Applications of Remote Sensing in Natural Disaster Monitoring and Risk Management for Insurance Industry

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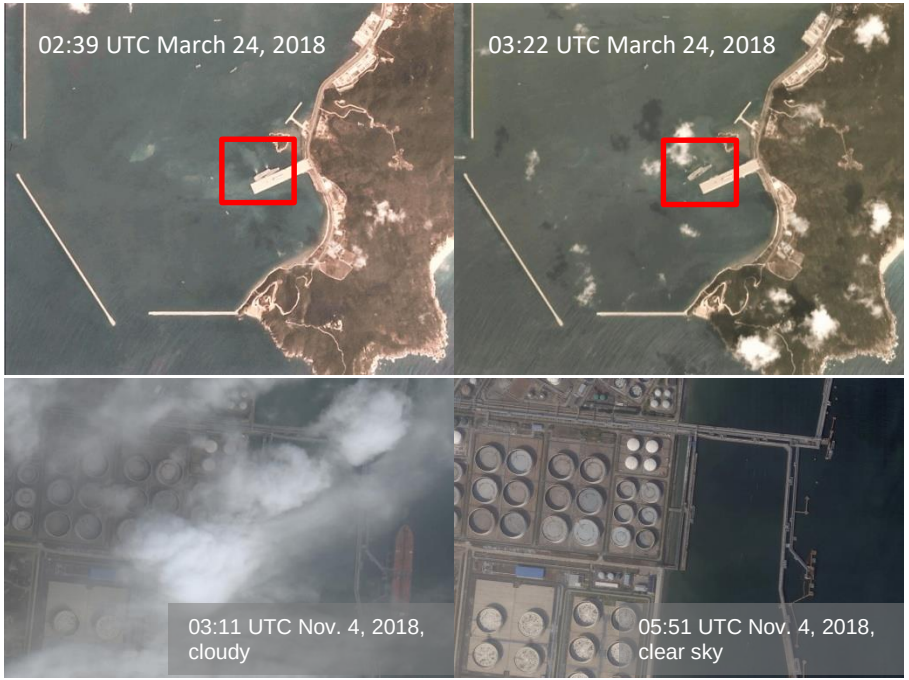
1. Great improvement of remote sensing capabilities

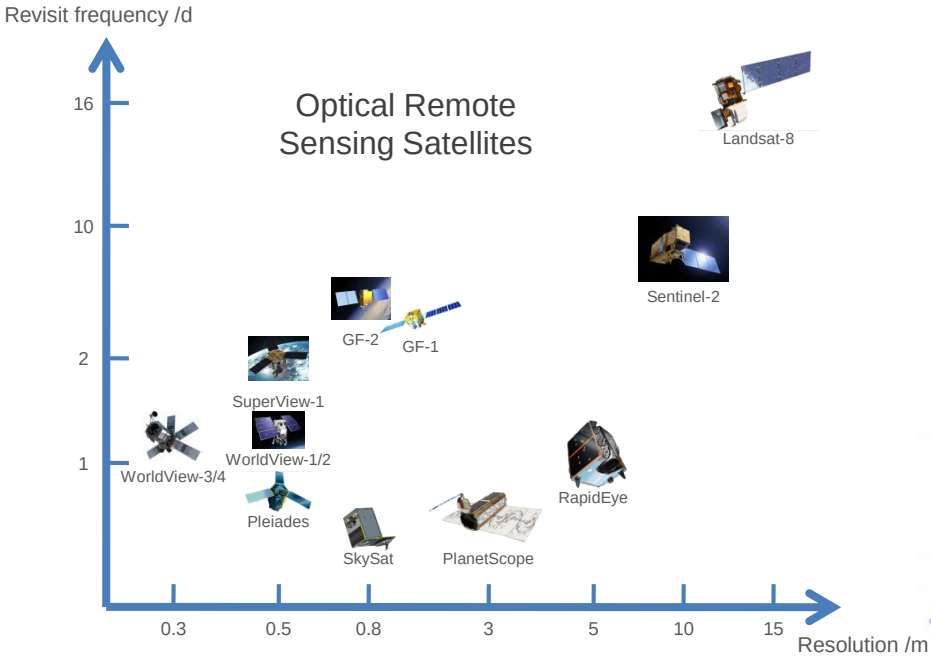
- More and more data sources
  - Satellites, aircraft, vehicles, etc
  - Optical, SAR, etc.
- Higher and higher resolution
  - Optical: better than 0.5m
  - SAR: better than 1m
- Faster and faster delivery speed
  - Optical: within 5 hours
  - SAR: within 1 hour

