KLEOS

SPACE POWERED SIGNAL & GEOSPATIAL INTELLIGENCE

An Introduction to Kleos

July 2022

The Challenge

HOW TO DETECT ILLICIT AND HIDDEN ACTIVITY

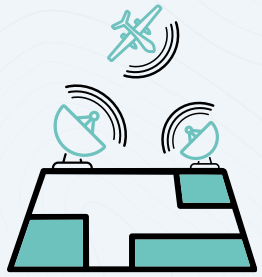
A variety of illicit and hidden human activity pose serious threats from state and non-state actors around the world, often occurring over very large areas that present challenges for detection and surveillance systems.

KLEOS

The Challenge

EXISTING SOLUTIONS FACE CHALLENGES OF SCALE & COST

Current land-based and terrestrial solutions are limited and often quite expensive.



GROUND

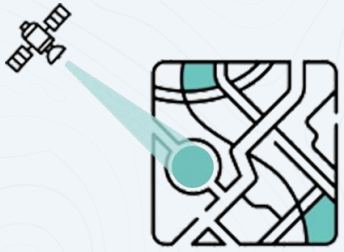
Directional and limited by line of sight

AERIAL

Very expensive and limited coverage

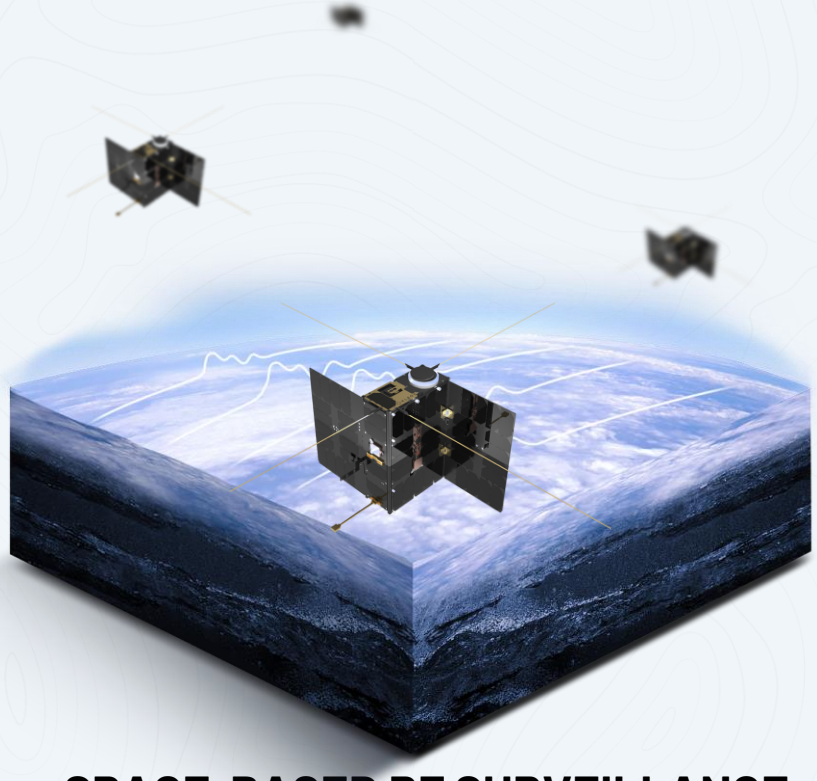
SHIP BORNE / AIS

Easily spoofed and unreliable



IMAGERY/SAR

Narrow aperture and cost prohibitive, lack of resolution, susceptible to weather



SPACE-BASED RF SURVEILLANCE OFFERS SIGNIFICANT ADVANTAGES

1. New developments in satellite and launch technologies make it possible to build and operate small commercial surveillance satellites at low cost.

2. Space-based RF collection offers a unique solution to reduce cost and increase coverage vs. terrestrial and airborne systems.

3. By sweeping over large areas from LEO of around 500-600km altitude, RF surveillance can provide early warning for tipping and cueing systems

sales@kleosglobal.com

The Kleos RF Solution

KLEOS IS BUILDING A SATELLITE CONSTELLATION TO PROVIDE RADIO FREQUENCY SURVEILLANCE DATA TO GOVERNMENTS AND COMMERCIAL CUSTOMERS WORLDWIDE

Kleos will map radio transmissions over key areas of interest around the globe, efficiently uncovering data points of human activity on land and sea.

