Гиперспектральные камеры ATH1010-4-25

Технические характеристики

По вопросам продаж и поддержки обращайтесь:

Алматы (727)345-47-04
Ангарск (3955)60-70-56
Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Владикавказ (8672)28-90-48
Владимир (4922)49-43-18
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89
Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48
Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Коломна (4966)23-41-49
Кострома (4942)77-07-48
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курск (4712)77-13-04
Курган (3522)50-90-47
Липецк (4742)52-20-81
Магнитогорск (3519)55-03-13
Москва (495)268-04-70
Мурманск (8152)59-64-93
Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
Новокузнецк (3843)20-46-81
Ноябрьск (3496)41-32-12
Новосибирск (383)227-86-73
Омск (3812)21-46-40
Орел (4862)44-53-42
Оренбург (3532)37-68-04
Пенза (8412)22-31-16
Петрозаводск (8142)55-98-37
Псков (8112)59-10-37
Пермь (342)205-81-47
Ростов-на-Дону (863)308-18-15
Рязань (4912)46-61-64
Самара (846)206-03-16
Санкт-Петербург (812)309-46-40
Саратов (845)249-38-78
Севастополь (8692)22-31-93
Саранск (8342)22-96-24
Симферополь (3652)67-13-56
Смоленск (4812)29-41-54
Сочи (862)225-72-31
Ставрополь (8652)20-65-13
Сургут (3462)77-98-35
Сыктывкар (8212)25-95-17
Тамбов (4752)50-40-97
Тверь (4822)63-31-35
Тольятти (8482)63-91-07
Томск (3822)98-41-53
Тула (4872)33-79-87
Тюмень (3452)66-21-18
Ульяновск (8422)24-23-59
Улан-Удэ (3012)59-97-51
Уфа (347)229-48-12
Хабаровск (4212)92-98-04
Чебоксары (8352)28-53-07
Челябинск (351)202-03-61
Череповец (8202)49-02-64
Чита (3022)38-34-83
Якутск (4112)23-90-97
Ярославль (4852)69-52-93

Россия +7(495)268-04-70
Казахстан +7(727)345-47-04
Беларусь +375-257-127-884
Узбекистан +998(71)205-18-59
Киргизия +996(312)96-26-47

эл.почта: otp@nt-rt.ru || сайт: https://optosky.nt-rt.ru/

DataSheet

VIS-NIR Hyperspectral Camera | ATH1010-4-25

Feature：

- Spectral Range：380 ~ 2500 nm
- Max Spatial Channels ：2048
- Max Spectral Channels ：1200
- Max FOV：21.7°(Depending on the lens)
- Superior imaging performance
- Data format is compatible with ENVI;
- Dimensions：372mm × 276mm × 185mm；
- Light weight：4.56kg；
- No mechanical scanning, high reliability;

Application：

- Prospecting for geology and minerals;
- Agriculture Monitoring: Crop condition and yield assessment
- Forest pest and fire prevention monitoring；
- Coastline and ocean monitoring；
- Pasture monitoring；
- Lake and watershed monitoring；
- Remote sensing teaching and research ；
- Industrial sorting；
- Ecological environment protection and mine monitoring；
- Water quality and soil monitoring；

Describe:

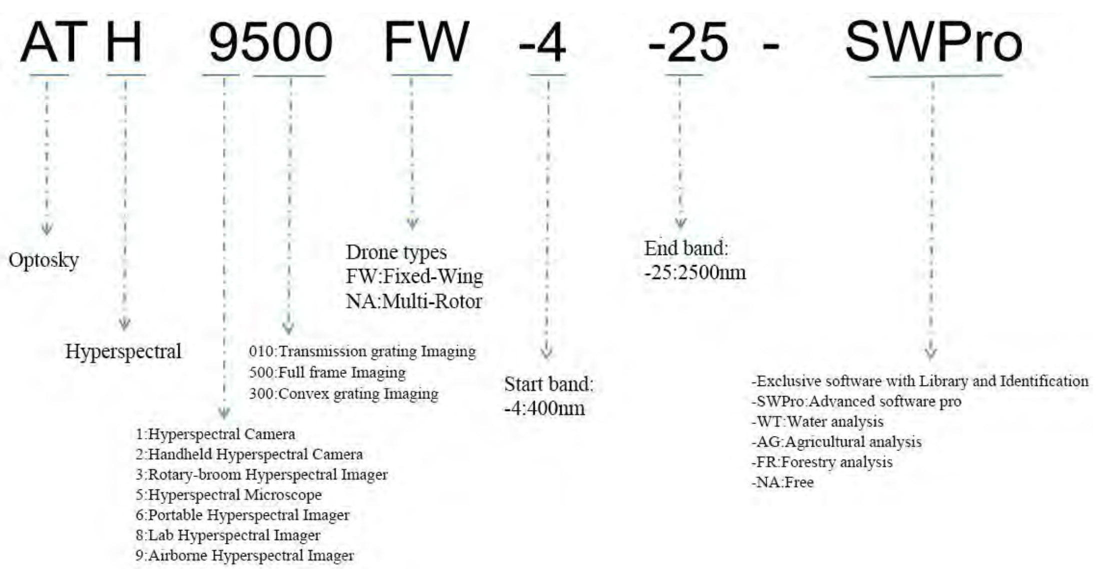
ATH1010-4-25 is a new and optimized shortwave infrared hyperspectral imaging system with small size and light weight. The spectral range is 400 ~ 2500nm. Except, ATH1010-4-25 has high spatial resolution, high spectral resolution, wide imaging range, etc. And it consists of two parts: imaging lens and hyperspectral camera.

ATH1010-4-25 uses high-performance Te-cooled CCD imaging device with 2048 x 1200 pixels and 640 x 512 pixels, which makes it has clear image, less noise and good linearity.

With its temperature-stable optical system, ATH1010-4-25 provides excellent stability and sensitivity required in VIS-NIR infrared chemical imaging applications, and meets the stringent requirements of laboratory, field, and industrial applications, making it become the right-hand in applications such as drug quality inspection, food safety, and agricultural analysis.

1. Selection Guide

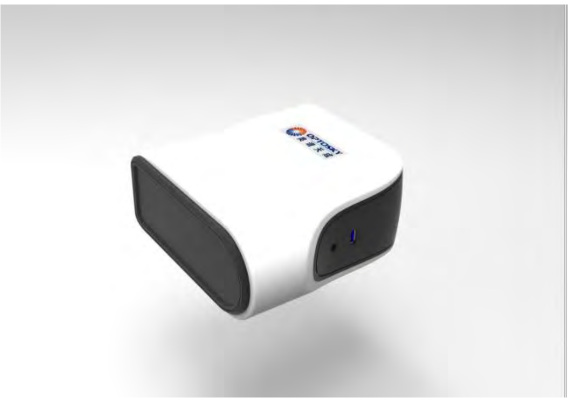
ATH1010 Series Model	Feature	Application
ATH1010	380-1000nm VIS-NIR Hyperspectral Camera	Precision agriculture, agroforestry diseases and insect pests, vegetation analysis, planting area assessment, crop yield assessment, water quality analysis, art scanning, cultural relic identification, pattern scanning, industrial sorting, oil pollution detection, etc
ATH1010-17	1.0~1.7μm SWIR Hyperspectral Camera	Semiconductor, industrial sorting, food sorting, construction waste sorting, meat sorting, plastic sorting, geological exploration, mineral exploration, cultural relics identification, judicial identification, document inspection
ATH1010-25	1.2~2.5μm SWIR Hyperspectral Camera	Precision agriculture and food analysis, dark plastic sorting, geological exploration, mineral exploration, national defense industry, cultural relic identification, judicial identification, document inspection, water content analysis, drug and material sorting, mineral mapping, medical identification, waste recycling;
ATH1010-4-25	0.38~2.5μm VIS-NIR Hyperspectral Camera	Geological survey, national defense industry, gas analysis, VOCs inspection, water temperature detection, land cover type identification, camouflage investigation, mineral sorting,
ATH1010-04-17	0.38~1.7μm VIS-NIR Hyperspectral Camera	Precision agriculture, agroforestry diseases and insect pests, vegetation analysis, planting area assessment, crop yield assessment, water quality analysis, art scanning, cultural relic identification, pattern scanning, industrial sorting, oil pollution detection, etc



2. Performance Parameter

ITEM	PARAMETER	
Spectral Range	380 ~ 2500 nm	
	VNIR	SWIR
Sensor Type	High Sensitivity VNIR detector	Te-cooled InGaAs I and InGaAs II SWIR Detector
Resolution	1.3 nm	8-15 nm
Image Resolution	2048 × 1088	640 X 512
Raw Pixels Size	5.5 µm x 5.5 µm	15 µm x 15 µm
Bit Depth	12bits	16bits
Max Spatial Channels	1200	512
Max Spectral Channels	2048	2048
Frame Rate	240 fps	240 fps
Interface	USB3.0	
Power Supply	12V±10%， 70W	
FOV	15.2°@f=35mm	
IFOV	0.7mrad@f=35mm	
Size	372mm × 276mm ×185mm	
Weight	<4.56kg	
Working Temp.	-20 - 50°C	
Storage Temp.	-30-70°C	

3. ATH1010-4-25 Physical & Size



4. ATH1010-4-25 Hyperspectral Imaging

Figure 1 Hyperspectral image taken by ATH1500-04-17; (a) 1100nm spectrum; (b) 1300nm spectrum; (c) 1500nm spectrum

5. ATH1010 Hyperspectral Camera Series(Other Models)

6. Application

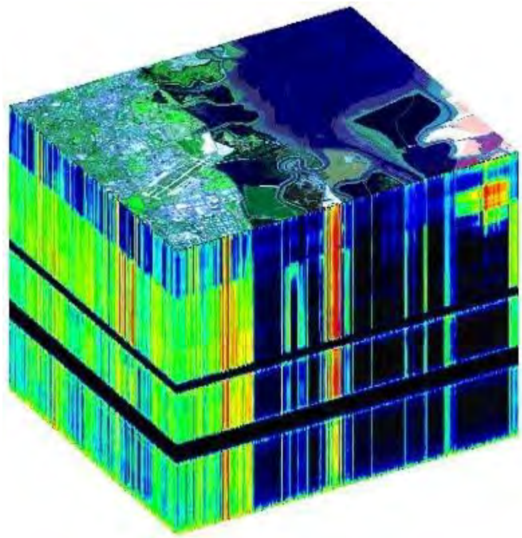


Figure 2 Data cube captured

Figure 3 Drone experiment

Figure 4 Outdoor experiment scene Ⅰ

Figure 5 Outdoor experiment scene Ⅱ

Figure 6 Outdoor experiment scene III

Figure 7 Outdoor experiment scene Ⅳ

Figure 8 Outdoor experiment scene Ⅴ

6.1 Industrial Sorting Application

With the development of NIR hyperspectral technology, such as Jiang tried to use near-infrared hyperspectral technology to detect impurities in cotton, especially the application of SWIR hyperspectral technology, which significantly improved the detection rate of plastic films compared with conventional methods.