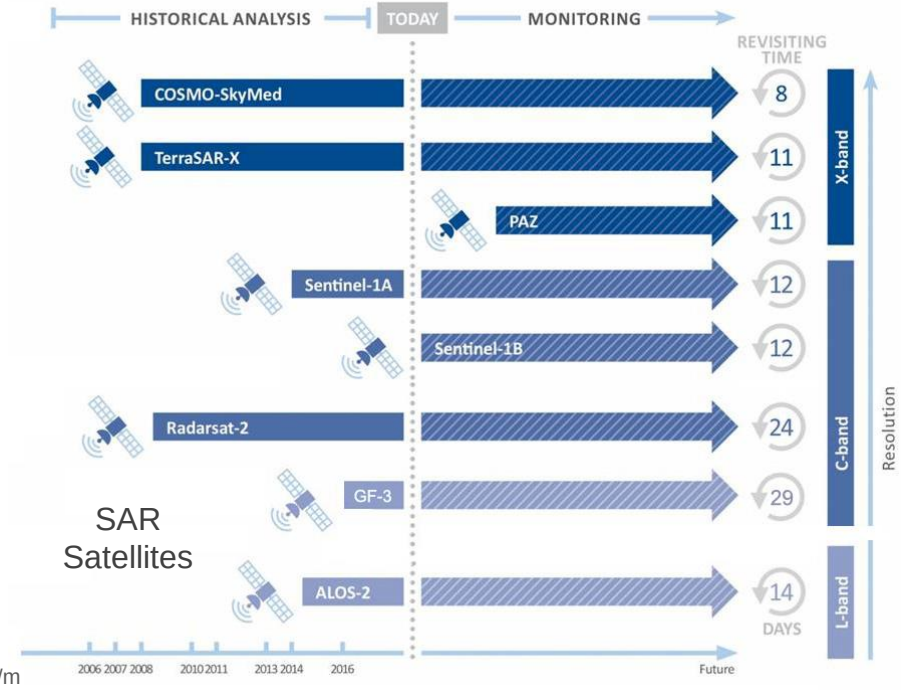


EV-Image

Imagery of PlanetScope and SkySat ©Planet Labs

1. Great improvement of remote sensing capabilities





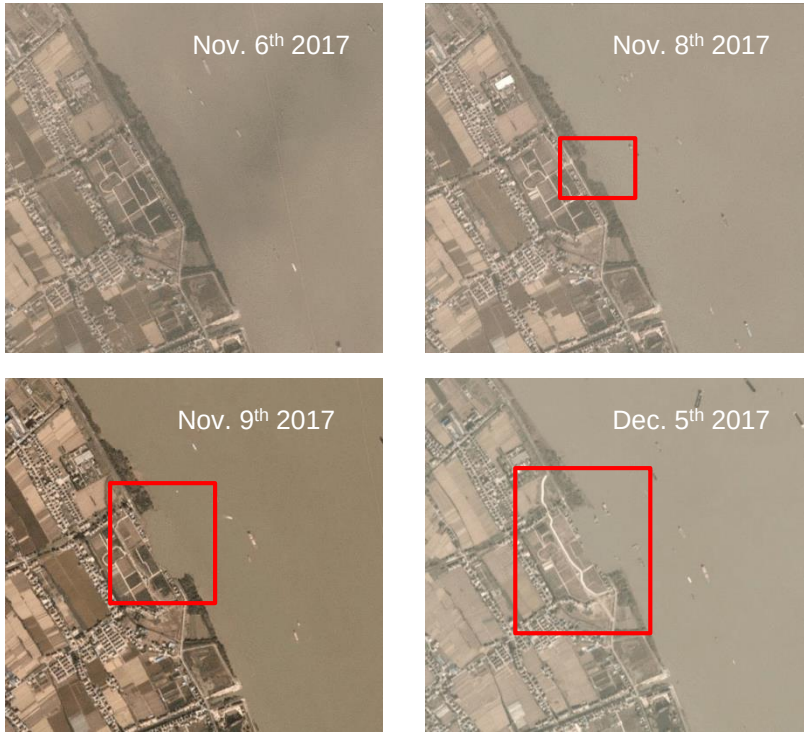
So many satellites, various resolutions, different beam mode, are ready for us to provide better remote sensing services.

