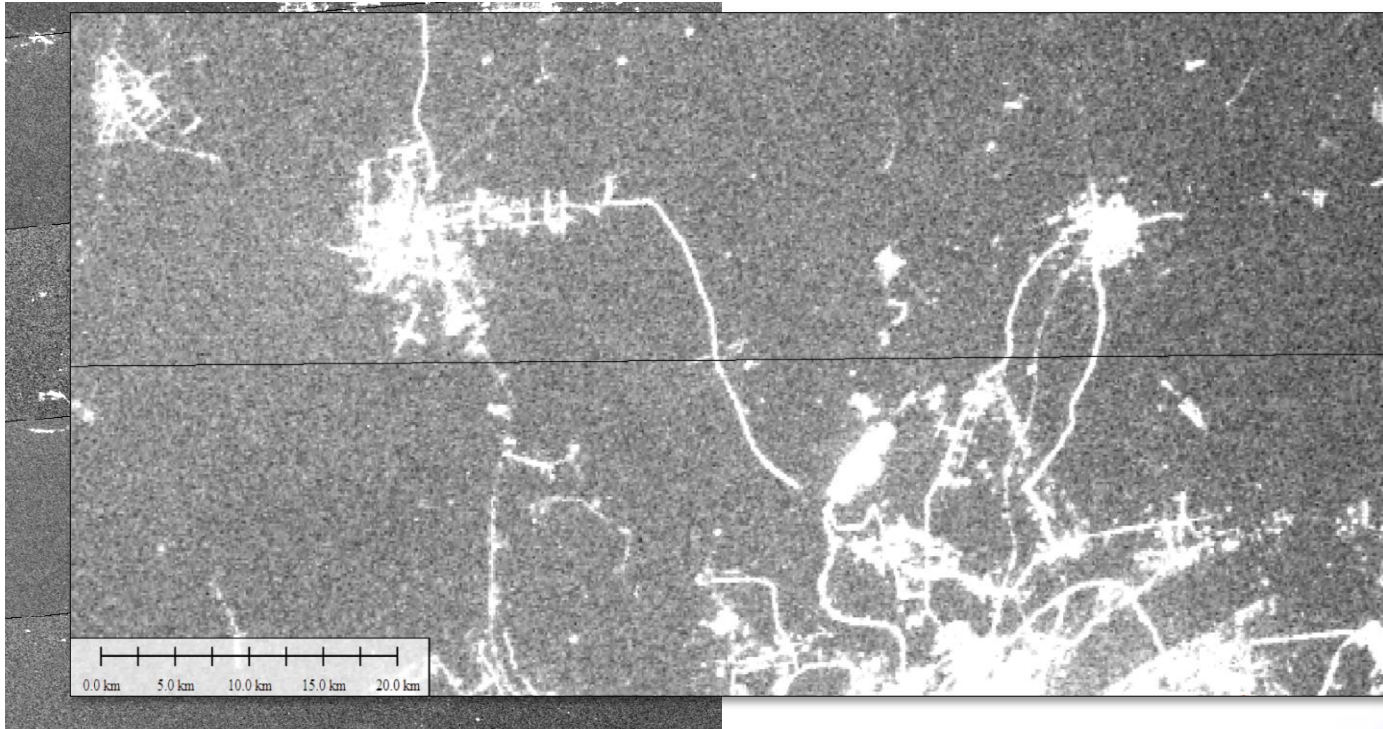


The max streaking metrics is better than 0.2%

Non-uniformity calibration

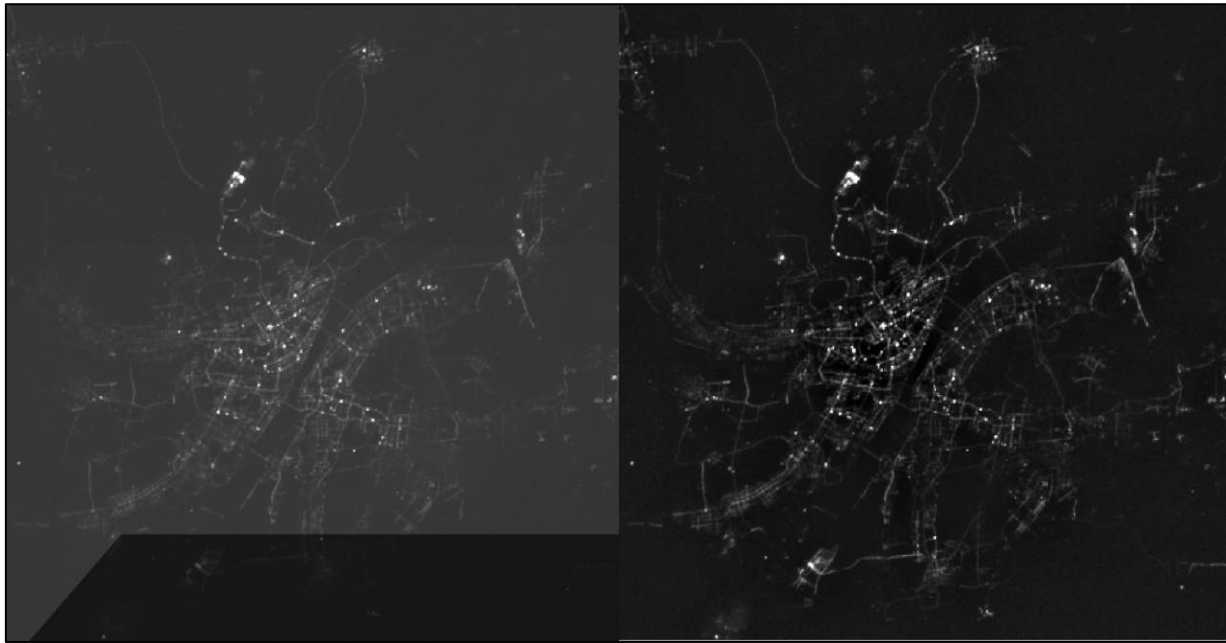


Ortho Rectification



In-Orbit Testing

Color consistency processing



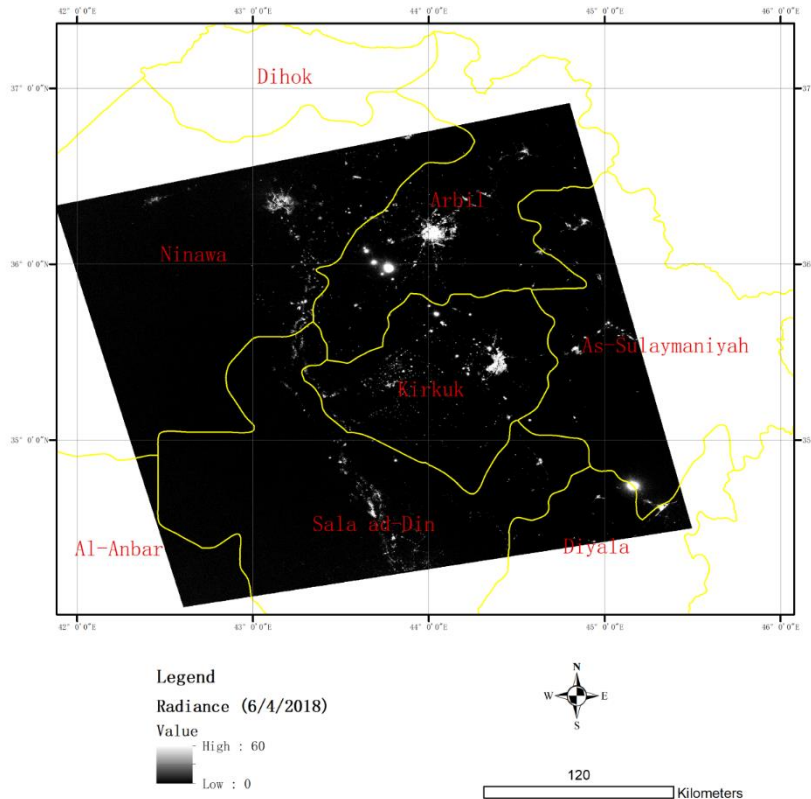
In-Orbit Testing: Conclusions

1. Resolution better than **130m**;
2. Ground bandwidth **260km**;
3. Relative calibration accuracy better than **0.2% (1δ)** ;
4. Absolute radiance calibration uncertainly better than **7% (1δ)**;
5. Positioning accuracy better than **700 meters** without GCPs.
6. Internal accuracy better than **0.5 pixels**.
7. Block adjustment accuracy better than **1 pixel** without GCPs.