Hyperspectral imaging technology is based on a very large number of narrow-band image data technology, which can obtain image information and spectral information of the sample while imaging the sample. Commonly used hyperspectral data processing methods include partial least squares (PLS), support vector machine (SVM) and artificial neural network (ANN).

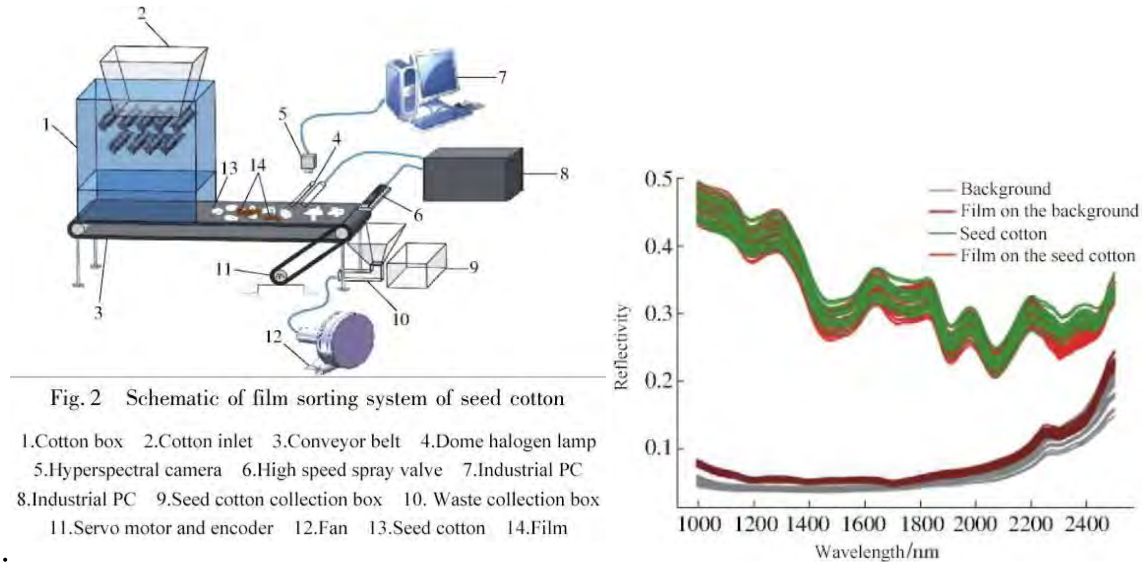


Figure 9 Seed cotton sorting application; (a) System functional composition; (b) Different substances reflectance spectrum

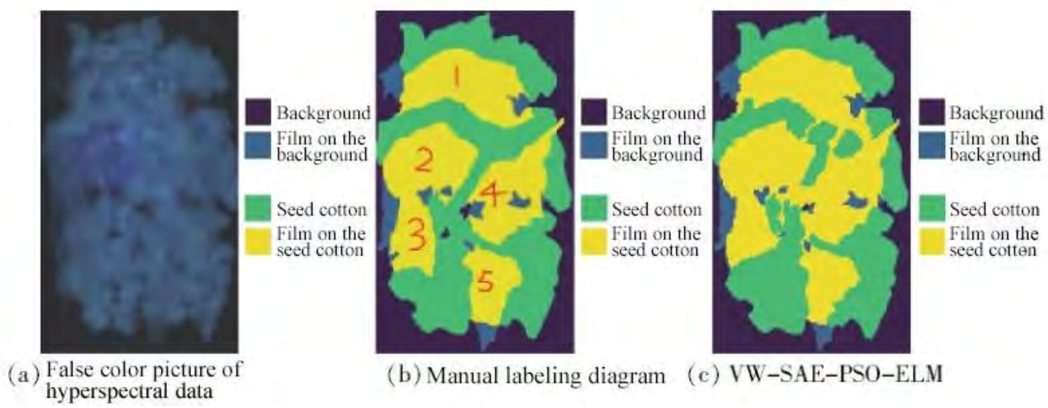


Figure 10 Seed cotton sorting application; (a) Artificial marking; (b) Recognition result

Apple’s external quality is the most intuitive quality feature of Apple, which directly affects Apple’s price and consumer preference. Aiming at the difficulties and key points of external inspection of apples, based on machine vision technology, hyperspectral imaging technology and multispectral imaging technology, integrated image processing technology, pattern recognition method, chemometric method and spectral analysis technology, the external physical quality of apple (shape and size) and detection methods for common defects on the surface.

The detection system and algorithm developed on the basis of the above research laid the foundation for my country's research and development of rapid online inspection and grading equipment for Apple's external quality based on machine vision technology and multi-spectral machine vision technology.

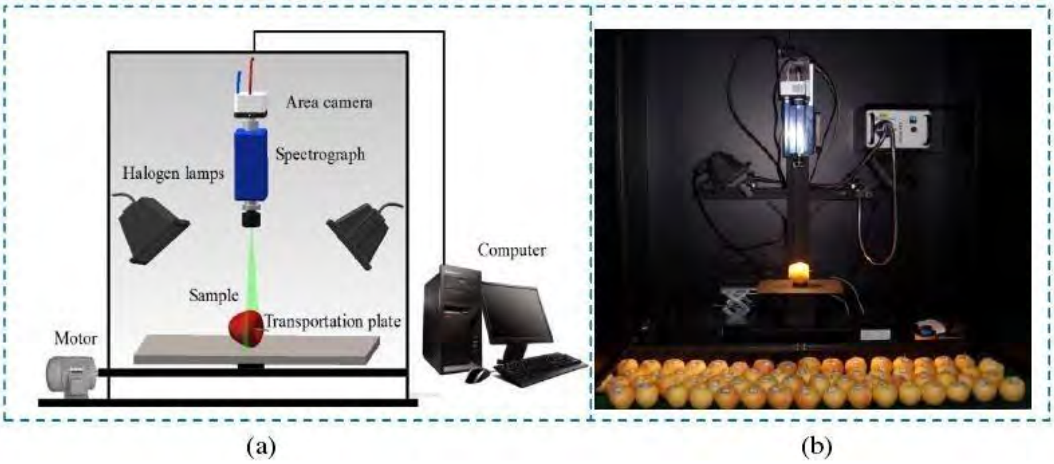


Figure 11 Schematic diagram and physical diagram developed by Dr. Zhang Baohua of Shanghai Jiaotong University; (a) Schematic diagram; (b) Physical diagram

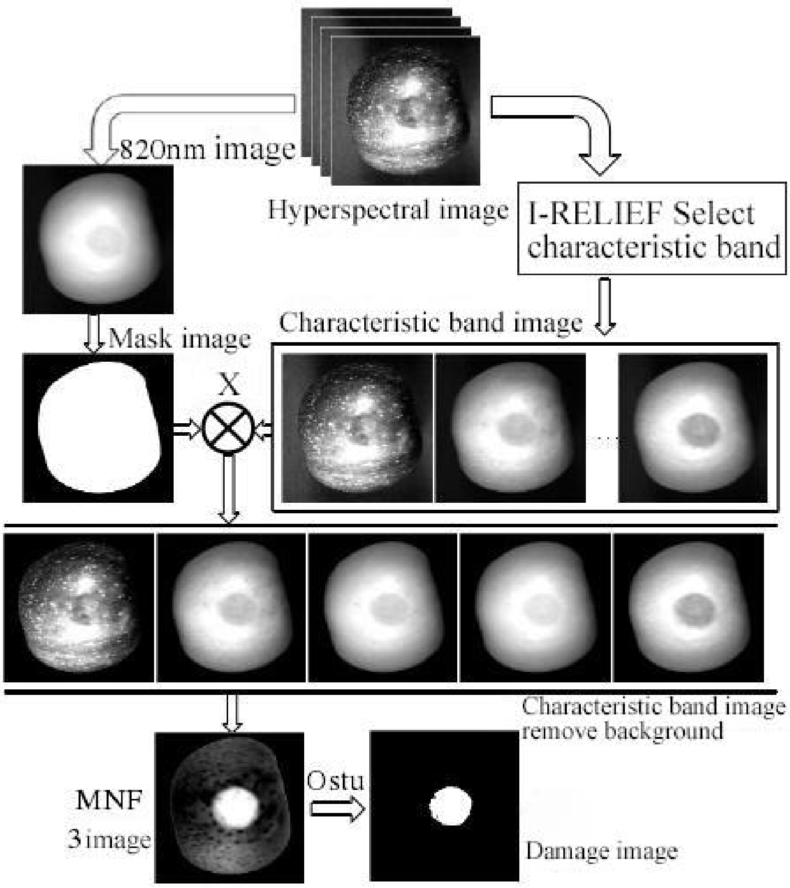


Figure 12: Flow chart of early damage detection algorithm for apple surface

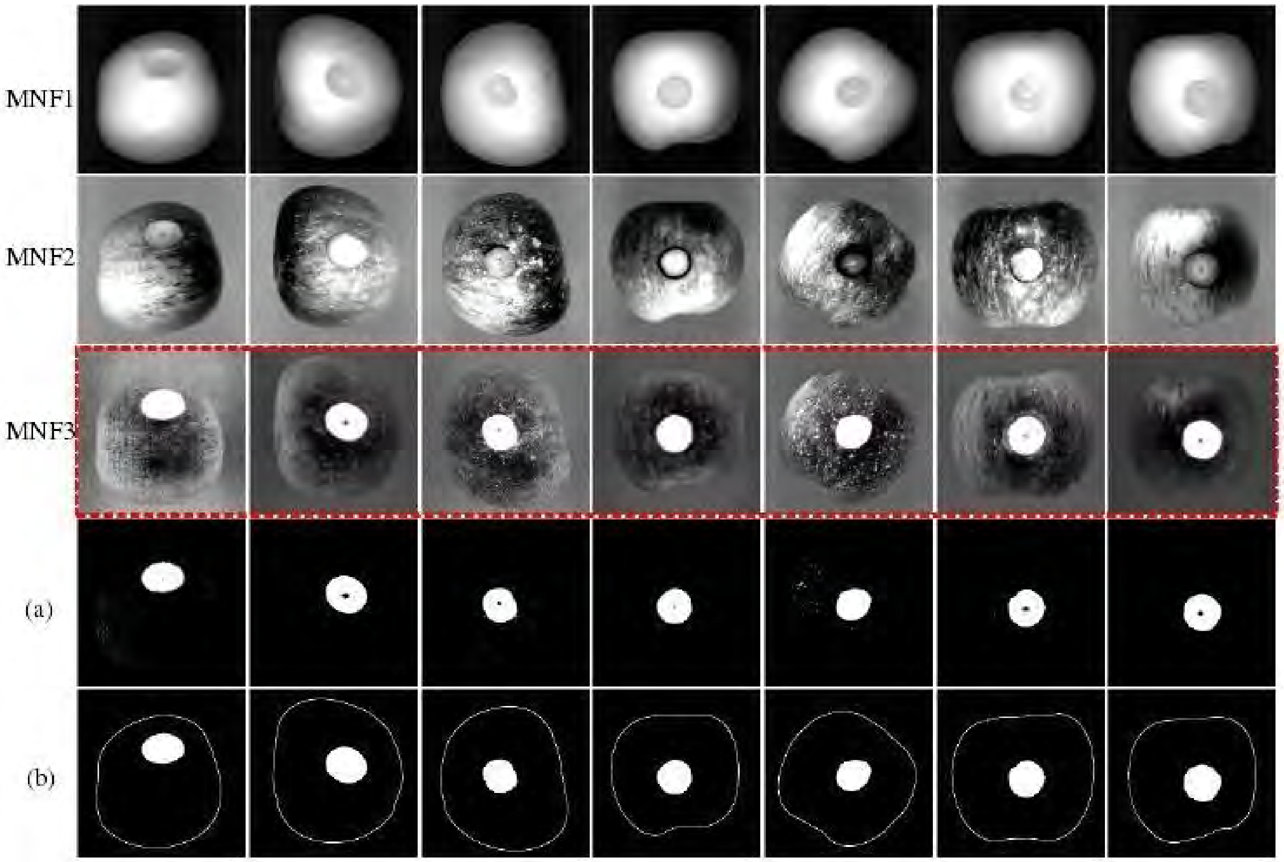


Figure 13 Recognition results of early decay of some apples and intermediate processing (a) rot segmentation results (b) final results