Using clusters of four satellites, radio frequency data (RF Data) is collected, processed and delivered to analytics and intelligence entities for government and commercial use.

Customers receive data in easy to ingest formats on a data-as-a-service (DaaS) subscription basis.

AT A GLANCE

Key Contacts

ANDY BOWYER
CEO & Co-founder
U.S Based

ERIC VON ECKARTSBERG
CRO (ex Maxar, Vricon)
U.S Based

VINCENT FURIA
CTO (ex Spire, Harris)
U.S Based

Key Contacts spread around the globe

35 employees and growing

Our Offices

LUXEMBOURG
Kleos Space S.A
Tel: +352 2088 2290

UNITED KINGDOM
Kleos Space Ltd
Tel: +44(0) 330 057 1886

U.S.A
Kleos Space Inc
Tel: +1 202-866-8794

Headquartered in Luxembourg

Development & Sales offices in the U.S, U.K and Australia

AT A GLANCE

8 SATELLITES LAUNCHED

Company Timeline

MID 2017
Spun out of Magna Parva, a space engineering company

AUG 2018
IPO

NOV 2020
Launch of 1st cluster of 4x satellites

KSM1

JUNE 2021
Launch of 2nd cluster of 4x satellites

KSF1

FALL 2021
Initial Data Products Released

APRIL 2022
Launch of 3rd cluster with VHF and X-band capability

KSF2

SUMMER 2022
Launch of 4th cluster VHF and X-band

PLANNED BUILDOUT
12 - 20 clusters. Payloads TBD.

Founded by Andy Bowyer and Miles Ashcroft

Kleos was formed in 2017 from a spin-off from Magna Parva Ltd., a space engineering firm, to disrupt the market for data products and solutions.

Publicly traded at ASX since August 2018

€24 mm equity capital raised to date

sales@kleosglobal.com

KLEOS

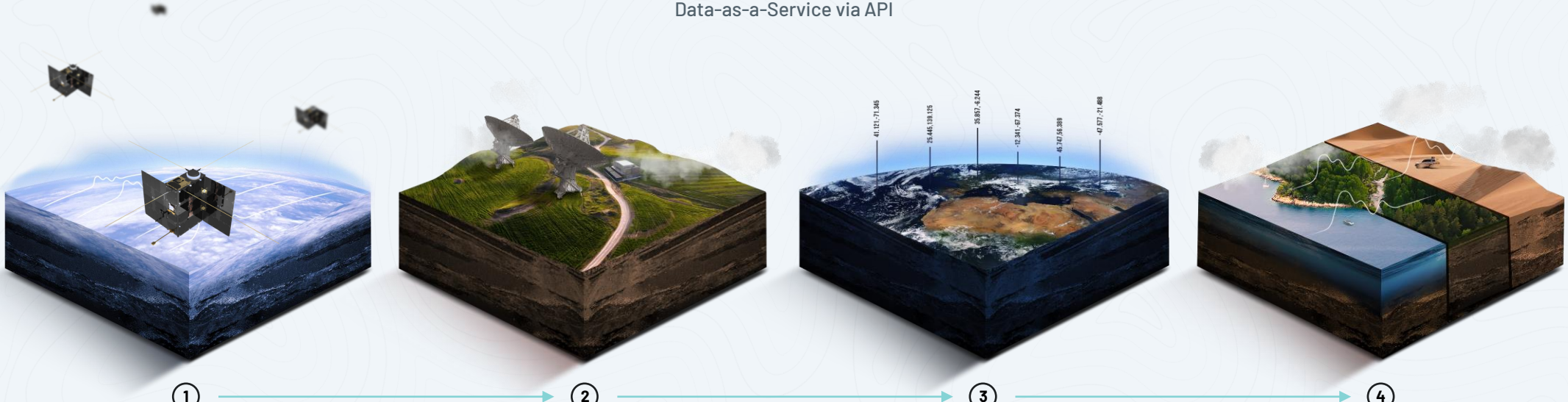
Our Solution

WHAT WE DO

Kleos has developed propriety geolocation capabilities for RF signals.

