

UAV-borne Hyperspectral Imaging System



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1.Introduction

The KHY100 UAV-borne hyperspectral system adopts cutting-edge hyperspectral imaging technology to fully extract and utilize the unique spectral signatures of different materials. Combined with a high-definition camera for capturing high-resolution images, it enables comprehensive detection of qualitative, quantitative, temporal, and spatial information — making it an integrated remote sensing device that unites both imagery and spectral data in one system.

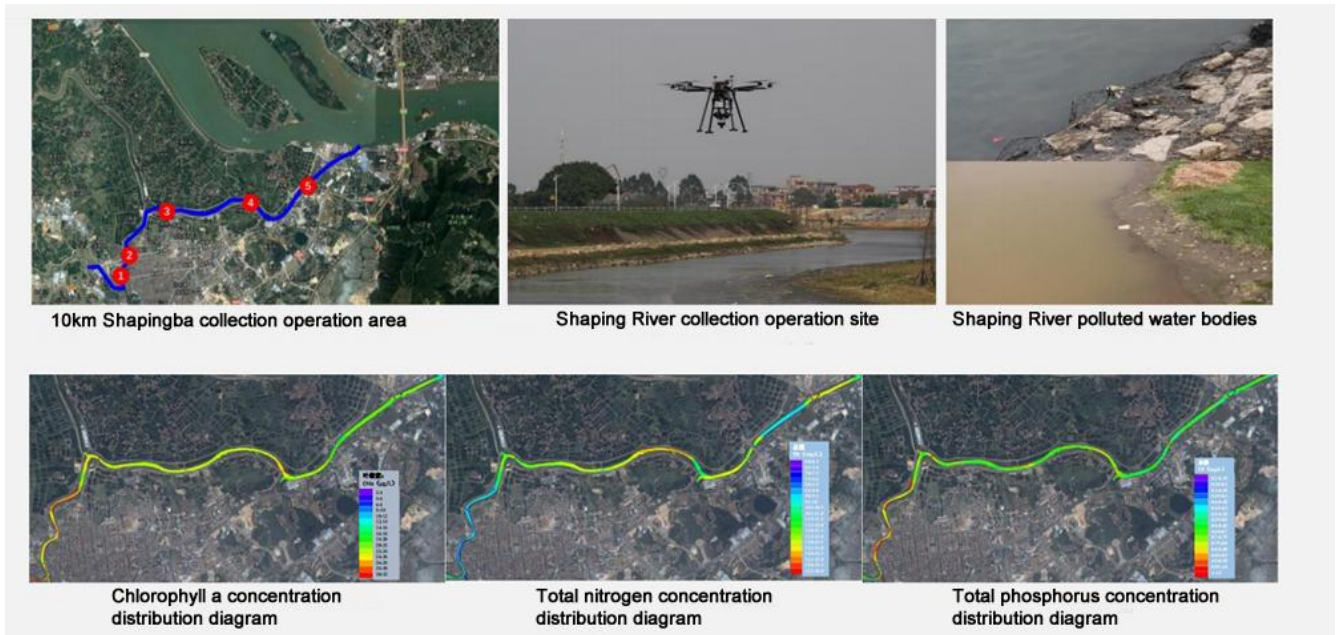
The UAV-borne hyperspectral system integrates a hyperspectral camera and a high-definition camera, synchronously acquiring multi-dimensional data during operation. It supports real-time mission monitoring and remote control. With a built-in high-performance processing unit, the system can perform real-time reflectance calculations and inversion analysis of ground objects. It can be widely applied in scenarios such as water environment monitoring, smart agriculture, forestry surveys, target recognition, and military camouflage detection, meeting the diverse needs of various industries.

2.Features

- Spectral resolution better than 2.8 nm, enabling precise analysis of various ground object spectral characteristics.
- Large-format CMOS hyperspectral camera supporting up to 1,920 spatial channels and 1,200 spectral channels.
- Onboard control and acquisition system with a built-in 1 TB SSD for worry-free data storage.
- Hardware-synchronized high-definition visible-light camera with 15-megapixel resolution, supporting high-precision orthophoto stitching.
- Built-in gimbal stabilization system for push-broom imaging without UAV hovering, ensuring high operational efficiency.
- Deeply integrated with UAV platforms, requiring only a single data cable for power supply and data communication; GPS information is acquired simultaneously and matched line-by-line with hyperspectral data.
- Supports remote intelligent control for ease of operation, avoiding inefficient flight missions.
- Capable of real-time rendering of multi-band spectral composite images, as well as real-time monitoring of hyperspectral acquisition and spatial point spectral curves.
- Preloaded with over 20 commonly used indices such as NDVI, with support for custom band operations and various spectral analysis functions.
- Capable of inverting parameters such as chlorophyll, total nitrogen, total phosphorus, ammonia nitrogen, permanganate index, and suspended solids in water quality monitoring.

