C-ASTRAL
AEROSPACE Ltd.

ENDURING - PRECISION!

UNMANNED AIRCRAFT SYSTEMS

C-ASTRAL.COM

C-ASTRAL **Highlights**

C-Astral unmanned systems are much smaller than manned aircraft, easier to maintain and transport and therefore much more cost-effective, providing excellent productivity and fast return on investment.

The industry leading BRAMOR UAS family is electrically powered and is able to achieve superior stability and endurance through its unique advanced Blended Wing Body airframe aerodynamics. It is capable of achieving the most precise surveying results in the small UAS category down to 0,6 cm, with a Ground Sampling Distance that starts at 0,7 cm.

MANUFACTURED FROM

Aerospace certified Kevlar™, Vectran™, carbon composites and honeycomb structural elements. Performance, Style and Form instead of “styrofoam”.

ADVANCED AERODYNAMICS

Blended Wing Body (BWB) airframes with large payload capacity, highest aerodynamic efficiency and long endurance resulting in better productivity. Unrivaled.

ACCURATE REMOTE SENSING

Precision optics and multiple sensor options with INS data logging electronics, enabling a fast, seamless and software agnostic processing chain. ENDURING - PRECISION!

GLOBAL TOOLS NEED GLOBAL SUPPORT

The C-ASTRAL customer service team is here to assist, support and problem solve. 24/7, 365.

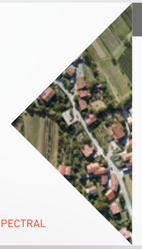
C-ASTRAL **Applications**

ppX

SURVEYING AND REMOTE SENSING

Point cloud derived DSM, DEM, Aero-photogrammetry, mapping, surveying, volume calculations and estimations.

RGB ╲ NDVI ╲ MULTISPECTRAL ╲ HYPERSPECTRAL

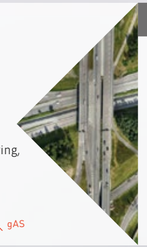


ppX C4EYE

INFRASTRUCTURE CONTROL

Roads and railroads management and control, critical infrastructure monitoring, pipeline and well monitoring, upstream, midstream and downstream monitoring.

RGB ╲ NDVI ╲ MULTISPECTRAL ╲ EYE-X ╲ gAS



ppX

PRECISION AGRICULTURE

Vigor and health of crops, yield estimation, crop counting and volume calculations, chemical management, plant deconvolution.

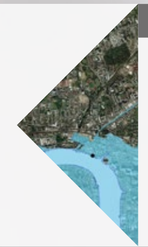
RGB ╲ NDVI ╲ MULTISPECTRAL ╲ HYPERSPECTRAL

ppX C4EYE

FLOOD MONITORING

Digital terrain model derived flood simulations and real time flood control.

RGB ╲ EYE-X

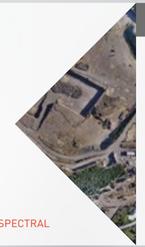


ppX

OPEN PIT MINING

High precision fast revisit time volume and stockpile calculations, infrastructure and machinery control.

RGB ╲ NDVI ╲ MULTISPECTRAL ╲ HYPERSPECTRAL



C4EYE ppX

ECOLOGICAL MONITO-RING AND SENSING

Precise ecosystems status monitoring, speciation, forest management, plant deconvolution, pollutants identification.

RGB ╲ NDVI ╲ MULTISPECTRAL ╲
EYE-X ╲ HYPERSPECTRAL ╲ gAS

THE ULTIMATE SOLUTIONS FOR YOUR MISSION.

C4EYE ppX

CLASSICAL ISR

Target tracking, coordinate estimation, tactical level observation, change detection, tactical mapping and charting, battlefield zone observation, BDA, maneuver estimation and observation, communications relay.

EYE-X ╲ RGB ╲ HYPERSPECTRAL ╲ MULTISPECTRAL

C4EYE ppX

SEARCH AND RESCUE

Video based visible light and thermal sensor based search, coordinate estimation, orbiting observation in the most extreme conditions.

RGB ╲ NDVI ╲ EYE-X

ppX

IED CHANGE DETECTION

Forward area infrastructure road and zone of interest mapping and charting, change detection algorithm applications.

RGB ╲ MULTISPECTRAL ╲ HYPERSPECTRAL

C4EYE ppX

WILDFIRE MANAGEMENT

Hot zone definition and fire perimeter definition, coordinate estimation, wildfire area mapping and charting, communications relay.

EYE-X ╲ HYPERSPECTRAL ╲ NIR

C4EYE ppX

CIVIL DEFENSE

Coordinate estimation, search and rescue coordination, zone of interest orbiting, charting and mapping, damage assessment, communications relay.

RGB ╲ EYE-X ╲ HYPERSPECTRAL ╲ MULTISPECTRAL

C4EYE ppX

FIRE CONTROL

Forward area of operations target estimation, BDA, tactical mapping and charting.

