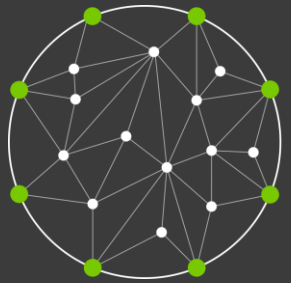
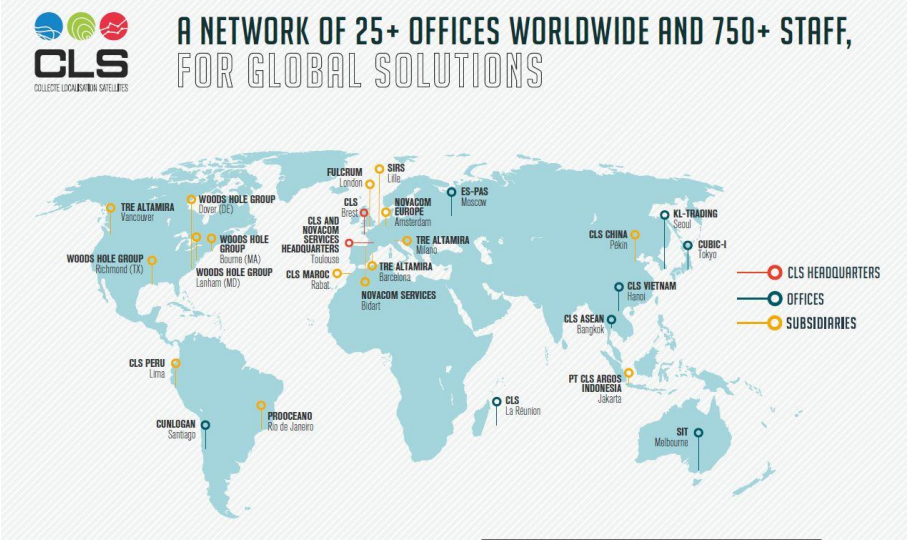
CLS
COLLECTE LOCALISATION SATELLITES



ARGOS
CONNECTED. PROTECTED.

Argos System Status – October 2018, Yann BERNARD

CLS: the ARGOS operator



CLS created in 1986 is a subsidiary of cnes CENTRE NATIONAL D'ÉTUDES SPATIALES

27 international sites, Headquarters in Toulouse, France

✓ **Unique operator of the Argos system**

✓ **Iridium value added services provider**

ARGOS CONNECTED. PROTECTED. iridium®

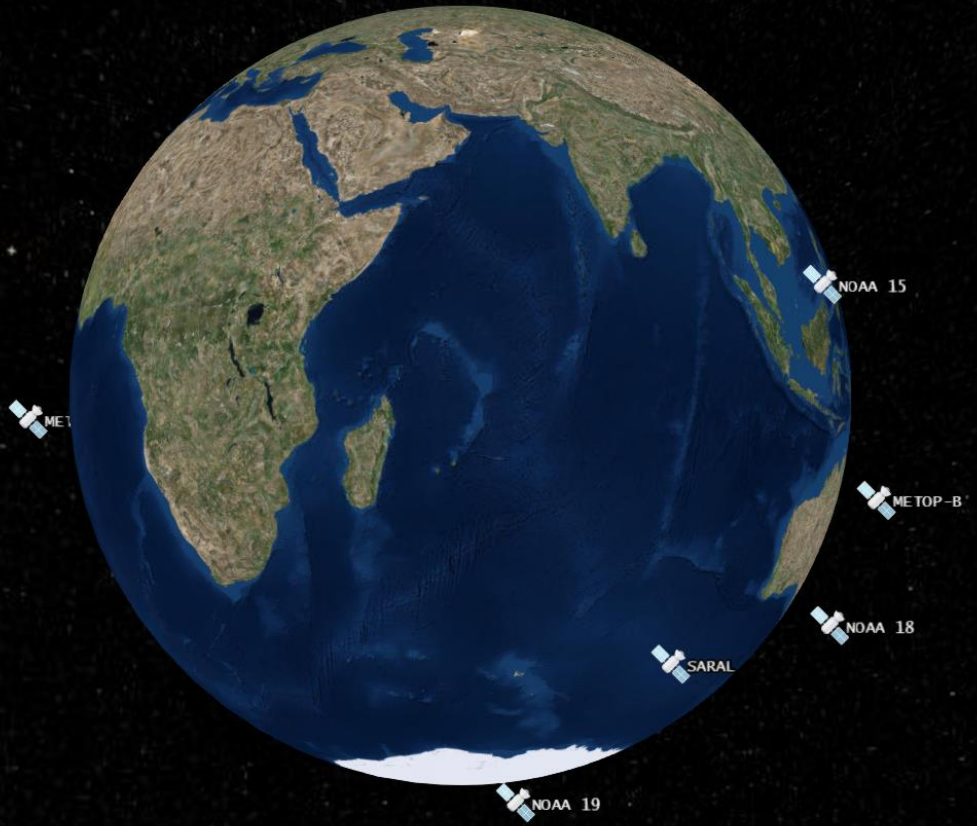
With 2 global coverage LEO satellite systems and 3 processing centers operational 24/7, CLS is the privileged partner of JCOMM programs