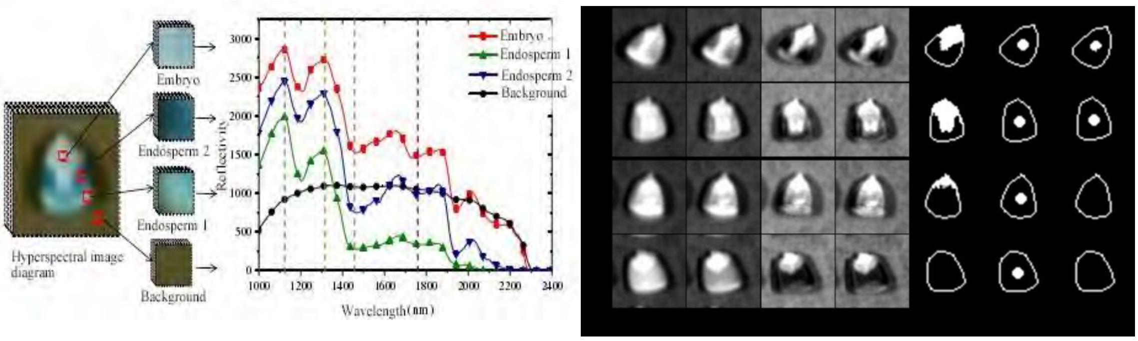


Figure 14 Corn seed sorting application (Dr. Chaopeng Wang, Northwest A&F University)

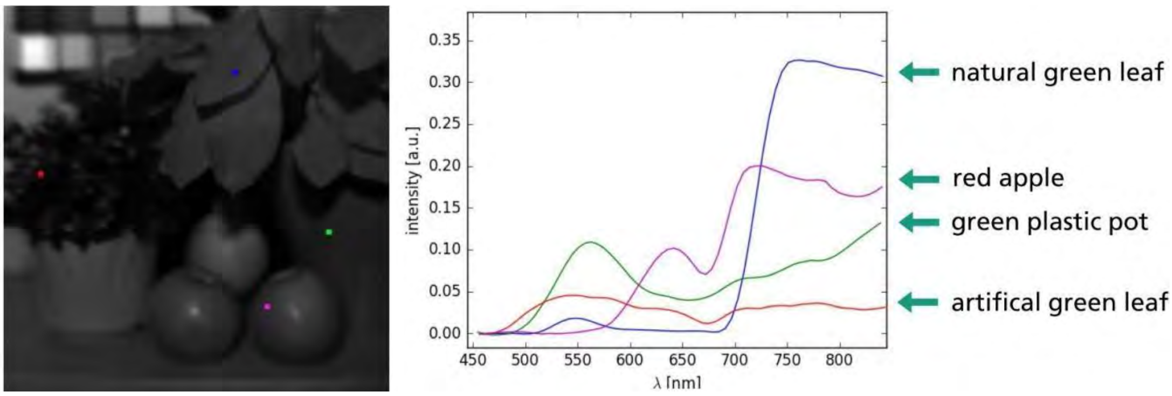


Figure 15 The spectrum of natural green plants, artificial green leaves, green plastic, and red apples

6.2 Precision Agriculture Application

Figure 16 Drone-borne hyperspectral imaging camera

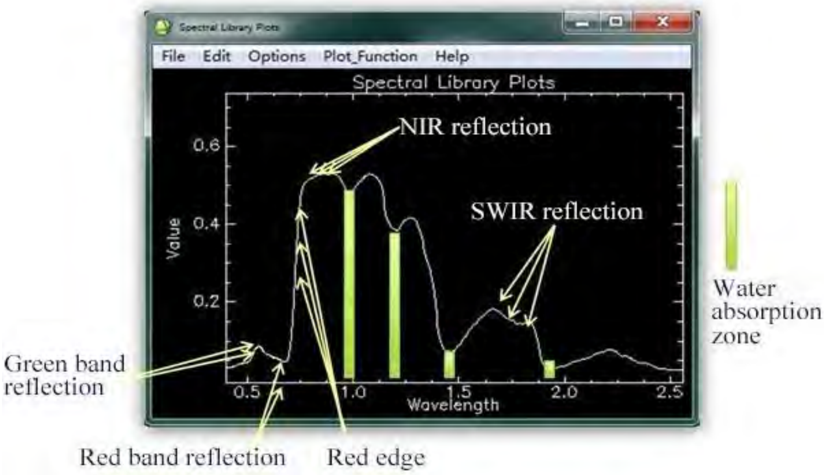


Figure 17 Green plants measured spectrum

1) **Crop growth monitoring and yield estimation:** Due to the different external factors of crops at each stage of their growth and development, there will be certain differences in their internal composition and external morphology. The most important difference is the leaf area index. Leaf area index is a comprehensive index reflecting the individual characteristics and group characteristics of crops.
2) **Crop pest control:** Remote sensing technology can monitor the effects of pests and diseases on the growth and development of crops, track the growth and development of crops, analyze and estimate disaster losses, and can monitor the distribution and activity of pests, thereby preventing the occurrence of pests.
3) **Drought monitoring of crops:** Remote sensing technology monitors crop drought conditions through crop vegetation index and canopy parameters.
4) **Monitoring of soil moisture content and distribution:** In the case of different thermal inertia

conditions, the difference between remote sensing spectra is very obvious, so a mathematical model between thermal inertia and soil moisture content can be established, and remote sensing technology uses this model to analyze soil moisture content and distribution.

5) **Crop nutrient monitoring:** The accuracy of remote sensing technology to monitor the nitrogen content of crops is higher than that of other nutrient elements.

Normalized difference spectral index (NDSI), ratio spectral index (RSI) and simple spectral index (SSI) were constructed by using single band and any two bands in the range of 450 ~ 882 nm to calculate the correlation between CGI and spectral index and screen out spectral index with good correlation. Combined with partial least squares regression (PLSR), the inversion model was established.

Using CGI as the index, Airborne hyperspectral image was used to monitor the growth status of wheat in the multi-growth period in 2015. Unmanned aerial vehicle hyperspectral image inversion CGI has high precision, which can judge the difference of wheat overall growth, and can provide reference for wheat growth monitoring.

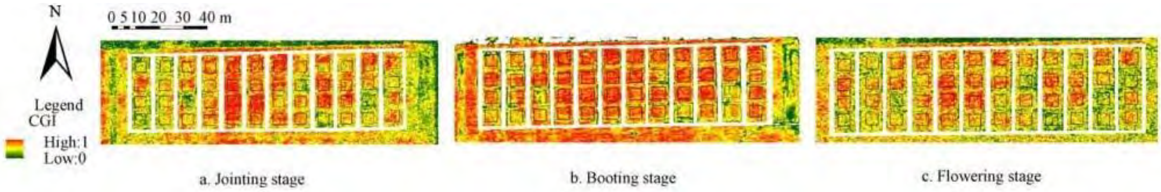


Figure 18 CGI inversion of wheat growth index

6.3 Forest Health Application

Used for pest monitoring and forest resource assessment.

Principle: The health of vegetation is related to greenness index, leaf area index, leaf moisture content and light use efficiency;

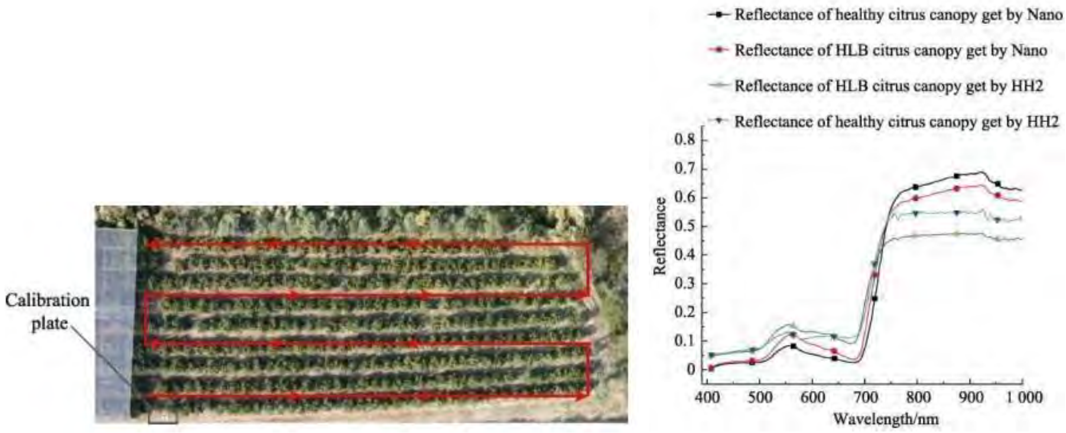


Figure 19 Monitoring and classification of citrus yellow dragon disease plants based on drone-borne hyperspectral imaging camera (designed by Lan Yubin et al., South China Agricultural University)

