

AISA DUAL *hyperspectral sensor*

AISA Dual is a high performance hyperspectral sensor system for simultaneous acquisition of VNIR and SWIR data. AISA Dual combines the AISA Eagle and Hawk sensors in a dual sensor bracket mount and provides an economic imaging tool for remote sensing companies and researchers.



Mounted AISA dual sensor system,
dimensions:
L: 400 mm
W: 490 mm
H: 630 mm
Mass: 55 kg

AISA Dual is a compact sensor, which requires minimum maintenance, and is easy to install in small aircrafts. The sensor assembly will only require a single hole in the aircraft, and fits on a standard stabilized camera platform.

In the dual sensor assembly, the Hawk sensor can be aligned with respect the Eagle to make the both sensors to look at the same swath on the ground. Also, the Hawk fore lens is adjustable to match the SWIR ground pixel size to that in VNIR.

AISA Dual sensor makes a high performance hyperspectral imaging system, when integrated with an AISA data acquisition computer, RSCube software, GPS/INS sensor and power supply. Several GPS/INS sensors are currently supported in the AISA systems, like C-MIGITS III, Oxford Technical Solutions RT3000 series, Applanix POS/AV series, and AeroControl GPS/INS.

Caligeo software supports the post-processing of the AISA Dual sensor data.

System Components

Besides a high performance sensor head, all AISA systems integrate the following basic system components:

- Real time acquisition computer with a user-friendly interface
- GPS/INS sensor
- Power supply
- Galigeo post-processing software

For more information, please see the AISA Systems brochure.



AISA Dual system is perfect for geological applications. Sample data from Buddingtonite Outcrops, Cuprite, Nevada. (Courtesy of SpecTIR LLC.)

AISA Dual Sensor head

| SENSOR HEAD | | TYPICAL SPECIFICATIONS | | | | | | | |
|-----------------------------|---|------------------------|-----|-----|------------------|-----------------|------|------|--|
| Spectral range | VNIR 400-970 nm | | | | SWIR 970-2450 nm | | | | |
| | Total 400-2450 nm | | | | | | | | |
| Spectral resolution | VNIR 2.9 nm | | | | SWIR 8.5 nm | | | | |
| Spectral binning options | VNIR | none | 2x | 4x | SWIR | none | 2x | 4x | |
| # spectral bands | | 244 | 122 | 60 | | 254 | 127 | 63 | |
| Spectral sampling/band (nm) | | 2.3 | 4.6 | 9.2 | | 5.8 | 11.6 | 23.2 | |
| FORE OPTICS | | | | | | | | | |
| Swath acquisition, option 1 | See data acquisition option 1 on right | | | | | | | | |
| # spatial pixels | VNIR | 320 | | | SWIR | 320 | | | |
| FOV | | 24 degrees | | | | 24 degrees | | | |
| IIFOV | | 0.075 degrees | | | | 0.075 degrees | | | |
| Swath width | | 0.43 x altitude | | | | 0.43 x altitude | | | |
| Swath acquisition, option 2 | See data acquisition option 2 on right | | | | | | | | |
| # spatial pixels | VNIR | 1024 | | | SWIR | 320 | | | |
| FOV | | 37.7 degrees | | | | 35.5 degrees | | | |
| IIFOV | | 0.037 degrees | | | | 0.111 degrees | | | |
| Swath width | | 0.68 x altitude | | | | 0.64 x altitude | | | |
| ELECTRICAL CHARACTERISTICS | | | | | | | | | |
| Camera | VNIR | CCD 12 bits | | | SWIR | MCT 14 bits | | | |
| SNR | | 350:1 (peak) | | | | 800:1 (peak) | | | |
| Integration time | Settable independent of frame rate | | | | | | | | |
| Image rate | Up to 100 images/s | | | | | | | | |
| Shutter | Electromechanical shutter for dark background registration in both channels, user controllable by software. | | | | | | | | |
| FODIS | In VNIR channel | | | | | | | | |

DATA ACQUISITION OPTIONS

Option 1: Single computer data acquisition setup

This computer setup is used to collect both the VNIR and SWIR data with the same swath width of 320 pixels. The Eagle sensor data is spatially binned by 2 to provide 512 swath pixels. From these 512 swath pixels, the 320 pixels are collected which overlap with the 320 Hawk swath pixels. The VNIR and SWIR data are combined and saved in a single image covering the spectral range of 400 to 2450 nm.

This computer setup consists of a single computer with a dual input frame grabber. Images from both the Eagle and Hawk are acquired synchronously with each other and with the GPS/INS data.

Option 2: Dual computer data acquisition setup

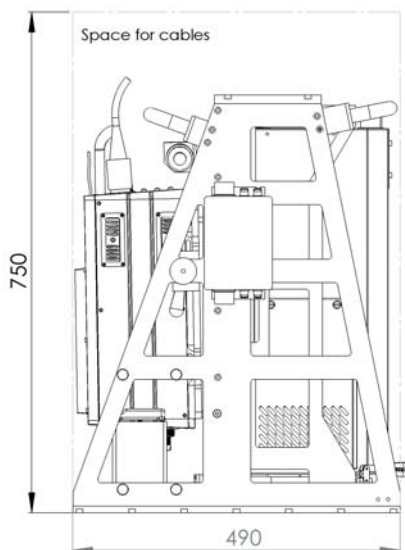
This computer setup is used to acquire and save the full swath from both the VNIR and SWIR sensors simultaneously with 1024 swath pixels from the Eagle and 320 swath pixels from the Hawk. Data streams from VNIR and SWIR are saved in separate images. The VNIR and SWIR images are also processed separately in CaliGeo software.

This setup consists of two independent computers in a single rack. A 2-port intelligent KVM (Keyboard/Monitor/Mouse) switch is used to allow two computers to share one keyboard, one monitor and one mouse. One computer acquires VNIR data stream and another SWIR data stream. VNIR and SWIR sensor heads are triggered to acquire data frames simultaneously with each other and the GPS/INS sensor. One of the computers is running in slave mode starting data acquisition into a file simultaneously when acquisition is started on a master computer.

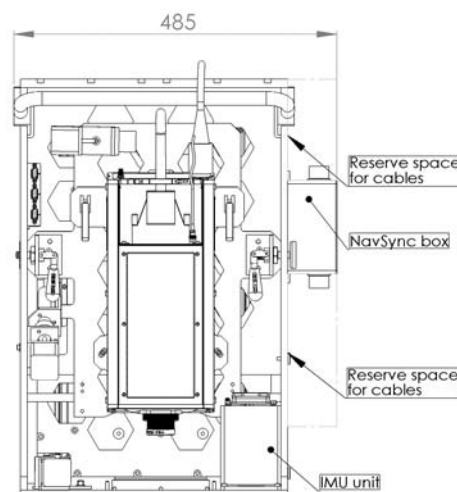
The optics can be selected also so that Hawk pixel size is 3 x larger than Eagle pixel size. In this way, 320 Hawk pixels cover the same area as 960 Eagle pixels and wider swath can be covered with both sensors.

DATA STORAGE

In both of the above computer options, data is stored in a 200Gb (or larger) hot-swap hard disk during acquisition. The capacity is sufficient for ca. 4 hours continuous acquisition.



AISA Dual sensor head assembly, side view



AISA Dual sensor head assembly, back view