RGB ╲ EYE-X

THE NEW

BRAMOR **ppX**

GNSS SURVEY GRADE RECEIVER

POWERED BY septentrio

ppX BASE STATION*OPTIONAL

POWERED BY septentrio

NEW C-ASTRAL PILOT C³P

- Mission planning
- Command, Control & Communications
- Real-time system health monitoring
- Failsafes management

FEATURES

- Accuracy down to 0,6 cm
- Fast initialization
- RTK datalink independent
- Up to 3,5 h flight time
- 100% Autonomous
- Exchangeable sensors
- Imaging control computer

SURVEY GRADE IMU *OPTIONAL

NEW SX-101 MINI BLUETOOTH GCS

BRAMOR ppX **Sensor Options**

3,5h | multiSensor | 150km | 15km² | cat | para

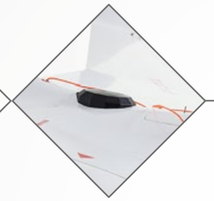
"We would not have been able to map more than 300 km of a remote railway line in Ethiopia in a week without Bramor's capability to acquire data without a preplaced grid of ground control points."

JAN ZOREC, KOBALE SURVEYING SERVICES

CARBON / KEVLAR™ / VECTRAN™ CONSTRUCTION

GNSS SURVEY GRADE RECEIVER

- Post Processing Kinematic
- Integrated IMU*OPTIONAL
- L1&L2 (L5 ready) GNSS receiver
- Fast initialization
- RTK datalink independent
- Accuracy down to 0,6 cm



PITOT CLEANING AND OBSTRUCTION CONTROL SYSTEM

LONG RANGE DATA LINK ANTENNAS

NAVIGATION LIGHTS*OPTIONAL

INTEGRATED SENSOR (MULTIPLE OPTIONS)

SINGLE RGB / CIR /NDVI | MULTISPECTRAL SENSORS | HYPERSPECTRAL | gAS

C-ASTRAL BRAMOR ppX BEST UAS IN ITS CLASS <5kg ELECTRIC PROPULSION 3,5h ENDURANCE 150km RANGE 2016 DRONEII.COM DRONE INDUSTRY INSIGHTS

The **BRAMOR ppX** (GNSS PPK - Post Processing Kinematic) UAS is ideally suited for surveying and remote sensing applications that need a fast high precision set of results, down to sub-centimeter GSD level also in the absence of a grid of ground control points.

DIMENSIONS

- Wingspan: 230 cm
- Length: 96 cm
- Central module length: 67 cm
- T/O Weight: 4,7 kg

FEATURES

- 100% Autonomous
- Automatic parachute landing
- Orography capable flight planning with GSD maintenance over slopes, hills and valleys
- Safe catapult launch
- 30mm and 19mm optics package
- Wind resistance 30 knots
- Operational temp -25°C to +45°C

One flight coverage estimation

- 15 km² / 600 m AGL / 7,8 cm GSD
- 2 km² / 200 m / 2,6 cm GSD

ppX Specifications

- Absolute dataset accuracy down to 0,6 cm
- GSD sub cm @ 70m AGL
- Onboard survey grade L1&L2 (L5 ready) GNSS receiver
- GPS, Glonass, Beidou, Galileo ready

ppX Survey modes

- Known point base station
- Unknown point base reference Station
- Virtual Reference Station
- Compatible with RINEX Base data

THE NEW

C-ASTRAL Pilot C³P Software

WORKFLOW PHASES

MISSION PLANNING → **FLIGHT & DATA COLLECTION** → **DATA & IMAGE EXPORT**

ONLINE FLIGHT LOGBOOK

DATA PROCESSING

C-ASTRAL PILOT C³P SOFTWARE

- Ergonomic touch screen GUI
- Critical flight control data always present on screen
- Seamless and fast mission planning
- In-flight systems monitoring
- Area, mission time, GSD and precision estimation
- Failsafes management
- System health monitoring
- Real-time camera feedback

COMPATIBLE WITH

- 3D SURVEY
- ENSO MOSAIC
- AGISOFT PHOTOSCAN
- PIX4D MAPPER
- PIENEERING
- MENCI

SIMPLE FLIGHT PLANNING

FUNCTIONAL GUI MODES

REAL-TIME IN-FLIGHT SYSTEMS MONITORING

Bramor ppX **RGB** Sensor 24,3MP

LAND SURVEY WITH THE HELP OF AN UNMANNED AERIAL VEHICLE (UAV) WITH 3DSURVEY

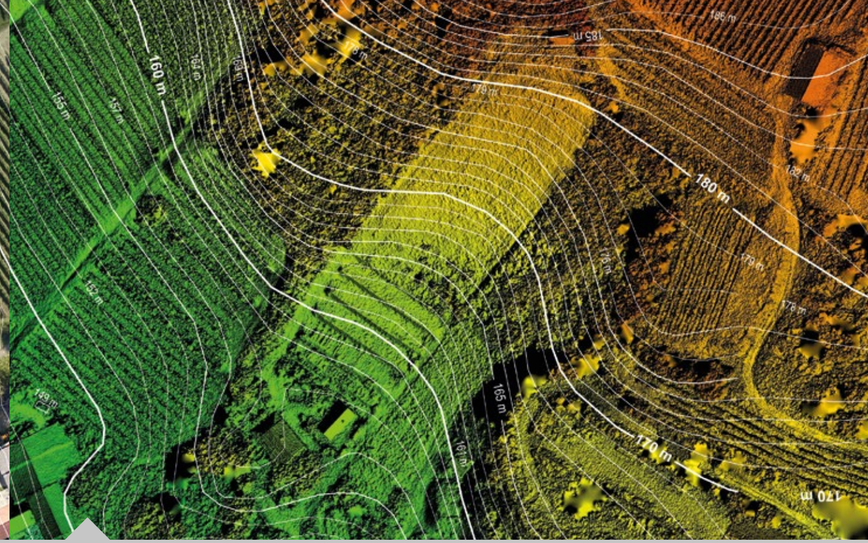
Whitepaper by Vid Petrman, Modri Planet d.o.o., Ljubljana, Slovenia
Email: vid.peterman@modriplanet.si

Bramor ppX accuracy assessment resulted in the mean error for X/Y = 6 mm and for Z = 24 mm.