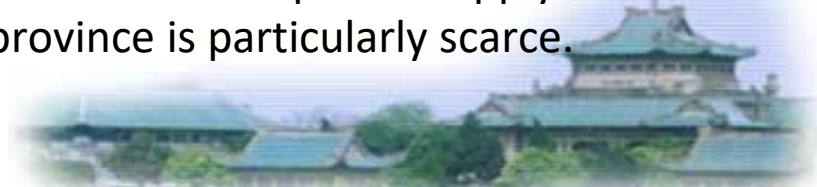


Example Applications

Assessing the reconstruction process in northern Iraq

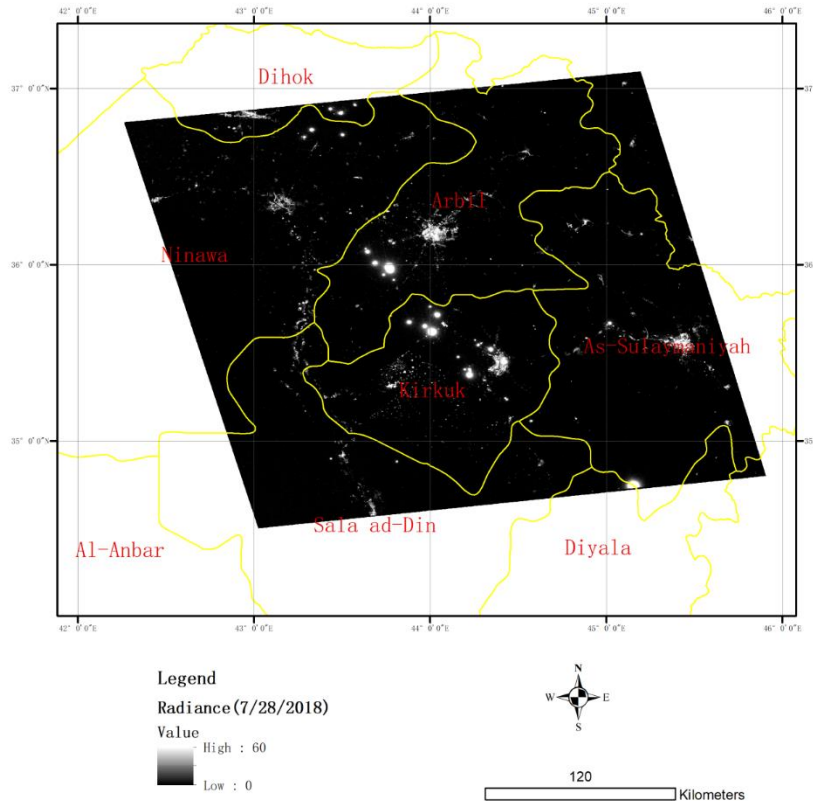


- 1) The light decreased in **Arbil Province**;
- 2) In **Kirkuk Province**, the light in towns have decreased, but the light of oil and gas wells have increased significantly;
- 3) The urban light in **Ninawa** and **Sala ad-Din** have increased and decreased in different areas.
- 4) The above phenomenon shows that oil production in northern Iraq is recovering rapidly, but urban power supply shows obvious regional difference. The power supply in Arbil province is particularly scarce.