3. Application Fields

- Surface water monitoring
- Aquaculture water quality monitoring
- Water ecological protection area monitoring
- Post-natural disaster water quality assessment
- Emergency water pollution incident response

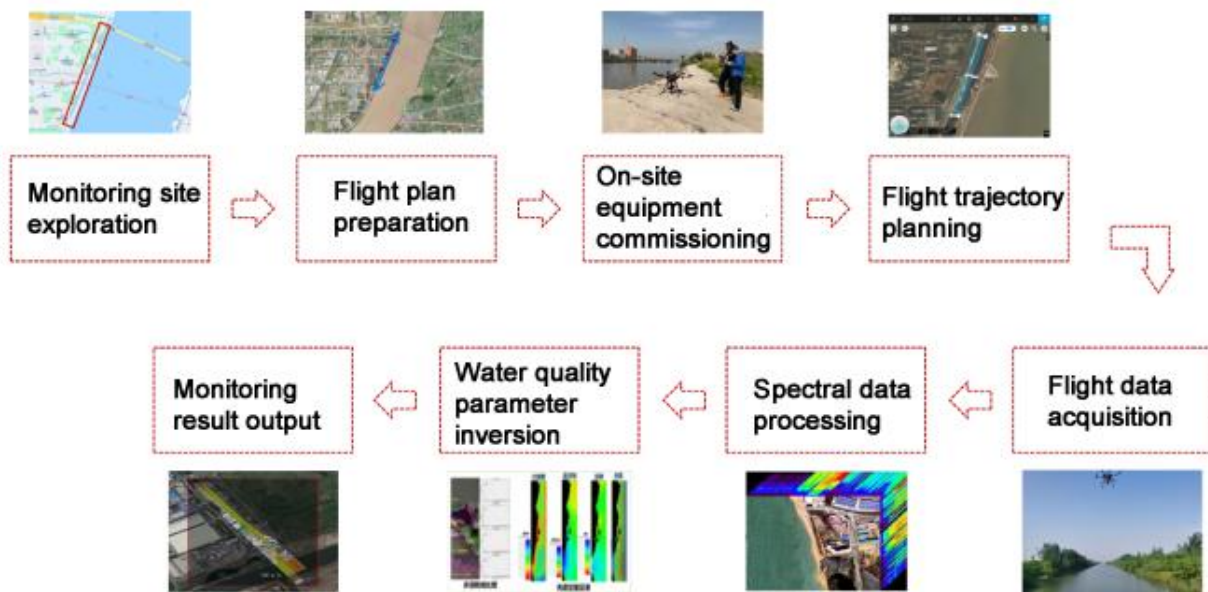


4. Technical Parameters

UAV-borne Hyperspectral Imaging System		
Name	Indicator	KHY100
Hyperspectral camera	Spectral range	400-1000nm
	Spectral resolution	Better than 2.8nm
	Spatial resolution	0.71mrad @F=35mm
	Number of spatial channels	1920(1x), 960(2x), 480(4x)
	Number of spectral channels	1200(1x), 600(2x), 300(4x)
	Detector	CMOS
	Detector interface	USB 3.0
	Frame rate	128fps
	Focal length (optional)	Standard 16mm
High-definition camera	Pixels	15MP
GPS	Positioning accuracy	Better than 10cm (RTK service required)
Wireless transmission system	Remote intelligent control	Real-time monitoring of hyperspectral images and spectral curves

