



Spatio-temporal Intelligence for SDG

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22/10/2025 Deqing

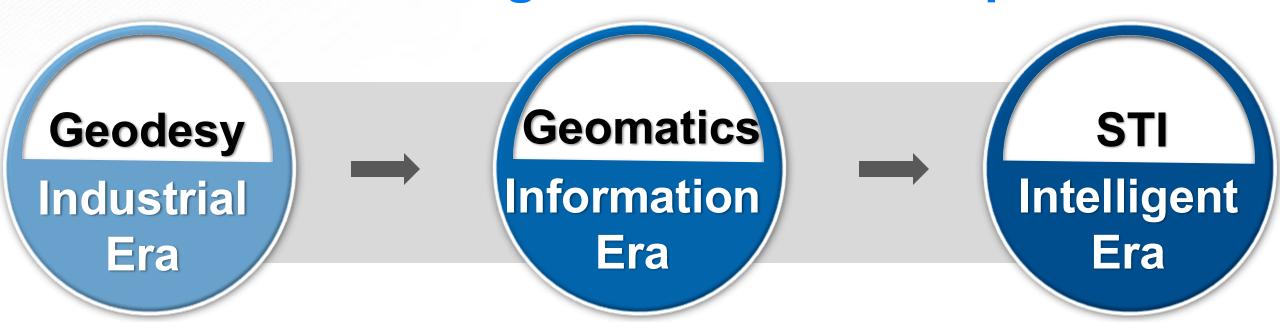
Contents of the Report

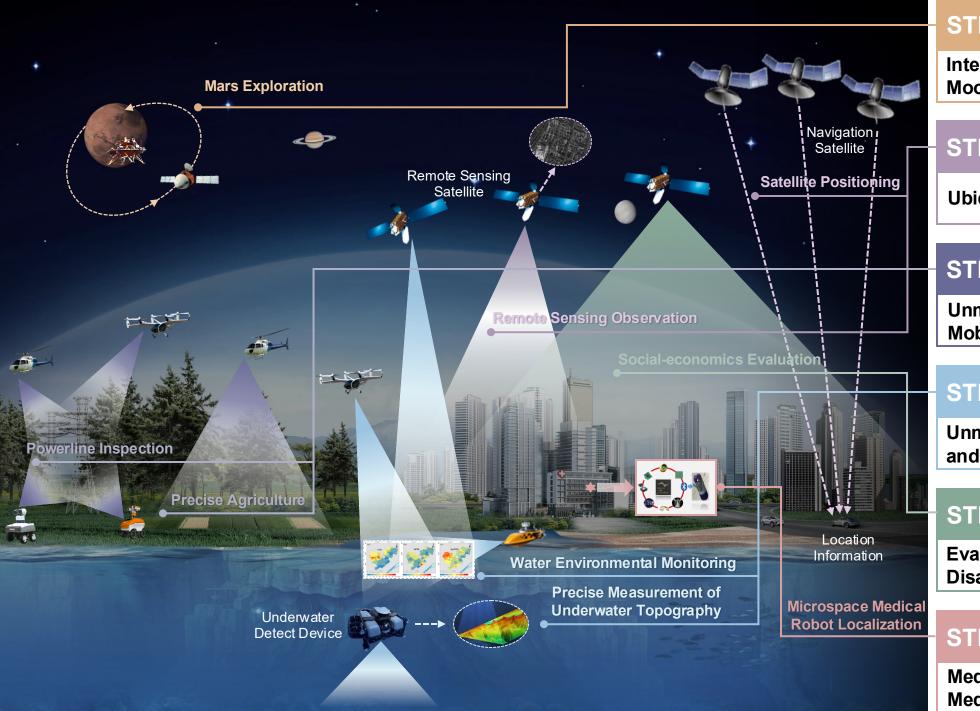
- 1. Spatio-temporal Intelligence (STI)
- 2. Ubiquitous PNT & PNTRC
- 3. STI for SDG
- 4. Conclusion and Future Work

Emerging Spatio-temporal Intelligence

The world is material, and matter is in motion, and this dynamic physical world is described through spatio-temporal information. In the era of Internet of Everything and Artificial Intelligence, spatial-temporal data acquisition, processing, information extraction, and knowledge mining need to become intelligent. Thus,

STI has emerged as a New Discipline





STI in Deep Space

Intelligent Exploration of the Moon and Mars

STI in Air-Space

Ubiquitous PNT and PNTRC

STI in Air-Ground

Unmanned Aerial Vehicle and Mobile Measurement Robot

STI in Underwater

Unmanned Photogrammetry and RS, Topographic Survey

STI in Social Economics

Evaluating Humanitarian
Disasters and Social Economics

STI in Smart Healthcare

Medical Images Interpretation, Medical Robot Localization

STI —— Intelligent Sensing Network Integrating Communication, Navigation, Remote Sensing and Computing

- When
- > Where
- What Object
- What Change
- > Why
- What Reaction

6 W



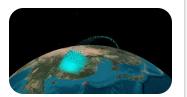
- Right Place
- > Right Data

/Information/Knowledge

Right Person



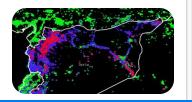
Integrated Full-domain Spatio-temporal Intelligence for Air, Space, Ground, and Sea













Strengthen the Military, Enrich the Nation, Benefit the People, and Promote Sustainable Development

STI on Communication, Navigation, Remote Sensing and Computing

- 1. In the material world of motion, STI completes things that people want to do but cannot do well and things that people do not want to do. The goal is to promote sustainable development
- 2. If Internet-based AI replaces human mental activities, it may weaken the process of human intelligence. Hinton, the father of AI, believes that AI has long been conscious, and the intelligence we have created may bring an end to human civilization

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PNT Service

PNT services are based on global satellite positioning systems (GNSS) which provide spatial and temporal references. These systems utilize the internet and mobile networks for communication, and provide users with location, direction, speed, time synchronization services.







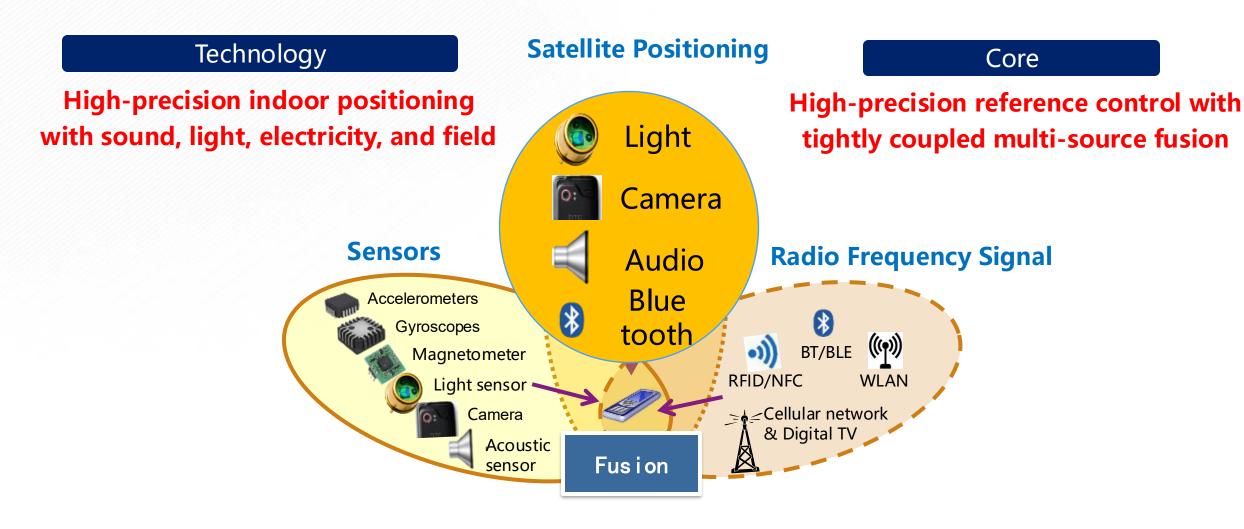


GNSS-Beidou BDS

- ◆Provides short message services, capable of transmitting up to 240 bytes (120 Chinese characters) of information at a time, with Beidou-3 reaching 1000 Chinese characters.
- ◆Adopting signals modulated on three frequencies B1/B2/B3 and satellite-based PPP technology, significant for navigation and positioning above the centimeter level (carrier phase ambiguity resolution).
- ◆The combined use of GEO-satellites, MEO-satellites, and inclined orbit satellites provides advantages in positioning for both low latitude and high latitude areas.

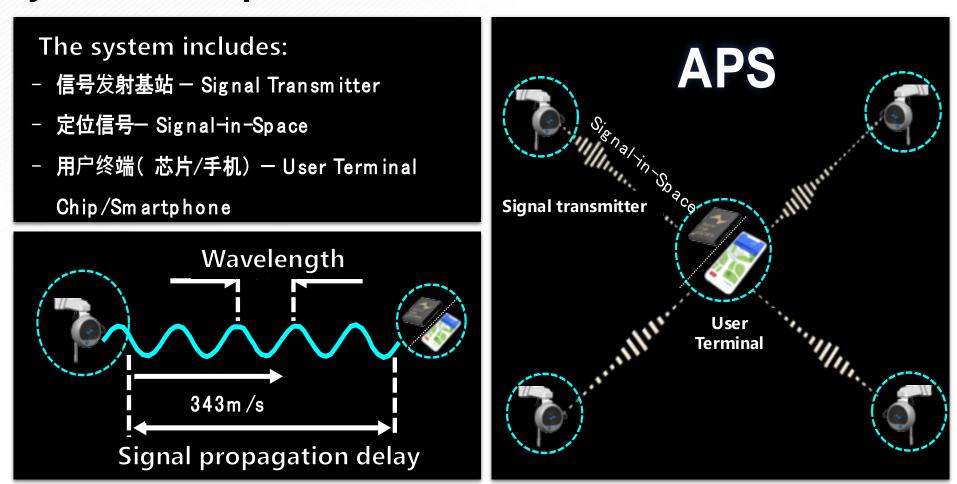
Integrated Positioning Services

Multi-source fusion indoor positioning on mobile phones



Acoustic Positioning System

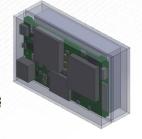
A full chain of hardware solutions ranging from positioning signal design, chips, positioning modules, positioning tags, positioning base stations, and cross-system, cross-platform software solutions.



