

UAV Pushbroom Hyperspectral Imager

ATH9100

Features

- Built-in pushbroom, supports hover hyperspectral scanning and UAV flight pushbroom imaging
- Band range: 380~1000nm
- High spectral resolution: better than 1.4 nm
- Wide FOV: 11.5°@f=35mm, 126m@35mm (300m height)
- Instantaneous FOV: 0.167mrad@f=35 mm
- the remote control can set parameters
- 1.5m wheelbase large multi-rotor UAV, high load, scalable and strong
- Ultra-long flight time: about 45 minutes

Application

- Geology and mineral resource exploration, soil monitoring
- Precision Agriculture, Crop Condition and Yield Evaluation
- Forest pest monitoring and fire monitoring
- Coastline and marine environment monitoring
- Pasture Productivity and Pasture Monitoring
- Lake and watershed environmental monitoring, water quality testing
- Agricultural and livestock product quality testing
- Military, Defense and Homeland Security

Description

ATH9100 series UAV hyperspectral imager is a small, light-weight UAV-borne micro-hyperspectral imager. It consists of a six-rotor high-stability UAV, a high-stability gimbal, and a hyperspectral imager. , built-in push broom system, wireless image system, GPS/IMU system, ground receiving workstation, ground control system, etc.

ATH9100 (standard configuration) and ATH9100W (wide field of view) adopt high-performance detection and imaging devices of 1920×1200 pixels and 4096X3000 respectively, with clear images and less noise. The ATH9100 series comes with hyperspectral data acquisition software and hyperspectral and processing software, including various basic and commonly used functions of hyperspectral data.

The main feature of the ATH9100 series is a hyperspectral built-in push-broom system, which can support UAV hovering and area scanning imaging modes; it can also support UAV flight push-broom imaging.

The ATH9100 series UAV hyperspectral imager can measure the spectral information of vegetation, water, soil and other ground objects in real time and generate a data cube. By analyzing spectral images, correlations can be established with the physical and chemical properties of plants, etc., which can be used to classify vegetation and study plant growth conditions. The system has a compact design and the imaging spectrometer host has high spectral resolution. At the same time, it supports two imaging methods, built-in push broom and external push broom, to meet the application needs of different scenarios.