GOOS jcommops

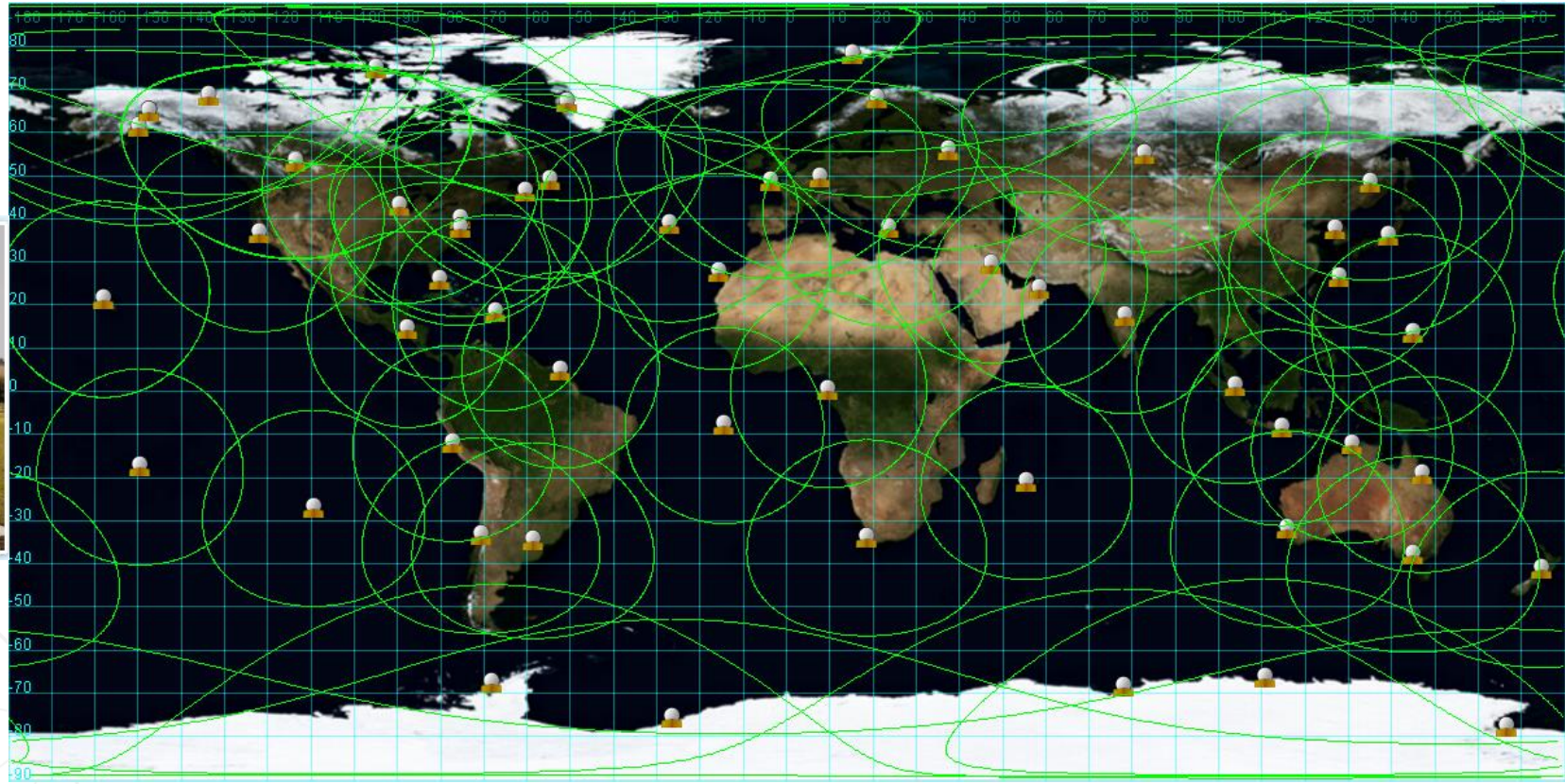
Today – 6 Argos satellites in orbit

6

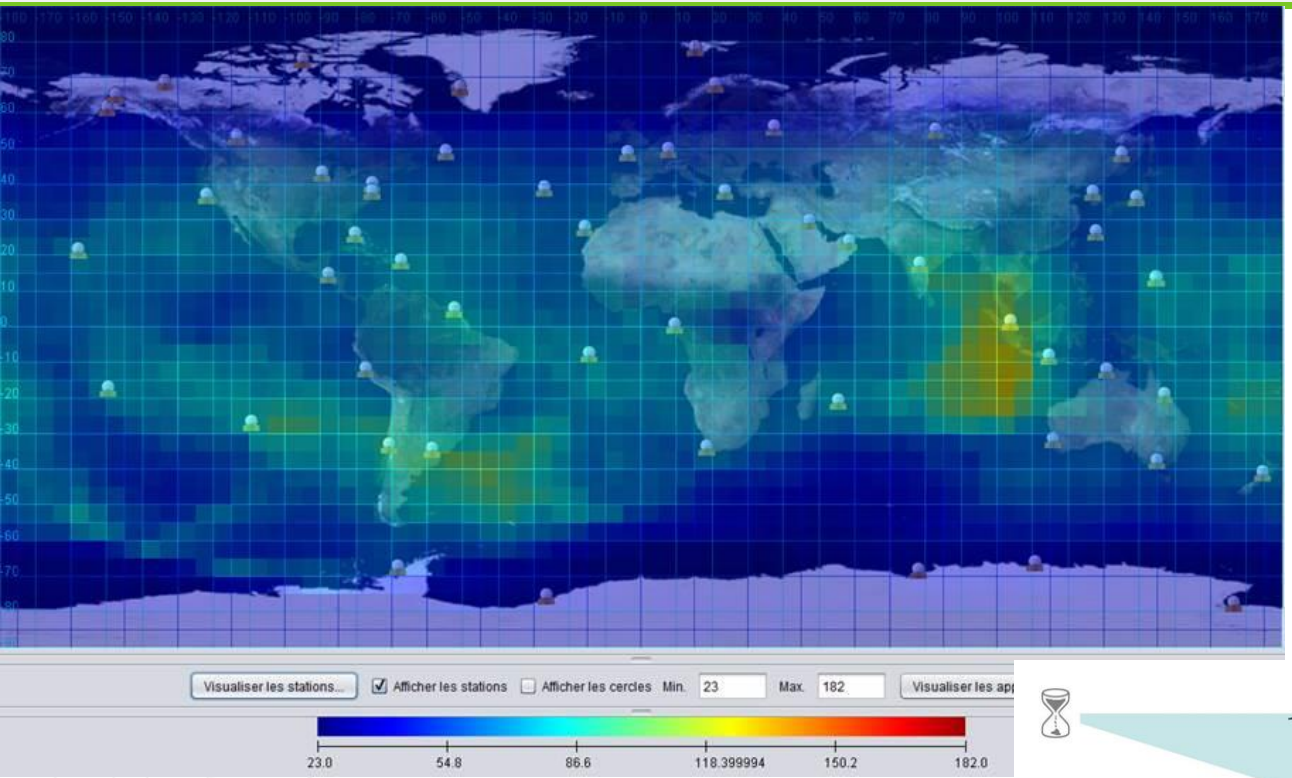
ARGOS : *an International collaboration satellite system dedicated to environmental monitoring*