Audio-based Positioning System - Integrated Hardware and Software Platform

Mobile Phone









Tags

Audio Signal Integrated Positioning Transmission Audio and Video



Evaluation Board



Chip



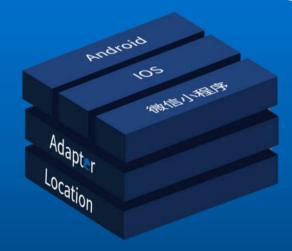
Software



Embedded Software

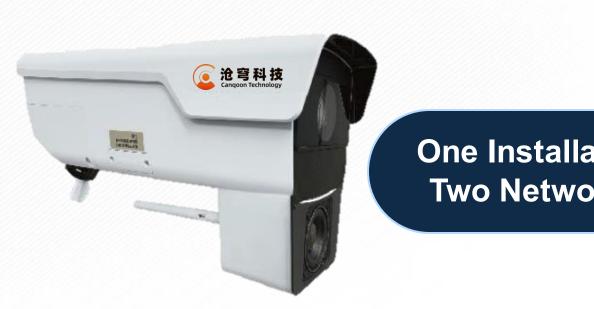


SDK/APP



Cross System and Cross Platform Software

Integrated Audio and Video Camera



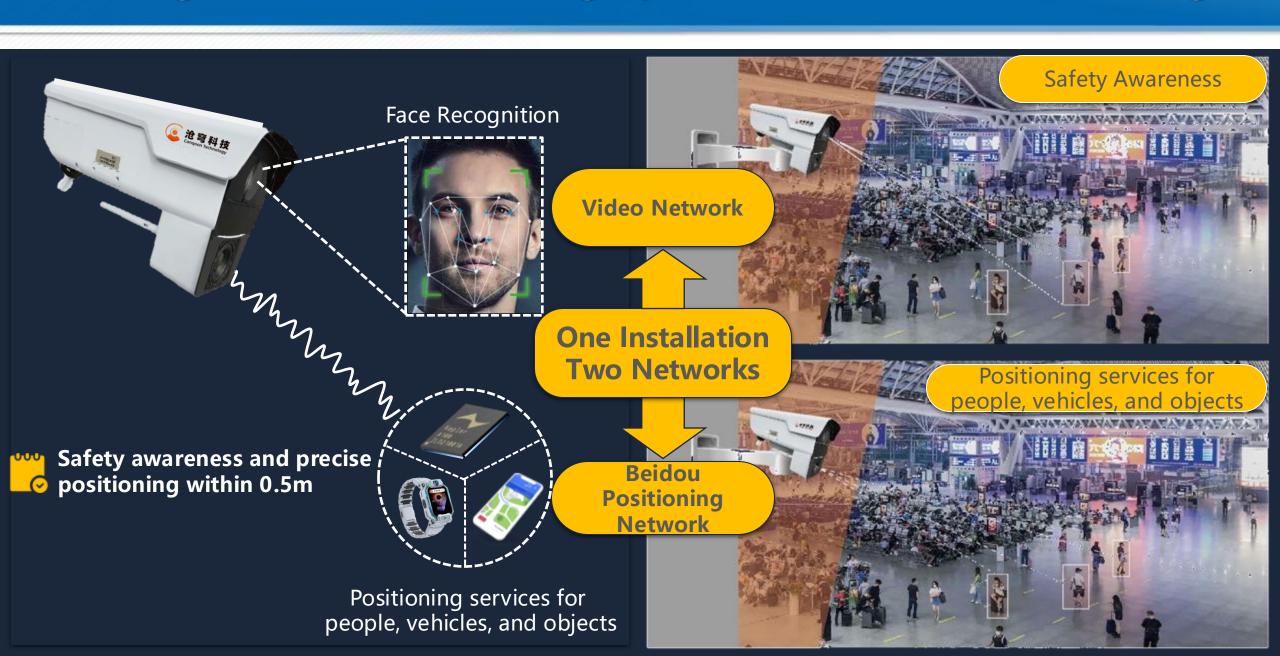




Simply replace cameras in public such as airports, train stations, and exhibition centers to achieve sub meter level positioning services for people, vehicles, and objects.



Integrated Video and High-precision Indoor Positioning



Independently Controllable from the Chip Source



** China

Precision 0.1-0.4m

Compatible with smartphones Unlimited user capacity

Popular applications Easy to promote (Supports WeChat)

Low synchronization accuracy requirements Low construction and maintenance costs

Non interfering with RF signals

Independently controllable

Aim: Domestic Substitution



US

Precision 0.1-0.4m

Poor compatibility

Popular applications Hard to promote

High synchronization accuracy requirements High construction and maintenance costs

Risk of interference with RF signals

US Technology



Overall performance is superior to US technology

Applications of Audio Positioning

Case 1: Smart Security

Nanjing South Railway Station

Cover 550,000m²

Real-time location services for public security police officers



Case 2: Smart Logistics

Ezhou Shunfeng Airport



Indoor and outdoor positioning of people, vehicles, and objects

460,000m²

Precise Positioning Service

Case 3: Ride Hailing

Hangzhou East Station

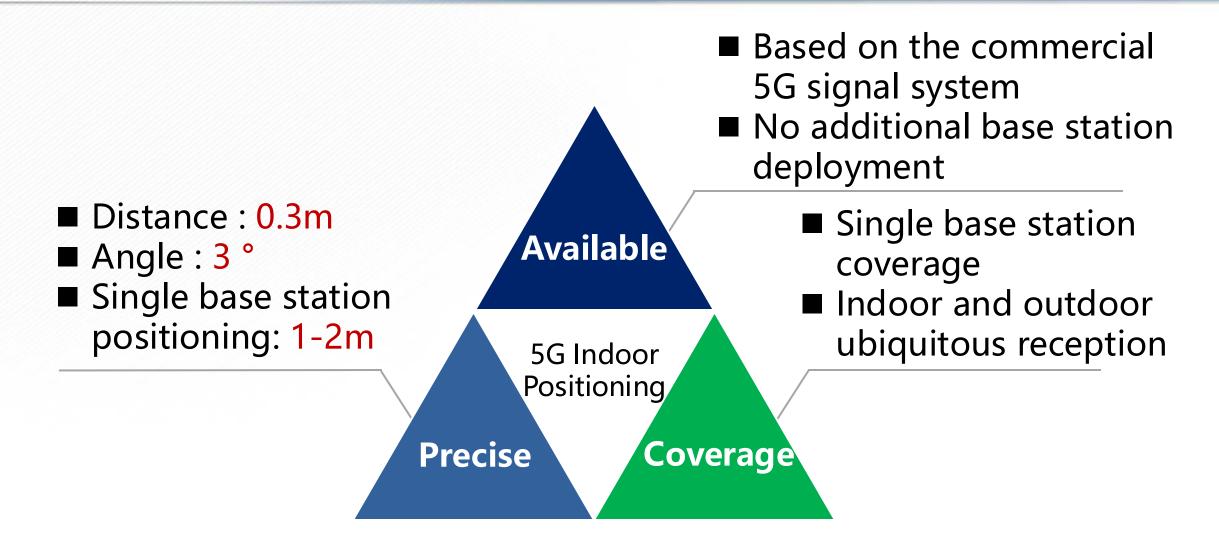


Positioning navigation, location sharing, ride hailing services





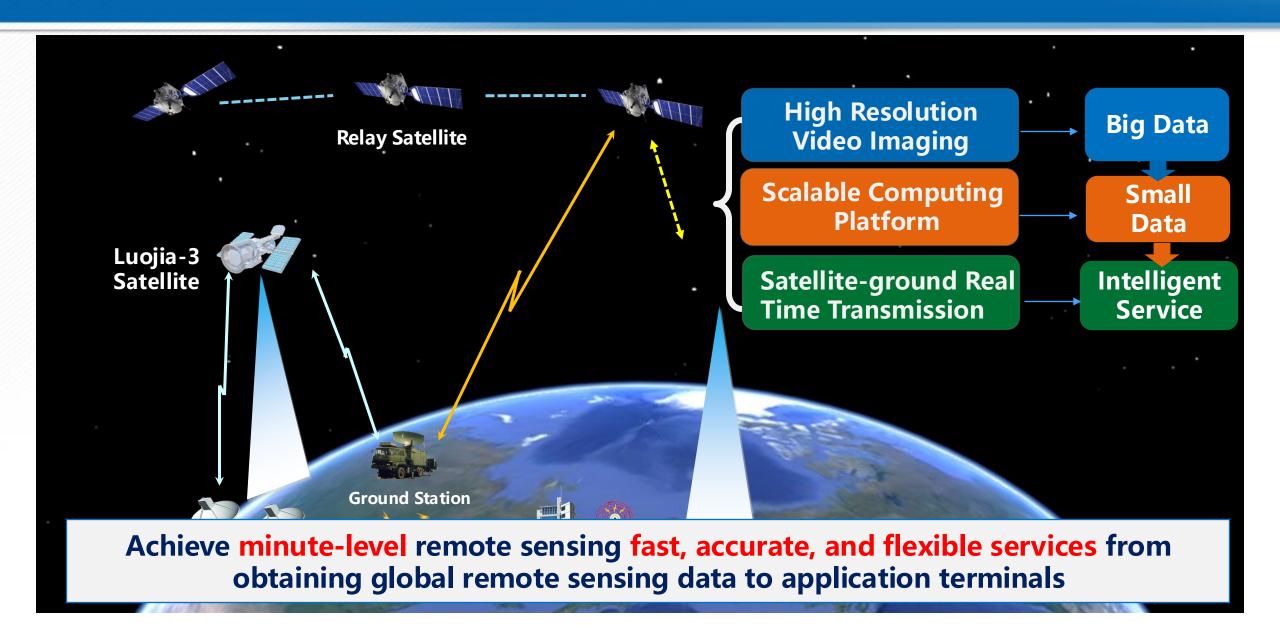
Commercial 5G Multi Beam Intelligent Positioning



Base on Commercial 5G Networks without Changing the Existing 5G Signal System, Provide Effective Solutions for 5G Indoor Positioning



From PNT to PNTRC



Software-defined PNTRC

Isolated Systems

Multi-function satellites, networked constellation Space-earth interconnected, integrated networks

Connected Systems

Separate Information

Standardized benchmarks, relational representation Data mining, knowledge discovery

Spatio-temporal Fusion

Outdated Services

Space-ground collaboration, networked transmission Intelligent processing, on-demand service

Unimpeded Service

Urgently need

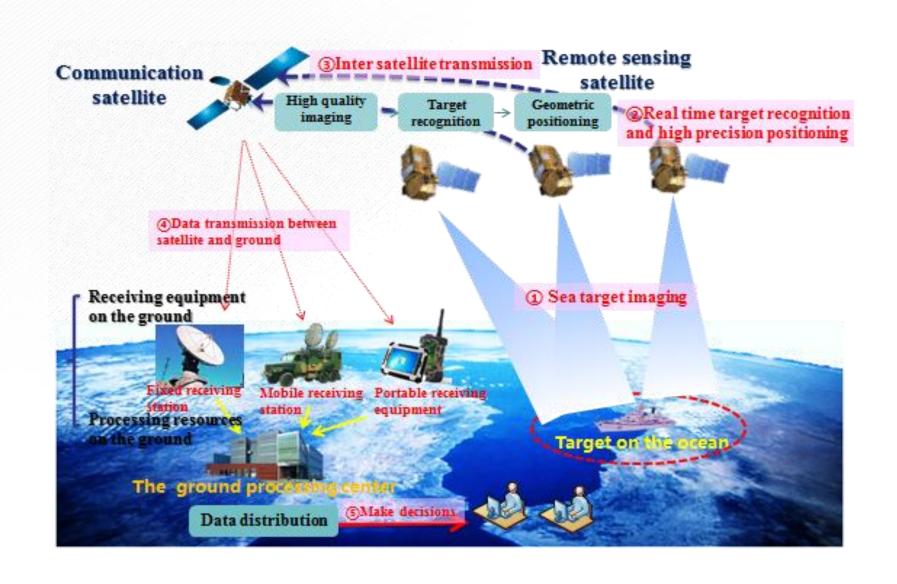
development

PNTRC

Advanced progress

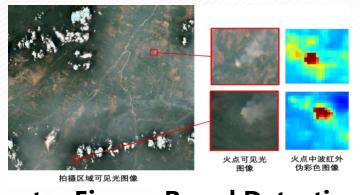
Space-based Information: professional services → public applications Industry Development: national support → marketization, internationalization

Remote Sensing: Isolated Satellites → EOB

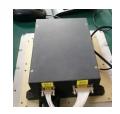


On Board Processing at Jinlin 01/02

An on board automatic processing software has been developed for forestry fire detection and positioning. Using Beidou short massage communication, second level transmission from sensor to end user is realized.



