



*Enhance your
perception*

AISA+

Airborne Hyperspectral System



AISA+ is a proven hyperspectral system that has been designed to collect accurate and reliable information of the earth surface.

This versatile tool can be used for a variety of commercial and scientific applications, and has the ability to be used in the air and on ground.



AISA+

Airborne Hyperspectral System

AISA+'s complete, pushbroom system, consisting of a hyperspectral sensor head, miniature GPS/INS sensor, and data acquisition unit in a rugged PC, has been described as being "the best mix of economy and performance for imaging targets which has spectral signatures in visible and near infrared portions of the spectrum, such as vegetation and water."

AISA+ has been designed to be user and field friendly. It is quick to install and remove from any aircraft and provides timely, accurate and reliable information.

"the best mix of economy and performance around"

The system includes an in-flight configuration setting, which allows alterations to be made easily for each exercise. A real-time fibre optic downwelling irradiance sensor (FODIS) is integrated in the AISA+ sensor head.

Specifications

Sensor head	Typical specifications
Spectrograph	High efficiency transmissive imaging spectrograph Throughput practically independent of polarization Smile and keystone < 5 microns
F/#	F/2.4
Pixel size	24 x 24 microns
Spectral range	400-970 nm
Spectral pixels	244
Spectral sampling/pixel	2.3 nm
Slit width	30 microns
Spectral resolution	2.9 nm
Spatial pixels	512, of which ~20 FODIS pixels
Standard fore optics	17 mm or 23 mm
FOV	39.7 degrees, 29.9 degrees
I FOV	0.078 degrees, 0.058 degrees
Swath width	0.72 x altitude, 0.53 x altitude
Ground resolution @1000 m	1.41 m, 1.02 m
Camera	Progressive scan CCD camera
Output	12 bits digital
Image rate from sensor head to hard disk	Up to 50 images/s with hyperspectral data of 2.3 nm sampling (244 contiguous spectral channels) Up to 60 images/s -- 4.6 nm sampling (122 - chs) Up to 100 images/s -- 9.2 nm sampling (61 - chs)
Integration time	Settable independent of image rate
Shutter	Electromechanical shutter for dark background registration, user controllable by software
FODIS	Diffuse light collector and fiber optic cable (5 m standard) with SMA connector
Calibration	Sensor head comes with wavelength and radiometric calibration file.

GPS/INS sensor

AISA+ employs a miniature, integrated 3-axial inertial navigation sensor for monitoring the aircraft position and attitude. The sensor integrates solid state gyros and GPS with a real time Kalman filter for increased accuracy.

Data acquisition system and data recorder

Data acquisition system supports synchronous acquisition from the AISA+ sensor head and the GPS/INS sensor. It is built in a rugged industrial chassis PC using

- high power processor,
- digital PCI frame grabber, and
- hot swap removable hard disk (73 GB or higher) with Ultra SCSI hard drive for data recording.

Hard disk can be changed in-flight to add recording capacity.

A very high contrast flat panel display and rugged keyboard are provided with the PC.



There is also an option of using a laptop PC (with limitations in some of the performance features)



Sensor head
Dimension: 16 x 16.5 x 36 cm
Weight : 7 kg
Power: 20 W



Data acquisition PC
Dimension: 17 x 33 x 41 cm
Weight : 14 kg
Power: < 300 W (typ. <150 W)



Monitor
Dimension: 41 x 31 x 6 cm
Weight : 3.6 kg
Power: 50 W



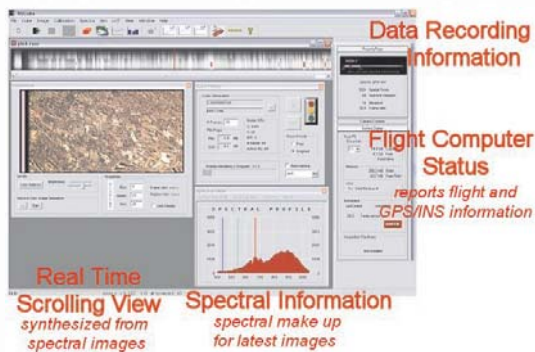
GPS/INS unit
Dimension: 12 x 9 x 8 cm
Weight : 1.1 kg
Power: 18 W

RS Cube flight operations software

The system uses optimized Windows-based software to

- control setup options for system operation, like width, position and number of spectral bands to be acquired
- control hardware, like image rate and exposure time
- display images, GPS/INS status, and other information in real time for monitoring the progress of data collection.