Partnered with commercial ground station providers around the world.

Data-as-a-Service via API



1. Transmissions received at each satellite with a 'time difference'.
2. Collected information transmitted to the ground.
3. Information processed through algorithms creating geolocated data.
4. Data sold to customers

Our Solution

KLEOS DELIVERS PRECISION GEOSPATIAL DATA AT A FRACTION OF THE COST OF GROUND OR AIR SYSTEMS.

	KLEOS	AERIAL SYSTEMS	TERRESTRIAL SYSTEMS	ADDITIONAL COMMENTS
WIDE AREA SURVEILLANCE	★★★★★★	★★★★☆☆	★★☆☆☆☆	High revisit rate, extended duration data for monitoring and detection for large area surveillance
TIME FLEXIBILITY	★★★☆☆☆	★★★★★☆	★☆☆☆☆☆	Satellites can be programmed to monitor specific areas at designated times – tasking slower than Air based systems, but faster than fixed ground sensors
SENSOR FLEXIBILITY	★★★☆☆☆	★★★★★☆	★★☆☆☆☆	Ability to vary data collection frequency ranges to monitor specific areas at designated times
ACCURACY	★★★☆☆☆	★★★★★☆	★★★★☆☆	4-satellites cluster system and proprietary algorithms that deliver highly accurate, technical data
COVERAGE AREA	★★★★★★	½☆☆☆☆☆	★☆☆☆☆☆	Satellites cover very wide areas at a single pass Satellites uniquely access foreign/contested areas
AFFORDABILITY	★★★★★★	½☆☆☆☆☆	½☆☆☆☆☆	RF data used for "tipping-queuing" high-cost assets

Why us?

THE ADVANTAGE OF USING 4 SATELLITES

Using TDOA techniques such as multi-lateration, acting as passive radio receivers.

4 satellites provide better accuracy, coverage, and redundancy in each mission.

All data is downlinked, providing rich source for analytics.

Plans to launch 12-20 clusters over the next 3 years.

Why us?

SMALL SATS vs LARGE SATS

Historically, large sats have been incredibly expensive to build with large payloads and long production timelines.

Kleos' nano satellites are economical and have much shorter development times.

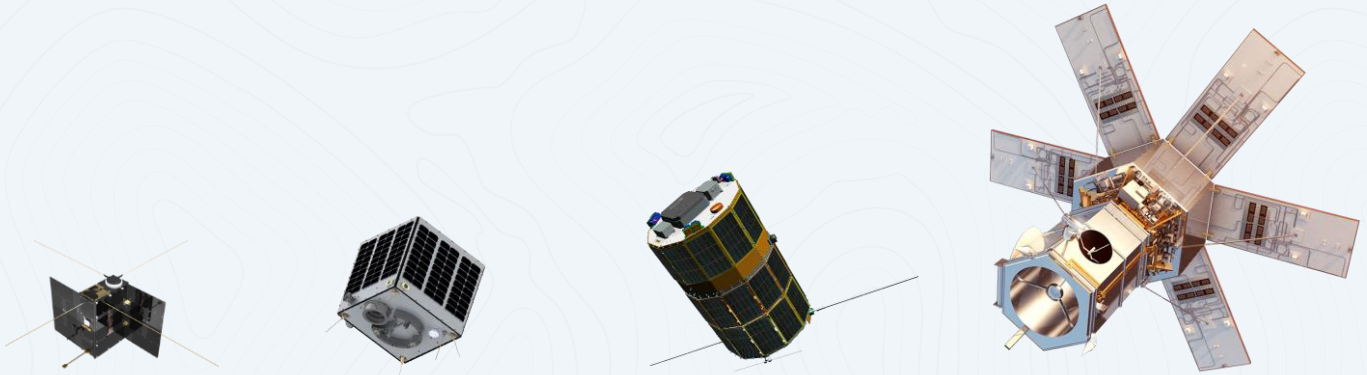
Rapid development cycle allows for most up-to-date technology onboard with each payload.

Flexible services and roadmap.

Agile and responsive approach to market demand.

Can plan clusters to be mission specific.

Can bring new collection capabilities to space within a year.