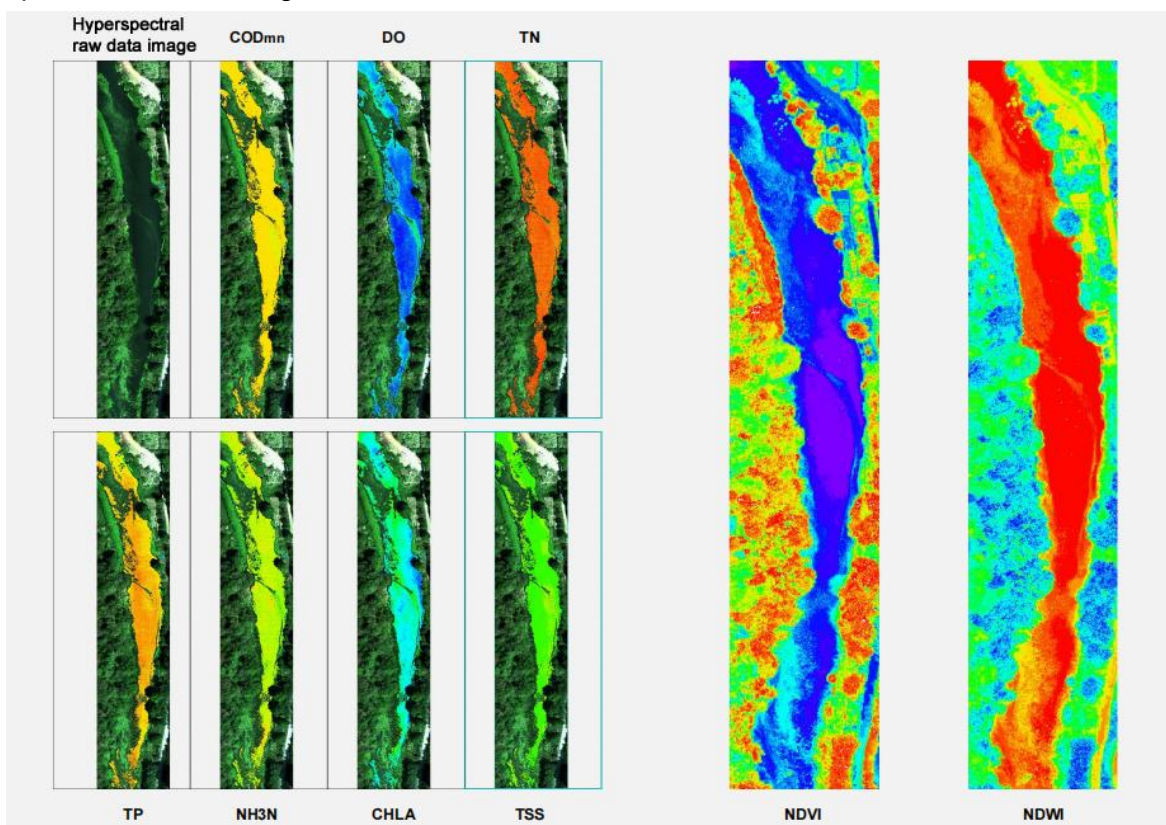
software		
Host control and data acquisition software	Functions	It can render multi-band spectral composite images in real time, and monitor hyperspectral acquisition images and spatial point spectral curves in real time; it supports real-time automatic reflectance calculation, speed-to-height ratio calculation, integration time recommendation, spatial resolution calculation, etc.
	Functions	Remotely communicate with the host through the ground station to control the equipment and adjust parameters.
Data processing and analysis software	Data preprocessing	Spectral and image data viewing, reflectance calculation, radiation correction, filtering, dark background subtraction, spectral noise reduction, spatial noise reduction, mask export, hyperspectral image cropping, rotation, flipping, etc.
	Data concatenation	Hyperspectral image stitching: no need to rely on GPS data to crop and stitch multiple bands of hyperspectral data. Built-in stitching line dodging algorithm, stitching line can be manually adjusted and optimized
	Common index calculations	Built-in calculation of more than 20 vegetation indices, including Normalized Difference Vegetation Index (NDVI), Ratio Vegetation Index (RVI), Enhanced Vegetation Index (EVI), Atmospheric Impedance Vegetation Index (ARVI), Red-Edge Normalized Difference Vegetation Index (NDVI 705), Modified Red-Edge Ratio Vegetation Index (mSR 705), Modified Red-Edge Normalized Difference Vegetation Index (mNDVI 705), Vogelmann Red-Edge Index (VOG1, 2, 3), Photochemical Vegetation Index (PRI), Structural Insensitive Pigment Index (SIPI), Normalized Nitrogen Index (NDNI), Vegetation Decay Index (PSRI), Carotenoid Reflectance Index 1 (CRI1), Carotenoid Reflectance Index 2 (CRI2), Anthocyanin Reflectance Index 1 (ARI1), Anthocyanin Reflectance Index 2 (ARI2), Water Band Index (WBI), Normalized Water Index (NDWI), Water Stress Index (MSI), Normalized Difference Infrared Index (NDII), Normalized Lignin Index (NDLI), and Cellulose Absorption Index (CAI).
	Data analysis	Built-in spectral angle and other hyperspectral data analysis algorithms, support supervised classification of self-built models, support custom analysis model input function, and custom band operation;
	Multi-parameter water quality inversion	Can calculate the inversion of water quality parameters such as chlorophyll, total nitrogen, total phosphorus, ammonia nitrogen, permanganate index, suspended solids, dissolved oxygen, etc.