EV-Image

Satellite pictures and its information sources from the internet

2. New requirements for remote sensing

- Continuous and stable monitoring
- Quickly response
- Automatically indentify ground features and their changes
- Accuracy meets the requirements

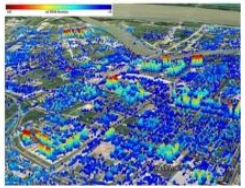


Yangzhong, Yangtze River. Imagery of PlanetScope ©Planet Labs

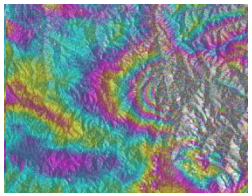
3. Natural disaster monitoring using remote sensing

- Most surface deformation disaster could be continuously monitored by using satellite data.
- Comparison shows remote sensing technology such as InSAR has similar accuracy with traditional measurement.
- Early warning for several natural disaster could be achieved using InSAR (Interferometry SAR).

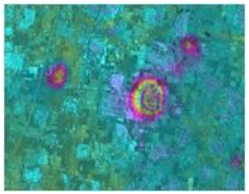
InSAR applications for ground deformation



Ground Subsidence

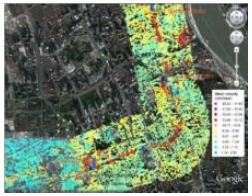


Earthquake

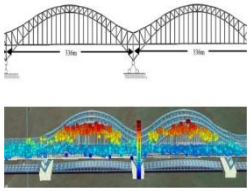


Mining Area

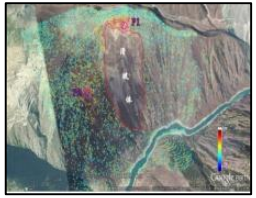
High-Speed Railway



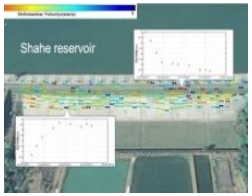
Subway



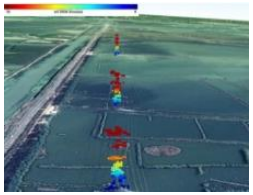
Bridge



Landslide



Dam

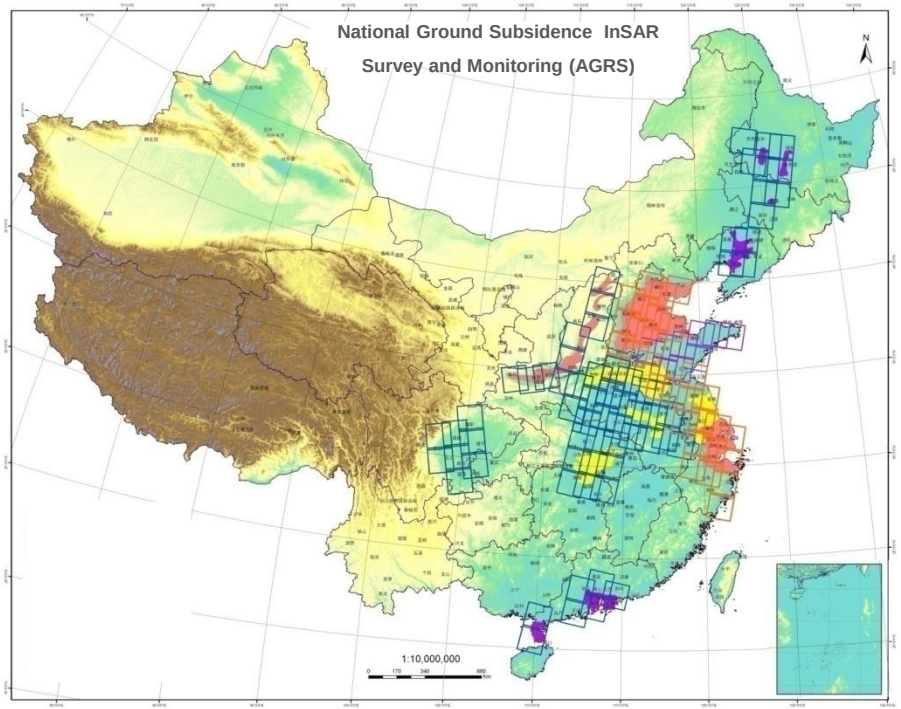


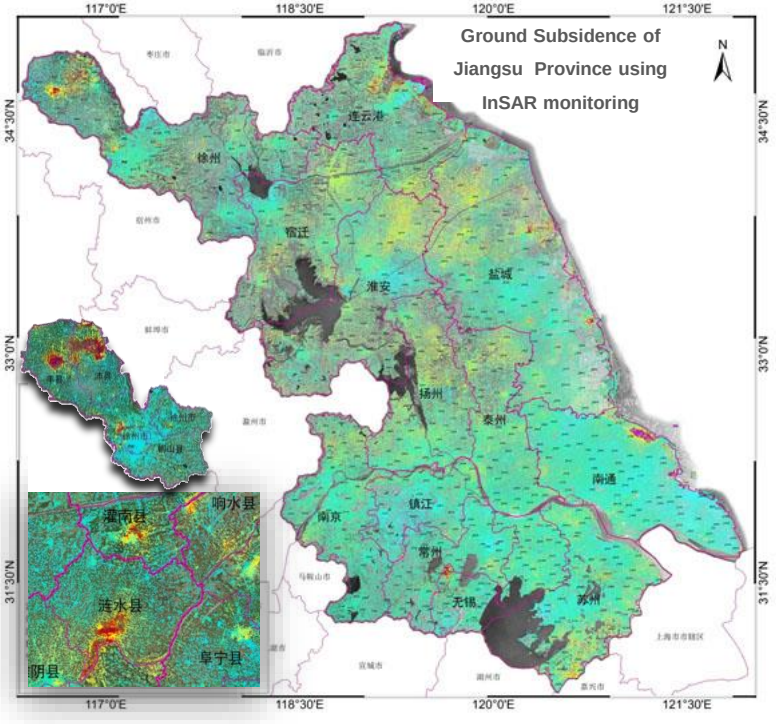
