



# KazEOSat-1

---

## Technical and Product ordering Description Sheet

April 2019

## 1 Technical Description

Following tables outline the main characteristics of the KazEOSat-1 space and ground segments:

### 1.1 Main Characteristics of the Space Segment

Number of satellites	1
Manufacturer	Airbus Defence and Space
Operator	Kazakhstan Gharysh Sapary (KGS)
Launch	Apr. 30 <sup>th</sup> , 2014 – Vega launcher
Design lifetime	7,25 years
Size	Body: 2.1 m x 3.7 m Solar array wingspan 5,4 m2
Launch mass	830 kg

**TABLE 1: MAIN CHARACTERISTICS OF THE SPACE SEGMENT**

### 1.2 Orbital Characteristics and Viewing Capability

Orbit	Sun-synchronous; 10:30 AM local time on descending node
Altitude	750 km
Inclination	98.56°
Period	100 minutes
Incidence angle	Up the 35° off-nadir angle into any direction
Revisit	3 days over medium latitude <sup>1</sup>
Pointing agility	60° slew in 90 s
Acquisition capacity	Up to 228,000 km <sup>2</sup> daily
Nominal imaging mode	20km-swath strips up to 2000km long
Stereo capability	Single pass stereo (Fore and aft mode)

**TABLE 2: ORBITAL CHARACTERISTICS AND VIEWING CAPABILITY**

<sup>1</sup> Depends on the latitude of the area of interest

### 1.3 Characteristics of the Optical Instrument

Optical system	NAOMI instrument made of Korsch telescope in Silicon Carbide, with a 640 mm aperture diameter.
Spectral bands (specification)	Panchromatic: 0.45-0.75 $\mu\text{m}$ Blue: 0.45-0.52 $\mu\text{m}$ Green: 0.53-0.60 $\mu\text{m}$ Red: 0.62-0.69 $\mu\text{m}$ Near Infrared: 0.76-0.89 $\mu\text{m}$ <i>The 5 bands are always acquired simultaneously.</i>
Spatial resolution	Panchromatic: 1m Multispectral: 4m
Swath	20km at nadir
Dynamic range at acquisition	12 bits per pixel
Location accuracy specification	20m RMS
Instrument telemetry link rate	X-band channel - 270 Mbits/s

**TABLE 3: CHARACTERISTICS OF THE OPTICAL INSTRUMENT**

### 1.4 Location of the KazEOSat-1 Ground Segment

Main receiving station	Astana (Kazakhstan)
S-Band uplink station	Astana (Kazakhstan)
Programming centre	Astana (Kazakhstan)
Production centre	Astana (Kazakhstan)
Satellite control centre	Astana (Kazakhstan)

**TABLE 4: LOCATION OF THE KAZEOSAT-1 GROUND SEGMENT**

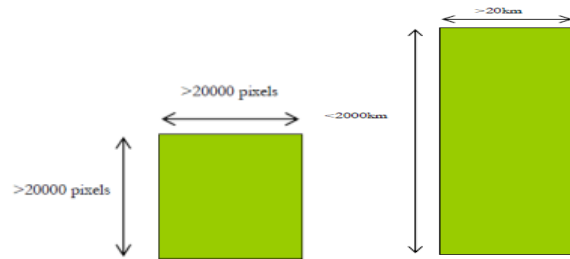
1.5 KazEOSat-1 Single Pass Collection Modes

Imaging mode

Imaging possibilities

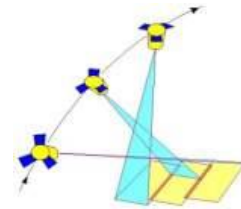
**Strip mode**

is conducted for the imaging along the route of the spacecraft, with the width of 20 km and length from 20 to 2000 km.



**Area mode**

is conducted along the maneuver of the spacecraft with the possibility to make the images of three adjacent strips (each of 20 km) with width of 60 km and length from 20 km to 90 km.



**Stereo mode**

is conducted along the maneuver of the spacecraft with possibility to make images of the same territory (object) with different imaging angles with width of 60 km and length from 20 km to 90 km.

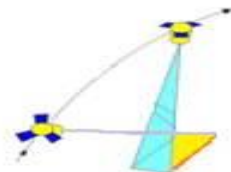


TABLE 5: KAZEOSAT-1 SINGLE PASS COLLECTION MODES




## 2 Product ordering Description Sheet

---

### 2.1 Introduction

A KazEOSat-1 product is a KazEOSat-1 image that covers fully or partially the Area Of Interest (AOI) of an End-User. It is delivered into a DIMAP format with usage rights defined by End-User Licence Agreement (EULA).

