**Specim**

AISA Eagle

Airborne Hyperspectral System VNIR

Fly with 1000 pixels

Our leading hyperspectral system AISA Eagle is breaking boundaries to achieve increased resolution and swath view.

AISA Eagle provides over 1000 pixels swath width with high hyperspectral image rates, which maximizes airborne productivity in VNIR hyperspectral data collection and reduces the time it takes to collect data.
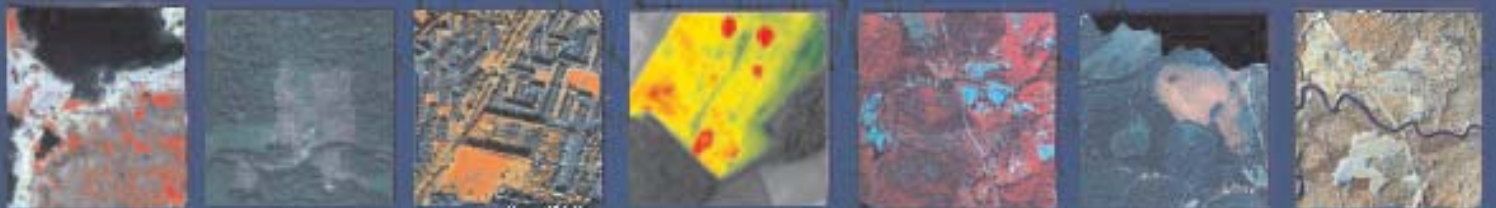
AISA Eagle

Airborne Hyperspectral System VNIR

AISA Eagle is a complete, pushbroom system that consists of a compact hyperspectral sensor head, miniature GPS/INS sensor, and data acquisition unit in a rugged PC. Auxiliary components include a mount to connect the sensor head to the GPS/INS unit, and CaliGeo post-processing software that produces calibrated, georeferenced images and image mosaics from the acquired data with an ENVI[1] header.

AISA Eagle is regarded as an excellent analytical, detection and mapping tool that provides an exceptional performance at an affordable cost. The system has established its ability in a range of commercial, research and public service applications. Some of the applications that AISA Eagle has been involved in are forestry management, vegetation cultivation, environmental investigations, precision farming, target identification, water assessment and land use planning.

1000 pixel swath width

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		
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, up to	1024, of which ~40 FODIS pixels		
Fore optics	**Standard**		**Optional**
	17 mm	23 mm	10 mm
FOV	39.7 degrees	29.9 degrees	63 degrees
IFOV	0.039 degrees	0.029 degrees	0,062 degrees
Ground resolution @1000 m	0.71 m	0,52 m	1,2 m
Camera	Progressive scan CCD camera		
Output	12 bits digital		
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.		
Image Rate	Up to 50 images/s @ 244 hyperspectral bands. Up to 80 images/s @ 60 hyperspectral bands.		

GPS/INS sensor

AISA Eagle 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 Eagle 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

- high capacity hot swap removable hard disk 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)

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

Bread box sized Sensor head
Dimension: 16 x 16.5 x 36 cm
Weight : 6.5 kg
Power: 20 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 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.

Data Recording Information

Flight Computer Status
reports flight and GPS/INS information

Real Time Scrolling View
synthesized from spectral images

Spectral Information
spectral make up for latest images

Software interface

Operating modes

Sensor is capable of acquiring any band combination ranging from a few multispectral bands to full hyperspectral data sets of 244 of bands. Using a provided band configuration tool user can easily define a band file for desired number of bands and individual bandwidth for each band. Used band file is selected on-flight via flight operations software.

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.
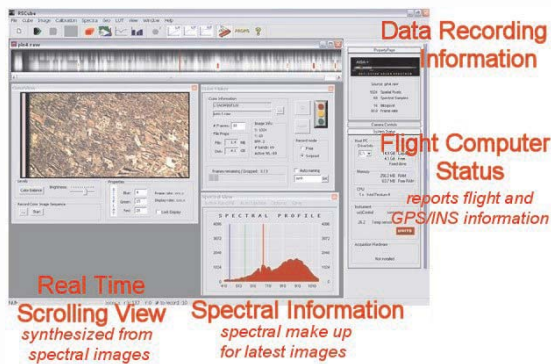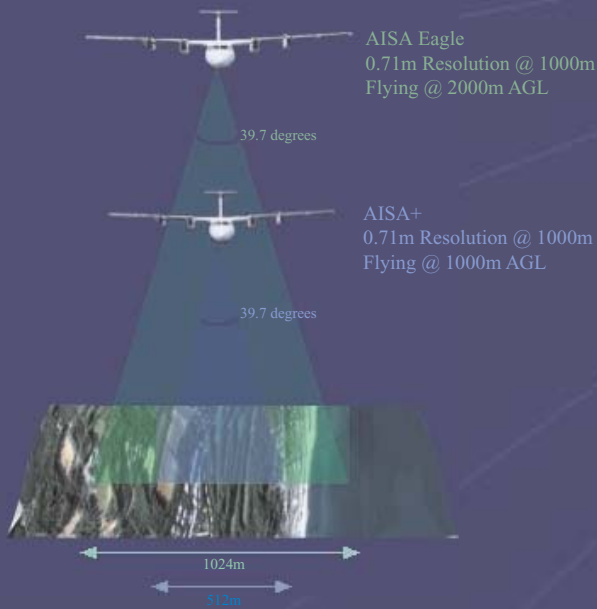
System options

Sensor head mount
A mechanical mount is available to quickly install the AISA Eagle sensor head in an aircraft. The mount has also a place to attach the GPS/INS sensor to the AISA Eagle 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.

AISA Eagle
0.71m Resolution @ 1000m
Flying @ 2000m AGL

39.7 degrees

AISA+
0.71m Resolution @ 1000m
Flying @ 1000m AGL

39.7 degrees

1024m

512m

AISA Eagle has up to 1024 spatial pixels which is double the amount of pixels AISA+ carries. This raise in pixels creates a number of advantages for the user;

Wider swath width
The major advantage of AISA Eagle to AISA+ is (if you assume all the variables are the same) that AISA Eagle can achieve the same ground resolution as AISA+ with double the swath width. Increasing the altitude of the aircraft or extending the FOV via adapting the optics achieves this.

Flexible flying height
AISA Eagle can increase its altitude by 100% before its ground resolution will drop below that of AISA+, which allows more operational flexibility. (See illustration)

Increased flight path coverage
50% fewer flight lines are required to cover a multiple line flight block when using AISA Eagle in comparison to AISA+.

Reduced acquisition time
Savings in flight time will vary according to the specifics of the mission however generally when the variable factors are kept the same it is possible to reduce the acquisition time by over 50%. The table below shows examples of AISA ground resolution, swath and altitude.

| System specifications | | Ground resolution | | | | | | | |
| | | 0.5 m | | 1 m | | 2 m | | 5 m | |
Focal length (mm)	FOV degrees	Altitude	Swath	Altitude	Swath	Altitude	Swath	Altitude	Swath
AISA+									
10	63°	209	256	418	512	836	1024	2089	2048
17	39.7°	355	256	709	512	1418	1024	3546	2048
23	29.9°	479	256	959	512	1918	1024	4794	2048
AISA Eagle									
10	63°	418	512	836	1024	1672	2048	4180	5120
17	39.7°	709	512	1418	1024	3546	2048	7091	5120
23	29.9°	959	512	1918	1024	4794	2048	9588	5120

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

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 Eagle or any of the other instruments in the AISA series feel free to contact us.