Point ID	Errors (m)			
	X	Y	Z	3D
P1	0,017	0,007	-0,025	0,031
P2	-0,001	0,002	-0,009	0,010
P3	-0,005	-0,004	0,020	0,021
P4	-0,004	-0,008	0,018	0,020
P5	-0,021	0,010	-0,050	0,055
P6	-0,010	-0,000	-0,040	0,041
P7	0,007	-0,001	-0,023	0,024
P8	0,005	0,004	-0,004	0,007
P9	0,005	-0,002	0,031	0,031

24,3 MP RGB
Map a large area in a single flight with high precision lenses. Ground Sampling Distance down to 0,7 cm.

CONTOUR LINES
Generate contour lines from pointclouds.



DSM
Generate high precision Digital Surface Model from your RGB dataset.

The RGB 24,3 megapixel sensor enables precise visible light survey grade mapping, aero-photogrammetry and dense point cloud data acquisition for digital terrain models, digital surface models, volume and stockpile calculations. With 30 mm and optional 19 mm optics, sub-centimeter GSD acquisition is enabled.

Mission area coverage estimation and ground sampling distances for the BRAMOR ppX

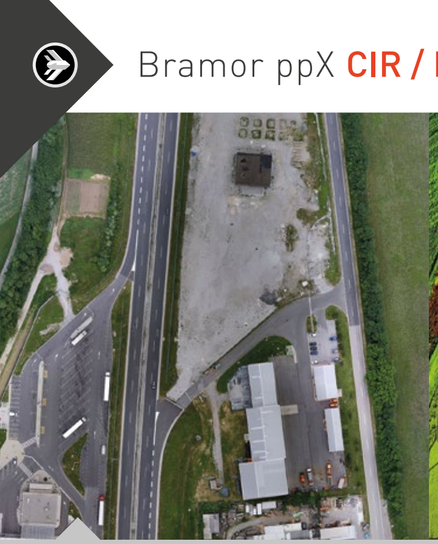
ALTITUDE (m)	GSD (cm/pixel)	AREA (km²)
100	1,3	2,5
200	2,6	5,0
300	3,9	7,5
400	5,2	10,0
500	6,5	12,5
600	7,8	15,0

APPLICATIONS

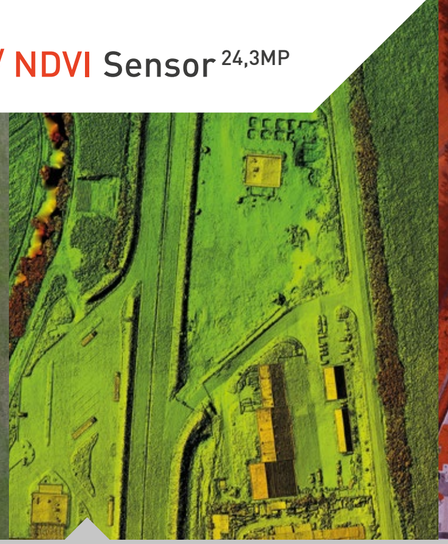
ppX SURVEYING AND REMOTE SENSING, INFRASTRUCTURE CONTROL, PRECISION AGRICULTURE, FLOOD MONITORING, OPEN PIT MINING, CLASSICAL ISR, SEARCH AND RESCUE, IED CHANGE DETECTION, WILDFIRE MANAGEMENT, CIVIL DEFENSE, FIRE CONTROL, ECOLOGICAL MONITORING AND SENSING

Location: **Mance, Slovenia** Area: **1 km²** Flight time: **25 min** Flight altitude AGL: **100 m** GSD Resolution: **1,3 cm / pix**

Bramor ppX **CIR / NDVI** Sensor 24,3MP



24,3 MP RGB
Map a large area in a single flight with high precision lenses. Ground Sampling Distance down to 0,7 cm.



DSM
High-res Digital Surface Model.

NIR
Multiple NIR band filters available.

IR
Multiple IR band filters available.

NDVI
Normalized Difference Vegetation Index is an index for visualizing vegetation health. The NDVI reveals variability in plant vigor and biomass, often times not visible in standard RGB color imagery.

NDVI SHADER

The 24,3 CIR/NDVI sensor is suitable for data acquisition in the NIR spectra, which can be processed into NDVI and eNDVI products. With the sub-centimeter GSD, single plant and micro-area focus is enabled, resulting in decision making support for precision agriculture, forestry, plant deconvolution and similar.