Forestry Fire on Board Detection







地球观测与导航重点专项项目在"星载在轨智能处理技术"研究中取得突破

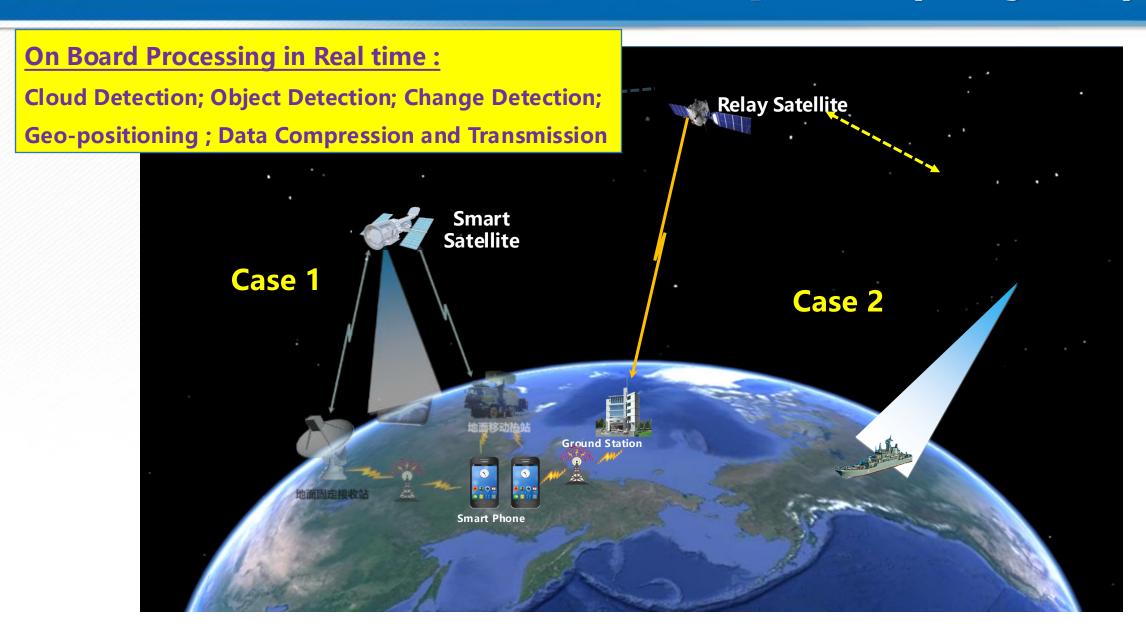
发布时间: 2019-07-09 15:03:42 作者: 张超 来源: 本站编辑 浏览次数: 1118

高时效性是突发事件应急响应的灵魂,对卫星获取的视频/图像直接进行在轨智能处理,实现分钟级甚至秒级的"从传感器到射手"的应用,是提升应急响应工作效能的核心技术之一。

由武汉大学牵头承担的国家重点研发计划"地球观测与导航"专项"区域协同遥感监测与应急服务技术体系"项目针对此进行了深入研究,团队联合长光卫星技术有限公司等单位提出了星载在轨处理应急响应技术体系,突破了目标监测与跟踪、高性能处理、多任务调

Developed System Web News from Ministry of Science and Technology

Real Time RS to Your Smartphone (Luojia3a)

















Luojia3-01 shooting Snow Dragon to Australia Fremantle port for loading and unloading supplies, 2023-11-14T10:12:47

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SUSTAINABLE GALS DEVELOPMENT GALS





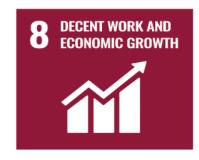
































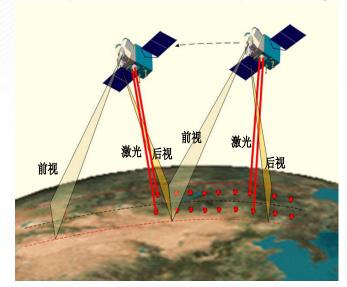
Block Adjustment and Global Mapping without GCPs for Large-scale Regions Based on ZY-3

Using 60 CPUs + GPUs, block adjustments without GCPs have been conducted based on the national ZY-3 satellite data (8,810 images, 20TB of original data). A weighted iterative posterior variance estimation method was applied for gross error detection, automatically selecting 3 million robust tie points from 2 billion matching points. The autonomous georeferencing accuracy of remote sensing images is better than 5 meters, meeting the global 1:50,000 mapping standard. We have now completed the map of 130 million square kilometers of global mapping, supporting national defense and the Belt and Road Initiative.

Technical Characteristics of GF7 satellite

"Dual line array camera + two-beam laser altimeter" composite system

By correlating the "invisible" laser and "visible light" images through the footprint camera, laser optical composite mapping can be achieved.



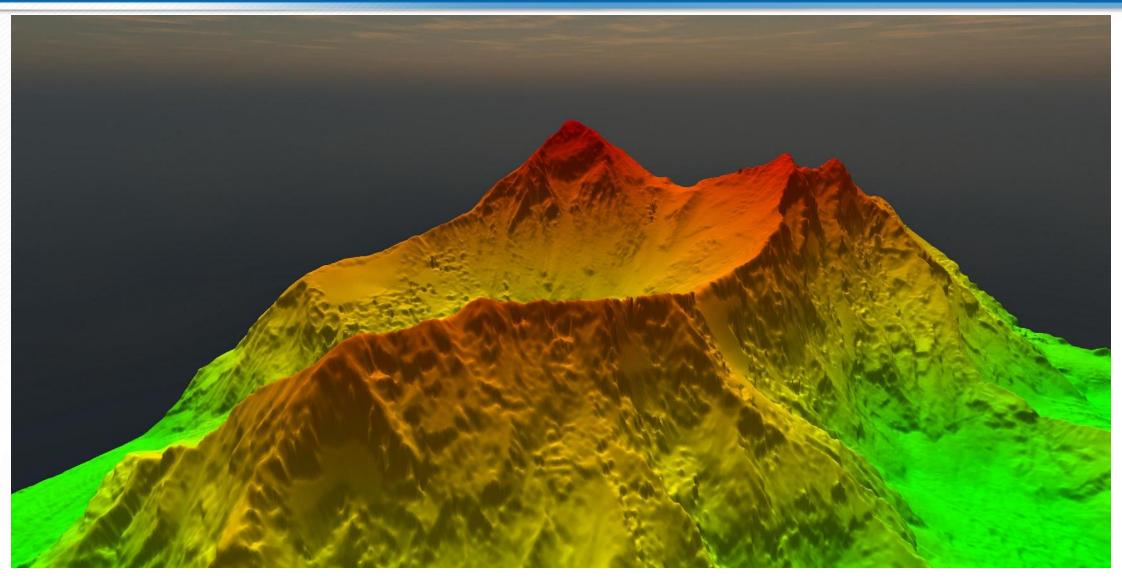




Laser footprints are not visible

The correlation between laser and optical images is realized by footprint images

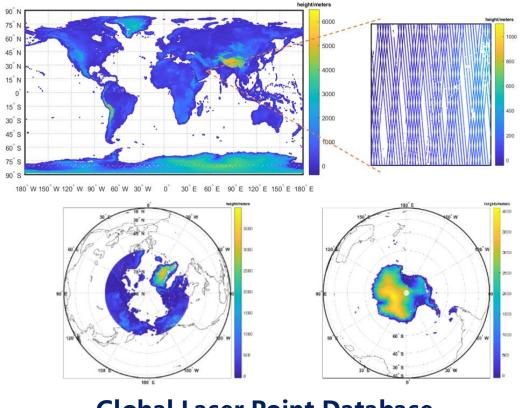
Main Products of GF7 Satellite



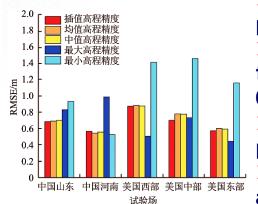
DSM in the Mount Everest Region

Global High-Precision and Uniformly Distributed Laser Elevation **Control Point Database**

A global satellite-borne laser altimeter elevation control point data set has been constructed, with the elevation accuracy better than 0.89m and a data volume of 20.2 GB. The high-precision satellite-borne laser data supports multi-source remote sensing data fusion.



Global Laser Point Database



- **▶Density:** The average density reaches 30-50 points per km²
- >Elevation Accuracy: Verification in five test fields globally shows an RMSE of less than 0.89m
- >Temporal Distribution: Data collected over the past three years (approximately 13TB)
- >Spatial Distribution: Coverage of global land areas

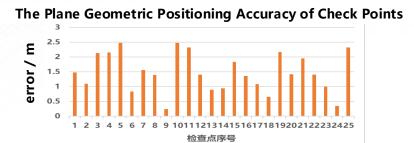
Primary Applications:

- Quality Assessment: Provide high-precision reference elevation data for data product accuracy assessment
- Co-Adjustment of Laser Altimeter Data: Supply highaccuracy elevation control points for stereo mapping with sparse or no GCPs
- > Multi-Source Terrain Fusion: Support the repair and refinement of other DEMs

Co-Adjustment Accuracy Analysis and Quality Control for Multi-Source Remote Sensing Data

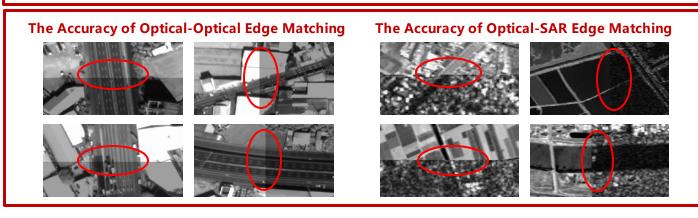
The co-adjustment of GF14 and GF7 data was completed for an overseas region, with positioning accuracy improved from an in-plane RMSE of 7.8meters and an elevation RMSE of 5.5 meters to an in-plane RMSE of 1.9 meters and an elevation RMSE of 1.3 meters. The accuracy of optical-optical edge matching was better than 1 pixel, while the accuracy of optical-SAR edge matching was better than 2 pixels.

- 66 GF7 optical stereo image pairs
- 48 GF14 optical stereo image pairs
- 16 SV2 SAR images
- 88 laser points





Check of the Edge Matching Accuracy Row Offset (pixels) Column Offset (pixels) The Accuracy of Requirement **Edge Matching Maximum** Maximum **RSME RMSE Error Error Optical-optical** better than 1 pixel 0.46 0.85 0.54 0.98 **Optical-SAR** better than 2 pixels 1.93 1.33 1.52 1.99



Global Orthorectified Map Based on GF-3

Original Data: 96T

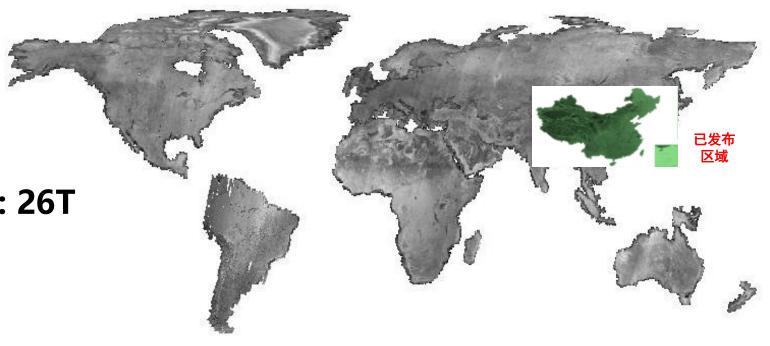
Calibrated Data: 38T

Converted Data: 26T

Color Uniformed Data: 26T

Tiled Data: 11T

Total Data: 197T



Using the 10m resolution images from the global GF-3 FS2 data, a global SAR reference map was produced. The national SAR reference map was released in 2018 as China's first high-resolution global radar orthorectified map covering land areas and major islands.

Accuracy Verification of the National Surface Deformation Map (Sentinel-1)

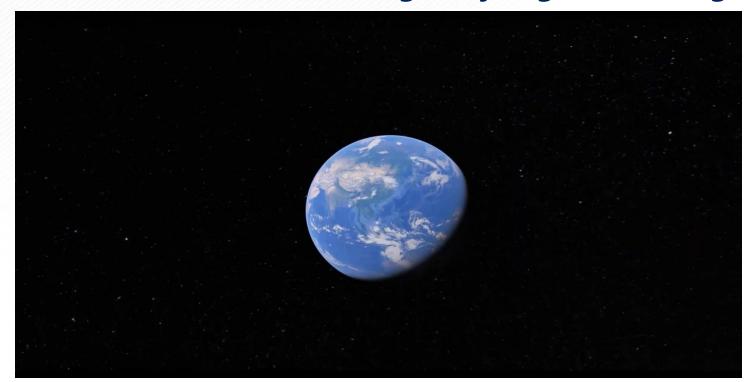
Verification was performed using data from 2,317 Qianxun CORS stations, covering a total of 2,009 coherent areas in the national deformation map, with a verified deformation accuracy of 4.818 mm/year.