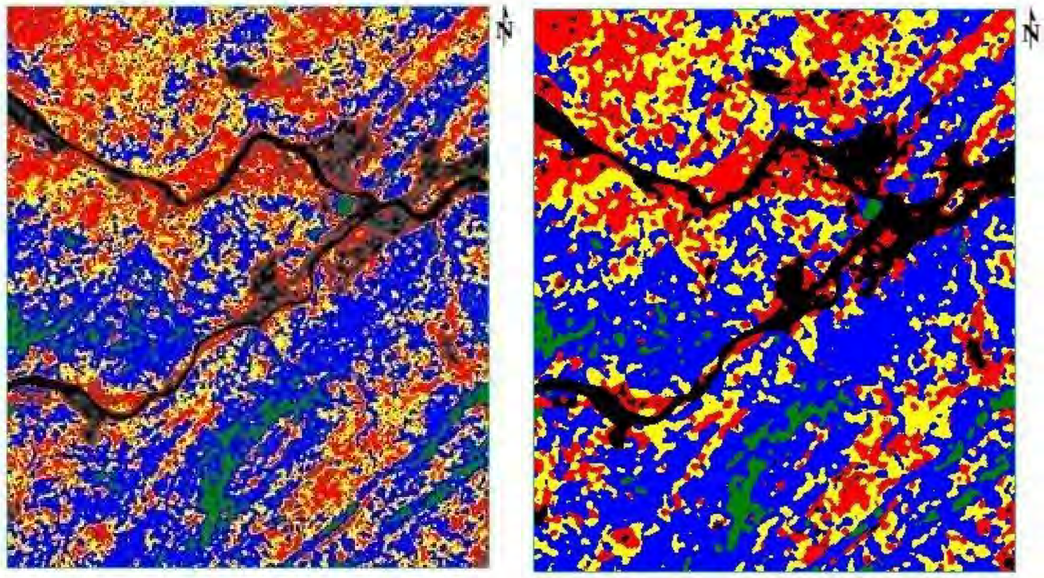
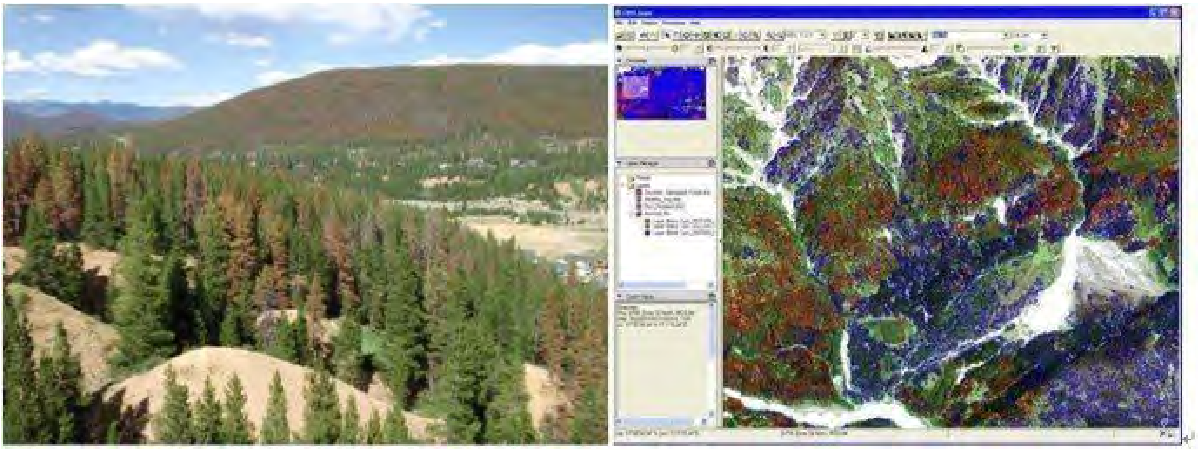


Figure 20 Distribution map of masson pine health degree studied by Wang Shuang of the University of Electronic Science and Technology of China with a hyperspectral camera



6.4 Geological Prospecting Application

Spectral remote sensing technology evolved from the multi-spectral remote sensing technology represented by Landsat and took initial shape in the mid-1980s (Goets et al., 1985, Tong Qingxi et al., 2006).

Due to its advantages of high spectral resolution and atlas integration, hyperspectral remote sensing technology has the ability of fine detection and analysis of surface rock mineral composition on a large scale. It can not only provide a macro image of the ground, but also determine the type and abundance of minerals in the geological body, and even the chemical composition of some minerals at pixel level details (Wang Runsheng et al., 2010).

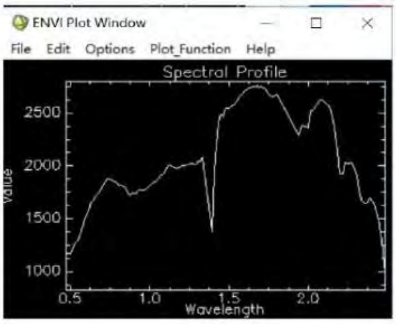
In recent years, with the continuous development of hardware, data processing methods and software related to imaging spectrometer, the application of hyperspectral remote sensing technology in the field of geological survey has been accelerated.

Hyperspectral remote sensing technology has played an important role in geological mapping, the definition and division of hydrothermal alteration zones, and the delineation and discrimination of mineralization anomalies from large metallogenic areas to medium-scale ore fields (e.g. Bierwirth et al., 2002; Company Changyun et al., 2005; Kruse et al., 2006; Cudahy et al., 2007; Wang Runsheng et al., 2010; Liu Dechang et al., 2011; Yan Baikun et al., 2014; Yang Zian et al., 2015; Graham et al., 2017).

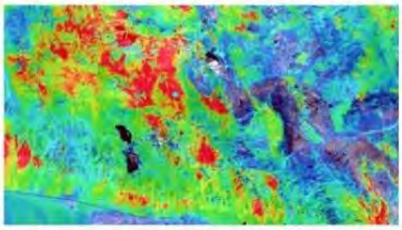
With the theory of metallogenic system (Wyborn et al., 1994) becoming the guiding principle of prospecting practice, thematic mineral mapping on the scale of large ore concentration areas and metallogenic belts will provide key regional material composition information for predictive prospecting and exploration.

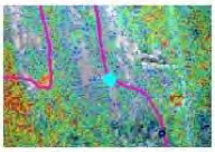
The spectral wavelength ranges used for mineral mapping include visible light (400-700nm), NIR (700-1000nm), SWIR (1000-2500nm), and thermal IR (7000-15000nm). At present, the most widely used in mining is the short-wave infrared region (1000-2500nm).

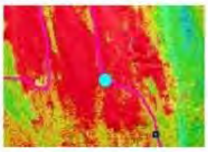
Because the frequency is close to the cofrequency and combined frequency of the chemical bond vibration in the mineral lattice, the mineral containing water or OH- (mainly layered silicate and clay) as well as some sulfate and carbonate minerals can be observed in the range of short-wave infrared wavelength.

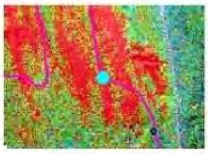


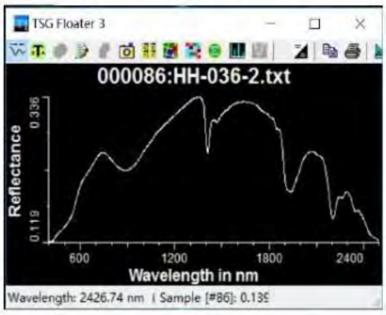
HH036 point image spectrum


Sericite Filling Results Comparison of known deposit points between HH036 and measured


Chlorite extraction results


Sericite extraction results


Feb3+ extraction result



HH036 point measurede spectrum


Sampling point photos


Long-range photos of sampling points

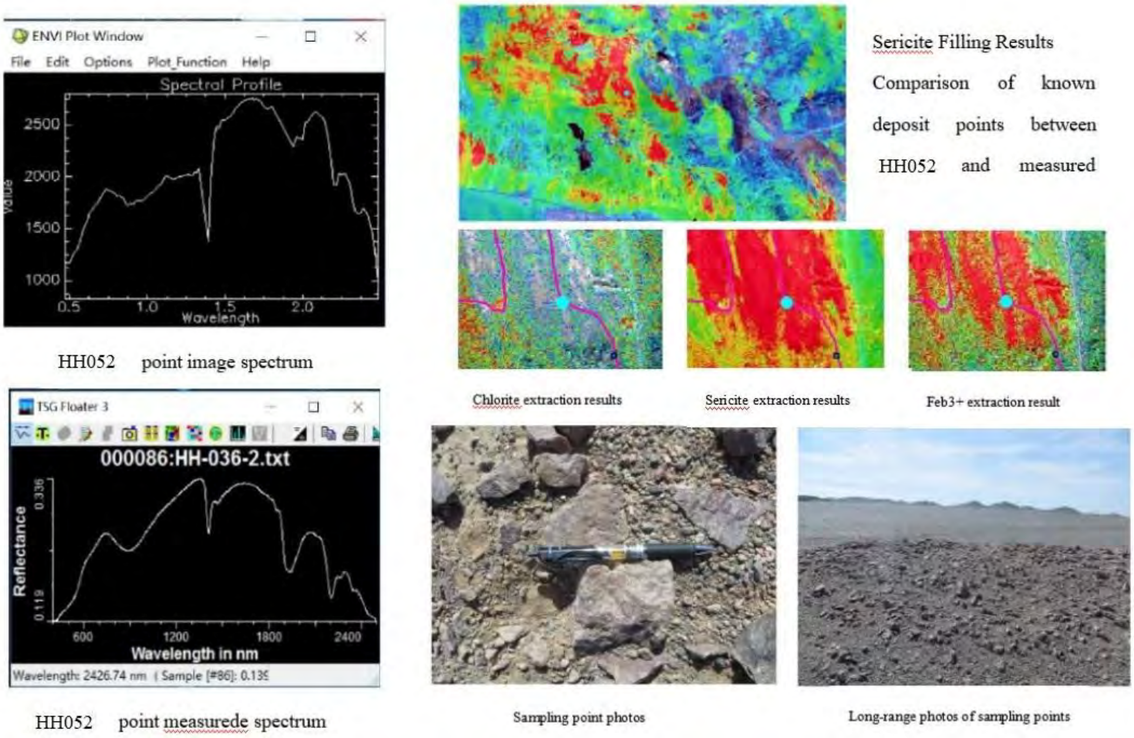


Figure 21 Application of hyperspectral imager in prospecting

Soil salinization is one of the important ecological and environmental problems in arid and semi-arid areas. Soil salinization causes soil hardening, fertility decline, acid-base imbalance, land degradation and other consequences, which seriously restricts agricultural development in China and affects the strategic situation of sustainable development in China at present.Remote sensing technology, with its characteristics of large scale, wide range, strong timeliness and economy, makes up for the deficiency of traditional methods for monitoring salinization phenomenon, and provides a new way for quantitative monitoring of soil salinization phenomenon.