FEATURES

- Sub centimeter GSD in the near infra-red and infra-red spectra
- Data acquisition for precise vegetation surveying, models and plant deconvolution
- Completely exchangeable with the RGB sensor
- Change detection on a sub cm GSD level
- Multiple NIR and IR band filters

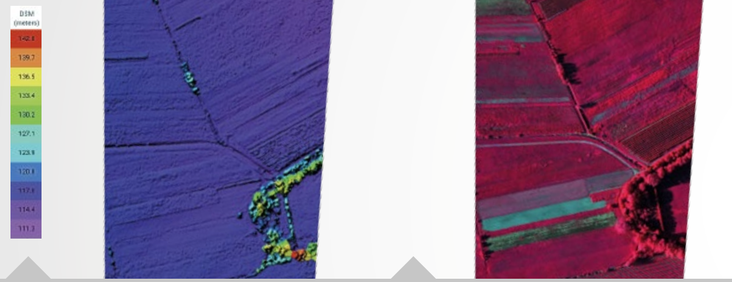
APPLICATIONS

ppX SURVEYING AND REMOTE SENSING, INFRASTRUCTURE CONTROL, PRECISION AGRICULTURE, FLOOD MONITORING, OPEN PIT MINING, CLASSICAL ISR, SEARCH AND RESCUE, IED CHANGE DETECTION, WILDFIRE MANAGEMENT, CIVIL DEFENSE, FIRE CONTROL, ECOLOGICAL MONITORING AND SENSING

Location: **Vipava, Slovenia** \ Area: **0,35 km²** \ Flight time: **20 min** \ Flight altitude AGL: **150 m** \ GSD Resolution: **1,9 cm/pixel** \

Bramor ppX **Multispectral sensors**

RGB
Red Green Blue: This is a true color representation of the studied (field) area.



DSM
Digital Surface Model can be used to visualize changes in topography or measure the height of plant / tree above the surrounding terrain.

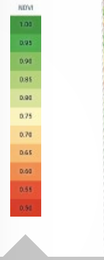
CIR
Color Infrared (or Near Infrared) layer helps you to visualize the amount of infrared light reflected.

MS-SQ

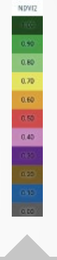
MS-SQ

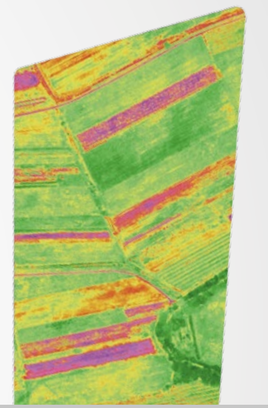
The BRAMOR ppX mounted MS-RE sensor simultaneously captures five discrete spectral bands, enabling the creation of tailored indices for high end vegetation mapping. The compact MS-SQ sensor can be carried simultaneously with one of C-ASTRAL's high resolution sensors and features four narrowband filters optimized for analyzing crop health and a 16 MP RGB imager for easy digital scouting. Its irradiance sensor and integrated GPS make it an accurate, compact and calibrated tool for precision agriculture.

"This is a revolutionary vegetation vision instrument. We can map 1500 hectares in a single flight."

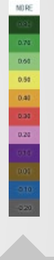


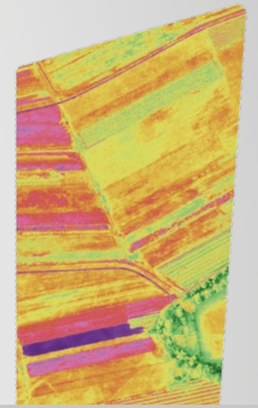
NDVI
Normalized Difference Vegetation Index is an index for visualizing vegetation health. Areas with NDVI values greater than 0,5 are colored using a red/yellow/green color scale. The NDVI reveals variability in plant vigor and biomass, often times not visible in standard RGB color imagery.





NDVI2
With NDVI2 a new color scale is applied, in which values below 0,5 are not hidden, like they are in the NDVI layer. This allows to visualize all NDVI values within the studied field.





NDRE
Normalized Difference Red Edge Index can be a valuable index when collecting data and monitoring stress /health over mature plants. The advanced vegetation indices like NDRE are more sensitive to changes in leaf chlorophyll content and provide information about plant nutrient status.

MS-RE FEATURES

- 5 spectral bands: Blue, green, red, red edge, near IR
- Calibrated for precise, repeatable measurements
- Ground Sample Distance: 8,0 cm per pixel at 120 m AGL
- Capture Rate: 1 per second
- Narrowband optical filters provide full imager resolution for each band
- 32GB Memory: Single SD card stores all images with geotags
- Wi-Fi capable device web-based interface

MS-SQ FEATURES

- 4 spectral bands, 10 bits Global shutter
- Self-calibrated using the Sunshine sensor
- Ground Sample Distance 12,4 cm Monoband, 2,7 cm RGB
- Capture Rate: 1 per second
- RGB Camera 16MP Rolling shutter
- 64GB Memory / IMU + Magnetometer + GPS
- Configuration over Wi-Fi