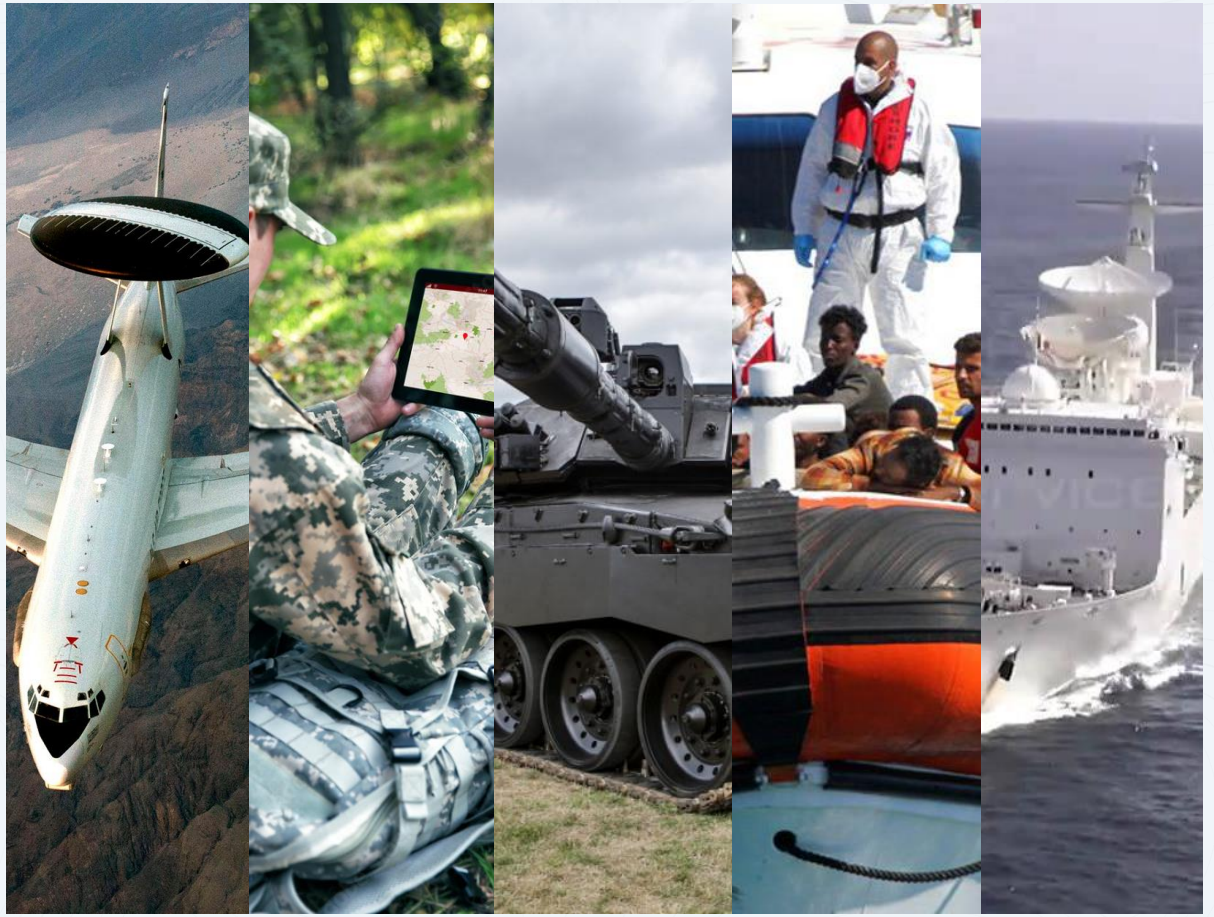


sales@kleosglobal.com

KLEOS

OUR CUSTOMER BASE

TYPES	USE CASES
GOVERNMENT DEFENCE	National Security (intelligence). Counter-Terrorism. Anti-jamming. Boarder Security / Immigration. Sanction Prosecution.
GOVERNMENT CIVIL	Illegal Commercial Fishing. Search & Rescue. Piracy. Coast Guard Monitoring & Smuggling/ Exclusive Economic Zone Protection.
INTEGRATOR	Tool & Analytics providers are able to fuse Kleos data with other sources to provide a more comprehensive view of human activity.
RESELLER, CHANNEL PARTNER	Kleos leverages resellers and channel partners to deliver solutions to international and specialized markets.



sales@kleosglobal.com

Our Product

DATA PRODUCTS & DELIVERY

Geolocation data of RF signals securely provided via a REST API

JSON files to be easily integrated into existing geospatial & analytic tools

AI and ML friendly

Data available as a one-off project fulfillment or monthly/annual subscription model

Time & location data can be used to correlate activities with other surveillance data such as AIS, Imagery, SAR, etc.