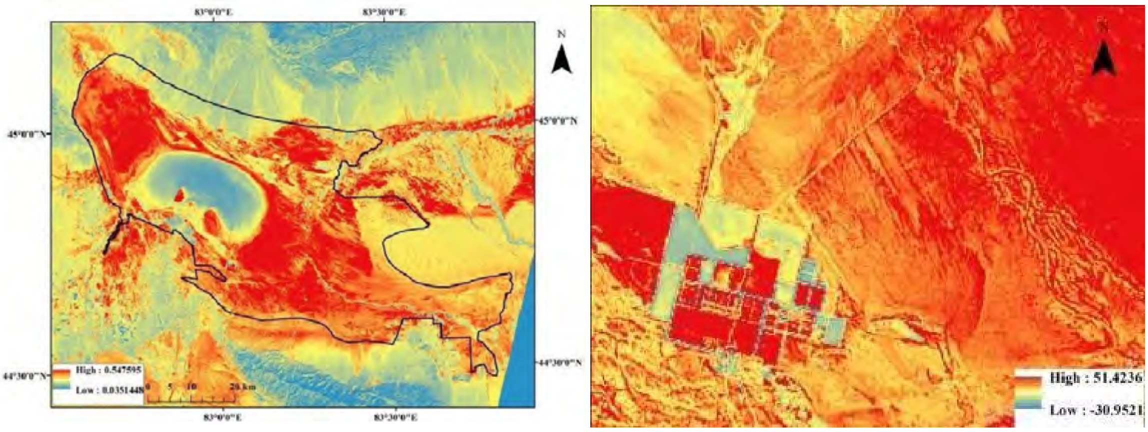
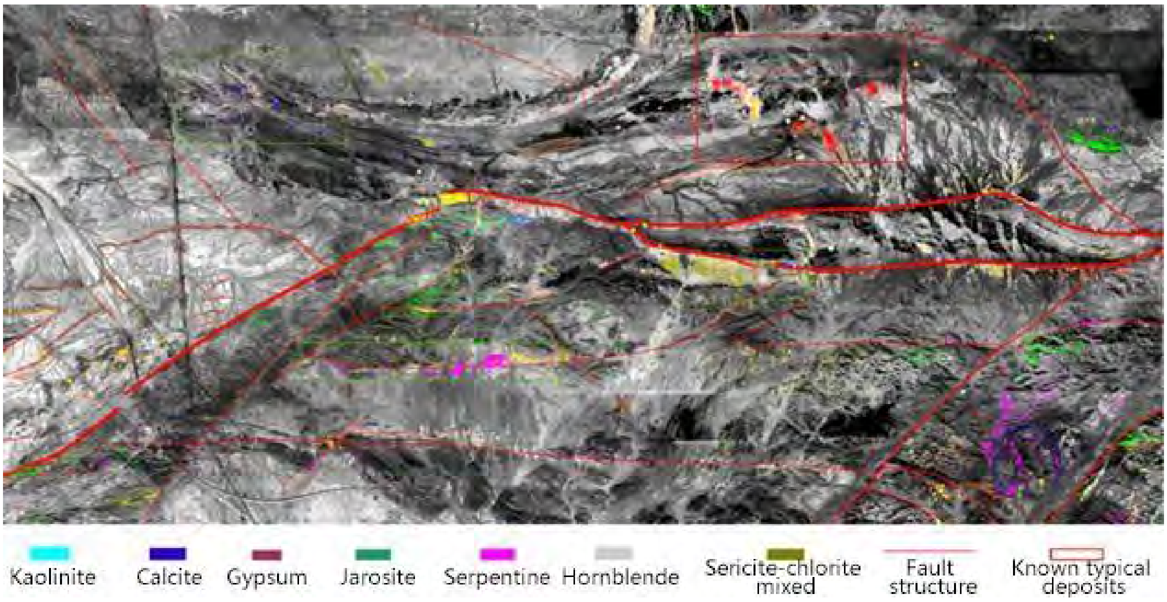


Figure 22 The surrounding area of a salt field



6.5 Public Safety Application

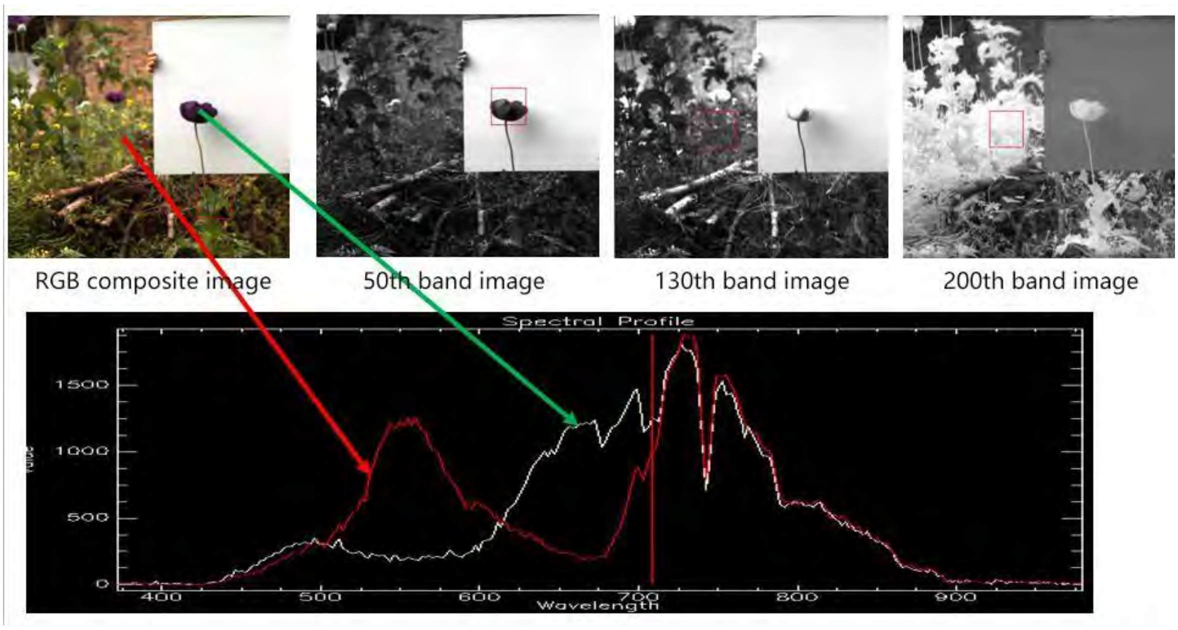


Figure 23 The searching for illegal poppy cultivation application

Figure 24 Document inspection application

6.6 Medical Microscopic Imaging Application

Objective: online detection and navigation positioning during tumor surgery

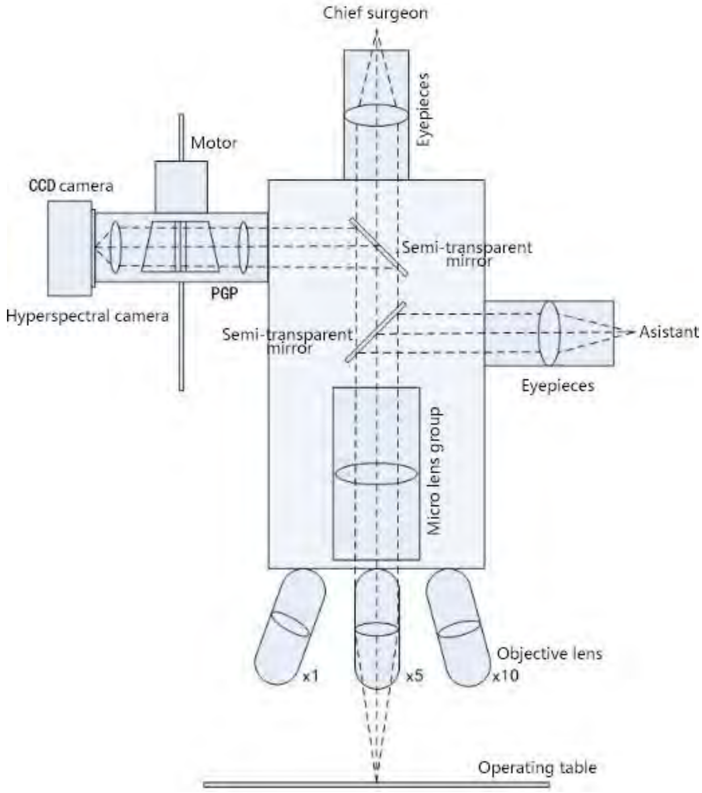


Figure 25 Medical microscope imager optical path schematic diagram

Is shown in the figure of medical microscopic imaging spectrometer principle diagram, the operating table for the target after the objective lens, microscope lens group is divided into three road, visual observation for the surgeon, all the way all the way for the assistant auxiliary visual observation, a routing imaging spectrometer detection, driven by a motor to imaging spectrometer measuring target space d scanning, imaging spectral information of the target under test, then through data analysis, image processing, through the display to the doctor.

Figure 26 Medical microscope imager figure

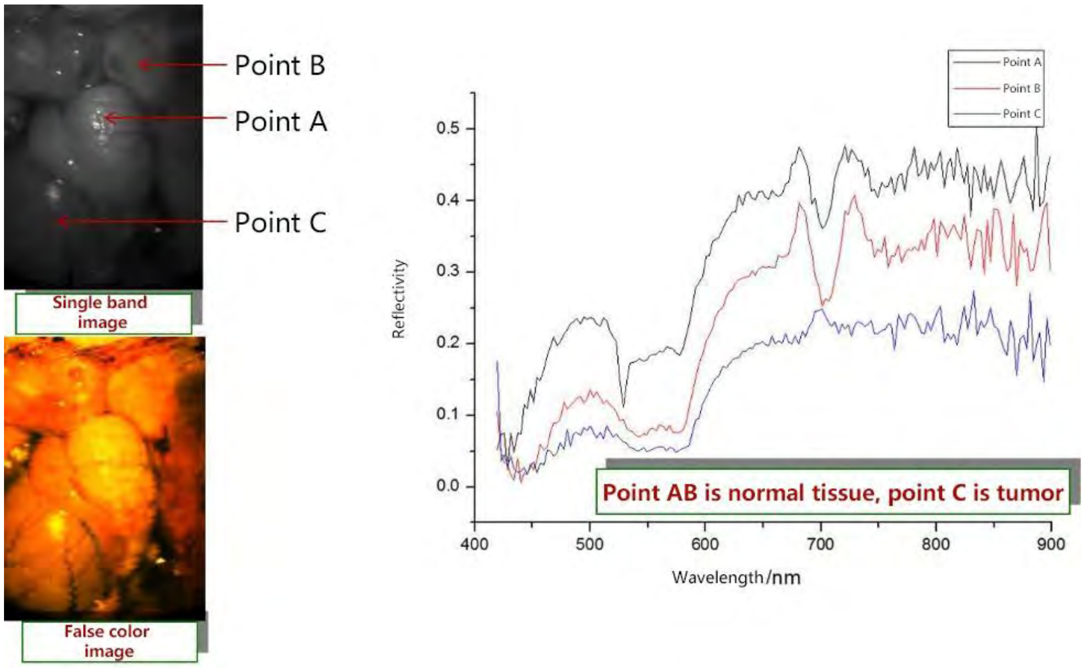


Figure 27 Data collect by medical microscopic imager

6.7 Airborne Imaging Spectroscopy Application

Figure 28 Optosky Airborne Imaging Camera

Objective: Airborne remote sensing

Application: Figure shows airborne imager consists of SpecVIEW-VIS, stable platform and POS modules. Figure 30 and Figure 31 show data was collecte. Figure 7 shows pseudo color image processed through geometric correction, flight strip spice and radiatation correction. Figure 31 shows typical geology spectral curve.