Ground network: 63 Argos antennae



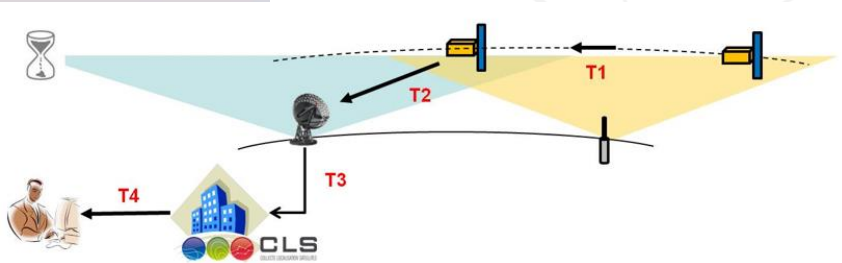
Argos average delivery time



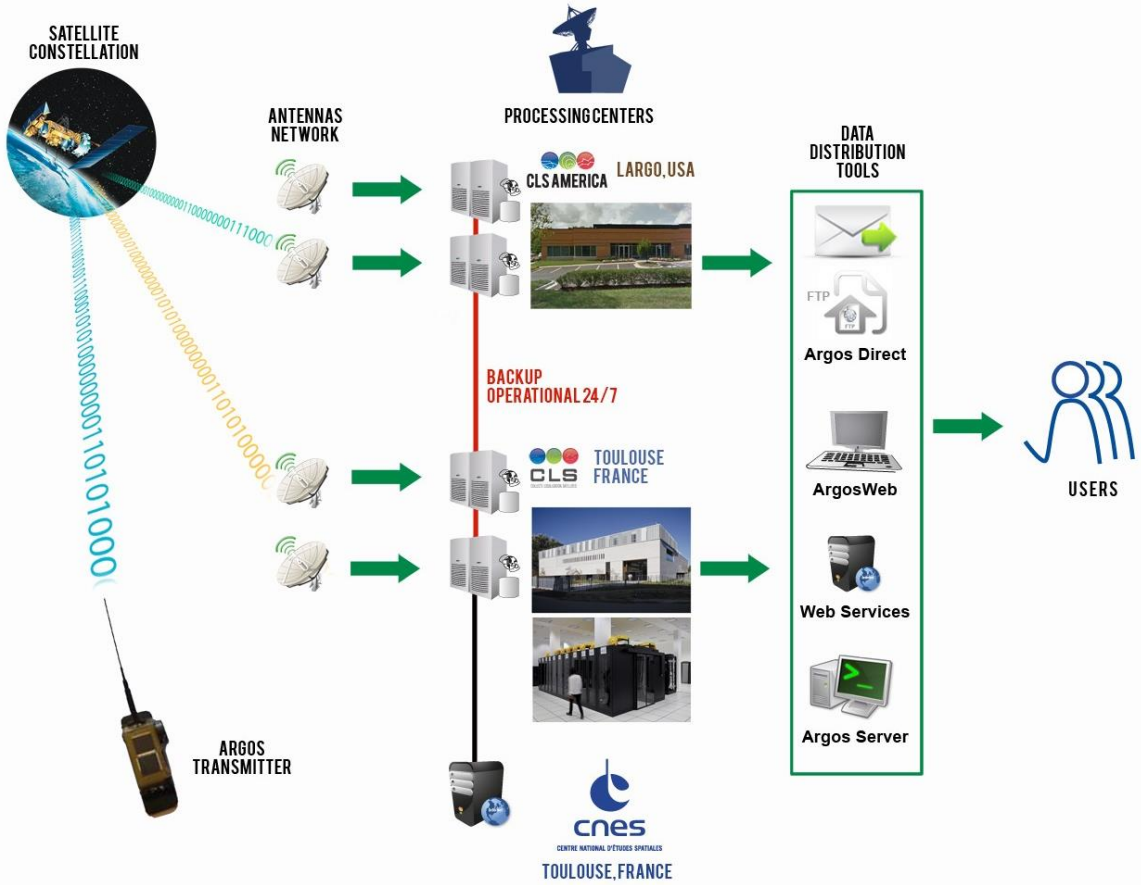
Still lower performances in the East of Indian Ocean areas due to :

Intermittent availability of the Bali antenna & the Perth antenna

→ Work in progress with Indonesia & BOM.