Accuracy Statistics (unit: mm/year)

| No. | Station | Lat | Lon | CORS | InSAR | Diff. |
|---------------|---------|-------|--------|--------|--------|--------|
| 1 | UBYH | 32.33 | 111.05 | -2.68 | -8.33 | -5.65 |
| 2 | SDRG | 37.34 | 122.42 | -3.33 | -8.67 | -5.34 |
| 3 | YNES | 24.18 | 102.40 | -6.22 | -9.01 | -2.79 |
| 4 | ENTB | 32.38 | 113.41 | -12.90 | -9.02 | 3.88 |
| 5 | FJMH | 25.96 | 119.23 | -2.95 | -9.94 | -6.99 |
| 6 | YNLF | 25.15 | 102.08 | -5.85 | -11.29 | -5.44 |
| 7 | BJDS | 40.08 | 116.41 | -7.60 | -12.27 | -4.67 |
| 8 | ENLC | 33.79 | 111.61 | -9.16 | -13.19 | -4.03 |
| 9 | GDDH | 22.05 | 112.97 | -9.14 | -15.00 | -5.86 |
| 10 | XJWJ | 44.17 | 87.54 | -21.18 | -23.19 | -2.01 |
| 11 | SDRG | 37.34 | 122.42 | -3.33 | -8.67 | -5.34 |
| ••••• | ••••• | ••••• | ••••• | ••••• | ••••• | ••••• |
| 2009 | YNSD | 24.71 | 99.19 | 2.89 | -8.48 | -11.37 |
| Maximum Error | | 41.5 | | RMSE | | 4.818 |

Automated Remote Sensing Monitoring of Natural Resources: National Greenhouse Map

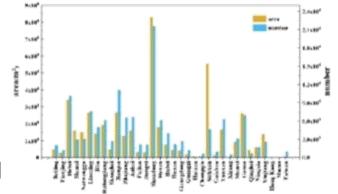
In response to the need for greenhouse extraction in natural resource monitoring, a dense-object deep learning extraction network was designed, and a nationwide 0.5-meter resolution image database of 59.785TB was constructed. 13,647,764 greenhouses across the country were extracted, achieving an accuracy of 85.78% on validation sets in Shandong, Xinjiang, and Shanghai.



In August 2018, a mobilization meeting was held to lunch a national campaign addressing the issue of "illegal greenhouse structures"



National Greenhouse Distribution Heat Map



Provincial Greenhouse Distribution Statistics

女化遗产数字化保护案例

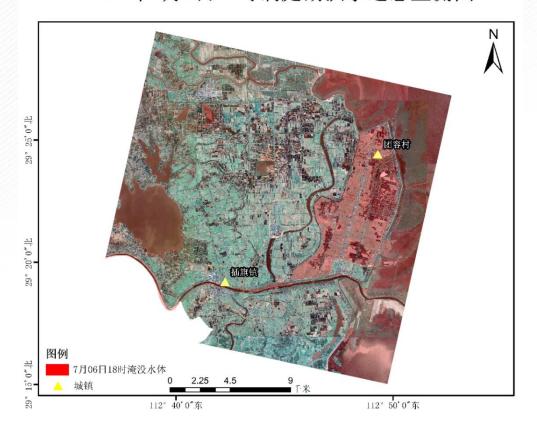
Case Study on Digital Protection of Cultural Heritage

武汉大学 武汉大势智慧科技有限公司

Remote Sensing Flood Prevention - Dongting Lake

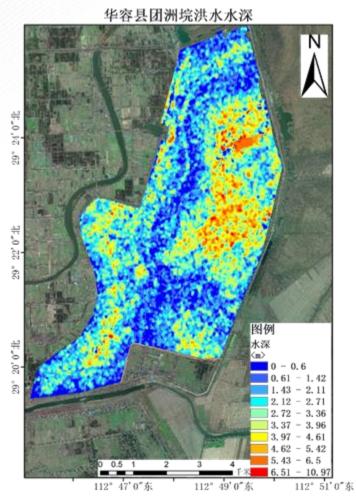
At 16:00 on July 5, 2024 pipe surge, at 17:48 July 5, the dam broke. On July 6, a large-scale flooding occurred. At18:00 July 6, the flooded area reached 47.63 square kilometers, with a water volume of 222 million cubic meters.

2024年7月6日18时洞庭湖洪水遥感监测图

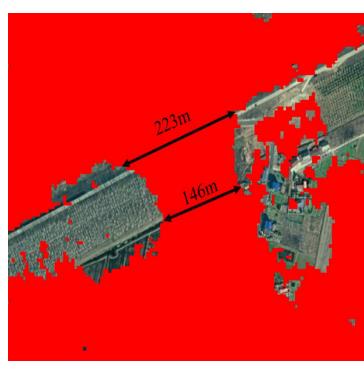


|图单位:武汉大学水利水电学院、武汉大学测绘遥感信息工程国家重点实验室

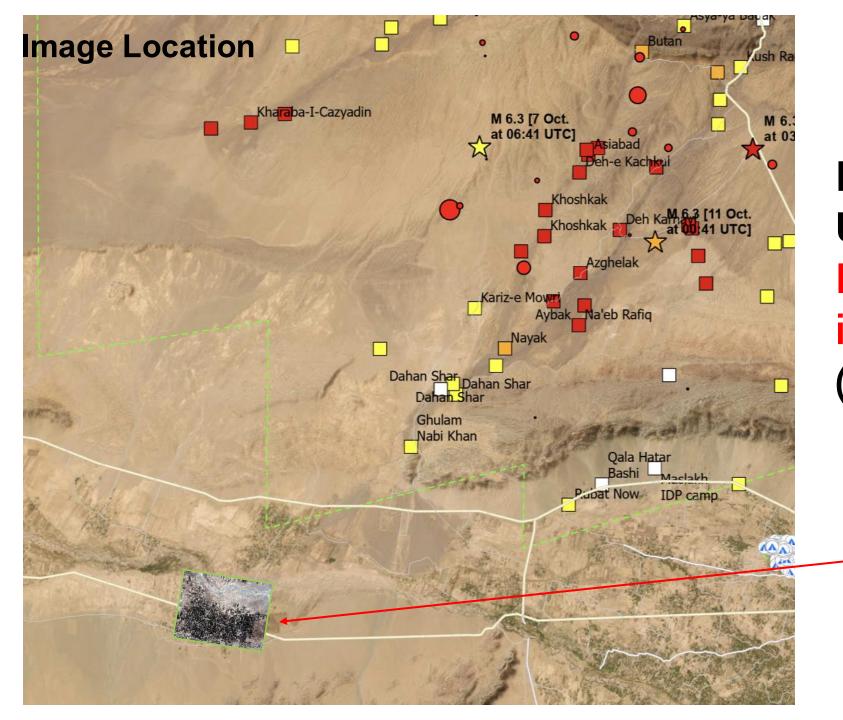
同分辨学内电观测系统领北效缩与应用中心 GAR数据:国家航天局对地观测与数据中心(高分三号)



Embankment breach



(112.82°E, 29.43°N) 146m-223m Width



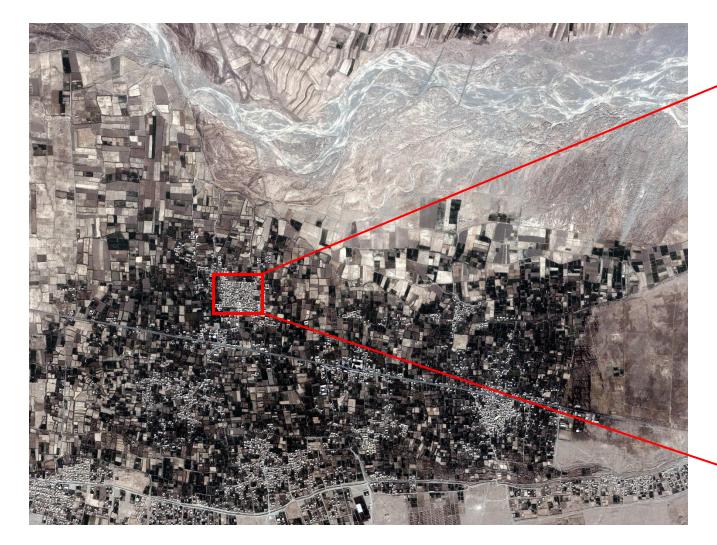
Luojia3-01 supports UN Earthquake Disaster assessment in Afghanistan (October 2023)

Zendeh Jan district of Herat province

34.34475° N 61.74092° E

Comparation to Google Earth image

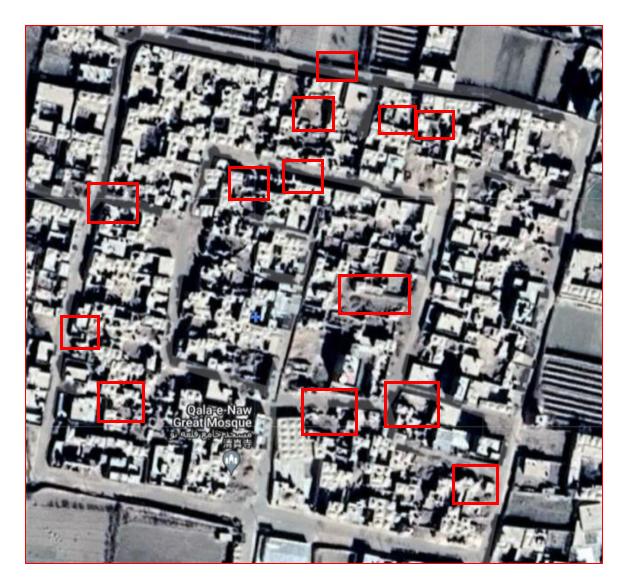
Luojia3-01 supports UN Earthquake Disaster assessment in Afghanistan (October 2023)





Zendeh Jan Village 1 Location 34.34969° N 61.73651° E

Comparation to Google Earth image

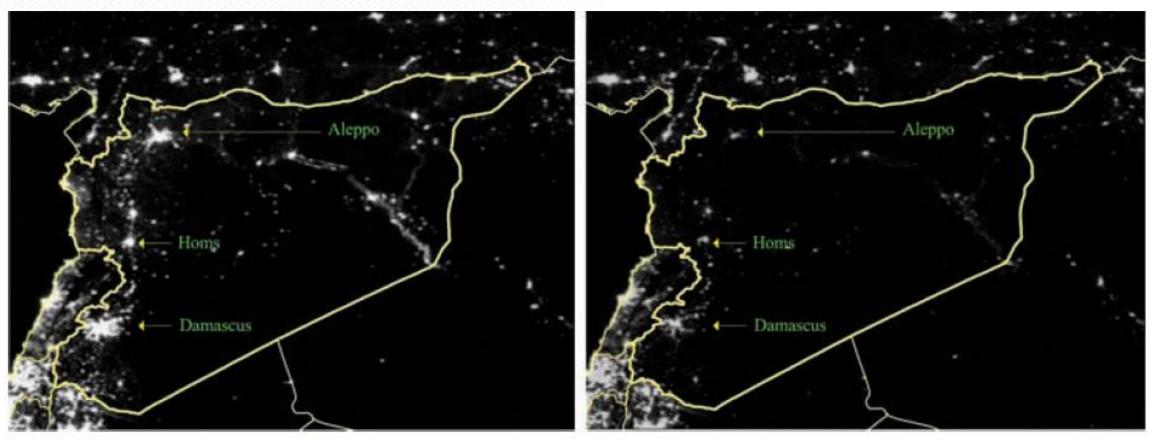


Luojia3-01 supports UN Earthquake Disaster assessment in Afghanistan (October 2023)



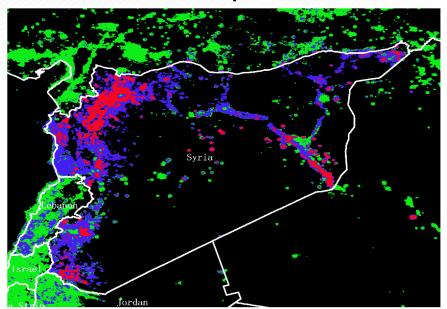
Google Earth

- We use the satellite images to show the night-time light in Syria
- Most of previously lit areas have fallen to darkness during the war



March 2011 February 2014

- By using clustering analysis multi-temporal night-time light images, the spatiotemporal pattern of the night-time light is revealed
- ✓ The three-class map shows different night-time light variation patterns with the
 international border as the pattern border
- ✓ Red class: sharp decline; Blue class: decline; Green class: stable