1. Flight data sample



Figure 1 Schematic diagram of hyperspectral flight of ATH9100 UAV



Figure 2 ATH9100 UAV hyperspectral single scene data chart

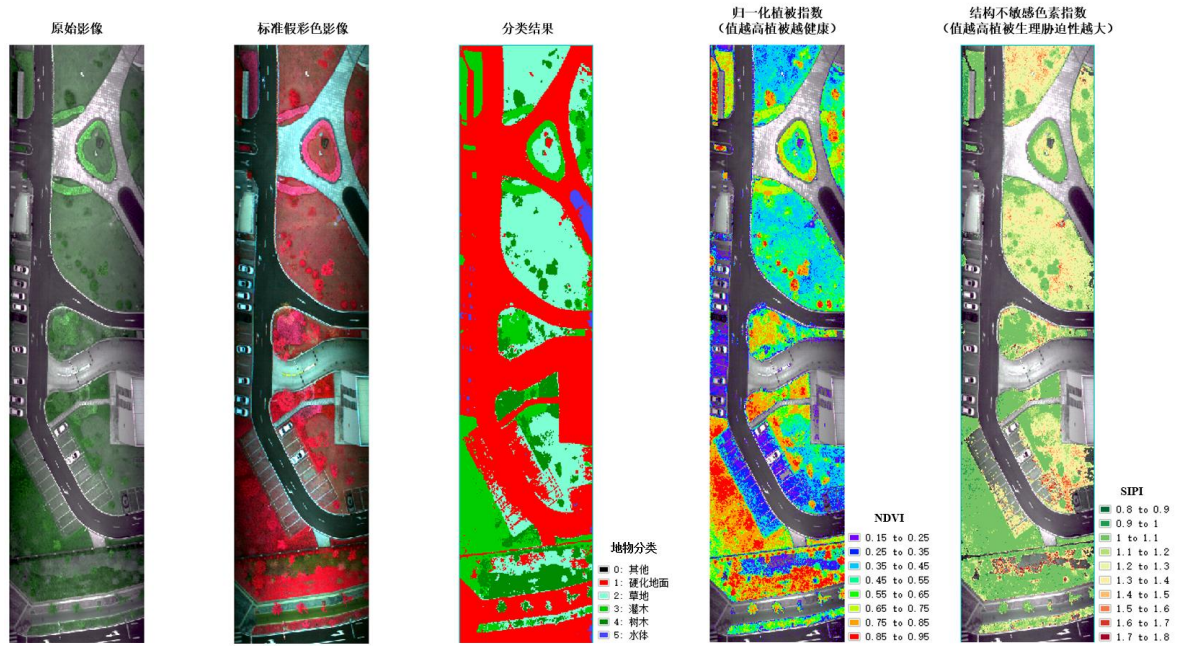


Figure 3 & Figure 4 ATH9100 UAV hyperspectral data inversion results

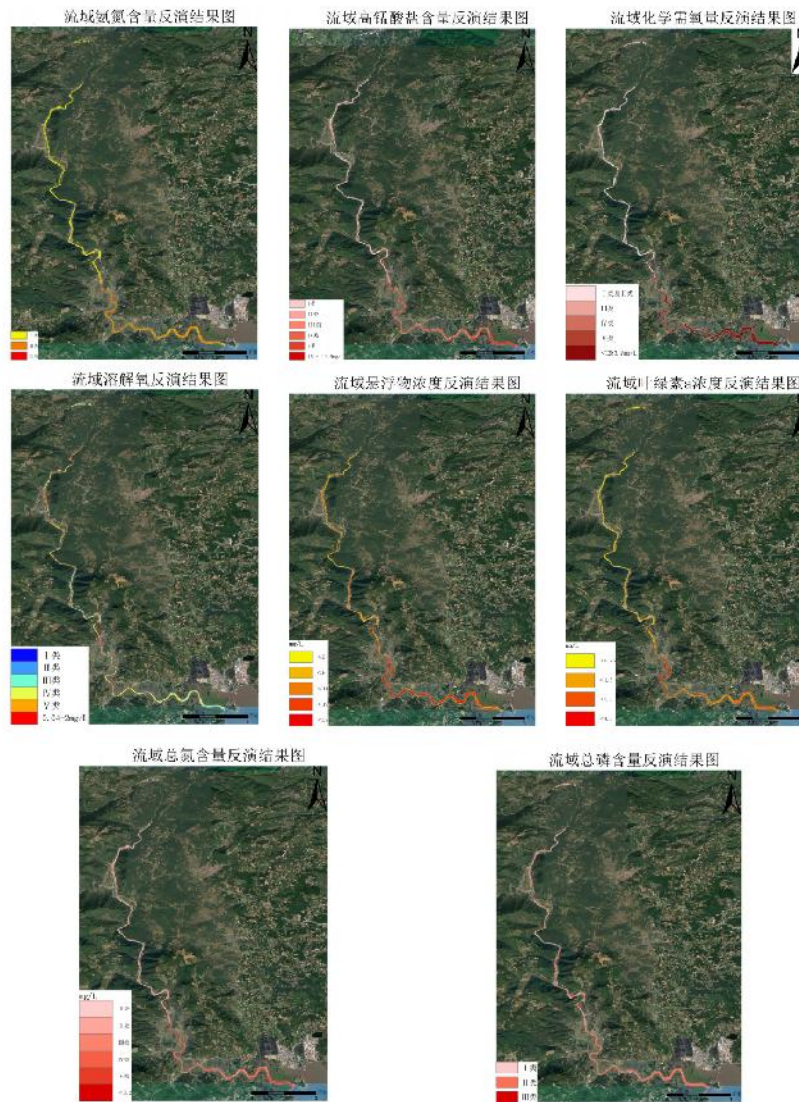


Figure 5 Inversion results of ATH9100 UAV hyperspectral river water quality inspection data