Pricing based on square kilometers collected per month

sales@kleosglobal.com

KLEOS

Our Product

PRODUCT SPECS

Guardian Locate is a data set processed to deliver geolocated RF activity. This data product is ready for further analytics by the customer within GEOINT and data fusion platforms.

GEOLOCATION OF RF SOURCES	Latitude, Longitude, ECEF Co-ordinates 200m to 3km accuracy depending on conditions **Capture Metrics:** Date / Time of event, TX Frequency
GEOLOCATION TECHNOLOGY	4-satellite clusters flying in formation Proprietary multi-lateration algorithms
API OPTIONS	RESTful API = JSON over HTTPS Event-driven API = HTTPS WebSocket (JSON) JSON file format Archive data access
OBSERVATION AREA	Daily coverage of AOIs anywhere on Earth
PRICING OPTIONS	Monthly or annual subscription based on AOI

sales@kleosglobal.com

1st Mission

KSM1: SCOUTING

The Scouting Mission satellites were launched into a 37-degree inclination, collecting data over crucial areas of interest such as Strait of Hormuz, South China Sea, East/West Africa, Southern Sea of Japan, northern Australian coast e.g. the Timor Sea.

Reveal dark, currently hidden, activity such as smuggling and piracy

The 4x satellite Kleos Scouting Mission' launched Q3 2020 on PSLV into a 37 degree inclination orbit

Scouting Mission satellites focused on capture frequency range of: 155-165 MHz

The Scouting Mission cover millions of square KM with multiple revisits per day

Example: Initial assessment of example areas of interest of the Strait of Hormuz and South China Sea was performed using the 10 degree planning approximation.

ADDRESS FROM FRANÇOIS BAUSCH

Luxembourg Deputy Prime Minister and Minister of Defence

ADDRESS FROM SASHA BAILLIE

CEO of Luxinnovation

WATCH THE LAUNCH

Launch of PSLV-C49 from Satish Dhawan Space Centre (SDSC)

sales@kleosglobal.com

2nd Mission

KSF1: VIGILANCE

The four KSF1 Polar Vigilance Mission satellites were launched on June 30, 2021 onboard a SpaceX Falcon 9, under a rideshare contract with Spaceflight Inc. The KSF1 satellites were launched into a 500-600km Sun Synchronous orbit, increasing Kleos' coverage to the north and south of the 37 degree inclination of the Scouting Mission satellites.

Polar Vigilance Mission satellites provide:

- An enhanced collection capability giving Kleos global coverage (incl. Arctic coverage, remote spaces...)
- Longer dwell times for vertical orientated AOIs