ARGOS system overview



The Argos Data Collection System

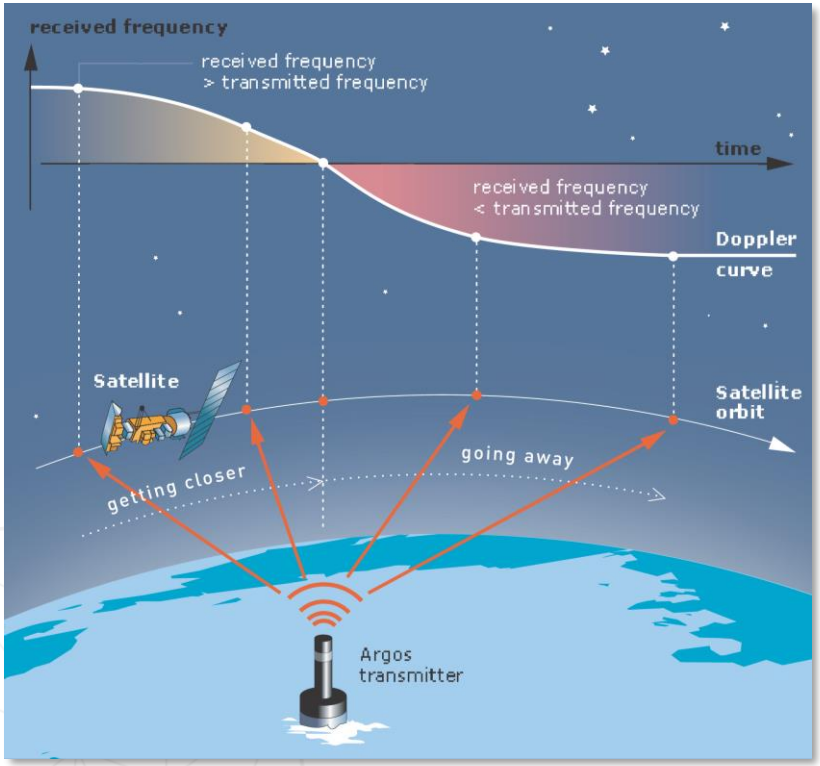
- **Global Coverage** thanks to polar orbits
- **Robustness**: Communication protocol fitted for harsh conditions (no hand checking protocol)
- Compatible with **low output power transmission** <1W (long lifetime autonomy)
- Satellite Pass Duration: up to ~10-12 min
- # satellite passes / day / sat:
  - 3-4 (low lat.)
  - 4-6 (mid lat.)
  - 10-12 (high lat.)

	Argos-2	Argos-3	Argos-4
Processing Units	8 low data rate	9 low data rate 3 high data rate	32 low data rate 8 high data rate
Uplink Data Rate	400 bps	400 bps (low) 4800 bps (high)	124 bps (very low) 400 bps (low) 2400 (medium) 4800 bps (high)
Downlink (465.9875 MHz)	No	Yes	Yes
Downlink Data Rate	N/A	400 bps	1000 bps
Data Transmitted per Satellite Pass	0.4 Kbytes	Up to 4 Kbytes	Up to 4 Kbytes

- With 6 operational satellites, from 7 Kbytes to **240 Kbytes** of data can be transmitted through Argos every day (24 hours)