Transmission Tower

EV-Image

Listed figures ©Google Earth ©AGRS

Wide area ground subsidence monitoring in China

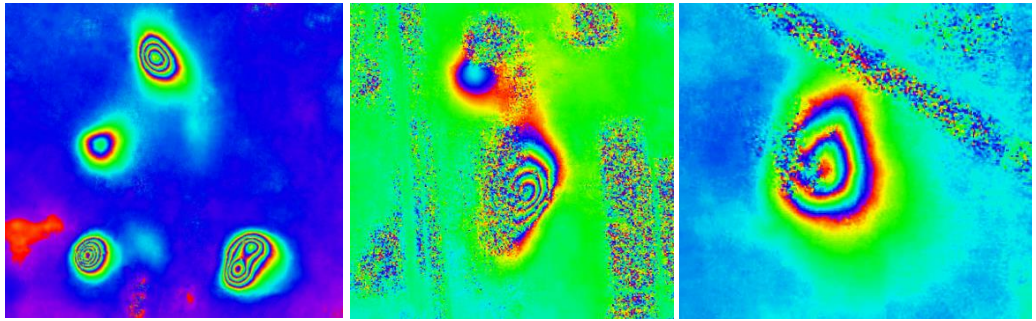


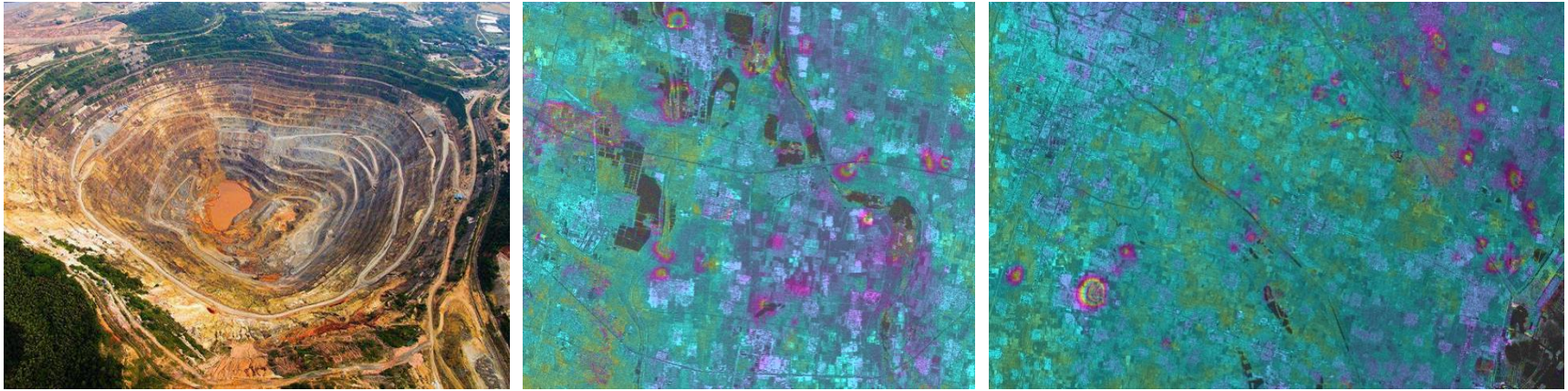


EV-Image

Deformation disaster monitoring and early warning

- Mining area subsidence monitoring

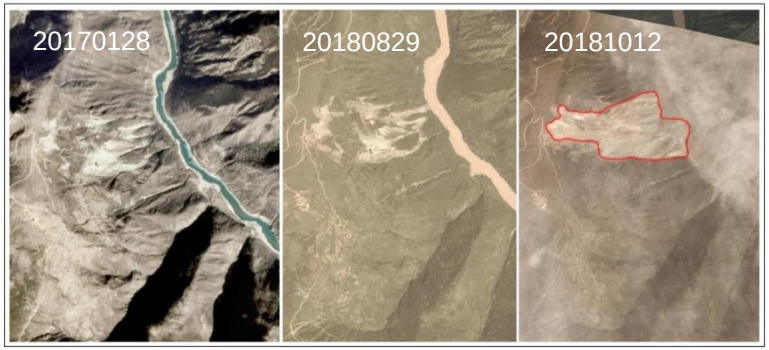


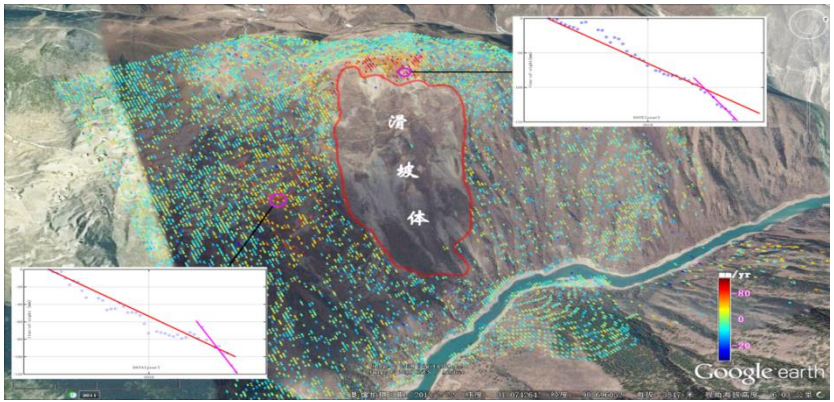


EV-Image

Natural disaster monitoring and early warning

- Combining with optical remote sensing, GB-InSAR, GNSS and LiDAR, satellite-based InSAR technology could early recognize disaster and continuously monitor it.