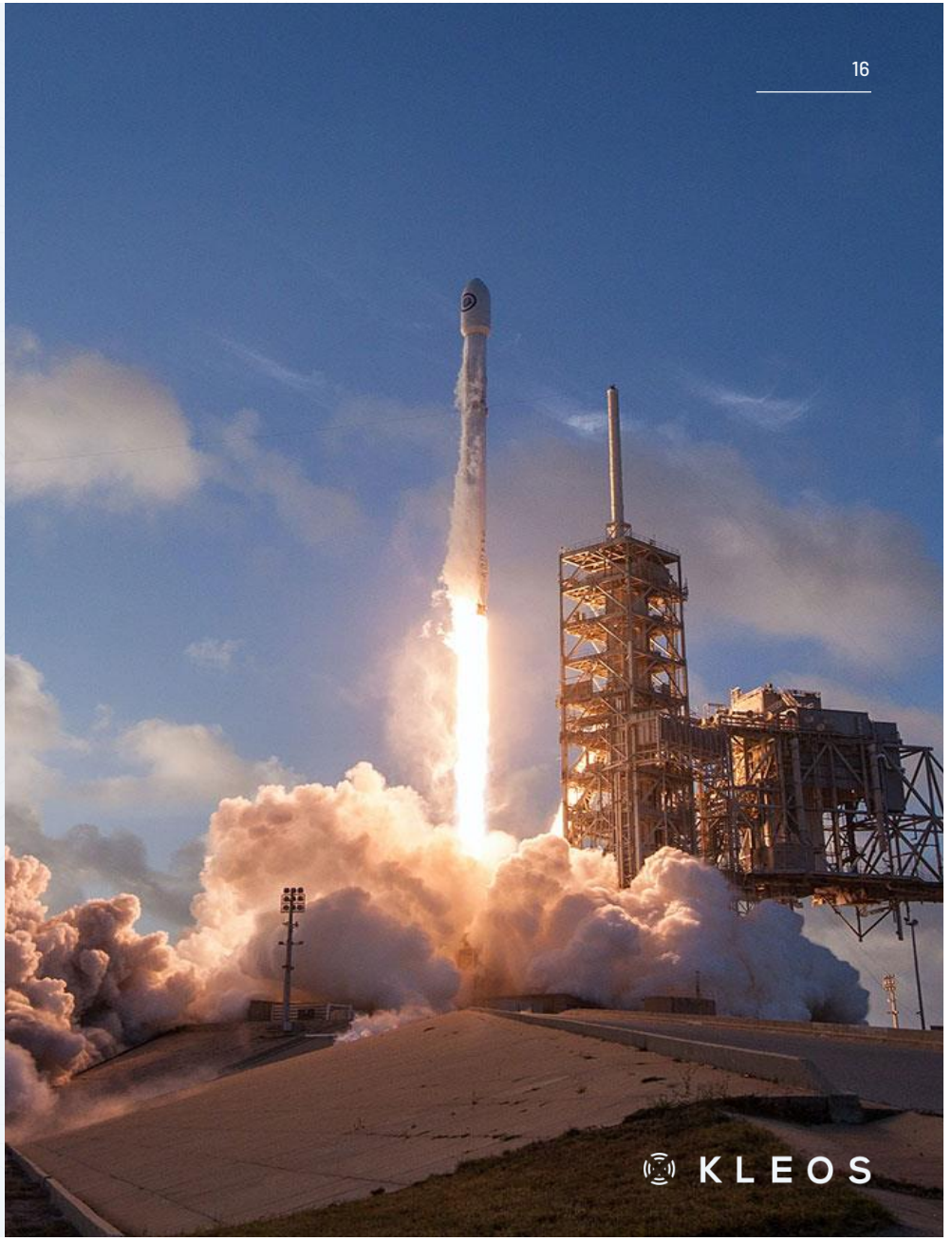
This Mission offers significantly higher coverage per orbit than the Scouting Mission

CONGRATULATIONS FROM LUXEMBOURG SPACE AGENCY

Marc Serres: CEO of the LSA

WATCH THE LAUNCH

Launch of Transporter-2, Space X's second dedicated SmallSat Rideshare program Mission



sales@kleosglobal.com

3rd Mission

KSF2: PATROL

Launched into a 500-600km Sun Synchronous Orbit on April 1st, 2022, the four Patrol Mission satellites Expand Kleos' data collection capability by up to an additional 119 million km^2 per day. This mission also enables Kleos to increase its average daily revisit rate over a 15-degree latitude area of interest to around five times a day.

- VHF as well as X-Band Radar in the Maritime Frequencies near 9 GHz
- Maritime navigational radar
- Supplements VHF to give a more comprehensive picture of maritime activity
- Navigational radar provide persistent signals for detection
- Three clusters of VHF + X-Band give us enhanced latency and coverage over key AOIs such as the South China Sea

sales@kleosglobal.com

Any Questions?

EMAIL US

sales@kleosglobal.com

WEBSITE

https://kleos.space

E.U

Tel: +352 2088 2290

U.S.A

Tel: +1 202-866-8794

U.K

Tel: +44(0) 330 057 1886

KLEOS

Providing Space Powered Signal & Geospatial Intelligence