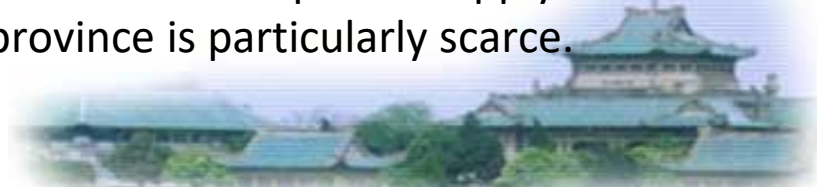


Example Applications

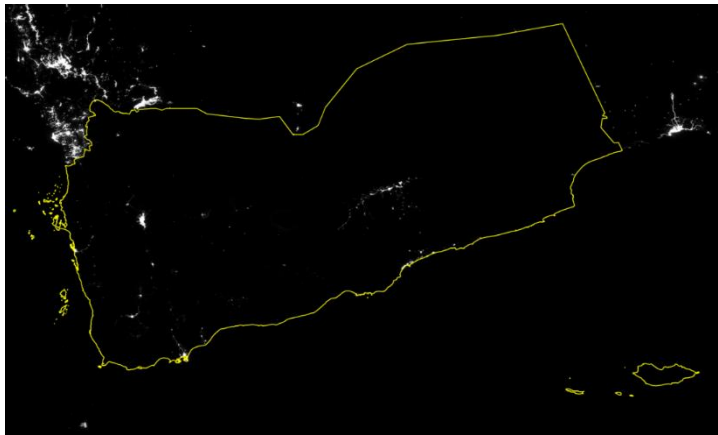
Assessing the reconstruction process in northern Iraq



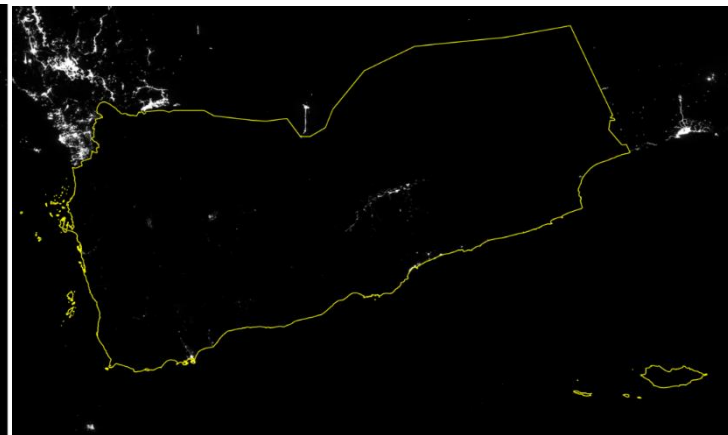
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Example Application: **Assessment of the impact of the Yemeni Civil War**



The VIIRS nighttime light image in Yemen in March, 2014



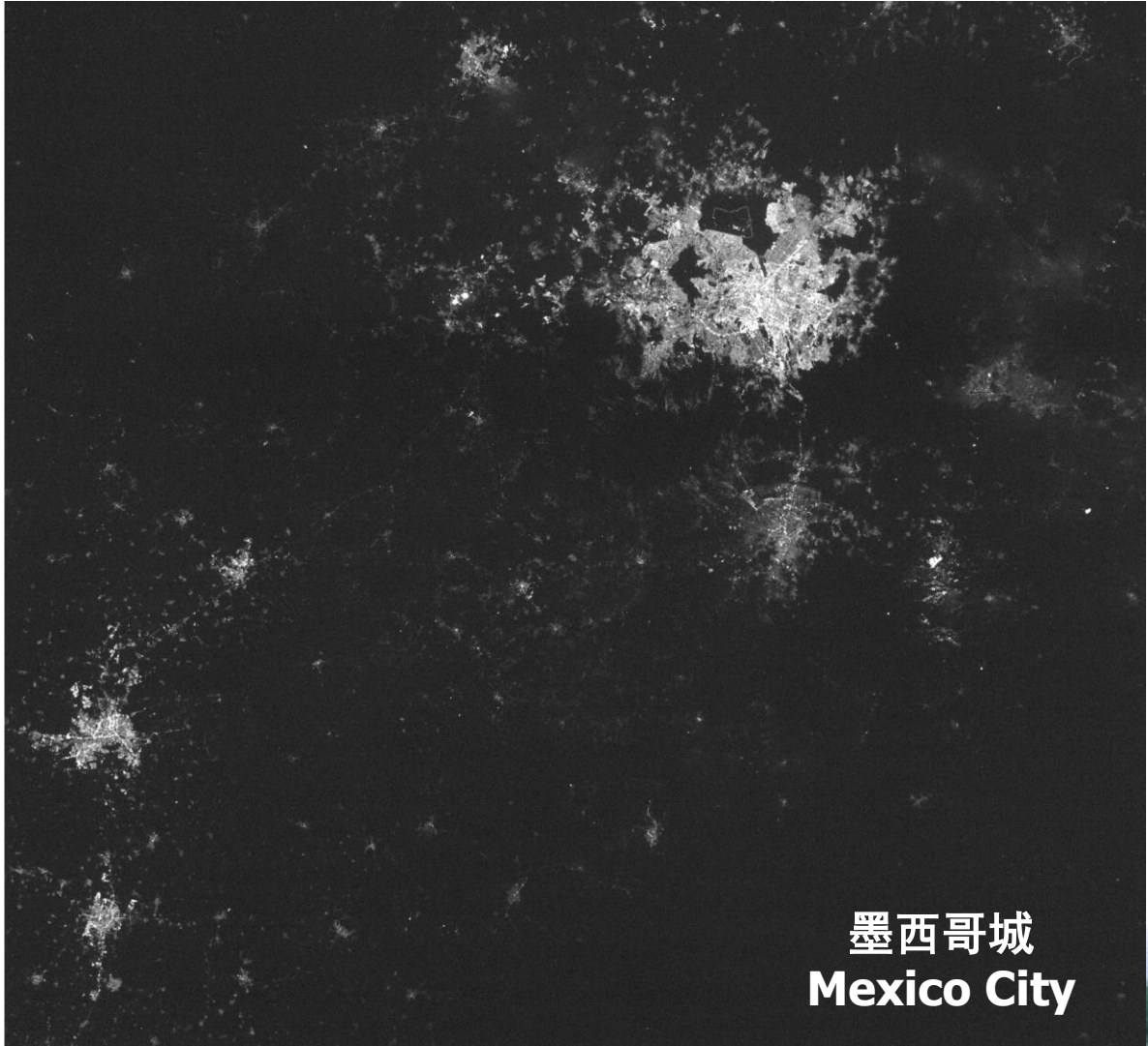
The VIIRS nighttime light image in Yemen in February, 2018