Clustered Night-time Light Temporal Patterns

Average Night-time Light of Three Classes



AL Jazeera

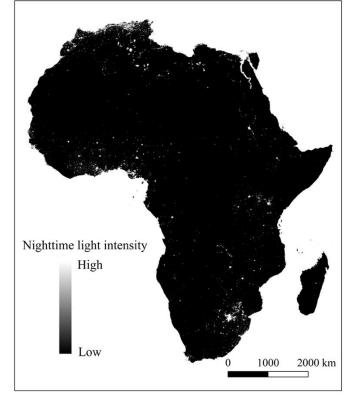


7418th Meeting in UN Security Council

Mapping Economic Development in Africa

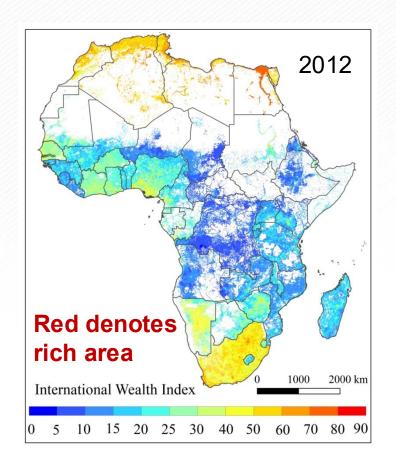
- Africa is the region that is furthest from achieving the global Sustainable Development Goals (SDGs), and there is a severe shortage of statistical data on sustainable development in Africa
- Night-time light remote sensing is helpful for conducting SDG assessments in Africa

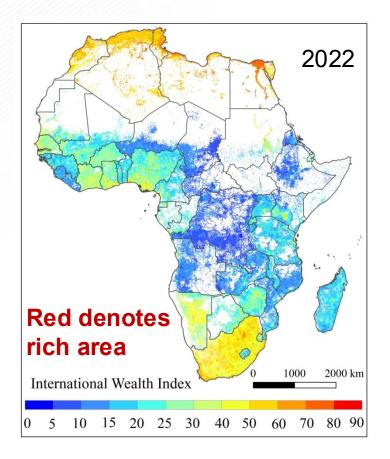


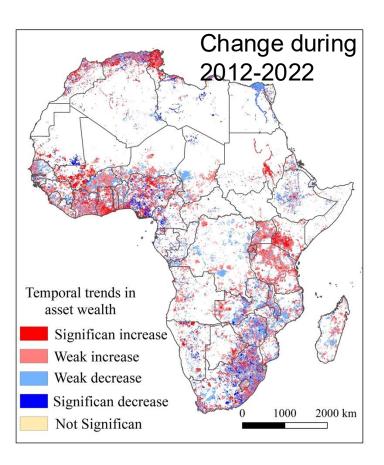


Mapping Economic Development in Africa

■ Considering that most areas in Africa are without light, a method was proposed to make full use of the neighborhood information of night-time lights to estimate Wealth Index in Africa



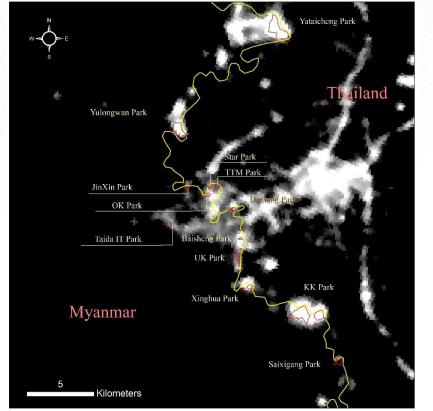


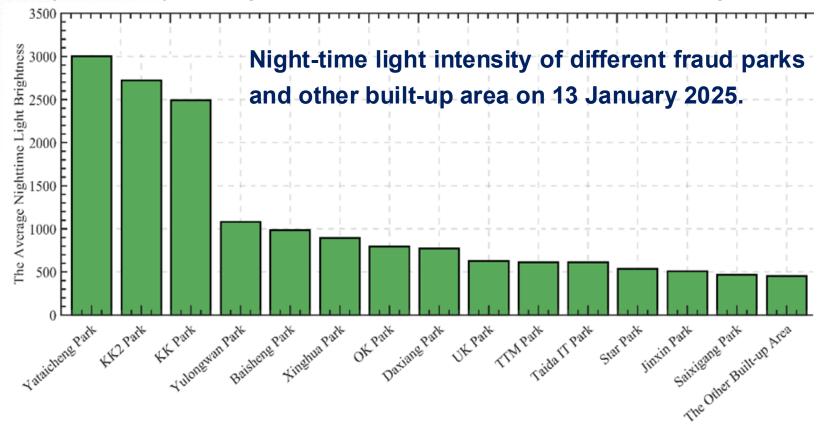


Wang, M., Li, X., 2024. Estimation of long time-series fine-grained asset wealth in Africa using publicly available remote sensing imagery. *International Journal of Applied Earth Observation and Geoinformation*. 135, 104269

Evaluating Telcomfraud Par

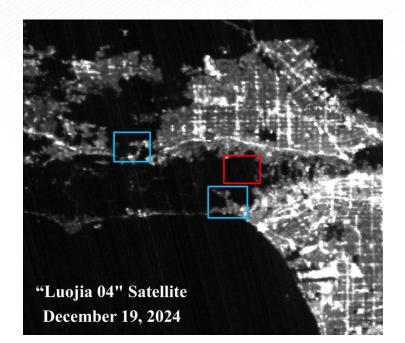
- Myawaddy (妙瓦底) is a city in southeastern Myanmar, and used to be one of the centers of human trafficking and fraud crimes in Southeast Asia
- Analysis based on Luojia-4 Satellite shows that the average night-time light intensity in the fraud parks in Myawaddy is higher than that in the non-fraud regions

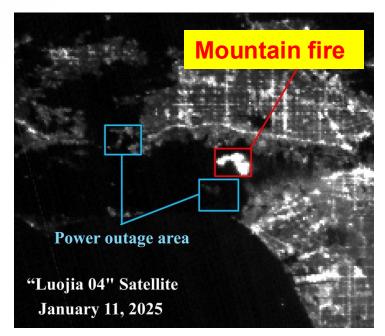


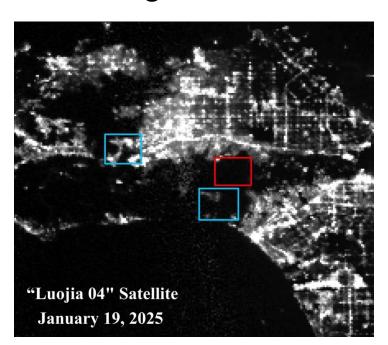


Monitoring Los Angeles Wildfires

- On January 7, 2025, a wildfire broke out in Los Angeles, causing serious casualties and economic losses
- To keep track of the dynamics of the wildfire and the extent of the disaster-affected situation, Luojia-4 was tasked to acquire the night-time light images
- The images show the mountain fire and power outage situation in the region







Monitoring Civil War in Sudan

- Since April 15, 2023, armed conflict broke out in Khartoum, the capital city of Sudan
- Due to dangerous situation in Khartoum, International Committee of Red Cross (国际红十字会) requires support of satellite data analysis from Wuhan University to transfer the patients to a safe place.



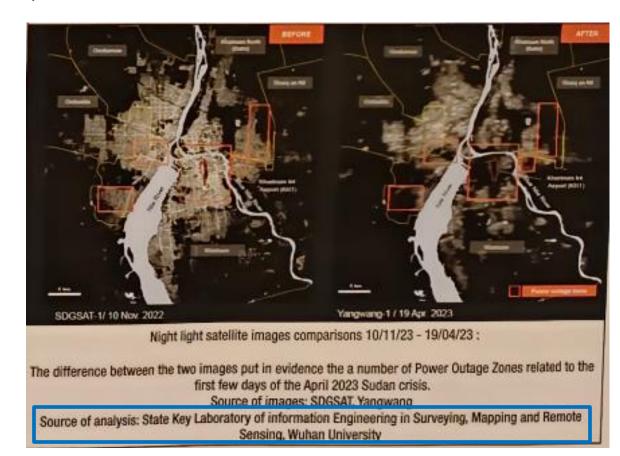


Monitoring Civil War in Sudan

■ The electricity loss regions were detected as dangerous areas, by using night-time light. The map was used as the operational map to support evacuation of

International Committee of Red Cross (ICRC)



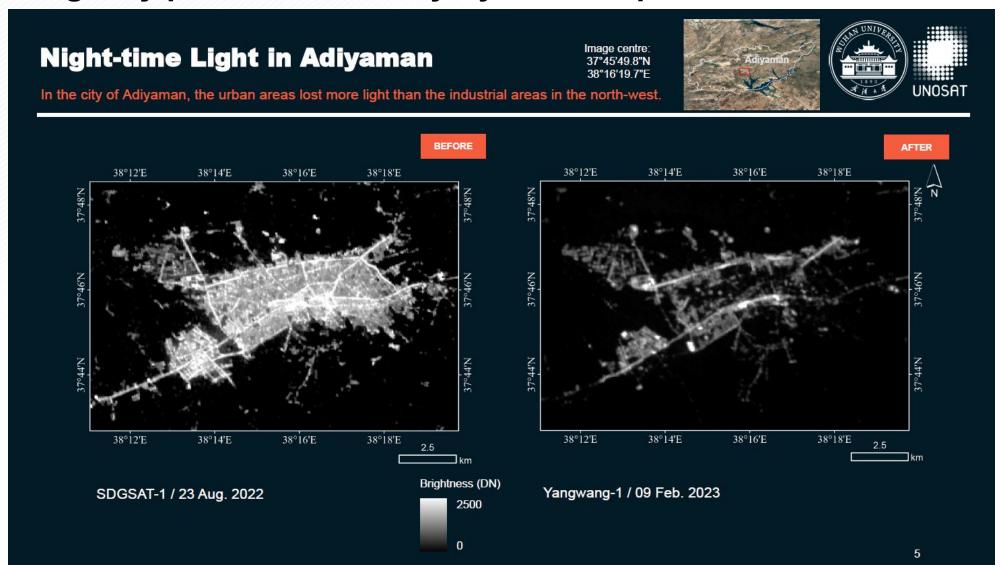


- On February 6, 2023, a major earthquake with a magnitude of MW 7.8 struck Turkey
- Wuhan University led an emergency team to evaluate the Earthquake using night-time light images to support United Nations' humanitarian relief in Turkey

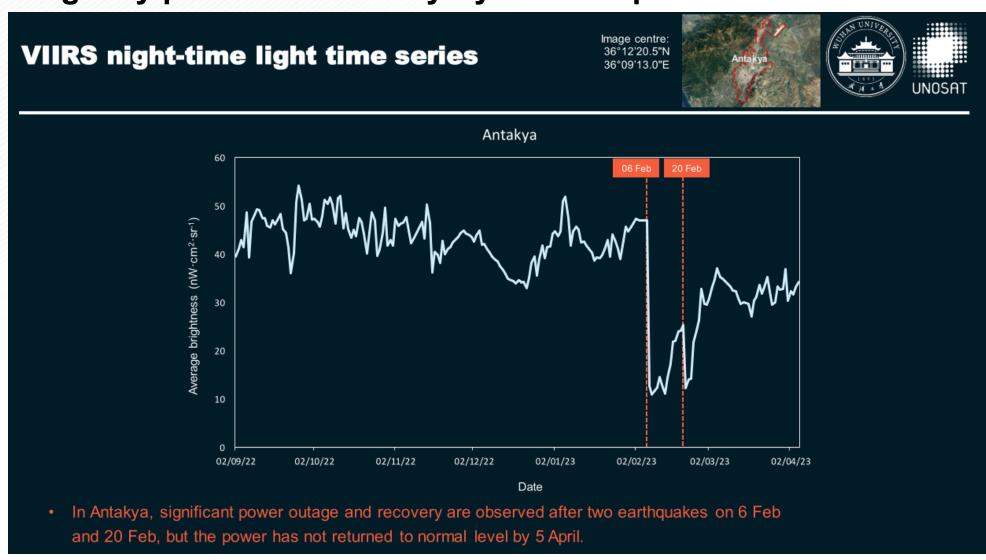




■ The emergency product for Turkey/Syria Earthquake

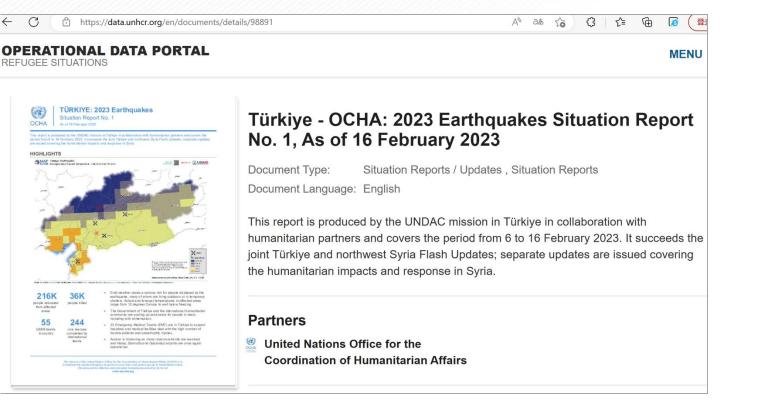


■ The emergency product for Turkey/Syria Earthquake

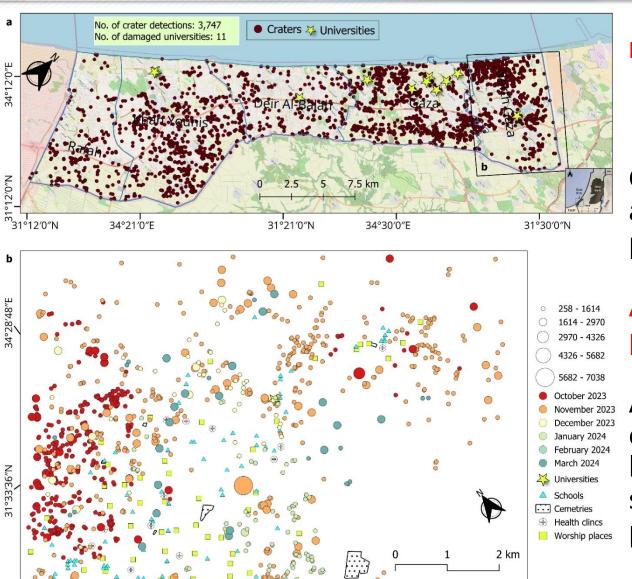


The UN-WHU joint report was used and cited by other UN organizations, such as United Nations High Commissioner for