Flight line images (data cubes) are saved in a simple file format that contains the succession of acquired spectral images as the aircraft moves. The flight line image is raw, binary data, saved in ENVI compatible format. Auxiliary information from GPS/INS sensor is stored in a companion file.



Software interface

Operating modes

- A Full hyperspectral data acquisition from 244 contiguous spectral bands at up to 50 images/s to 61 contiguous spectral bands at 100 images/s.
- B Multispectral data acquisition at programmable wavebands, up to 61 wavebands with up to 100 images/s. Waveband center wavelength and band width can be individually set at increments of 2.3 nm.

CaliGeo software *Improved*

Our post processing software, CaliGeo has been improved to provide a more user friendly and fast tool to apply both radiometric calibration and georectification to the AISA images. CaliGeo now exists as an ENVI plug-in running under ENVI user interface, and providing a seamless path from calibrated image to application processing.

System options

Sensor head mount

A mechanical mount is available to quickly install the AISA+ sensor head in an aircraft. The mount has also a place to attach the GPS/INS sensor to the AISA+ sensor head in order that they follow the aircraft movements equally.

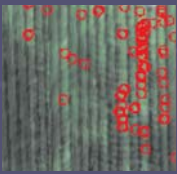
Power supply

A power supply is available that takes 18-36 Vdc from the aircraft, and supplies regulated power to the sensor head, GPS/INS sensor, and data acquisition computer.

¹ ENVI is a spectral analysis software package available from Research Systems Software

Note: Due to continuous development work, specifications are subject to changes without a prior notice.

Applications

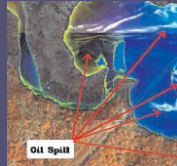


Highlights citrus cranker infestation

Agriculture

AISA+ is an accomplished detection and mapping tool that farmers, cultivation managers and agricultural agencies can use to monitor the condition of the vegetation, classify crops, identify potential land yield and check soil conditions for potential problems such as moisture deficiencies.

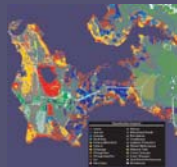
AISA systems provide accurate information up on the extent of an infestation or disease (for example weed and fungal infestations) and measure the effectiveness of the control and eradication treatments. Ensuring that the problem is dissolved and over application of eradication treatments do not occur, which will help reduce costs.



Oil spill clean up guidance

Emergency Services

AISA+ is a useful tool for monitoring mapping and assessing the extent of the damage caused by forests fires storms, floods and oil spills. An aerial viewpoint, and permanent record provides a perspective of damage caused by fire, wind and hail, lightning storms, floods that is difficult to obtain using any other medium which will provide assistance in the regeneration process and planning future responses.



Wetlands environmental study

Environmental

Used by environmental institutions, researchers and scientists AISA quickly and accurately maps, measures and characterizes remote and environmentally sensitive areas, like coral reefs and wetlands. An area can be surveyed quickly to provide on site biologists with an alpha vegetation map, which will allow them to target areas of interest for further ground investigation, minimizing the time and effort spent on foot surveying.



Forestry mapping

Forensics and Military

AISA is capable of collecting and assessing data from various land and water based areas, to detect targets from their background and to produce evidence (for example chemical residue, human activity and submerged anomalies).



Monitoring phytoplankton concentration

Forestry

The increased need and demand for forestry management and species classification are two of the common problems being addressed by AISA+ hyperspectral imagery. The high spectral and spatial resolution of AISA+ provides precision classification of tree species within a forest, which allows the user to detect and record the make up of a vast land area.

Water Assessment

By analysing the imagery gathered by the AISA researches can assess the various qualities of a water area. AISA is proven to detecting and analysing a range of inorganic and organic constituents (for example, phytoplankton, chlorophyll and blue-green algae cover) and pollutants, giving information on point of origin and probable clean up sites.



Coral reef mapping

Field Scanner for groundborne applications

AISA hyperspectral sensors can be equipped with a mirror scanner to scan a fixed target. It makes fixedly-placed (for instance on top of a tripod) AISA sensor suitable for remote sensing in field. The system can measure hyperspectral images over two-dimensional targets, for example leafage, opencast mine walls, and save the image in data cubes with horizontal, vertical and spectral data dimensions.

All the instruments in the AISA series offer unbeatable performance for their value and have been developed and manufactured by SPECIM, spectral Imaging Ltd. whose personnel have extensive expertise and experience in hyperspectral imaging systems. If you have any inquiries about AISA+ or any of the other instruments in the AISA series feel free to contact us.

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