APPLICATIONS

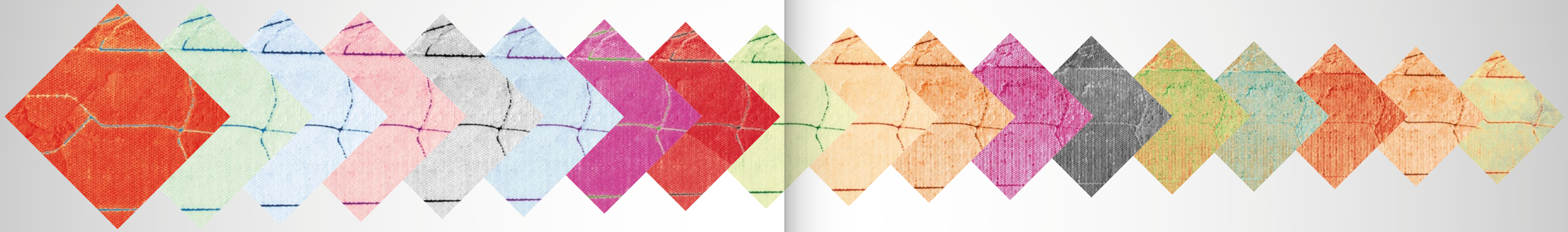
ppX SURVEYING AND REMOTE SENSING, INFRASTRUCTURE CONTROL, PRECISION AGRICULTURE, FLOOD MONITORING, OPEN PIT MINING, CLASSICAL ISR, SEARCH AND RESCUE, IED CHANGE DETECTION, WILDFIRE MANAGEMENT, CIVIL DEFENSE, FIRE CONTROL, ECOLOGICAL MONITORING AND SENSING

Location: **Vipava, Slovenia** | Area: **0,3 km²** | Flight time: **20 min** | Flight altitude AGL: **100 m** | GSD Resolution: **12,4 cm Monoband 2,7 cm RGB**

Bramor ppX gHY Sensor

OIL PALM PLANTATION

"The world's smallest and most lightweight system with a functional hyperspectral camera."



WAVELENGTH (nm)	505	519	531	560	570	584	625	665	677	700	719	742	764	778	789	871	871_719	VREI1

The gHY sensor creates 2D spectral information in VIS-VNIR spectral range with single exposure and enables mosaicking with photogrammetric software. The sensor provides real response in each pixel without interpolation. This high end sensor is, due to it's spectral range, especially suitable for uses in agriculture, forestry and water research for unrivaled results and precision.

FEATURES

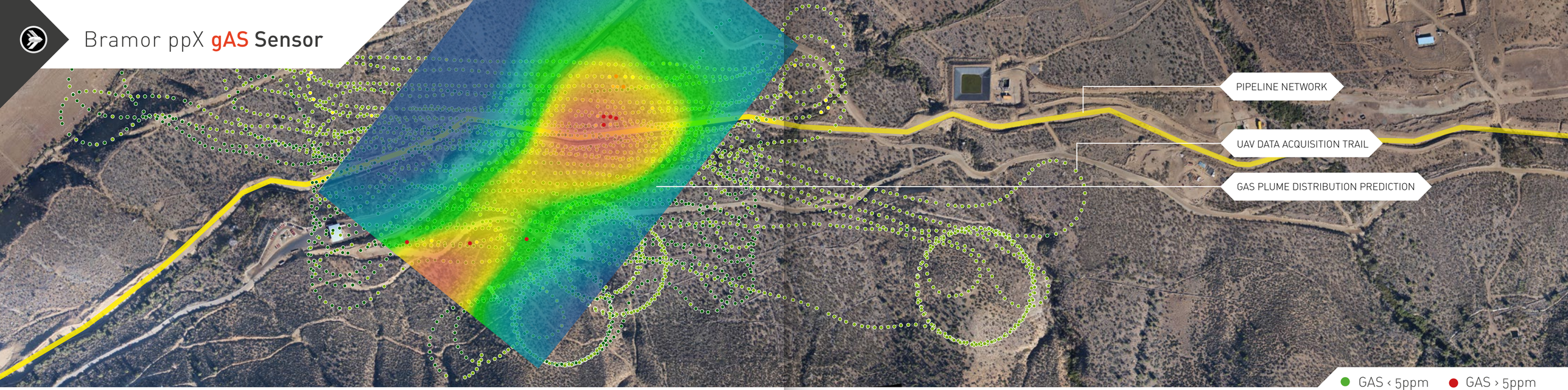
- Hyperspectral imager
- VIS-VNIR snapshot
- F-number: ~ 2,8
- Focal length: 9 mm
- Ground pixel: 6,5 cm at 100 m altitude
- Default spectral range: 500-900 nm
  Other ranges: 400 - 700, 450 - 800, 550 - 950 nm
- Spectral resolution: ↑10 nm, FWHM
- Spectral step: 1 nm
- Spectral bands: ~ 380 max
- Dynamic range: 12 bits
- Exposure time: 0,06-3000 ms
- Frame rate: 30 frames/s
- Max Image dim: 1010 x 1010 pix
- Sensor1010 * 1010 pixels for each band, CMOS, 5,5 * 5,5 microns / pixel
- FOV: 37 degrees
- F number: ~2,8
- Exposure time: integration time 5 - 15 ms / band, 30 bands /s (1010*648 pixels)

APPLICATIONS

ppX SURVEYING AND REMOTE SENSING, INFRASTRUCTURE CONTROL, PRECISION AGRICULTURE, FLOOD MONITORING, OPEN PIT MINING, CLASSICAL ISR, SEARCH AND RESCUE, IED CHANGE DETECTION, WILDFIRE MANAGEMENT, CIVIL DEFENSE, FIRE CONTROL, ECOLOGICAL MONITORING AND SENSING

Location: **Indonesia** | Area: **2 km²** | Flight time: **60 min** | Flight altitude AGL: **100 m** | GSD Resolution: **6,5 cm**

Bramor ppX **gAS** Sensor



The gAS sensor option on the ppX aircraft is a unique an extremely capable high resolution, excellent selectivity long range methane leak detection system, based on a proven DFB tunable diode laser absorption spectroscopy system adapted to UAS use from larger manned platforms. Developed in collaboration with gas detection industry leaders Boreal Laser and C-ASTRAL partners Ventus Geospatial, this system revolutionizes pipeline, oil and gas well and other methane and noxious gases detection and compliance operations.