Refugees (联合国难民署)



Reflecting the destruction of buildings, the departure of people from their homes, and the disruption of basic utilities, a preliminary lightloss assessment issued by the UN Satellite Centre (UNOSAT) and Wuhan University on 14 February shows that many urban areas in affected areas became darker after the earthquake, with power outage areas mainly distributed along the plate iunction Kahramanmaras and Hatay, and significant light particularly observed loss Hatav. Kahramanmaras and Adiyaman. In many sectors of Hatay City, night-time light declined by more than 90 per cent; in Adiyaman, eastern sectors of the city lost more light than western sectors; and downtown Hatay city (areas with higher light density) lost significant light postearthquake.



31°30′0″N

34°31′12″E

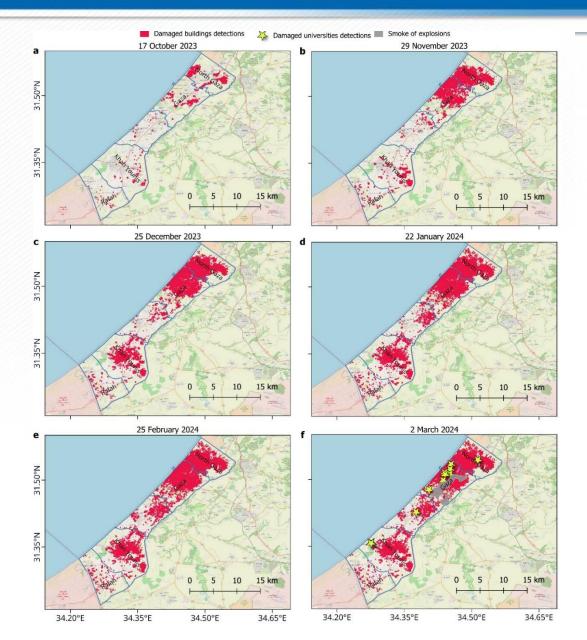
Automatic detection of missile craters in Gaza Strip based on temporal change detection

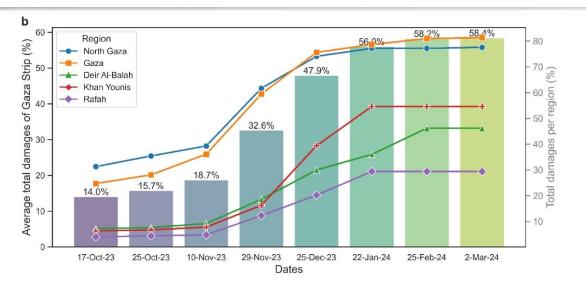
Can automatically detect the location, size, and quantity of missile craters in each period

As of March 2, 2024, a total of 3747 missile pits of different sizes have been detected

Automated detection of different types of damaged buildings in the Gaza Strip has been achieved such as primary and secondary schools, university hospitals, and places of worship

Xiongwu Xiao, Deren Li, et al

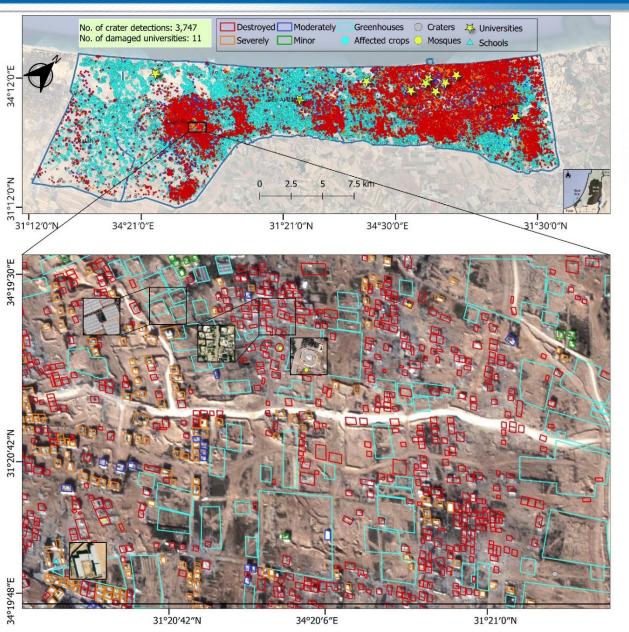




➤ Monitoring of building damage in the Gaza Strip based on high-precision temporal change detection (the red area in the left figure represents the damage situation of buildings at different times)

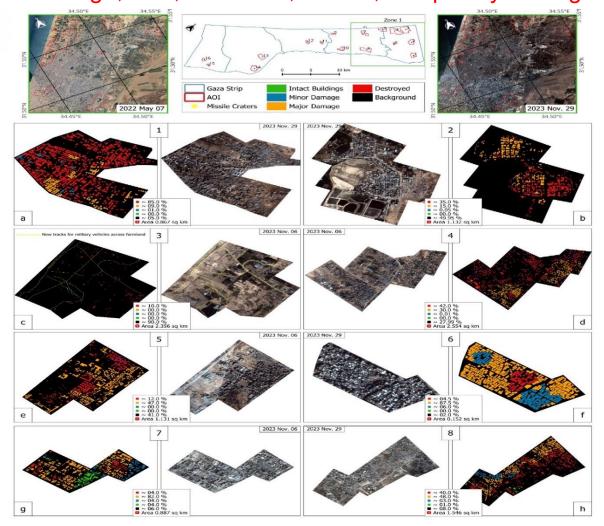
The above chart shows the trend analysis of building damage in five provinces of the Gaza Strip.

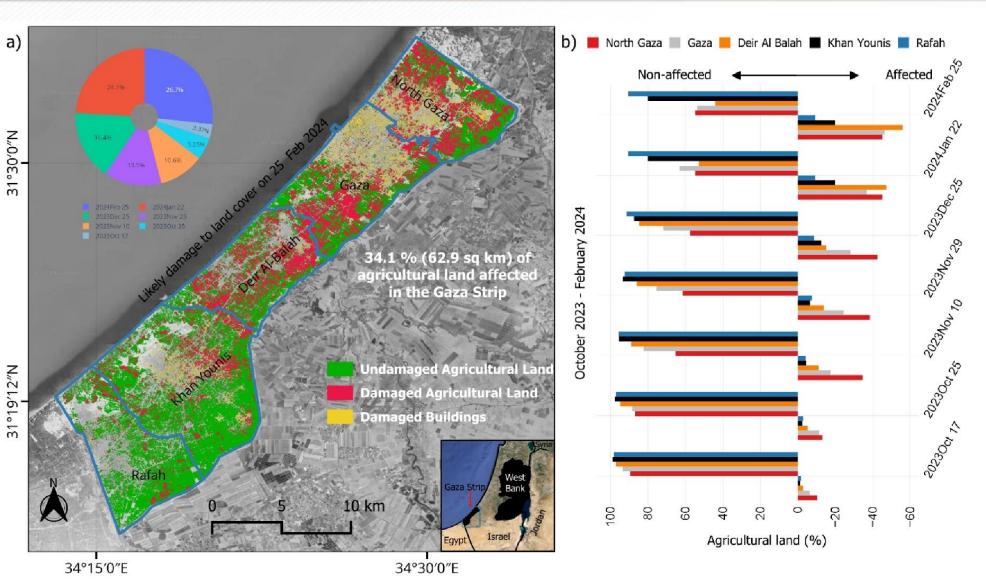
➤ As of March 2, 2024, the proportion of buildings damaged in the Gaza Strip reached 58.4%



Automatic assessment of damage for buildings

(no damage, mild, moderate, severe, completely damaged)





From October 2023 to March 2024, the damage to farmland in five provinces of the Gaza Strip at different times (the red area in the left figure represents the damaged farmland)

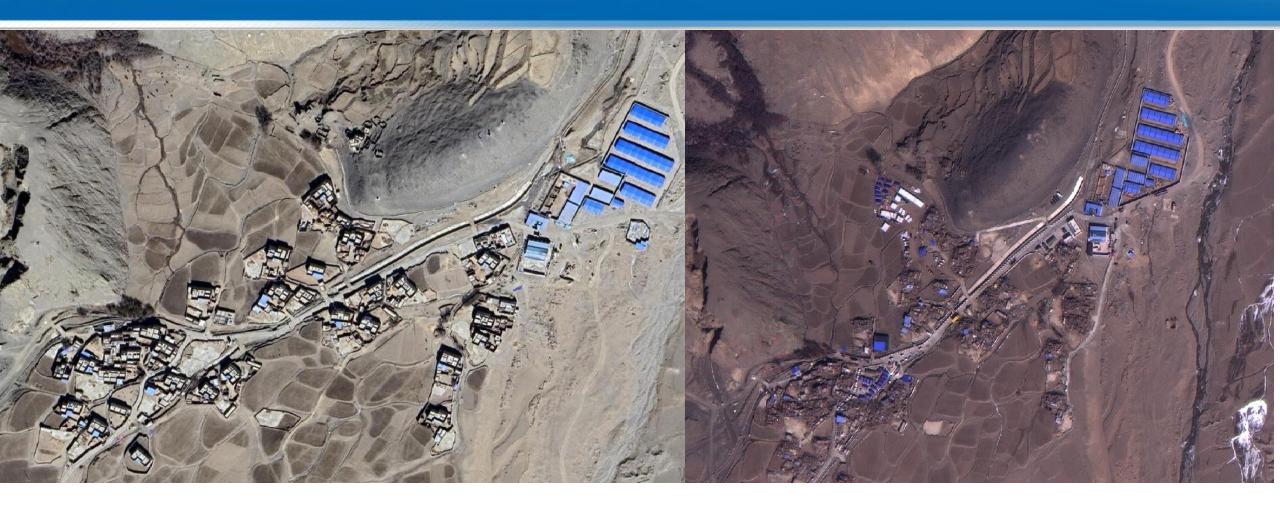
As of March 2, 2024, the proportion of farmland damage in the Gaza Strip was **34.1%**

Monitoring and Assessment of Earthquake Damage in Shigatse

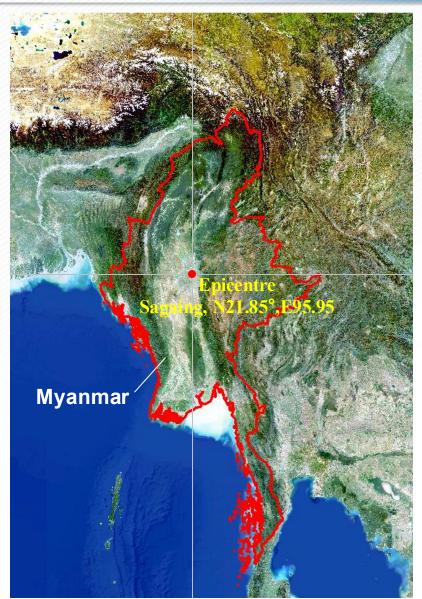


Compared with satellite images before the disaster, emergency tents can be seen, and some buildings in the middle of Tangren Village were damaged.