洛杉矶
Los Angeles

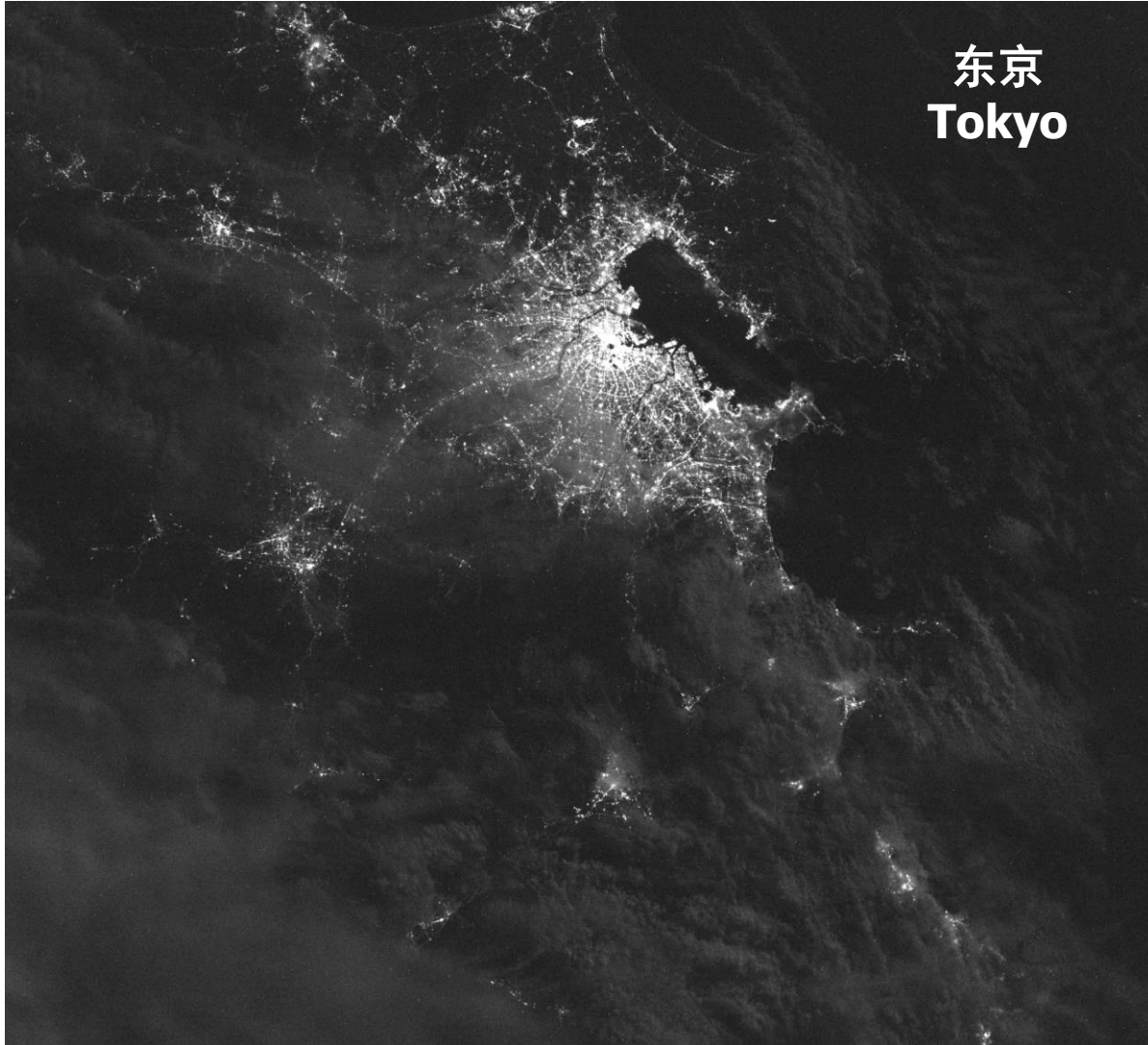


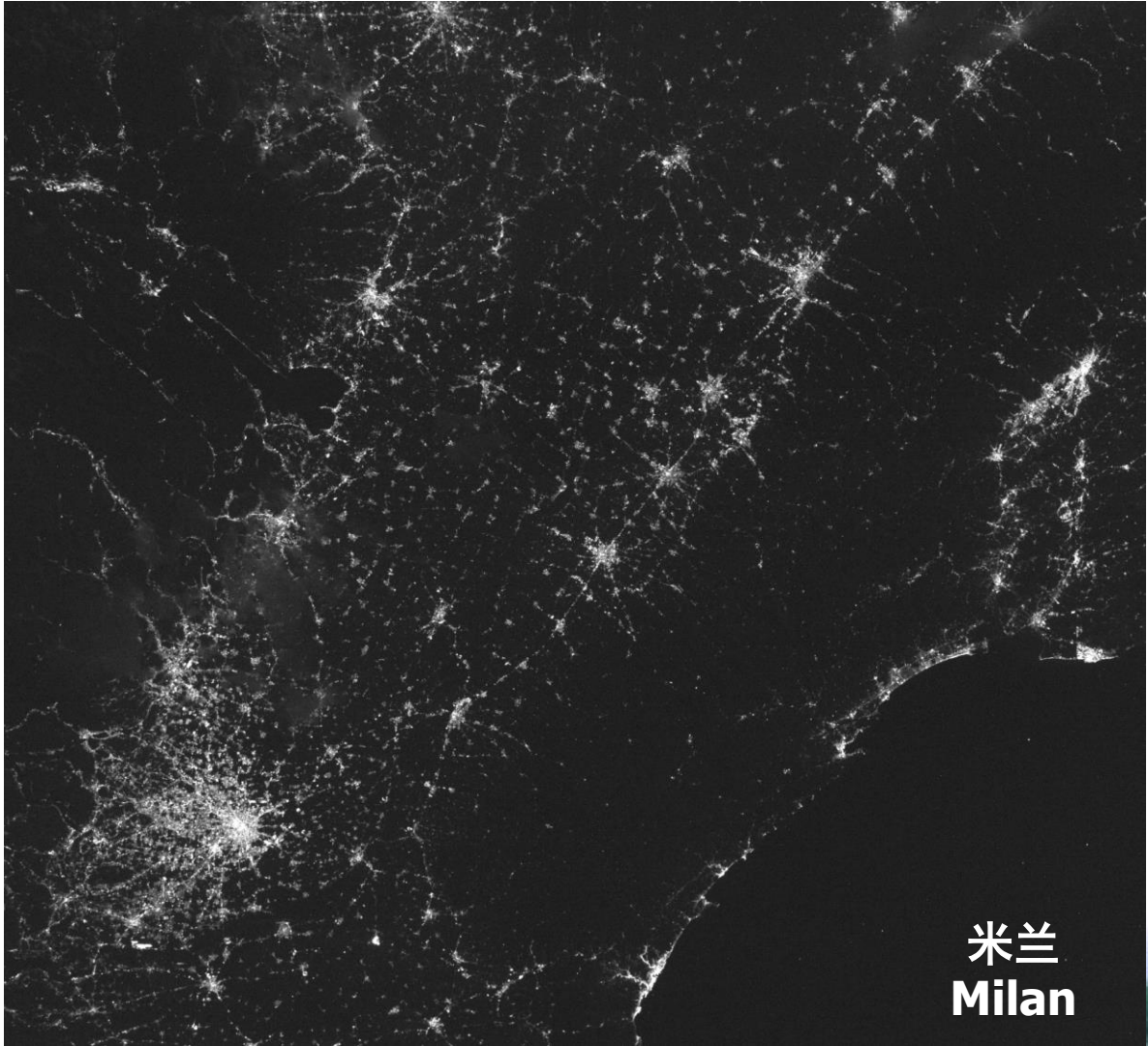


墨西哥城
Mexico City



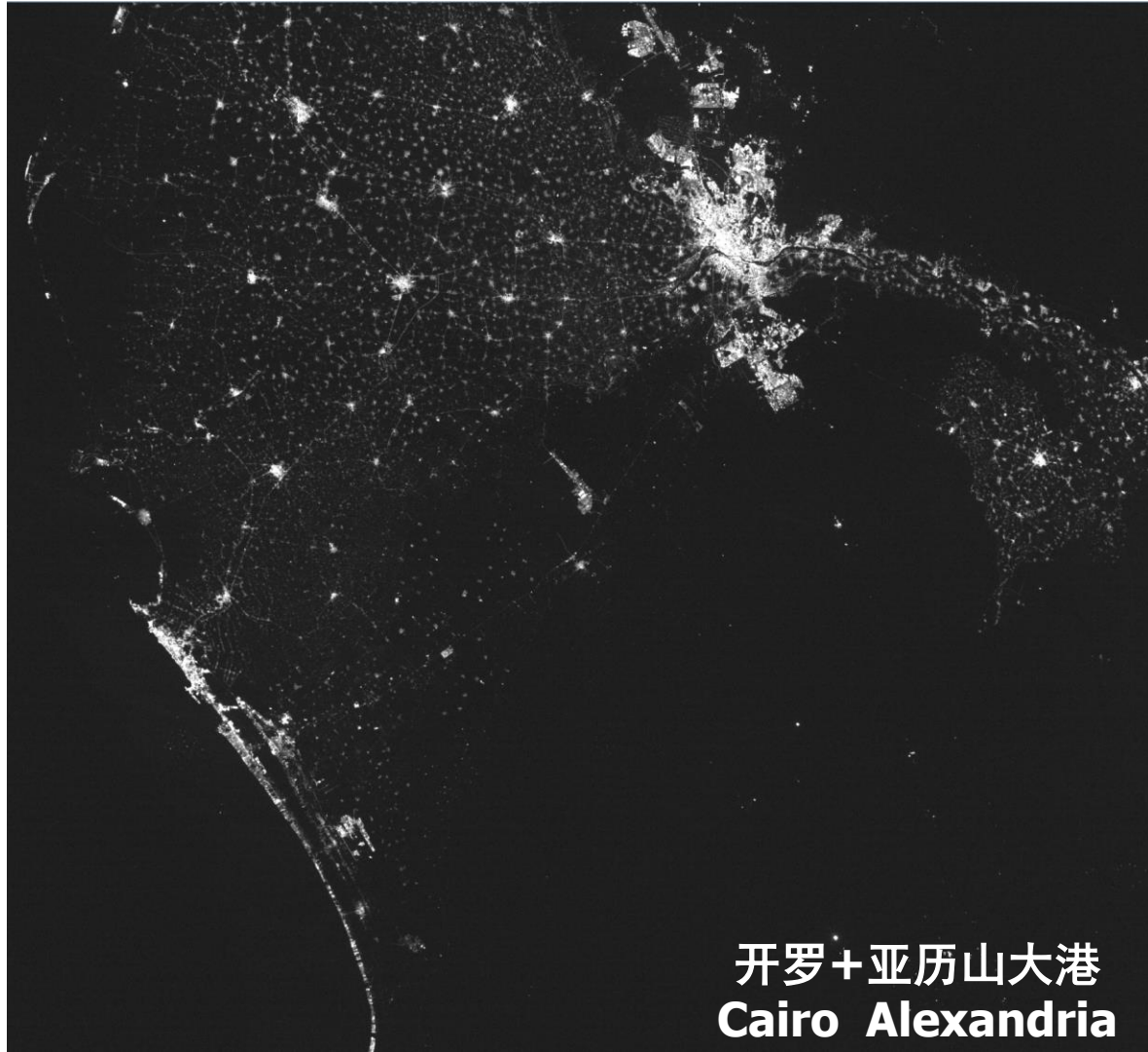
东京
Tokyo





米兰
Milan

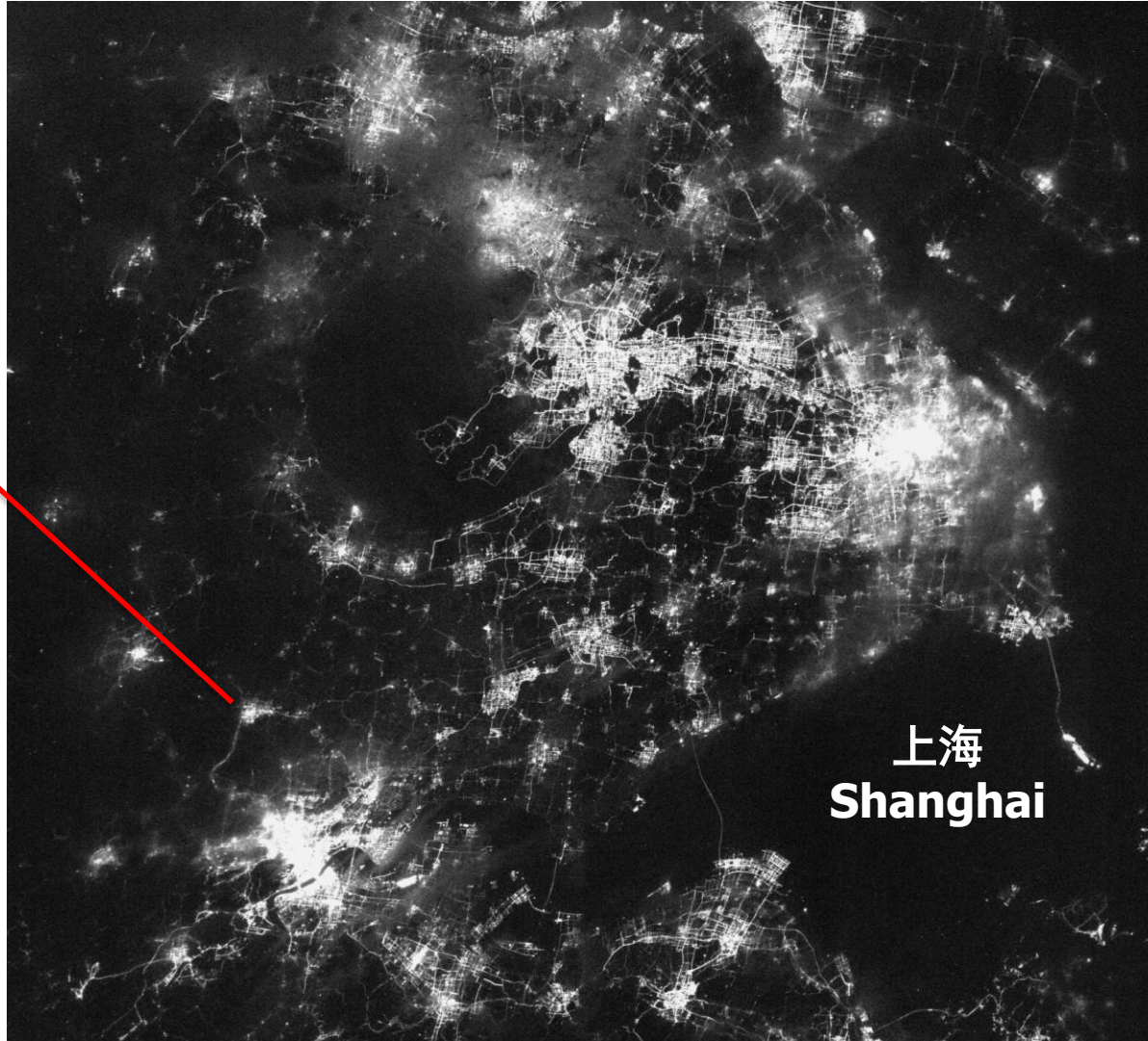




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上海
Shanghai



Data Open and Free Policy