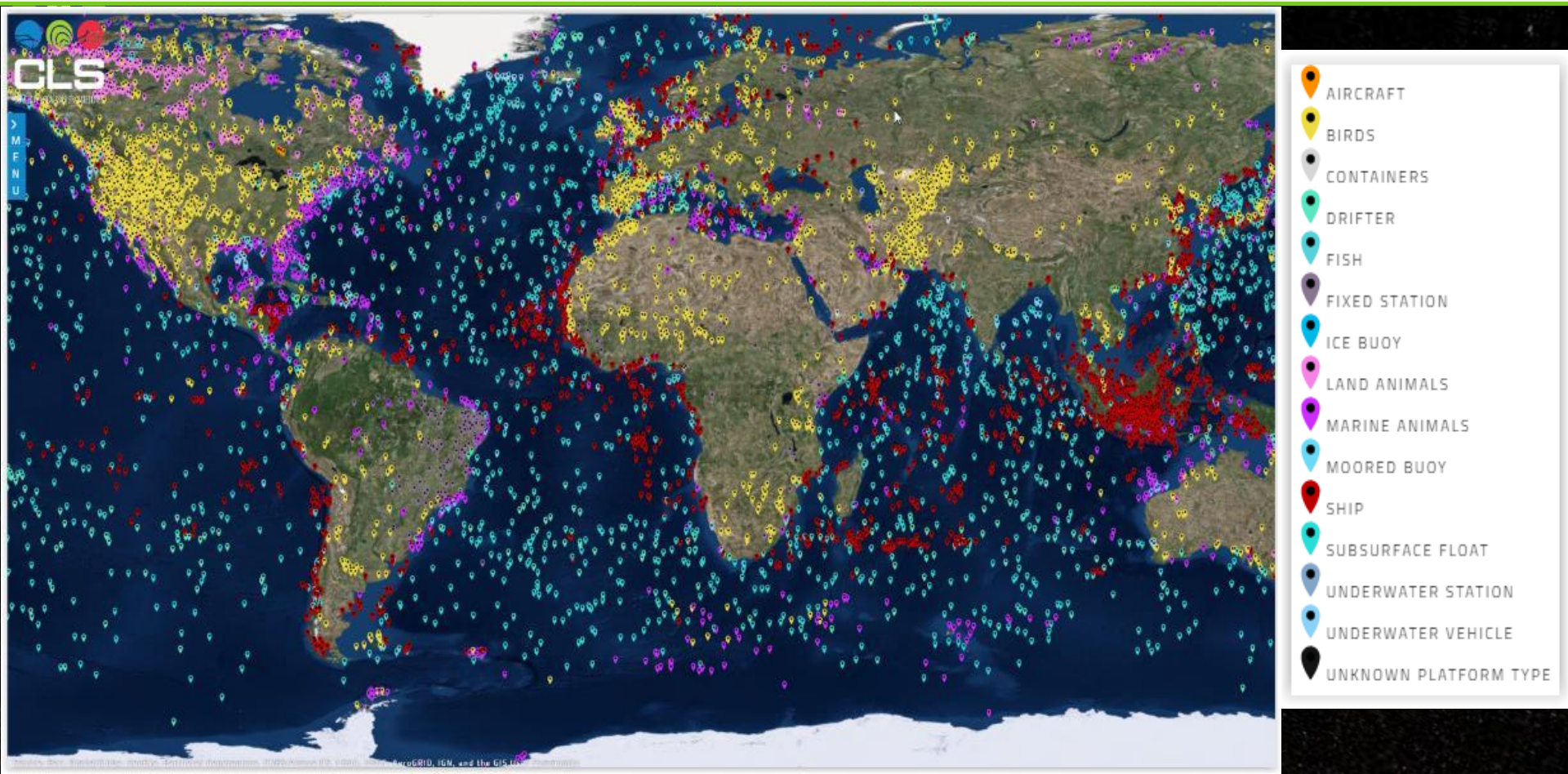
The Argos Doppler Location

“Doppler Effect” Location Principle

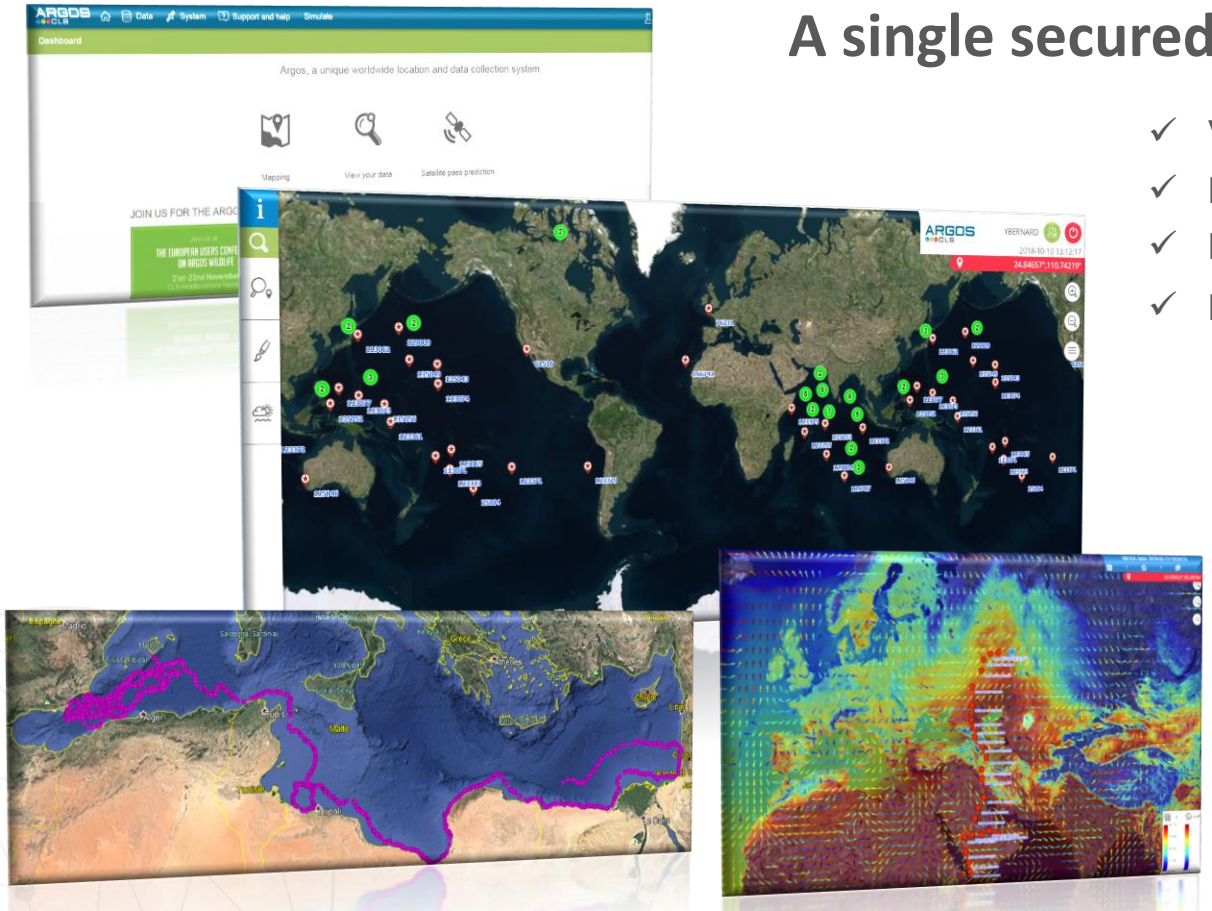


- ⇨ **GPS free** positioning system
- ⇨ Locations computed by the system itself
- ⇨ **Uncorruptible**
- ⇨ **Few seconds** with sky visibility is enough to get a position
- ⇨ Accuracy up to **250m**
- ⇨ For more accuracy GPS could be added

Argos usage – 18 000 active transmitters



ARGOS WEB



A single secured web site to:

- ✓ **View all positions on a map**
- ✓ **Download all available data**
- ✓ **Export Google Earth files**
- ✓ **Manage users settings**