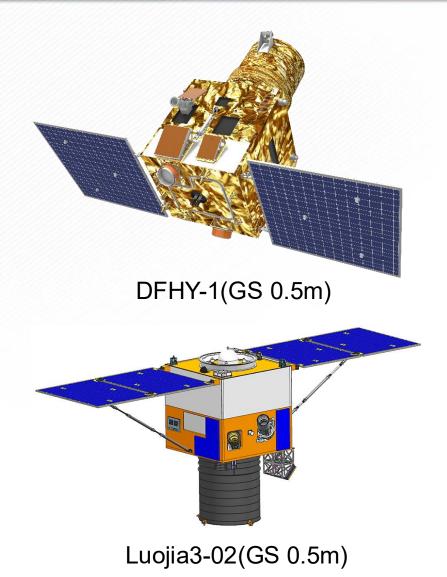
Monitoring and Assessment of Earthquake Damage in Shigatse



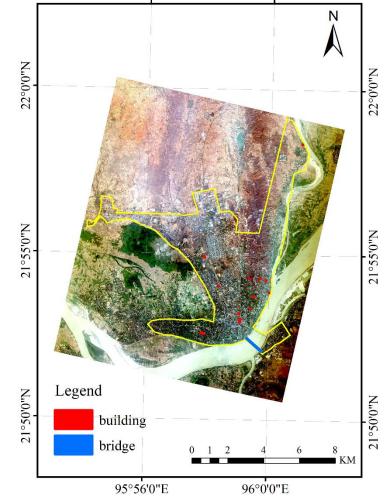
Gurong Village was severely affected and a large area of houses collapsed.



According to the official determination by the China Earthquake Networks Center, a powerful 7.9magnitude earthquake struck central Myanmar on March 28, 2025 Beijing Time. The epicenter was located at N21.85°, E95.95°, within Sagaing Province of Myanmar. The quake caused severe damage to local infrastructure including buildings, transportation systems, and power facilities.



Investigation on the Disaster Information of the 7.9-Magnitude Earthquake in Sagaing, Myanmar 95°56'0"E 96°0'0"E



Mapping Unit: LIESMARS, Wuhan University Data Source: Dongfang Huiyan Gaofen 01

Mapping Date: March 30, 2025





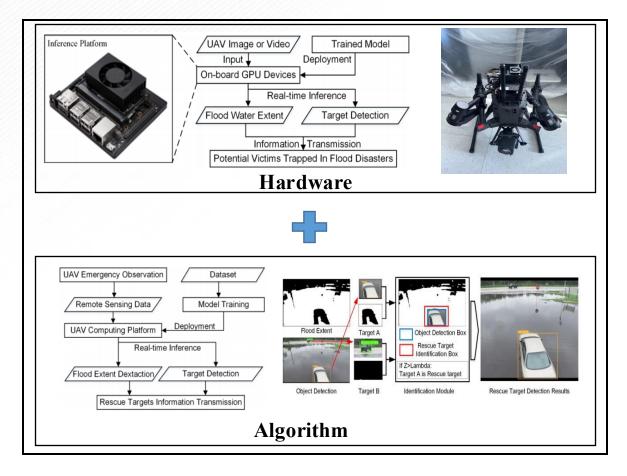
Airborne online flood real-time personnel/vehicle detection

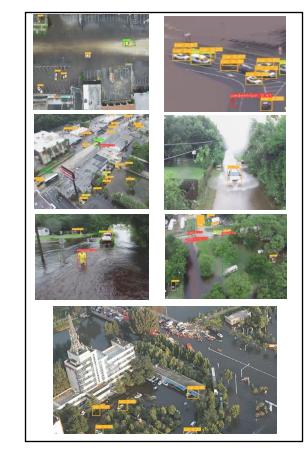
In response to the problem of difficulty in obtaining real-time rescue target information in emergency situations, a flood emergency rescue unmanned aerial vehicle (UAV) airborne processing system was constructed. UAV images were combined with deep learning technology, and through lightweight processing and fusion, real-time retrieval of rescue information from UAV platforms was achieved, providing support

for disaster rescue.



Images and Videos after Disaster





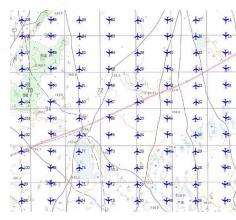
Result



Automatic Change Detection for UAV Data







UAV taking off













Precise Agriculture Supported by Beidou and Remote Sensing

Monitoring System

Precise Agriculture **Internet of Things**

Area

Nutrient

Varieties

Disease

Growth



Integrates Information Technology with Agriculture

Seeding

Irrigation

Manure

Medicine

Harvest

Implement agricultural operations and management in a targeted, timed, and quantitative manner

Digital Twin Smart Grid

A software-hardware system integrating precise positioning, identification, modeling, and 3D spatial relationship calculation models for power corridors, addressing safety risk localization and early warning.

LiDAR Diagnostic •



Electric Power Inspection Robot for Smart Grid

The electric power inspection robot can achieve all-round, fully autonomous intelligent inspection and safety protection of substation, transmission, and distribution equipment, including automatic patrol, intelligent meter reading, image recognition and other functions. It replaces traditional manual inspection with artificial intelligence, reduces safety risks, ensures the safety of the power grid, for the power grid.







Electric Power Inspection Robot for Smart Grid





Application of Digital Twin in Smart Grid

UAV intelligent monitoring system for power grid World's first large-scale UAV power inspection

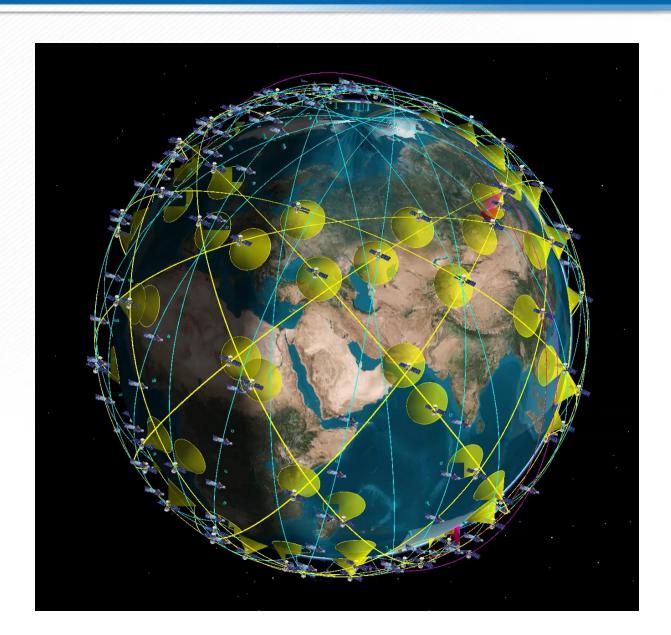


- ■15 provinces, cities, and regions
- **■**Economic benefits exceeding 200M
- ■Inspection route ~20,000km
- ■Inspection mileage exceeds 100,000km

Contents of the Report

- 1. Spatio-temporal Intelligence (STI)
- 2. Ubiquitous PNT & PNTRC
- 3. STI for SDG
- 4. Conclusion and Future Work

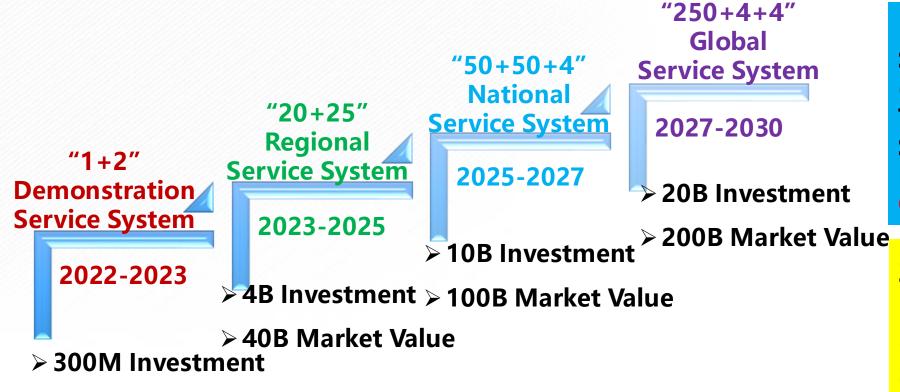
Oriental Smart Eye Constellation (2023-2030)



High Res. OSE-HR 150
Radar OSE-SAR 100
Hyperspect. OSE-HS 4
Thermal infrared OSE-HIR 4

Oriental Smart Eye Constellation (2022-2030)

Oriental Smart Eye - Global Real-time Intelligent Monitoring



> 3B Market Value

Hyperspectral:

Spatial Res.: 5m/20m (Nighttime Light)
Temporal Res.: 5 day

Spectral Res.: 22 bands

Location Accuracy.: 10m

Global Covering every 5 days

Spatial Res.: 0.3-0.5m

Temporal Res.: 5 minutes

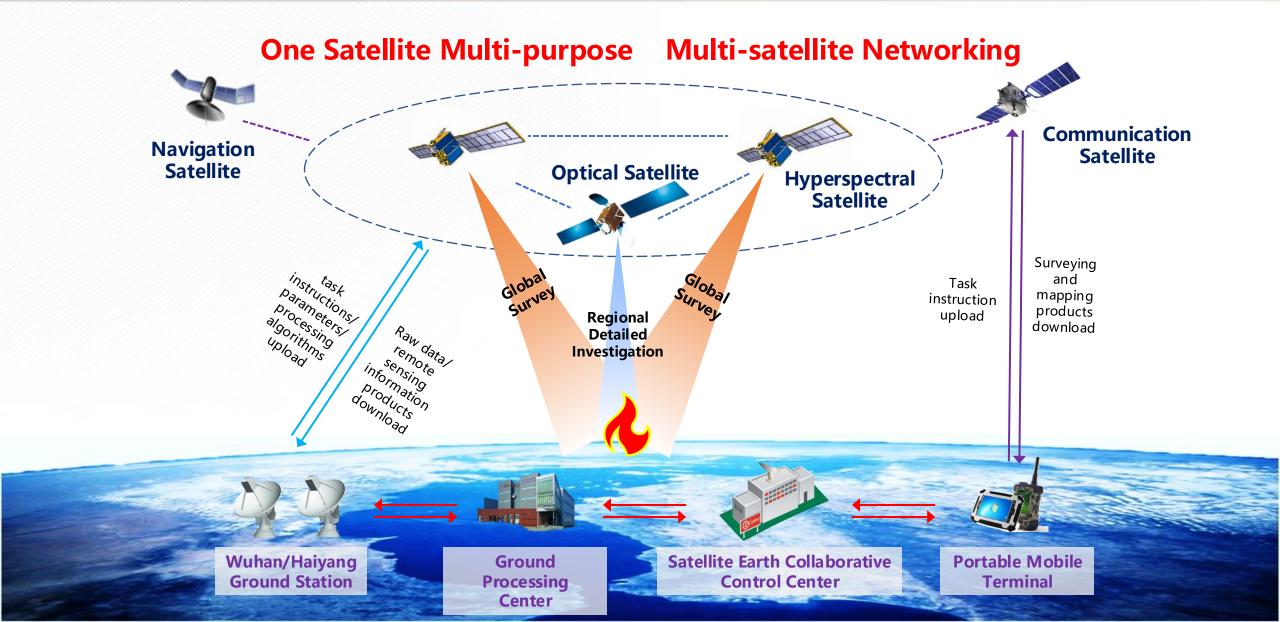
Positioning Acc: 3-5m

Quantize: 12Bit

Service Mode: B2B, B2G, B2C

The target can be seen quickly, clearly, accurately, comprehensively, understood, and delivered to the designated location

Overall Plan for Phase-I

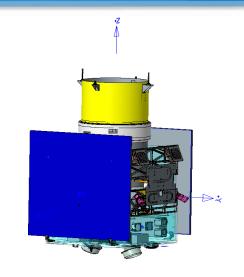




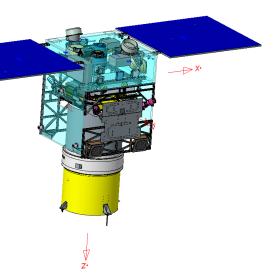
OSE-HR01 High-resolution Satellite (Feb 3, 2024)

The satellite weighs 230 kilograms and has three main characteristics:

- (1) Beidou short message service can be used for emergency measurement, control, and data transmission through the Beidou third-generation global navigation system.
- (2) The satellite is equipped with a satellite communication terminal, which can achieve bidirectional relay communication of 5Mbps forward and 10Mbps backward.
- (3) The intelligent processing unit produced nationwide is used for in orbit data processing.