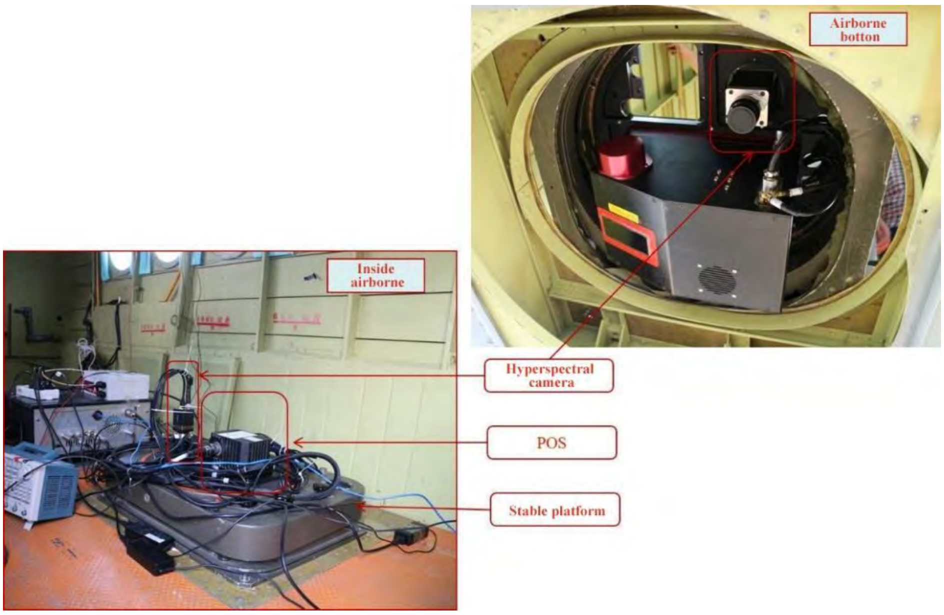


Figure 29 Airborne remote sensing application

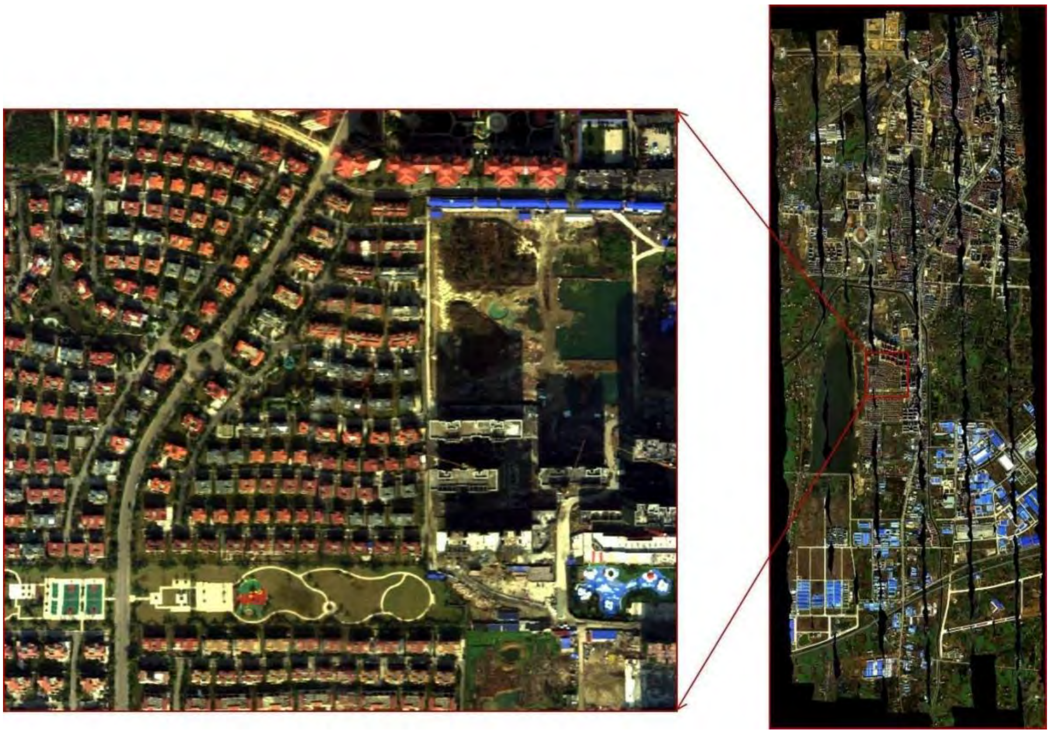


Figure 30 Airborne application data-pseudocolor image

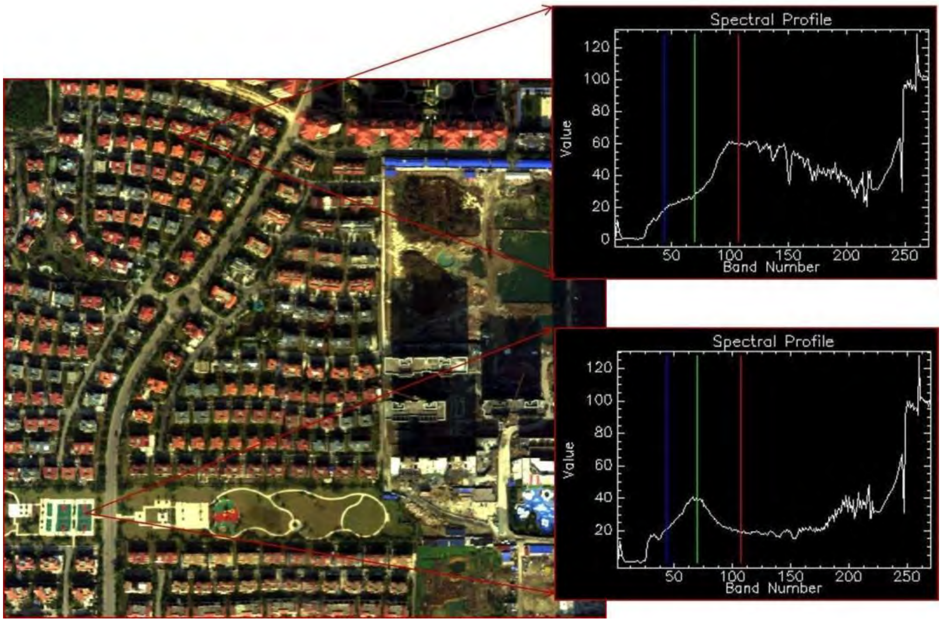


Figure 31 Airborne application data-spectral curve

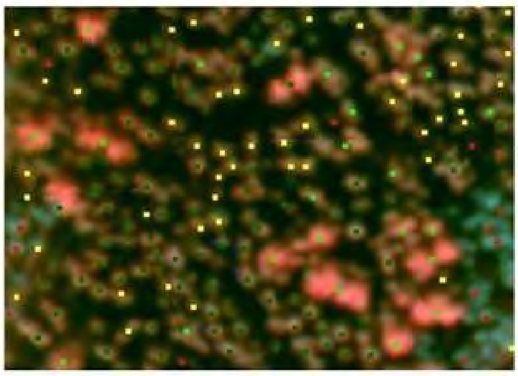
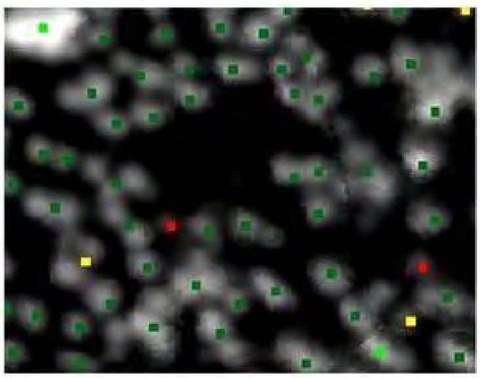



Figure 32 Forest remote sensing, Airbone hyperspectral monitor forest disease and pest