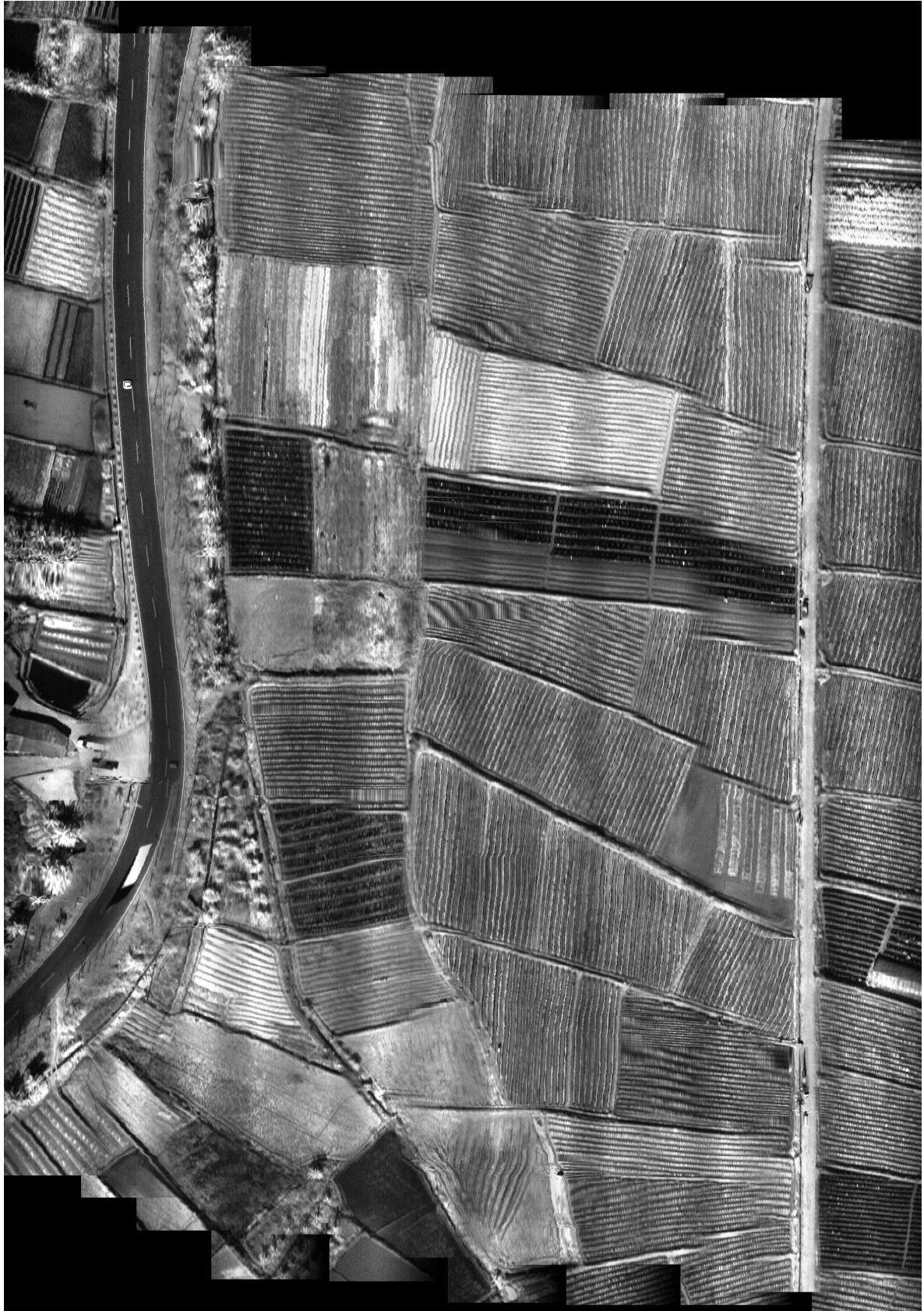


Figure 6 Hyperspectral splicing data of large-area tobacco plantation and multiple flight zones flown by ATH9100 UAV hyperspectral imager

2. Order guide

Model	Feature
ATH9100	Standard configuration type, band range 380-1000nm, heavy-duty 6-rotor UAV, flight time 45 minutes.
ATH9100W	Wide-field, heavy-duty 6-rotor drone with a flight time of 45 minutes.
ATH9100-17	Short-wave infrared 900-1700nm, heavy-duty 6-rotor UAV, flight time 45 minutes.
ATH9100-FW	Vertical take-off and landing fixed-wing UAV, the flight time is 2 hours, and the flight distance is 120km.
ATH9100W-FW	Wide field of view, vertical take-off and landing fixed-wing UAV, flight time 2 hours, flight distance 120km.
ATH9100-4-17	Heavy-duty 6-rotor drone with a wavelength range of 380-1700nm.
ATH9100-4-25	Heavy-duty 6-rotor drone with a wavelength range of 380-2500nm.

*Note:

1. “W” is the abbreviation of wide field of view;
2. “FX” is the abbreviation of Fixed Wing UAV;



Figure 7 Flight scene of ATH9100-FW and ATH9100W-FW vertical take-off and landing fixed-wing UAVs equipped with hyperspectral imagers

3. Parameter configuration

	ATH9100	ATH9100W
Data interface	USB3.0	USB3.0
Imaging method	Hover (built-in push broom), fly push broom	
Light splitting method	Transmission grating	
Resolution (before Binning)	1920 (spectral dimension) × 1200 (spatial dimension)	3000 (spectral dimension) × 4096 (spatial dimension)
Scanning speed (line images/s)	24	24
Single frame shooting speed (seconds)	15	15
Maximum frame rate	255 fps	80 fps
Image Resolution	1920 × 1200	4096 × 3000
Power supply	12V, 3W	12V, 5W
Storage	256G	

Product data information is current as of publication data. Products conform to specifications per the terms of Optosky Standard warranty.