Satellite Launch Status



Satellite in Orbit Status

Satellite Payload Imaging

♦ Image of Gaza Strip on March 2, 2024



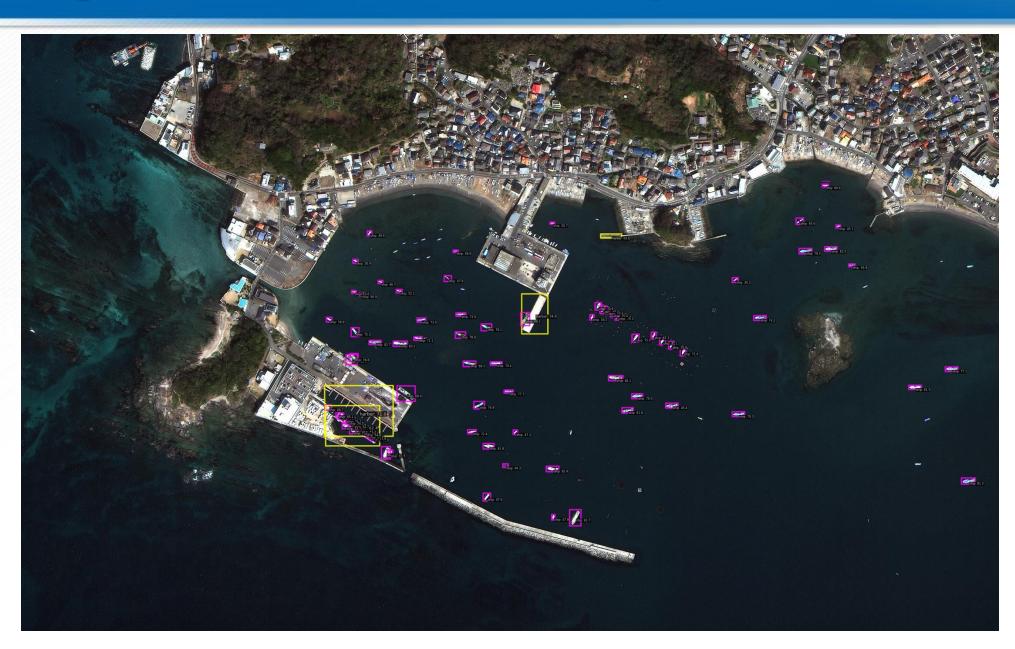
Target Detection Test Example 1

Aircraft Detection (Bold Border)



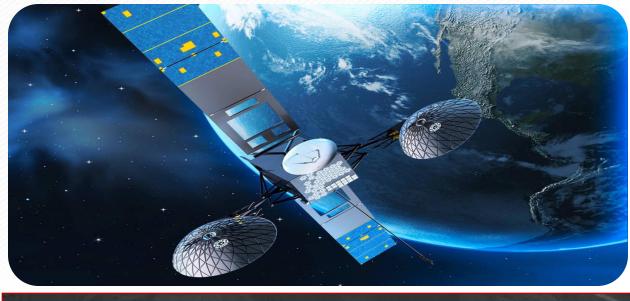
Target Detection Test Example 2

Yellow - Dock Crimson - Ship



On Board Processing and Transmission

Within 5 Minites





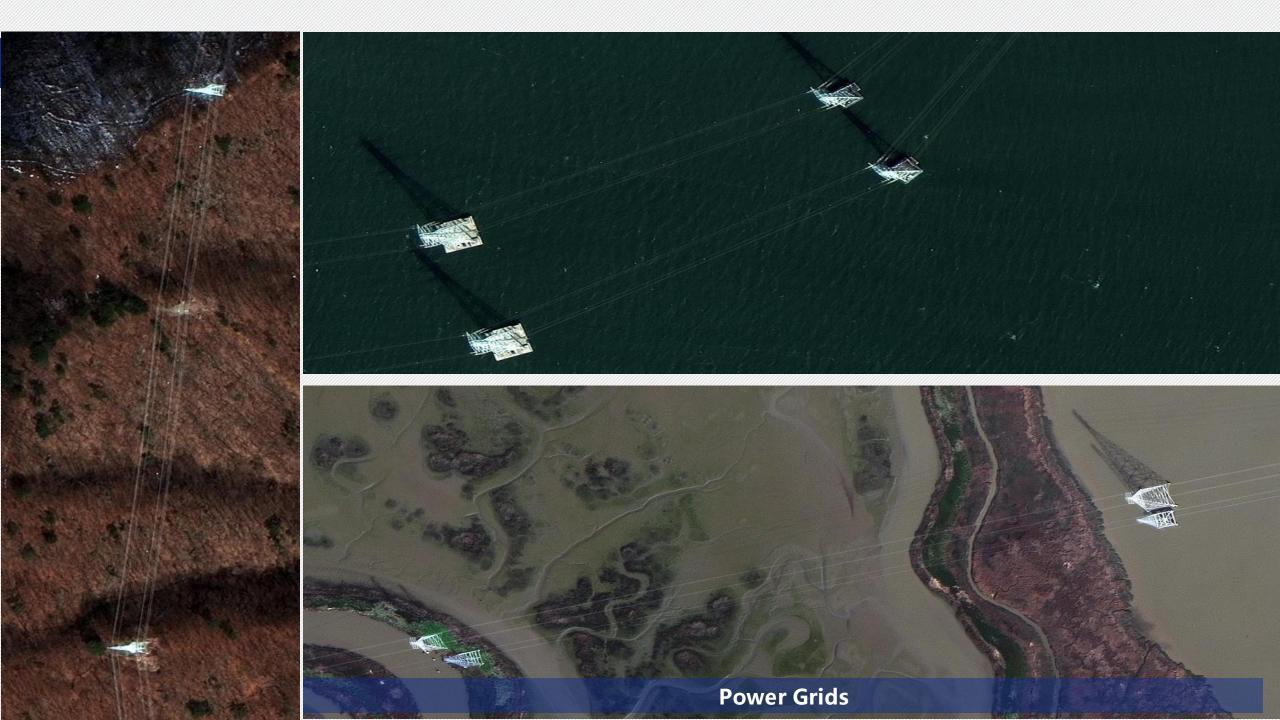


ROI Image Creation in Realtime





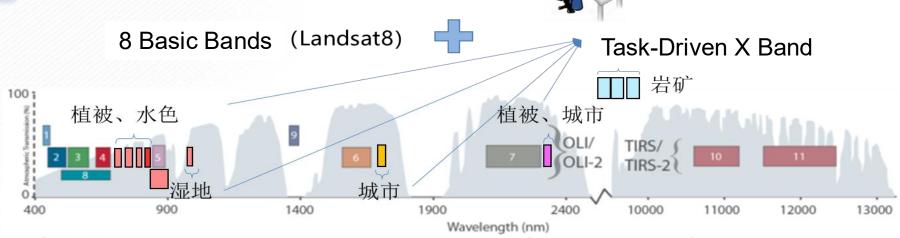




High Geometry Hyperspectral Satellite - OSE-01/02

Characteristic

Launch Time: By the end of 2025



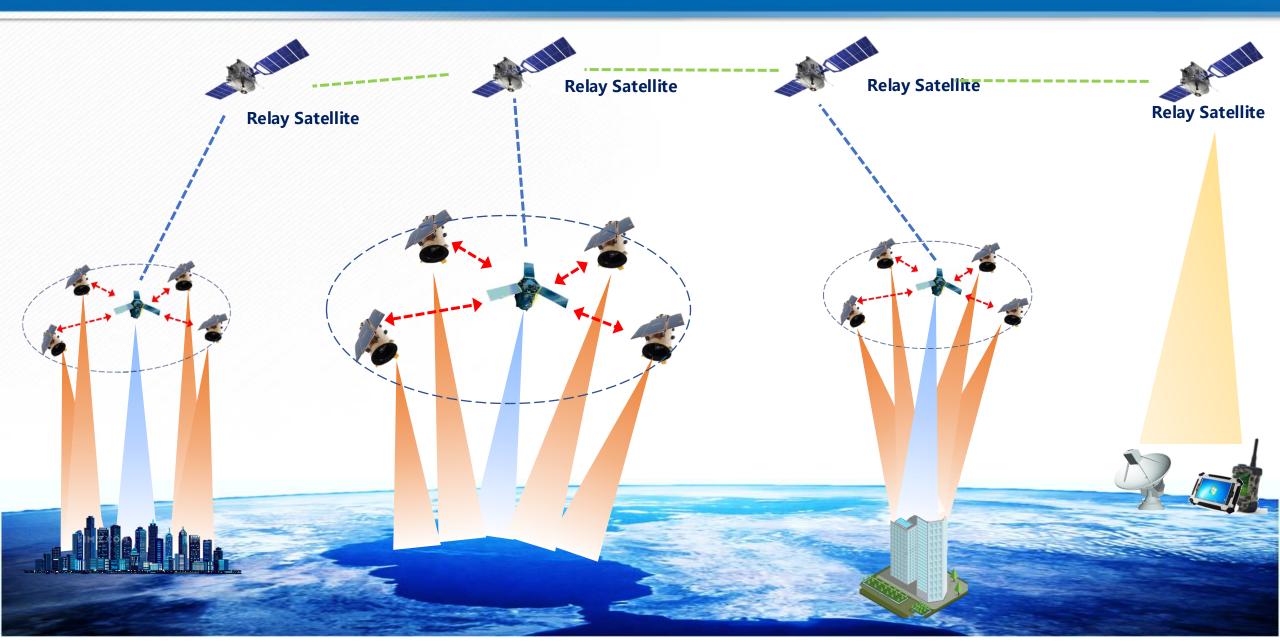
Benchmarking world-class satellites (Sentinel-2/LandSat-9/LandSat Next)

- ✓ Orbital similarity: 780km frozen SSO, dual star global revisit in 5 days
- ✓ Spectral compatibility: Spectral bands are compatible, data processing easier
- ✓ Progressive: more spectral bands, higher resolution, larger width, lighter weight
- ✓ Widely applicable: Supports daytime hyperspectral and nightime light; Support visible light+short wave infrared; Support ocean imaging

Hyperspectral Satellite Scheme

| Parameter | Sentinel-2A/2B | LandSat-8/9 | OSE-HS01/02 |
|-------------------|----------------------------------|--------------------------------|--------------------------------------|
| Orbit | 786km | 705km | 786km |
| Constellation | Dual star equal phase deployment | | |
| Width | 290km | 185km | 300km |
| Resolution | 10m/20m/60m | 15m/30m/100m | 5m/20m |
| Spectral Bands | 4 / 6 / 3 | 1/9/1 | 17 / 5 |
| Data Rate | 1.36Gbps | 440Mbps | 28Gbps |
| Telemetry Rate | 450Mbps | 384Mbps | 2×900Mbps |
| Weight | 1200kg | 1512kg | ~300kg |
| Global Coverage | 5 Days | 8 Days | 5 Days |
| Al | No | No | Support |
| Deployment Method | 2A: 2015.6.23 2B: 2017.2.7 | L8: 2013.2.11 L9: 2021.9.27 | By the end of 2025 within one rocket |
| Lifespan | D7 y/R12 y | D5 y/R10 y | D5 y |

The Second Phase of OSE (Multi-angle RS)



Conclusion

- 1. Efforts should be made to promote ubiquitous PNT, PNTRC and STI services
- 2. Efforts should be made to promote the real-time intelligent aerospace information services (such as Oriental Smart Eye) under artificial intelligence, and create multiple trillion-level industries for UN-SDG
- 3. Courageously promote the transformation of surveying, mapping, RS, GIS into Spatio-Temporal Intelligence.