FEATURES

- Remote molecular level gas detection down to 0,05 ppm CH_4
- 2-hour flight time
- 110km operational range
- Plume estimation and mapping
- 1 reading per second, default alarm 10ppm
- No consumables, minimum sensor maintenance
- Additional multispectral and 16MP RGB sensor option
- ADS-B transponder option
- Long range solar power extended range option

APPLICATIONS

ppX SURVEYING AND REMOTE SENSING, INFRASTRUCTURE CONTROL, PRECISION AGRICULTURE, FLOOD MONITORING, OPEN PIT MINING, CLASSICAL ISR, SEARCH AND RESCUE, IED CHANGE DETECTION, WILDFIRE MANAGEMENT, CIVIL DEFENSE, FIRE CONTROL, ECOLOGICAL MONITORING AND SENSING

Location: **South America** | Area: **8 km²** | Flight time: **45 min** | Flight altitude AGL: **65 m** | Accuracy: **‹ 0,05 ppm (CH_4)**

BRAMOR **C4EYE**

3h | EO/IR/LI | 150km | cat | para

FEATURES AND APPLICATIONS

- Wildfire management
- Environmental monitoring
- Infrastructure control
- Over the hill observation (LOS)
- Night surveillance
- Long range (40 km) data/video link
- Fire control
- Civil defense
- Target detection and tracking
- Low intensity conflict zone control
- Search and rescue missions
- Encryption[OPTIONAL]
- MANET (Mobile Ad Hoc Network) and MIMO (multiple in / multiple out) optional secure digital communications

IN OPERATIONAL USE ON FOUR CONTINENTS

BATTLEFIELD AND SPECIAL OPS PROVEN

RETRACTABLE EYE-X SENSOR

MODULAR AIRFRAME

INTEGRATED PARACHUTE

SUPREME AERODYNAMIC EFFICIENCY

"The Ultimate C4ISR Solution – the most capable and affordable small UAS in its class in the world!"

A NATO OPERATIONS C-ASTRAL USER

VIDEO/DATA RANGE UP TO 40 KM

TRACK, GEO-REGISTER OR LOCK TARGETS

BRAMOR C4EYE **Sensor Options**

3h | EO/IR/LI | 150km | cat | para

"We have put this machines through their paces in battle zone conditions and the MOD has decided that this will be the UAS of choice for future procurement."

A SOVEREIGN C4EYE OPERATOR IN EUROPE

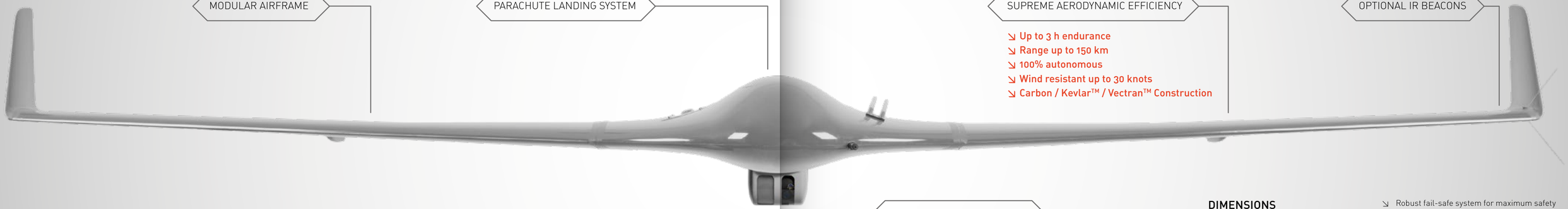
MODULAR AIRFRAME

PARACHUTE LANDING SYSTEM

SUPREME AERODYNAMIC EFFICIENCY

- Up to 3 h endurance
- Range up to 150 km
- 100% autonomous
- Wind resistant up to 30 knots
- Carbon / Kevlar™ / Vectran™ Construction

OPTIONAL IR BEACONS



RETRACTABLE EYE-X SENSOR

EYE-X EO/IR/Laser Illuminator Gimbal

C-ASTRAL BRAMOR C4EYE **BEST UAS** IN ITS CLASS <5kg ELECTRIC PROPULSION 3h ENDURANCE 2016 DRONEII.COM DRONE INDUSTRY INSIGHTS

The field proven **BRAMOR C4EYE** UAS line is appropriate for operations where real-time or near real time video observation and surveillance capability is of utmost importance. With an endurance of up to 3 hours, a standard data and payload link of 40 km, or the optional MANET / MIMO digital communications capabilities.