It is described by selection parameters, production and delivery options.

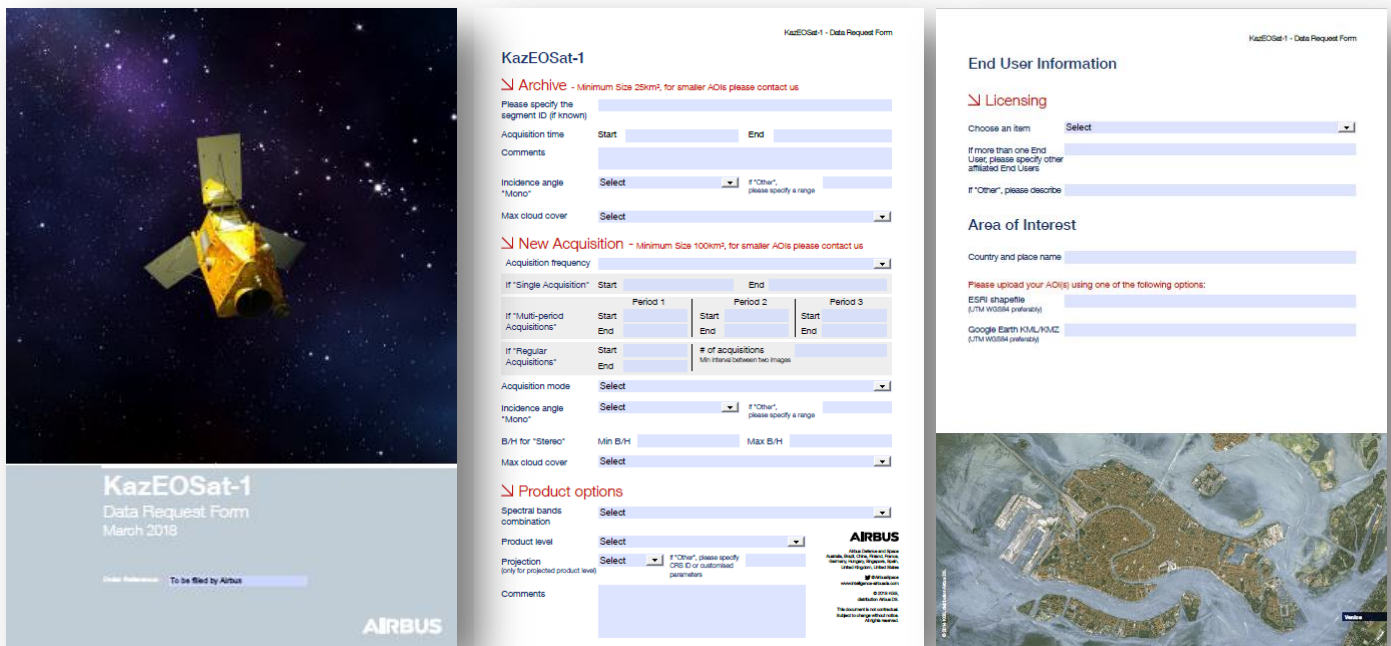
1.  **Selection parameters** describe acquisition characteristics
2.  Product is processed according to selected **production options**
3.  Product is delivered on your FTP



**End-User Licence Agreement (EULA)** defines the rights granted to the users regarding the use of the products (<http://www.geo-airbusds.com/en/886-legal-documents-and-supply-conditions>)

An on-line catalogue available at <http://cof2.gharysh.kz/> allows browsing of the available KazEOSat-1 archive database.

For archive ordering or submission of new acquisition requests, please fill-in the Data Request Form and sent it to Airbus Defence and Space Customer Care Optical service at [Customer\\_Care\\_Optical@spotimage.fr](mailto:Customer_Care_Optical@spotimage.fr)



KazEOSat-1 Data Request Form

## 2.2 Selection Parameters

### Areas of Interest

KazEOSat-1 products are selected according to the area of interest. Invoicing is based on the ordered surface.

#### How to define the AOI?

In the Data Request Form, there are several fields to describe an AOI:

- **ESRI shapefile or KMZ/KML vector files** to be provided to Customer Care Optical as attached file on an email with the Data Request Form.