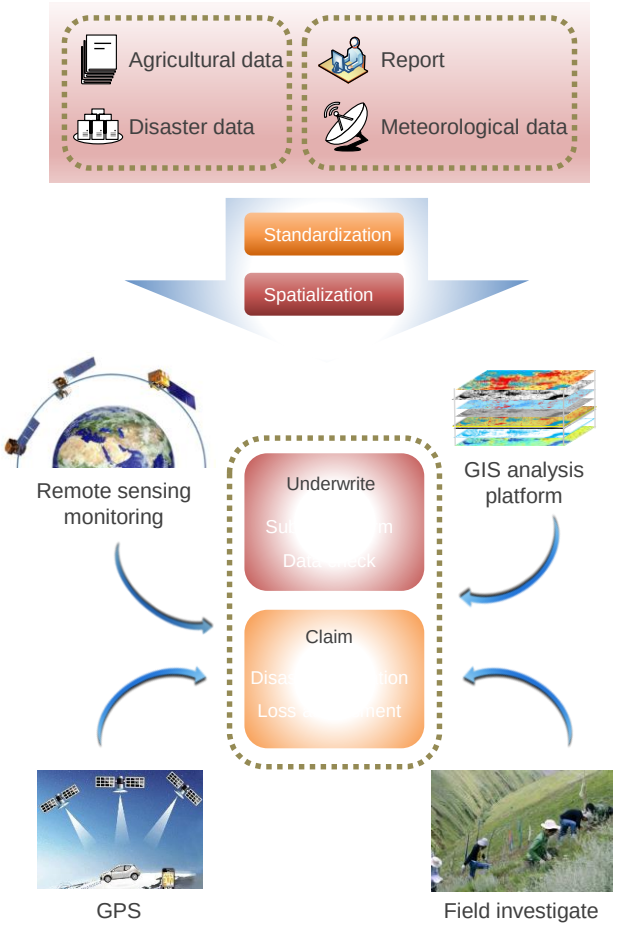


EV-Image

Listed figures ©Google Earth ©Planet Labs

4. Remote sensing risk management for insurance industry

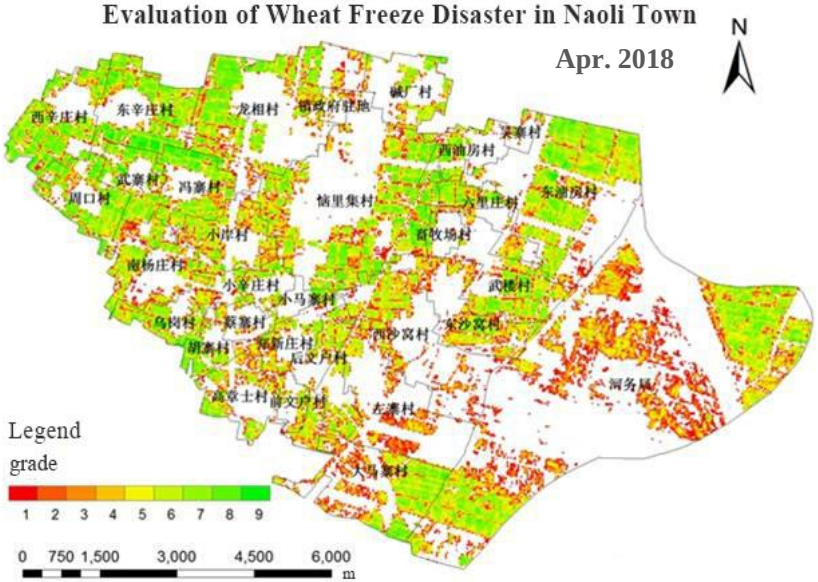
- Insurance companies need real-time data to determine facts.
- Remote sensing could provide data and bring innovation to the agricultural insurance companies.
- It can help agricultural insurance companies to
  - Underwrite
  - Investigate
  - Claim



EV-Image

Risk management for agricultural insurance: crop freeze

- Crop damage could be indentified from satellite imagery.
- Insurance companies could use this information to investigate and claim.