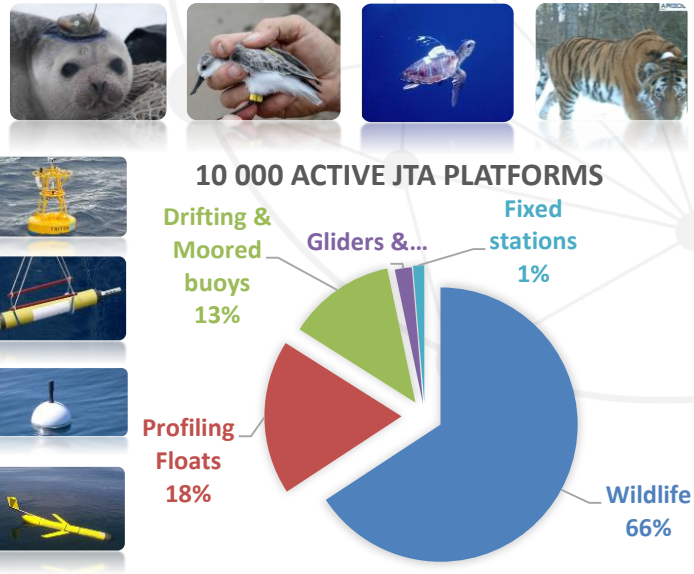
- ⇨ *Free access to one year of data online*
- ⇨ *Meteorology & Oceanographic data from Global Models (EUCMWF, Copernicus) together*
- ⇨ *Mapping and along-track sampling*
- ⇨ *Mobile friendly responsive design*

Argos JTA pricing

- **Argos Join Tarif Agreement (JTA)** part of the Satcom Forum under the umbrella of IOC and WMO through JCOMM.
- **Cost recovery basis**, operation costs = revenue
- **A pricing structure simple, attractive and budget predictable**
  - 15€/month per active platform
  - 4€/day of transmission capped to 12 days per month

  → **UNLIMITED monthly subscription @ 63 € / platform**

  ("all you can transmit" offer)
- **Argos service costs has been divided by 3** for oceanography & meteorology applications in 2018



CLS Argos team

60 people dedicated to Argos worldwide !

Argos – near future

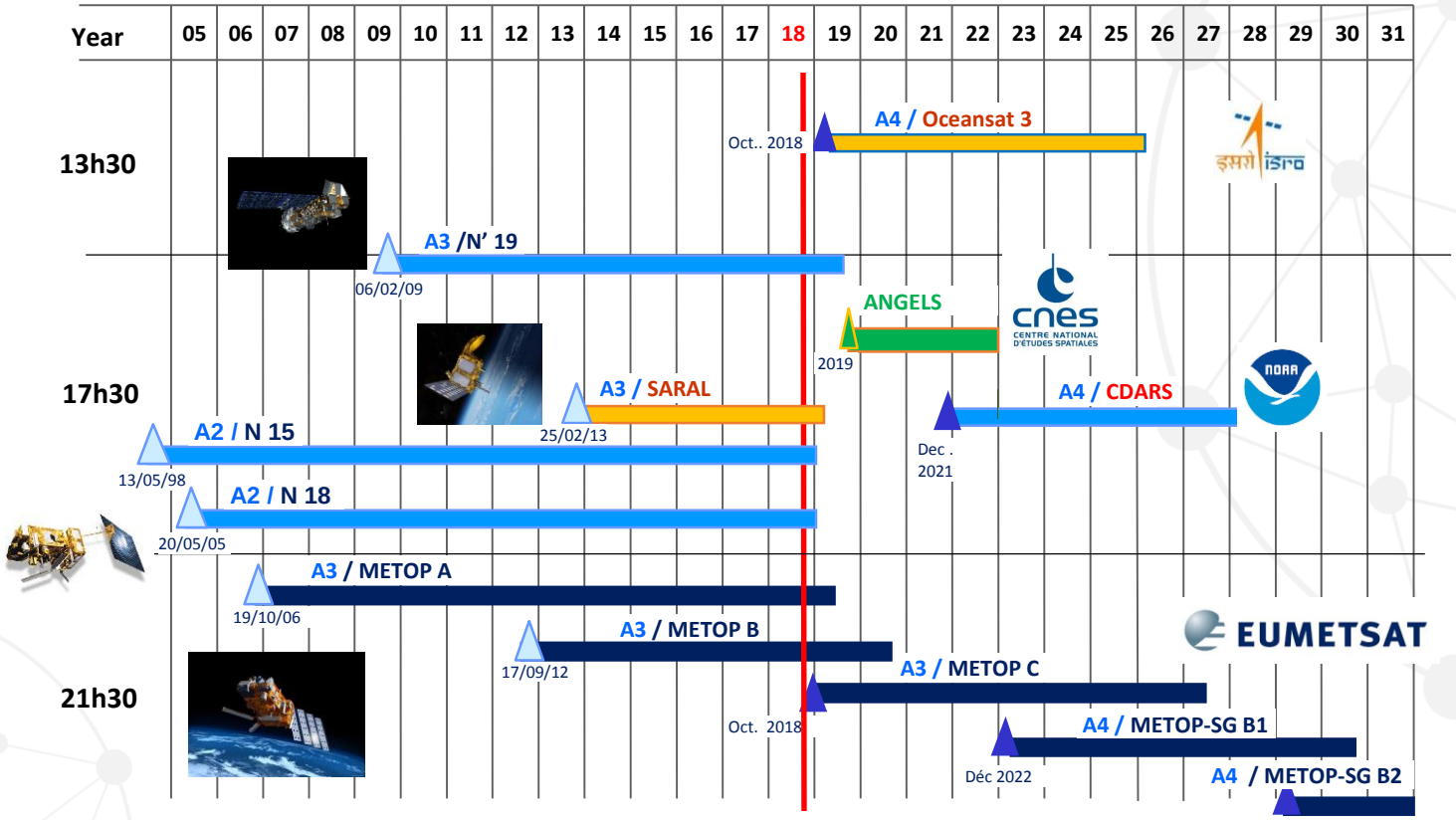
A new satellite with an Argos payload will be launched next month (07/11/18): METOP-C

New generation of satellite instrument Argos-4 will be launched end 2019 by ISRO on OceanSat-3

NOAA, in coordination with the U.S. Air Force, is undertaking the next step to support flight of an Argos-4 instrument in 2021: CDARS program