<http://datasearch.hbeos.org.cn:3000/#>

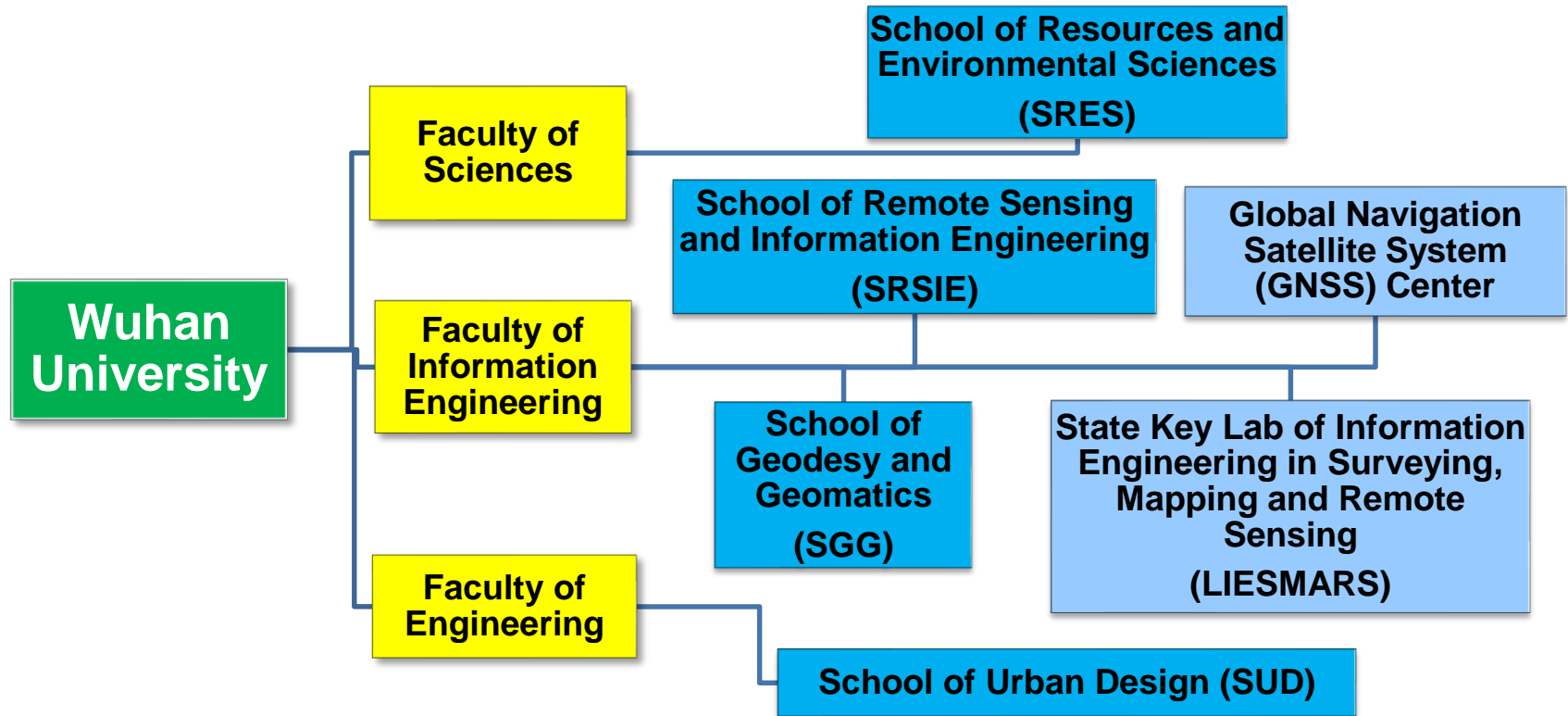




LJ1-01 App (Android)



Master and Ph.D GeoInformatics Programs in WHU



GeoInformatics Related Programs	Academic Staffs:	350
	Undergraduate Students:	3,000
	Graduate Students:	1,000
	Ph.D. Candidates:	500



Master and Ph.D Geoinformatics Programs in WHU

Master	Master of Science	<ul style="list-style-type: none"> ● Cartography & GIScience ● Photogrammetry & Remote Sensing ● Geodetics ● GNSS 	Chinese
	Master of Engineering	<ul style="list-style-type: none"> ● Geomatics ● Computer Applications 	Chinese/ English
Ph.D.	Ph.D. of Science	<ul style="list-style-type: none"> ● Cartography & GIScience ● Photogrammetry & Remote Sensing ● Geodetics ● GNSS 	Chinese/ English
	Ph.D. of Engineering	<ul style="list-style-type: none"> ● Cartography & Geoinformatics 	Chinese/ English



Master and Ph.D GeoInformatics Programs in WHU



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Some Thoughts on Capacity Building