DIMENSIONS

- wingspan: 230 cm
- length: 96 cm
- central module length: 67 cm
- T/O Weight: 4,5 kg

FEATURES

- In-flight waypoint management
- Camera, Altitude, and Target prosecution guidance modes
- 1-2 person operation
- Catapult takeoff
- Accurate parachute landing in a 30 m x 30 m zone
- Convoy following capability
- Robust fail-safe system for maximum safety
- Wind penetration up to 30 knots
- Flight ready in less than 5 min
- Ability to track, Geo-register or Lock targets
- Video/Data range up to 40 km LOS

Bramor C4EYE **EYE-X EO/IR/LI Gimbal** Sensor

TARGET GEO-LOCATION

Accurate geo-location of a target based on its location in a video image is a key functionality provided by the EYE-X gimbal sensor at day and night. Scene lock mode will activate blue target square that will track not only inside the square but thought whole video.

10MP SNAPSHOT

Enables 10MP snapshot stored on VPU.
Video recording is possible on-board as well as off-board.
Live snapshot gallery accessible via MANET / MIMO radio.

The EYE-X EO/IR/laser illuminator gimbal brings the capabilities of much larger UAS systems to the tactical level. Equipped with a 10MP visible light sensor and an industry benchmark thermal imagery uncooled micro-bolometer with an optional laser illuminator, it is capable of detecting, tracking, following and geo-locating targets, objects and features, infrastructure, positions and estimating maneuvers, day and night. It is the sensor of choice for institutional and sovereign customers needing immediate actionable intelligence.

FEATURES

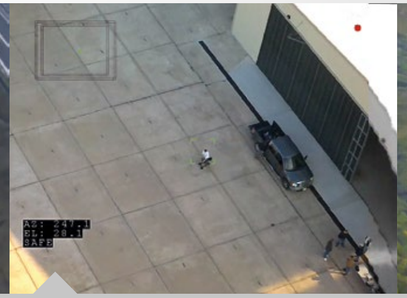
- 10 MP ePTZ CMOS RGB visible light sensor
- LWIR Uncooled bolometer core FLIR QUARK 640
- 2x, 4x, 8x zoom capability
- Full Frame Rate 7,5 Hz (NTSC); 8,3 Hz (PAL)
- Pixel Pitch 17 µm
- Spectral band 7,5-13,5 µm
- QUARK VPC module
- Brushless electric motor
- Pan 360°, Tilt 90°
- Gyro + Software continuous stabilization
- 300mW laser illuminator (LI) available at 400-2000nm
- Image stabilization
- Target tracking and Pursue mode
- Target geo-location
- On-board / Off-board Recording

APPLICATIONS

C4EYE — INFRASTRUCTURE CONTROL, FLOOD MONITORING, ECOLOGICAL MONITORING AND SENSING, CLASSICAL ISR, SEARCH AND RESCUE, WILDFIRE MANAGEMENT, CIVIL DEFENSE, FIRE CONTROL

“The system performed much better than what we were used to from other UASs and the change detection counter IED workflow saved lives.“

A BRAMOR SYSTEMS INSTRUCTOR FROM A NATO COUNTRY OPERATING IN AFGHANISTAN



VEHICLE TRACKING

Pursue mode continually updates the loiter point around the target to allow the UAV to center its flight path on the target of interest.

HUMAN SIZE OBJECT TRACKING

VIDEO/DATA RANGE UP TO 40km

Flight demonstrated 40 km video / datalink range with the Astral Tracking Antenna / Videolink.

Bramor **System Package**

ppX

Basic **Bramor ppX** system package consists of:

- BRAMOR ppX airframe
- GCS SX101 Bluetooth stand-alone magnetic GCS unit
- Rugged mission planning and command and control computer
- Flight case transportation system
- CAT 1 elastic launching system
- Recovery parachute (2 units) with protective packs
- Set of basic spares (carbon tubes, small material, 1 extra propeller)
- Battery charger (including cables for GCS and Li-Po)
- Training in Slovenia (excluding lodging & transportation costs)
- Documentation & Manuals

OPTIONAL ENHANCEMENTS:

- Septentrio GNSS Base station
- 400Hz high precision IMU
- ADS-B S-Mode Transponder
- Emergency Beacon Locator
- Cat 2 Pneumatic launching system
- ASTRALTRACK tracking antenna

C4EYE

Basic **Bramor C4EYE** system package consists of:

- BRAMOR C4EYE airframe
- KJ-200 rugged GCS
- Flight case transportation system
- CAT 1 catapult launcher
- ASTRALTRACK tracking antenna
- Recovery parachute (2 units) with protective packs
- Set of basic spares (carbon tubes, small material, 1 extra propeller)
- Battery charger (including cables for GCS and Li-Po)
- Documentation & Manuals

OPTIONAL ENHANCEMENTS:

- GCS - ADV2X Portable dual screen ground control station and other configurations
- Touchscreen option with composite video input
- AC/DC adapter
- Power supply, external VGA option for portable GCS
- RADICAL-30X automatic high power antenna GCS/combination

Optional enhancements

ppX

CAMERA MOUNTED IMU

- On-board Extended Kalman filter running at 400 Hz, IMU data at 1kHz
- Dynamic accuracy better than 0,3 deg in heading, 0,1 deg in pitch/roll

C4EYE ppX

ADS-B S-MODE TRANSPONDER

- Make your UAV visible to other cooperating traffic and air traffic control.

C4EYE ppX

EMERGENCY BEACON LOCATOR

- Find the location of your system with a built-in VHF beacon and handheld receiver.