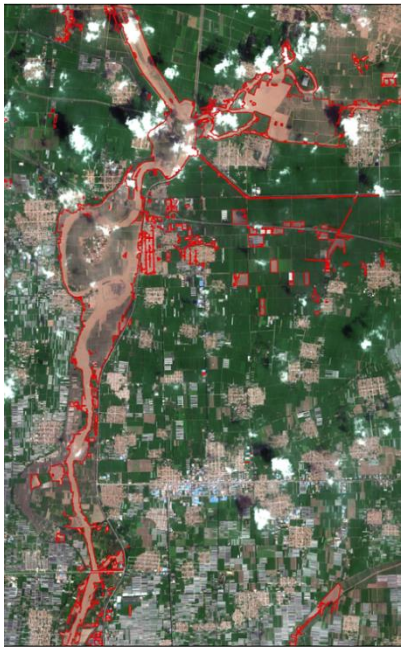
Ref. * Administration of Science, Technology and Industry for National Defense of Henan Province

Risk management for agricultural Insurance: flooding

- Disaster such as flood could be recognized from satellite imagery.

- Insurance companies could use this information to see whether the insurers' vegetable farm was damaged or not.

Aug. 10th ,2018, before flooding



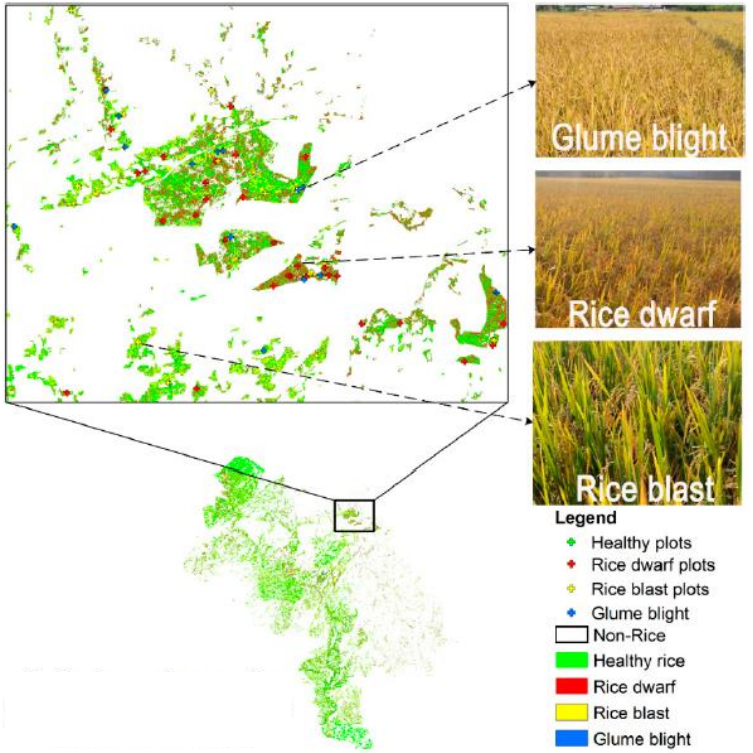
Aug. 21st ,2018, after flooding

EV-Image

Imagery of PlanetScope

Risk management for agricultural insurance: crop diseases

- Crop diseases information could be extracted from remote sensing imagery.
- Insurance companies could use this information to analysis whether the insurers' rice farm was suffered from diseases.



Ref. * Shi Y, Huang W, Ye H, et al. Partial Least Square Discriminant Analysis Based on Normalized Two-Stage Vegetation Indices for Mapping Damage from Rice Diseases Using PlanetScope Datasets[J]. Sensors, 2018, 18(6).

5. Conclusion and prospect

➢More and more companies will provide remote sensing application technology services for various industries instead of selling remote sensing data.

➢Remote sensing cloud platform is necessary.

➢How to use AI and machine learning to extract useful information efficiently from remote sensing BIG DATA will become the key in the future’s remote sensing applications.

Thanks!