6.8 Water Quality and Environmental Protection Appication

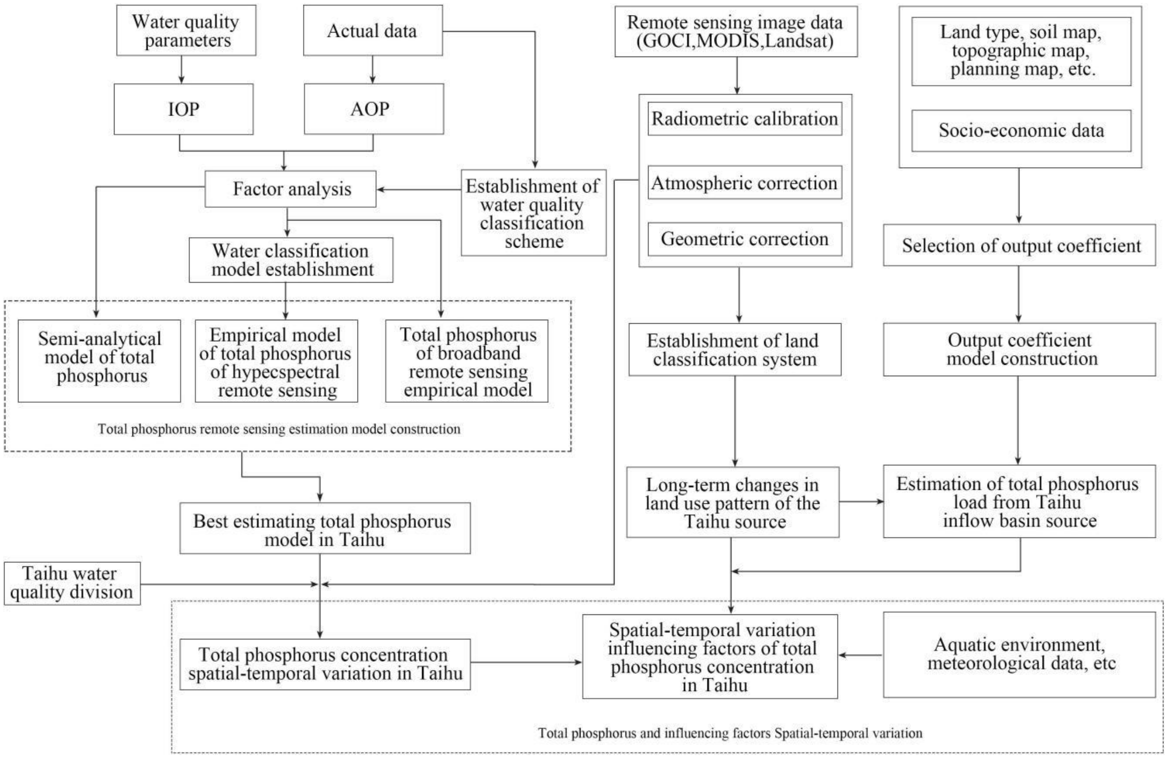


Figure 33 Inversion algorithm flow of hyperspectral data

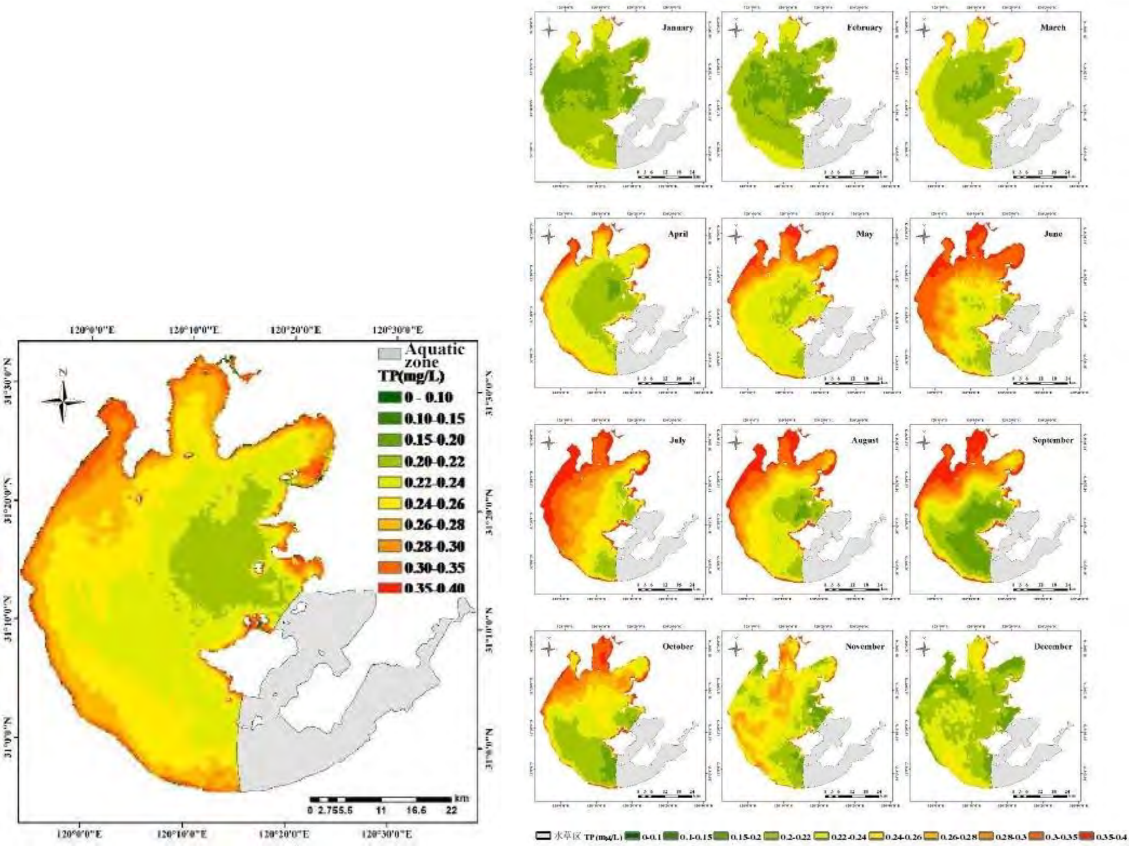


Fig. 34 (a) Spatial distribution of total phosphorus concentration in Taihu Lake. The spatial difference of total phosphorus concentration was obvious, with the highest value of 0.38mg/L and the lowest value of 0.06mg/L. (b) Monthly variation of total phosphorus concentration in different lakes.

The lake area also generally reaches its maximum phosphorus concentration between June and September. The total phosphorus concentration in Zhushan Bay, Meiliang Bay and the west bank of Taihu Lake was higher than the mean value of the whole lake from March to October of the year, and was significantly higher than that in the rest of Taihu Lake. The total phosphorus concentration in Gonghu Bay was higher than that in the whole lake only in June, and the total phosphorus concentration in the south bank of Taihu Lake and Great Taihu Lake was relatively low throughout the year.

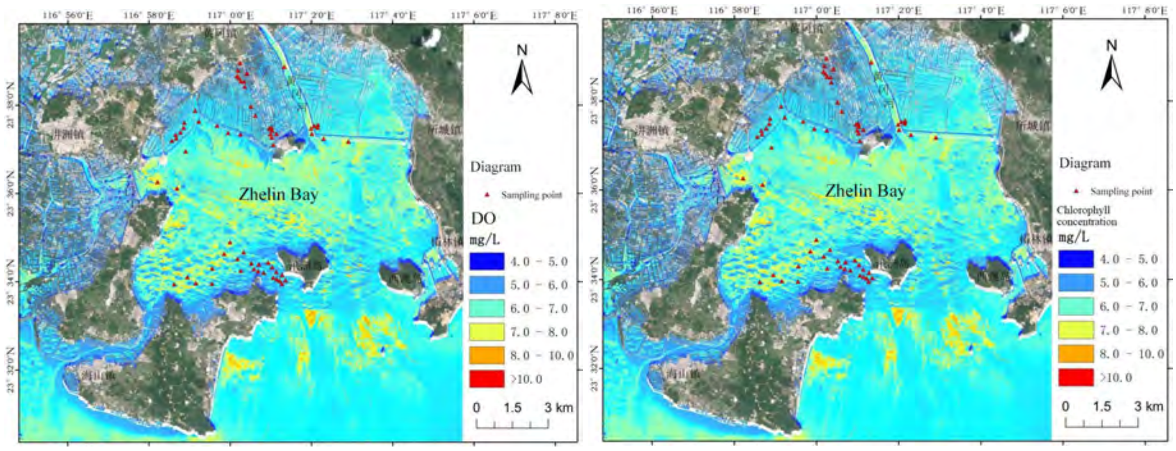


Figure 35 The distribution of dissolved oxygen and chlorophyll concentration in Zhelin Bay, eastern Guangdong, taken by hyperspectral

7. Company Profile

Optosky company is a first-class spectroscopy solution provider, with the headquarter locates in the 7th floor of the research institute of the Chinese Academic of Science at an area of 2500 square meter in Xiamen city where successfully held the international 9th BRICK summit in 2017.The subsidiary company locates in Wuhu city with an area of 2035 square meters.

The company founder Dr.Hongfei,Liu graduated Docter degree from the Chinese Academic of Science and postdoctoral degree from Xiamen University, by integrating both of top Universities' spectroscopy technology background into Optosky company aiming at developing the leading spectroscopy equipment in the world.

The company bases on unique technologies of Optomechatronics, Spectroscopy Analysis, Process Weak Optical and Electrical Signals, Cloud Computing, and have been developed wide products line of the competitive Raman spectroscopy instruments, micro spectrometer, hyperspectral imager, field spectroradiometer, fluorescence spectroscopy, LIBS etc. Driven by advanced technologies and products, Optosky brand has been well-known to customers all over the world.

Optosky company base on technology innovation, market-driven direction, customer first, provides first-class products and services, and one-stop solutions to many fortune 500 companies in many industries. The company received praise from different industry companies, as well as many innovative intellectual properties, software copyright, qualification certification, and winner awards over hundred numbers.

Optosky receives top class A introduced the high-tech company to international Xiamen city, the national high-tech and new innovative technology company award. The founder Dr.Hongfei Liu receives the innovation talent award by the ministry of science and technology.

The company is currently conducting the exclusive project of major industrialization national oceanic administration with a total fund of five million us dollars. The company in charge of drafting national industry standard of VNIR and SWNIR Field Spectroradiometer, and six national standard drafters, including China National Standard Drafter for Hazmat detector based on Raman spectroscopy, China National Standard Drafter for Buoy-type Monitor eco-environment, China National Standard Drafter for water quality monitor in the unmanned boat, China National Standards drafter for online water quality monitor by spectroscopy, China National Standard Drafter for UV-absorbent measure fabrics.

The company has over 70 IPs and over 20 innovative patents.

The company received ISO9001:2015 certification, CE certification, Police Administration Certification, FDA approval compliant, IQOQPQ compliant.

Figure 1 Optosky (Xiamen) Photonics Inc. Company Headquarter

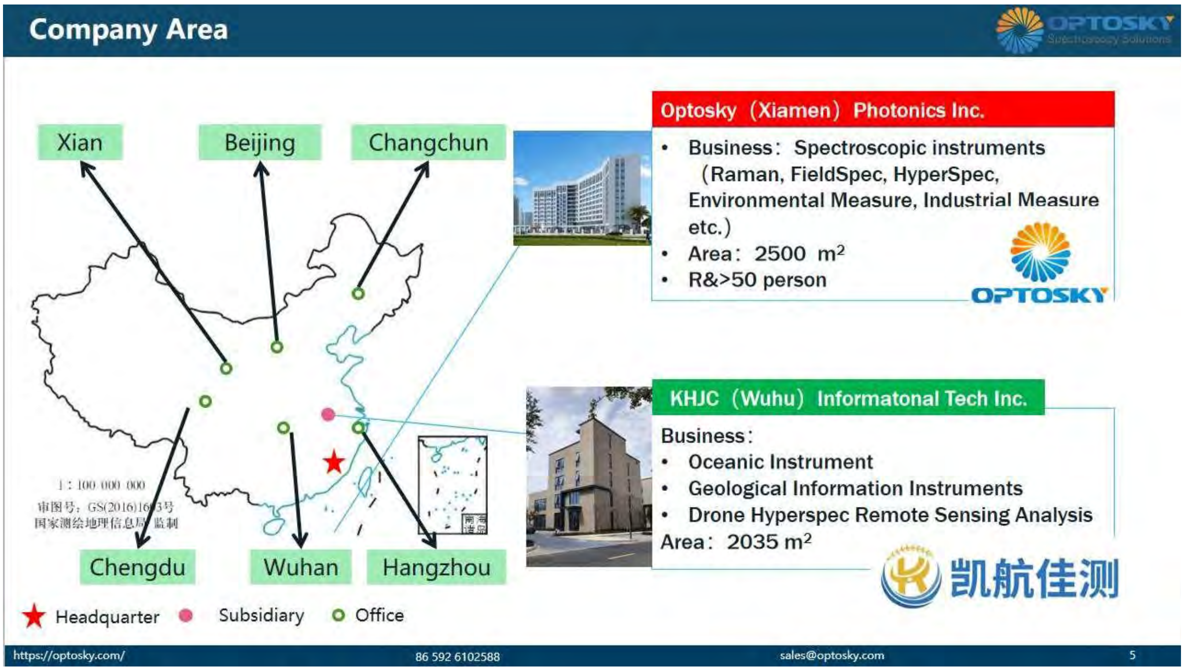


Figure 2 Optosky Company Area

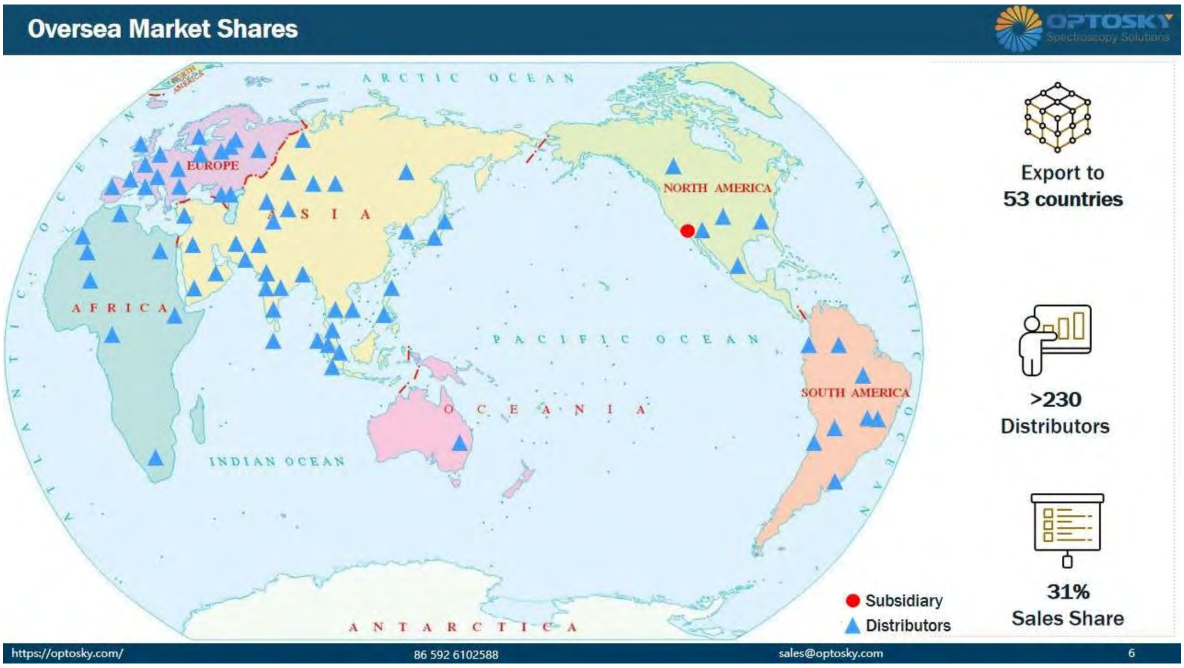


Figure 3 Oversea Market Shares

Figure 4 Optosky Chair and Draft National Standards Lists.