C4EYE ppX

CAT 2 PNEUMATIC LAUNCHING SYSTEM

- For cold weather operations (-20°C).
- Aluminum lightweight folding pneumatic catapult including a compressor & an electronic valve.

Modularity, adaptation and system flexibility are the key features of the C-ASTRAL BRAMOR UAS family.

C4EYE ppX

RADICAL-40X ANTENNA SYSTEM

- Tracking technology for 40 km range DATA and VIDEO transmission.
- REACH-40 video TX and RX units
- 2,4 GHz, 40 km LOS video link
- Optional MANET/MIMO digital radios

C4EYE ppX

ASTRALTRACK TRACKING ANTENNA

- Tracking technology for 30 km range DATA and VIDEO transmission.
- REACH-40 video TX and RX units
- 2,4 GHz, 40 km LOS video link

C4EYE

MANET / MIMO RADIOS

- High-speed wireless IP networking
- Network relay to send and receive IP data
- 1775-1815 MHz, 2200-2250 MHz
- MIL-STD-810F
- TSM-X™ Waveform
- SOCOM approved

C4EYE ppX

WATER RESISTANT BACKPACK

- Heavy duty whole system water resistant carrying backpack for ppX and C4EYE systems.

Bramor UAS **Technical data**

COMMERCIAL DESIGNATION	BRAMOR C4EYE	BRAMOR ppX		
SENSING TECHNOLOGY	C-Astral EYE-X	24,3 RGB	Multispectral	gAS
		24,3 CIR/NDVI	Hyperspectral	
WINGSPAN	230 cm			
LENGTH	96 cm			
AIRCRAFT TYPE & AIRFRAME	Fixed wing, Blended Wing Body configuration, Kevlar™ reinforced carbon and Vectran™ composite airframe			
AVIONICS	Lockheed Martin and C-ASTRAL ORTHOelectronics			
PROPULSION	C-Astral brushless electric			
MTOW	3,8 - 4,7 kg			
PAYLOAD	0,6 – 1,0 kg			
CRUISE SPEED	16 m/s			
Vne	30 m/s			
TAKEOFF SYSTEM	ELASTIC LAUNCHER / PNEUMATIC LAUNCHER			
LANDING AREA	**30 m x 30 m**			
LANDING	PARACHUTE			
SERVICE CEILING	up to 5000 m AMSL			
VIDEO & DATALINK RANGE	**Up to 40 km LOS with the ASTRALTRACK tracking antenna**			
ENDURANCE	up to 3 hours (demonstrated)	up to 3,5 hours (demonstrated)		
T/O READINESS	System T/O ready in less than 5 minutes			
TRANSPORT	2 MILSPEC backpacks and / or rugged transportation cases			
OPERATOR REQ	one or two operators			
FLYING	100% autonomous from takeoff to landing			
GIMBAL CONTROL	flight stick control			
ORTHOPHOTO CONTROL	**100% autonomous, multiple orthophoto mission geometries possible in 1 flight, reprogrammable on the fly while vehicle in the air**			
MANUAL FLIGHT CONTROL	optional flight stick			
GCS ENDURANCE	up to 10 h			
EMERGENCY FAIL-SAFES	yes, user configured			
TRAINING	**5 day training in Slovenia provided to all customers, special training arrangements are possible**			

“There is no better system on the market that can achieve this accuracy, productivity and flexibility.”

Jose Marcos Perez Diaz, UAS manager at Airdrone 3D

C-ASTRAL **Sales Partners**

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"BRAMOR ppX delivers a staggering 3,5 hours of flight endurance - more than double of most other UAVs"

ASTRON ENVIRONMENTAL SERVICES PTY LTD

C-ASTRAL BRAMOR C4EYE BEST UAS IN ITS CLASS <5kg ELECTRIC PROPULSION 3h ENDURANCE 150km RANGE 2016 DRONEII.COM DRONE INDUSTRY INSIGHTS

C-ASTRAL BRAMOR ppX BEST UAS IN ITS CLASS <5kg ELECTRIC PROPULSION 3,5h ENDURANCE 150km RANGE 2016 DRONEII.COM DRONE INDUSTRY INSIGHTS

C-ASTRAL
AEROSPACE Ltd.

ENDURING - PRECISION!

C-Astral is an aerospace solutions provider based in Ajdovscina, Slovenia, the "hub" of advanced aerospace development and integration in this part of Central Europe.

The company is a global market leader with established reputation in the specialized, fixed wing small Unmanned Aircraft Systems (UAS) manufacturing and services field, with a specific focus on high productivity, endurance, surveying and remote sensing. C-Astral's customer base is diversified between the commercial UAS operators, larger institutional networks, scientific users as well as government entities. Currently, C-Astral systems are flying with six sovereign entities on force protection, border protection, fire control and surveillance operations on four continents and more than 100 commercial and scientific operators globally. C-Astral established a multidisciplinary software and hardware laboratory for aerodynamics and systems integration work and a prototyping CAD/CAM workshop facility for composite materials manufacturing and modeling. The founders of C-Astral have been active in aerospace since 1999 and have been pioneering UAS integrated solutions ahead of the market curve. C-Astral systems are now flying over all continents, including extreme environments such as high altitude open-pit mines, deserts, mountains, Antarctica, over the Arctic and global agricultural lands.

C-ASTRAL
AEROSPACE Ltd.

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