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Reliability		
Range of working temperature	-20 ~ 50°C	
Storage temperature range	-20 ~ 65°C	-20 ~ 65°C
Working Humidity Range	≤85% RH	≤85% RH
Optical parameters (customizable)		
Spectrum range	380~1000 nm (Other bands can be customized)	380~1000 nm
Optimal Spectral Resolution	< 1.5 nm	< 1.5 nm
Line bending	<1/3 pixel	<1/3 pixel
Spectral distortion	<1/3 pixel	<1/3 pixel
Lens focal length	35mm,25mm,16mm	
Field of view	11.5°@f=35 mm 16.16°@f=25 mm	16.8°@f=35 mm 23.4°@f=25mm
Instantaneous field of view	0.017mrad @ f=35 mm 0.0234mrad @f=25 mm	0.00977mrad@f=35 mm 0.0137mrad@f=25mm
Slit width	30μm	30μm
System Numerical Aperture	0.19(F/2.6)	0.2(F/2.4)
Optical path design	Full transmission lens, scientific light and dark focus	Full transmission lens, scientific light and dark focus
Sensor		
Sensor type	CMOS	CMOS
Detectable range	350~1100 nm	350~1100 nm
Effective Pixels	1920 × 1200	4096 × 3000
Dynamic Range	60 dB	72 dB
Data bit depth	12 bit	14 bit
Collection method	Software Binning or hardware Binning (software optional)	Software Binning or hardware Binning (software optional)
Software		
Basic skills	Exposure, gain, and speed can be flexibly set, and real-time hyperspectral images and hyperspectral curves can be dynamically displayed;	Exposure, gain, and speed can be flexibly set, and real-time hyperspectral images and hyperspectral curves can be dynamically displayed;
Focusing	Dynamic real-time display of hyperspectral images, scientific light and dark focusing, avoiding artificial visual focusing errors.	Dynamic real-time display of hyperspectral images, scientific light and dark focusing, avoiding artificial visual focusing errors.
Software system	The data acquisition software can dynamically display hyperspectral images and hyperspectral curves in real time; it can provide measurement modes such as transmission and reflection, and can flexibly set parameters such as exposure time and speed. Spectrum recognition and other functions.	The data acquisition software can dynamically display hyperspectral images and hyperspectral curves in real time; it can provide measurement modes such as transmission and reflection, and can flexibly set parameters such as exposure time and speed. Spectrum recognition and other functions.

Flight platform parameters:

Heavy 6-rotor UAV	
flying platform	Customized version of long-duration, high-load large-scale 6-rotor UAV
gimbal	Three-axis brushless DC motor high stability gimbal
Number of rotors	6 rotors
Take-off and landing mode	vertical takeoff and landing
Wheelbase	1500 mm
Maximum load	6 Kg
maximum ceiling	5000 m
Drone size	1650 X 1410 X 500 mm
GPS positioning accuracy	0.5 m, RTK (0.1m) optional
Endurance flight time	>45 minutes
Ground station working distance	10 Km

Vertical take-off and landing fixed-wing UAV (Fix Wing)	
flying platform	Customized version of long-term vertical take-off and landing fixed-wing UAV
gimbal	Three-axis brushless DC motor high stability gimbal
Number of rotors	4 rotors
Take-off and landing mode	vertical takeoff and landing
cruising speed	25m/s (90km/h) 、Maximum speed:37m/s(133km/h)
maximum takeoff weight	22.5kg
navigation satellite	GPS:L1+L2、BeiDou:B1+B2、GLONASS:L1+L2, Optional PPK/RTK post-differential/real-time differential high-precision positioning module
Landing accuracy	Horizontal height $\leq \pm 0.2m$, standard height $\leq \pm 0.5m$
Wind resistance	$\leq 12m/s$
Rain resistance	light rain (rainfall $\leq 10mm/24h$)
Maximum load	4 Kg
maximum ceiling	5000 m
Drone size	1950mm×3800mm×525mm
GPS positioning accuracy	0.5 m, RTK (0.1m) optional
Endurance flight time	>120 minutes
Take-off and landing site	8*8m
Ground station working distance	20 Km (normal visibility conditions)

4. Accessories list

No.	Items	Quantity	Optional
1	Hyperspectral imager (380-1000nm) host	1	Standard configuration
2	6-rotor UAV or fixed-wing UAV	1	Standard configuration
3	High reliability UAV gimbal and landing gear	1	Standard configuration
4	Airborne data acquisition and large-capacity data storage system	1	Standard configuration
5	Battery	1	Standard configuration
6	objective lens	1	Standard configuration
7	Hyperspectral imaging system workstation (including operation controller and control software)	1	Standard configuration
8	50cm diameter 95% field calibration whiteboard	1	Standard configuration
9	High-precision indoor scanning pan/tilt	1	Optional
10	High blue steady flow halogen lamp	4	Optional
11	Standard calibration plate	1	Optional

12	Original imported field calibration cloth (1.2m×1.2m)	1	Optional
13	360 degree outdoor rotating platform	1	Optional
14	tripod	1	Optional
15	Large-capacity lithium battery for outdoor use	2	Optional
16	measuring darkroom	1	Optional
17	Outdoor portable transport box	1	Optional