5. Flight Monitoring Process



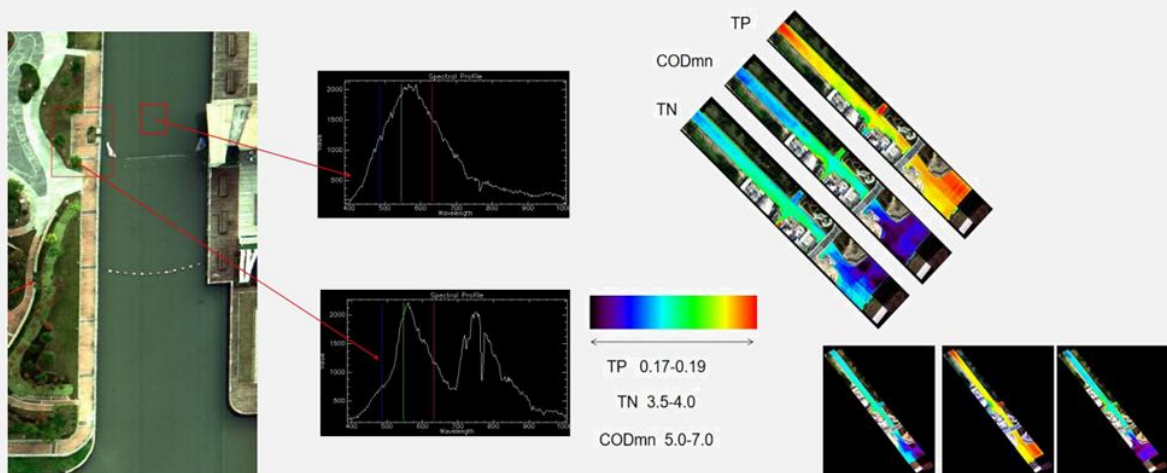
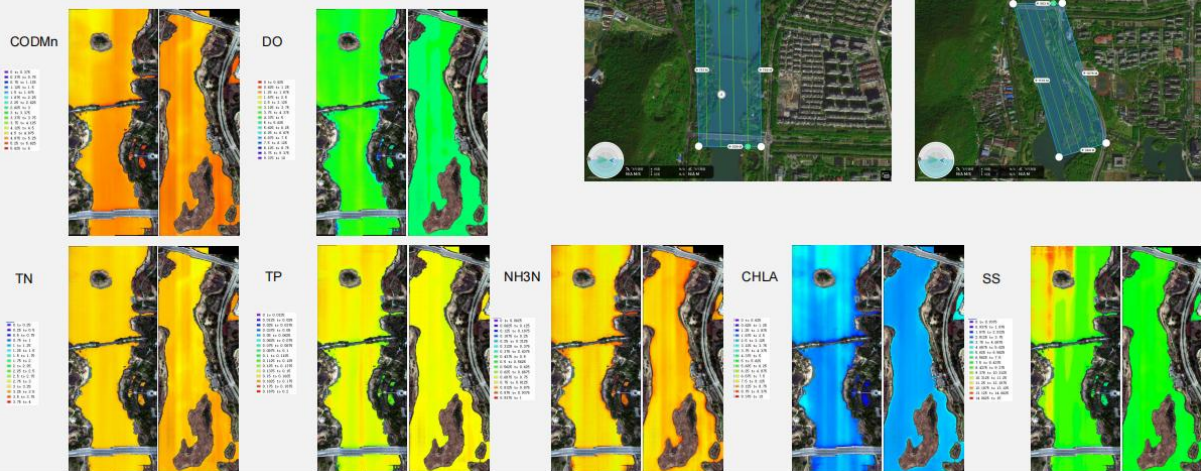
Results Analysis:

The drone-mounted hyperspectral system features simultaneous multi-dimensional data acquisition, acquiring 300 bands of hyperspectral data and high-definition visible light photographs in a single flight. The accompanying software also allows calculation of common indices such as NDVI and NDWI. A built-in multi-parameter water quality inversion algorithm accurately retrieves various water quality parameters, including total nitrogen, total phosphorus, ammonia nitrogen, permanganate index, chlorophyll, and suspended solids, generating clear and intuitive concentration distribution maps for precise source tracing.



6.Cases

A river basin in Jiangsu Province UAV-borne Hyperspectral Imaging System



Taicang, Jiangsu

A river in Shanghai UAV-borne Hyperspectral Imaging System