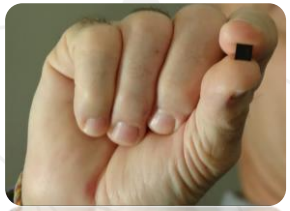
CNES will launch ANGELS (Argos NEO Generic Economic Light Satellites) the 1st Argos CubeSat end of 2019

Argos constellation in 2018



Argos-4 improvements

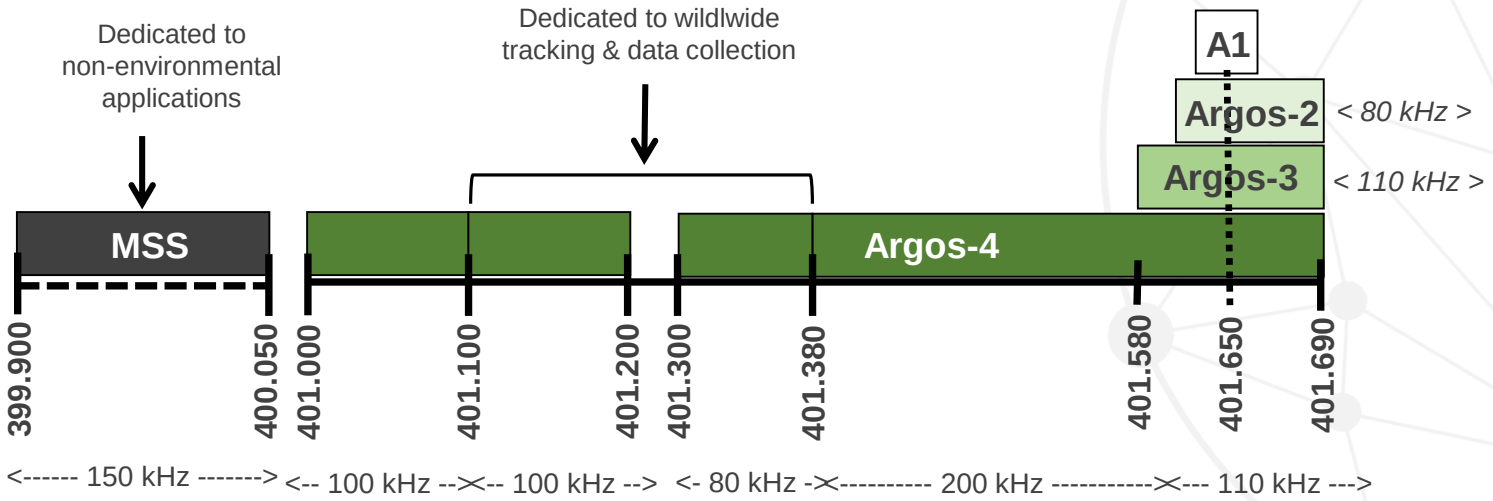
- **To reinforce performance for very low power transmitters**
  - ✓ Objective : to decrease the transmitter output power : **down to 100 mWatt**



- **To reinforce high data rate performance (2400- 4800 bps)**
  - ✓ **4 dB improvement**, automatic switch between medium and high data rates
  - ✓ New downlink, compatible with US frequency regulation

- **To increase the system capacity**
  - ✓ More than **50 000 beacons** will be processed (5 000 today) on a footprint (5 000 km diameter) thanks to a better performance regarding detection
  - ✓ 40 processing unit (instead of 12 with Argos-3)
  - ✓ High increase of frequency bandwidth (600 kHz instead of 110 kHz on Argos-3)