Figure 5 Qualification

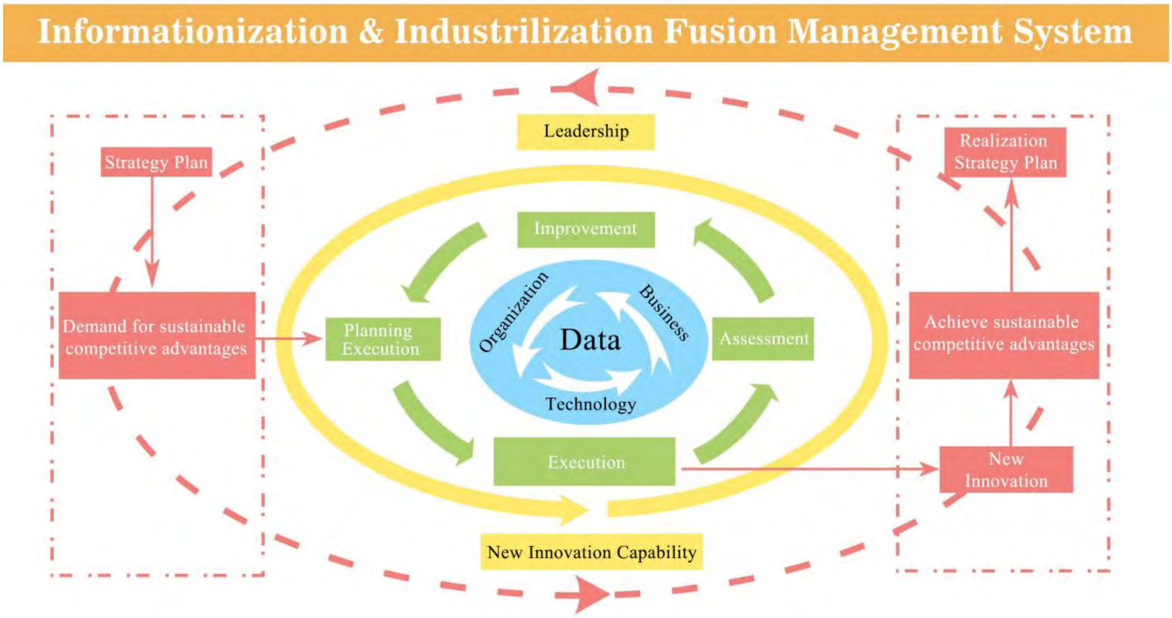


Figure 6 GB/T 23001_Informationization & Industrilization Fusion Management System

Figure 7 Optosky's Co-founder_Dr. Hongfei Liu

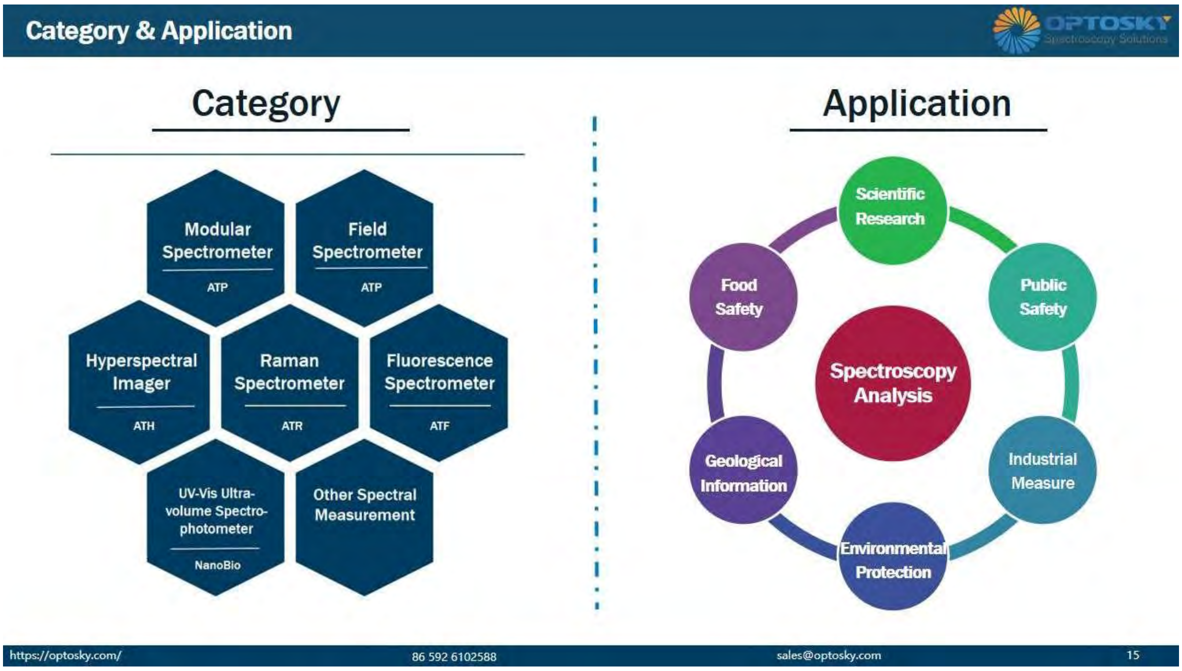


Figure 8 Category & Application

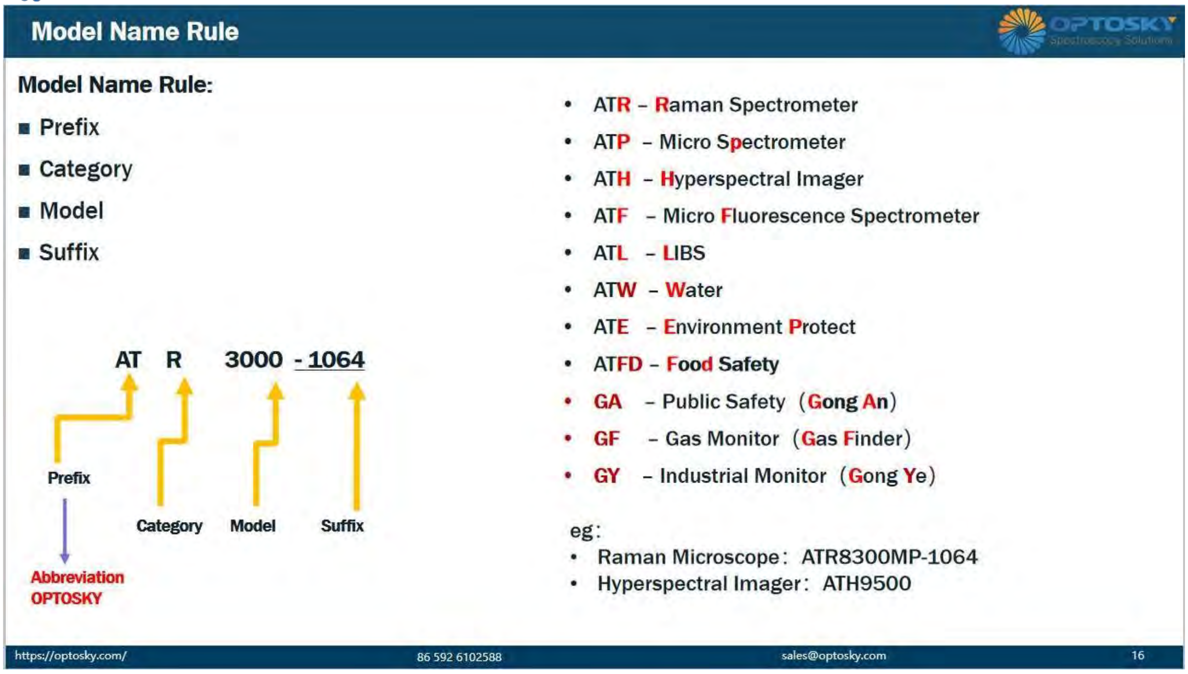


Figure 9 Model Name Rule

По вопросам продаж и поддержки обращайтесь:

Алматы (727)345-47-04
Ангарск (3955)60-70-56
Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Владикавказ (8672)28-90-48
Владимир (4922)49-43-18
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89

Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48
Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Коломна (4966)23-41-49
Кострома (4942)77-07-48
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курск (4712)77-13-04
Курган (3522)50-90-47
Липецк (4742)52-20-81

Магнитогорск (3519)55-03-13
Москва (495)268-04-70
Мурманск (8152)59-64-93
Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
Новокузнецк (3843)20-46-81
Ноябрьск (3496)41-32-12
Новосибирск (383)227-86-73
Омск (3812)21-46-40
Орел (4862)44-53-42
Оренбург (3532)37-68-04
Пенза (8412)22-31-16
Петрозаводск (8142)55-98-37
Псков (8112)59-10-37
Пермь (342)205-81-47

Ростов-на-Дону (863)308-18-15
Рязань (4912)46-61-64
Самара (846)206-03-16
Санкт-Петербург (812)309-46-40
Саратов (845)249-38-78
Севастополь (8692)22-31-93
Саранск (8342)22-96-24
Симферополь (3652)67-13-56
Смоленск (4812)29-41-54
Сочи (862)225-72-31
Ставрополь (8652)20-65-13
Сургут (3462)77-98-35
Сыктывкар (8212)25-95-17
Тамбов (4752)50-40-97
Тверь (4822)63-31-35

Тольятти (8482)63-91-07
Томск (3822)98-41-53
Тула (4872)33-79-87
Тюмень (3452)66-21-18
Ульяновск (8422)24-23-59
Улан-Удэ (3012)59-97-51
Уфа (347)229-48-12
Хабаровск (4212)92-98-04
Чебоксары (8352)28-53-07
Челябинск (351)202-03-61
Череповец (8202)49-02-64
Чита (3022)38-34-83
Якутск (4112)23-90-97
Ярославль (4852)69-52-93

Россия +7(495)268-04-70
Казахстан +7(727)345-47-04
Беларусь +375-257-127-884
Узбекистан +998(71)205-18-59
Киргизия +996(312)96-26-47

эл.почта: otp@nt-rt.ru || сайт: https://optosky.nt-rt.ru/