Opportunities for Dialogue between Young People



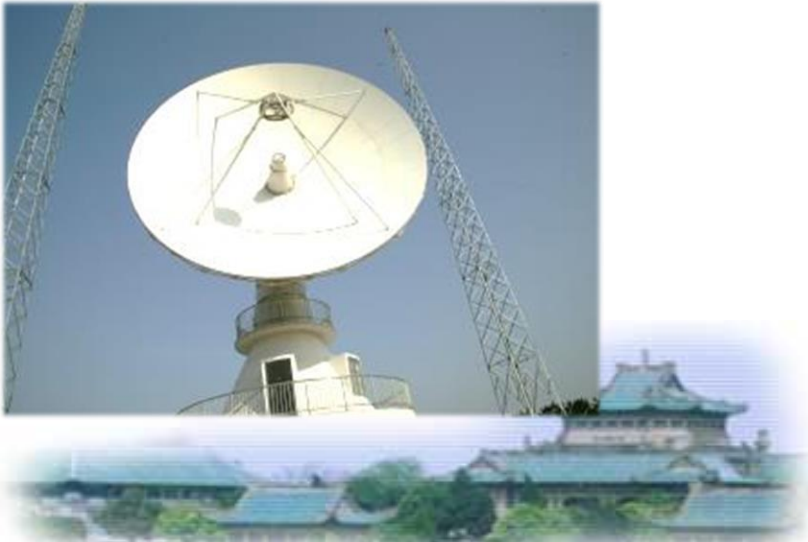
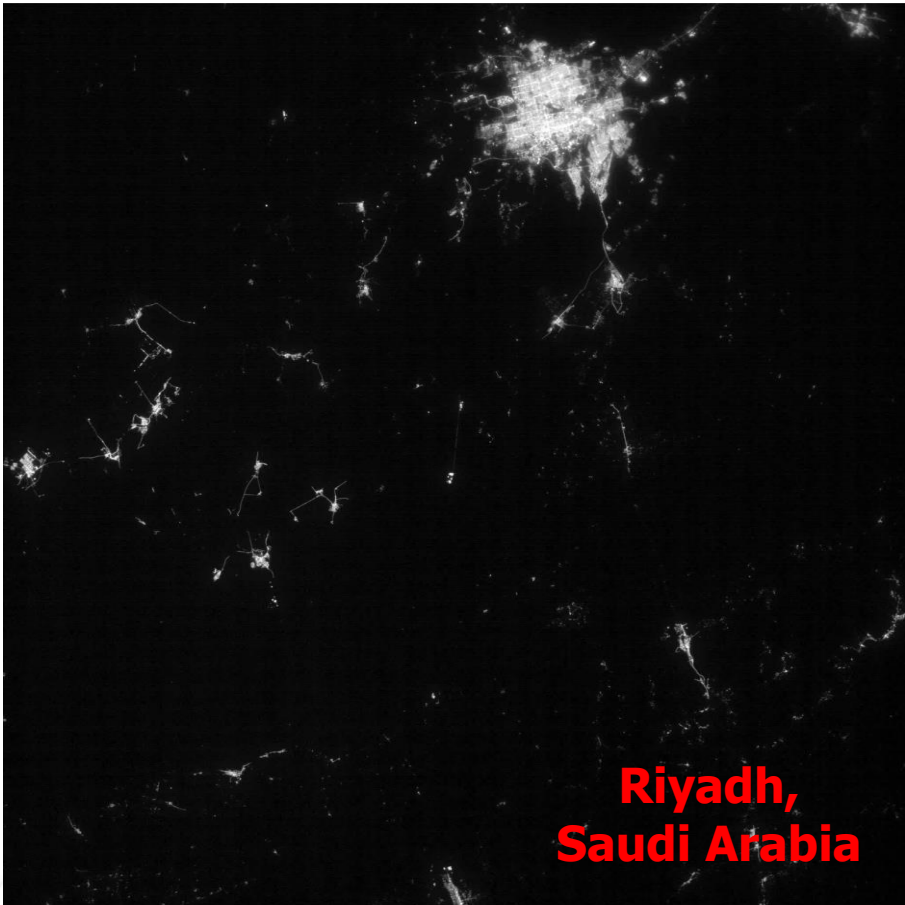
Some Thoughts on Capacity building

Affordable System Training and Practical Education



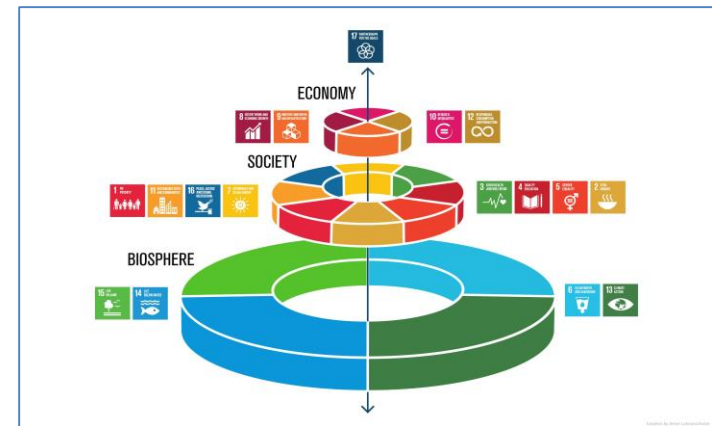
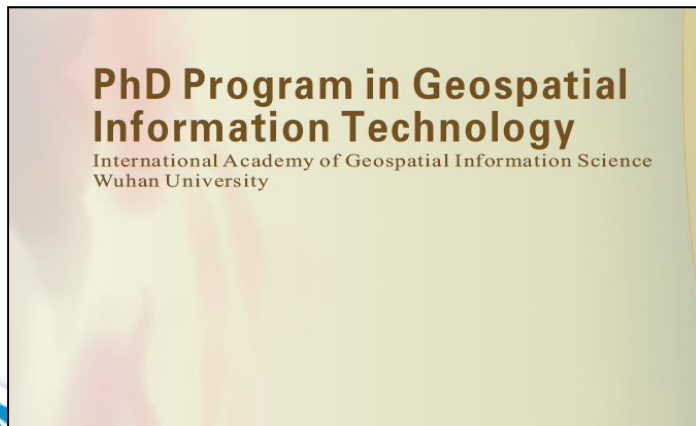
Some Thoughts on Capacity building

Open Data and Facilities Accessibility



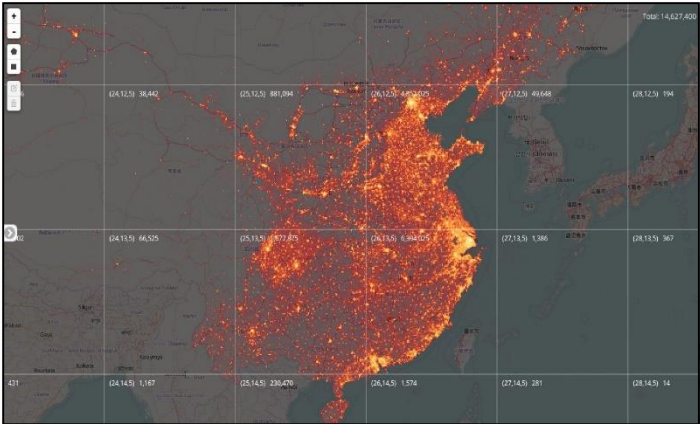
Some Thoughts on Capacity building

Cooperate on Education of GeoInformatics for SDGs



Some Thoughts on Capacity building

Develop Technology of GeoInformatics for SDGs



Take-away Messages

- Luojia 1-01 provides free and open night-time light RS images
- WHU provides dual-language Master and Ph.D. Programs for the world
- For Capacity Building for supporting SDGs, more opportunities should be created and especially for young people

Dialogue, Affordable Training, Education, Open Data, Accessible Facilities, Available Technologies



Thanks