ARGOS-4 FREQUENCY BANDS



A PROMISING FUTURE

A revolution is coming…

SPACE IOT

A NEW ARGOS SYSTEM IS BORN

GIVES BIRTH TO A COMPANY DEDICATED TO THE NEXT ARGOS SYSTEM

CLS
COLLECTE LOCALISATION SATELLITES

kinéis
A CLS GROUP COMPANY

With Kinéis, ARGOS becomes IoT Everywhere

20
NANOSATELLITES
INTEGRATED PROPULSION

25
GROUND STATIONS

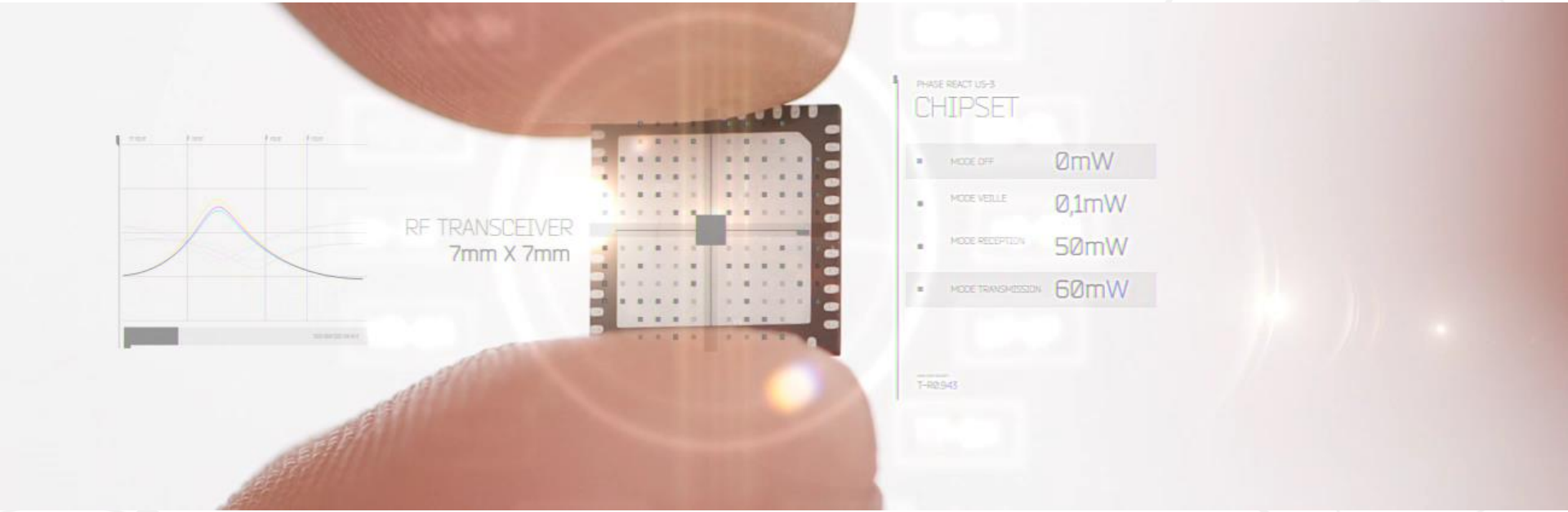
3
STRATEGIC PARTNERS

cnes CENTRE NATIONAL D'ÉTUDES SPATIALES
NEXEYA LET'S MERGE OUR TALENTS
ThalesAlenia Space

2021
PUT INTO ORBIT

2022
OPERATIONAL SYTEM

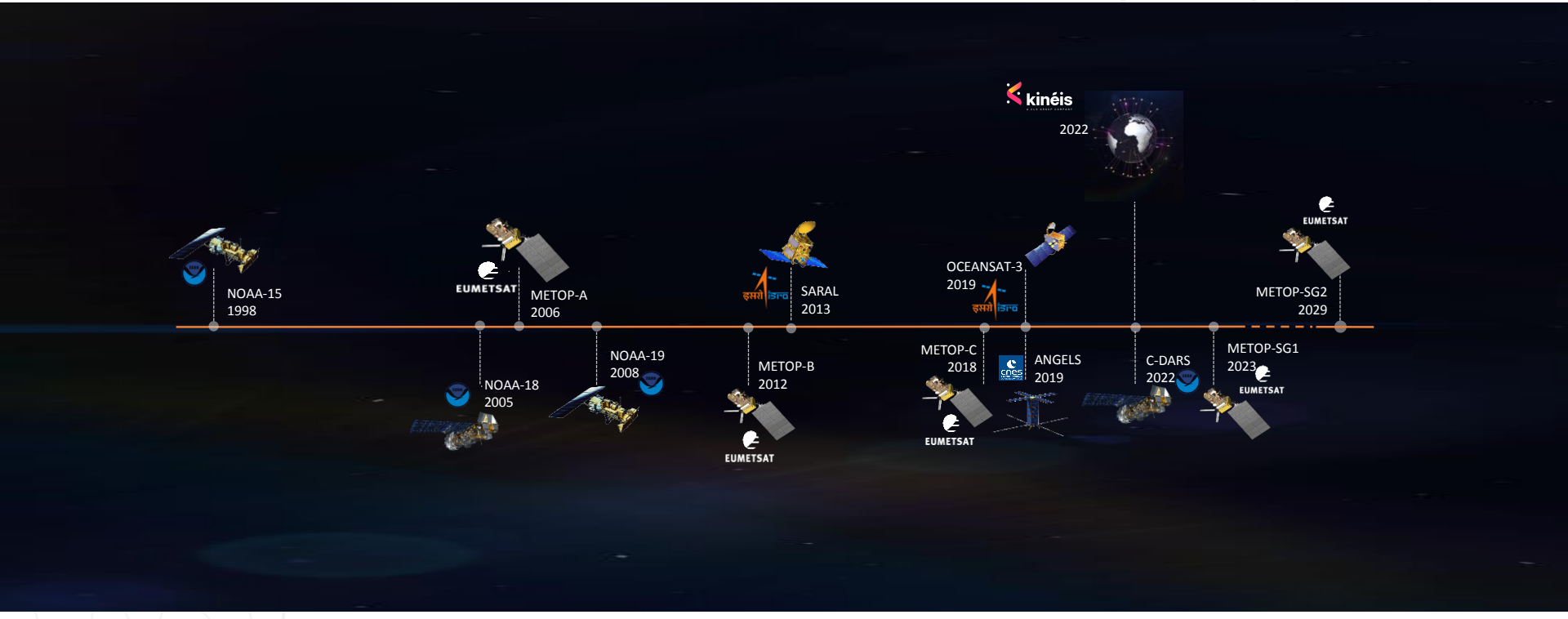
A single chipset for Connectivity



ARTIC chipset : Argos Receiver Transmitter with Integrated Control

- RF 7mm x 7mm single chip **compatible with Argos 2/3/4**
- “Easy to use” component: **Functionalities addressed by a few SPI commands**

Unparalleled private-institutionnal constellation



KINEIS – A CHOICE FOR A LONG-TERM PARTNERSHIP

CLS
COLLECTE LOCALISATION SATELLITES

ARGOS OPERATOR

AIMS TO

1 REINFORCE THE SYSTEM

2 ENSURE ITS CONTINUITY

3 REMAIN A KEY PARTNER FOR THE INTERNATIONAL SCIENTIFIC COMMUNICATION

2022 : A system with multiplied capacities

TOTAL CONTINUITY OF SERVICE WITH THE ARGOS SYSTEM

-

Total compatibility between Argos generations

INCREASING REVISIT TIME

-

10 to 15 minutes in average

-

Less than 20 minutes everywhere

CAPACITY TO TRANSMIT MORE DATA

-

More satellite passes

-

More possibilities to send data in high data rate

TWO WAYS GUARANTED

-

A constellation fully equipped to communicate with transmitters

Thanks for your attention !

ARGOS
CONNECTED. PROTECTED.

www.argos-system.org