#### Minimum order area:

Archive	100 km <sup>2</sup>
New acquisition	100 km <sup>2</sup>

## Acquisition mode

KazEOSat-1 is able to collect imagery in two acquisition modes:

- **Mono**  
Single coverage of the area of interest
- **Stereo**  
A “Stereo Pair” is a bundle of two Primary Level image products that corresponds to two image scenes collected consecutively by KazEOSat-1 satellite in a fore & aft stereo imaging sequence.

## Cloud cover

Standard cloud cover rate for new acquisitions is less than **10%**.

In case weather conditions are difficult in the area to cover, higher set cloud cover rate may be advised in order to get the area of interest covered in shorter time.

## Incidence angle

Standard range for incidence angles is **0-35°**.



In case of future Ortho production, better geolocation accuracy is achieved with limited incidence angle; i.e. 0 to 20° or even 0-15° for rough terrain areas.

## 2.3 Production Options

---

### Processing levels

- **Primary (Level 1)**

Imagery data with radiometric correction and basic geometric processing aiming at rebuilding as best as possible an image which would have been acquired from a unique ideal Push-Broom sensor.



Primary level is preferred when further orthorectification process is expected..

- **Projected (Level 2)**

Georeferenced imagery data based on the projection on a coarse DEM.

- **Tailored Ortho (Level 3)**

User is able to provide its own reference for Ortho production –i.e. DEM and ortho layer/GCP. Specific processing requests are subject to feasibility study and a surcharge may apply. Tailored Ortho (DEM and/or GCPs provided by Customer).

### Imagery format

---

Image format is **GeoTIFF**.

### Product encoding

---

KazEOSat-1 image bit-depth is **12 bits** – i.e. 4,096 levels for each spectral band.

GeoTIFF files are coded on 2 bytes (16 bits).

### Ortho projection

---

Geographic coordinates and a list of projection systems are available as standard.

### Spectral combinations

---



Selection of spectral bands and possible combinations:

Reference	Bands	Resolution
PMS	Pan-sharpened - 4 bands	1m
BUNDLE	Panchromatic - 1 band	1m
	Multispectral - 4 bands	4m

## Mosaic

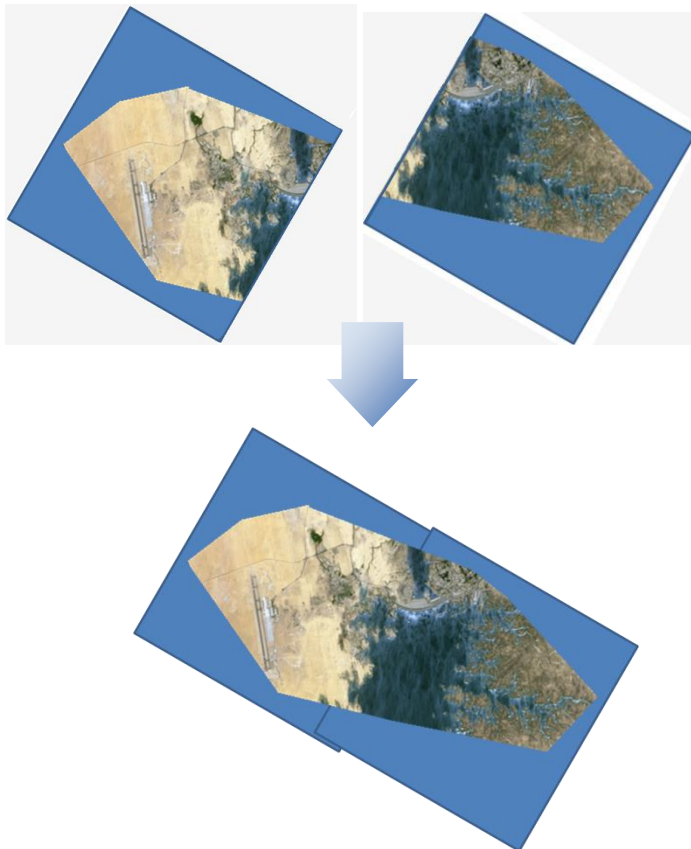
---

KazEOSat-1 products can be delivered separately or in seamless mosaics to cover the whole AOI.

When Mosaic option is selected, feasibility study is performed and quotation provided accordingly.

Production time depends on the size of the area of interest.

Mosaics are delivered at Ortho level in Jpeg2000 or Geotiff format.



## 2.4 Delivery Options

---

- **FTP:** Default
- **Hard Drive:** Large volume deliveries