



Satellite Services & Products for metocean platforms

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ARGOS
CONNECTED. PROTECTED.





MENU

- ▶ Company profile :

CLS is the **privileged partner** of most important ocean in-situ programs

- ▶ *Current & Evolutions* of the ARGOS & IRIDIUM satellite telemetry systems

- ▶ CLS value-added services and products for met/ocean users

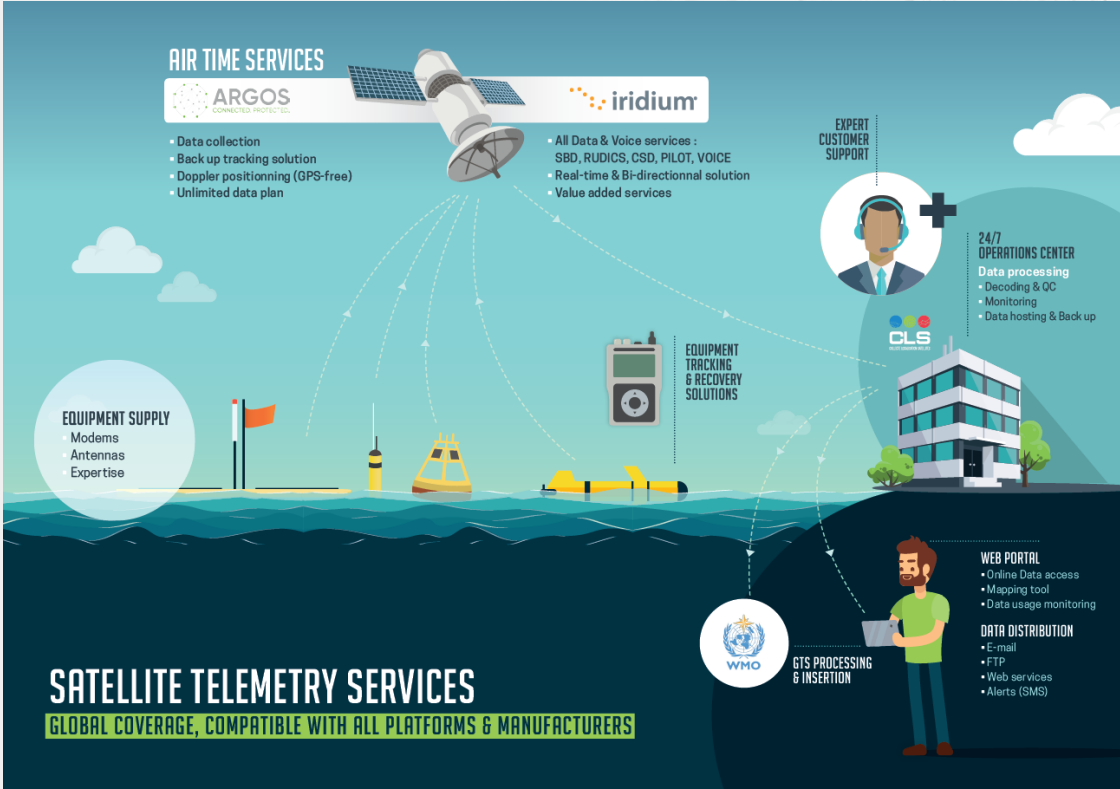
COMPANY PROFILE



CLS is a subsidiary of the French Space Agency (CNES)

- ▶ Created in 1986
- ▶ 25 international sites, Headquarters in Toulouse, France
- ▶ **Unique operator** of the Argos system
- ▶ **Iridium services provider** dedicated to ocean & meteo platforms
- ▶ **3 processing centers operational 24/7**
- ▶ CLS is the **privileged partner of most important ocean in-situ programs**

OVERVIEW OF WHAT WE HAVE TO OFFER



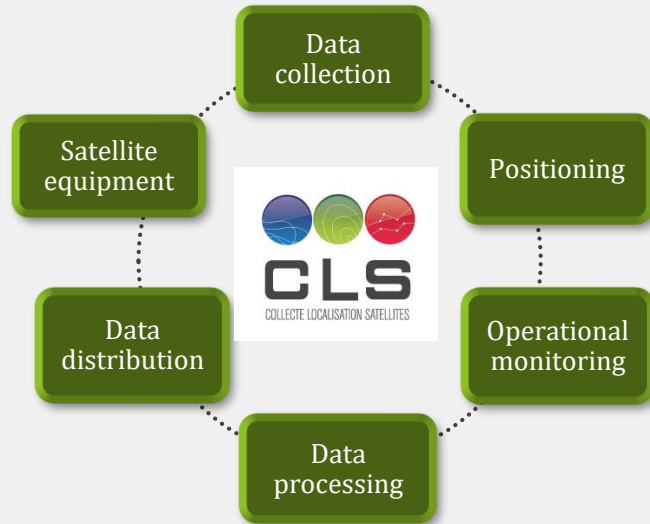
Satellite Services & Products for ocean weather observation programs

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OCEAN OBSERVATION PROGRAMMES

CLS is the privileged partner of most important ocean in-situ programs



24/7 OPERATIONALITY

Receiving, processing, monitoring, distributing and archiving

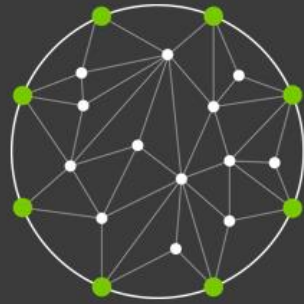


Argos, Jason 2 &
3, Saral, CryoSat-
2, Sentinel 1& 3,
Doris, Cospas-
Sarsat, etc.



CLS Systems are
MONITORED
24/7

+24/7 HOTLINE



ARGOS

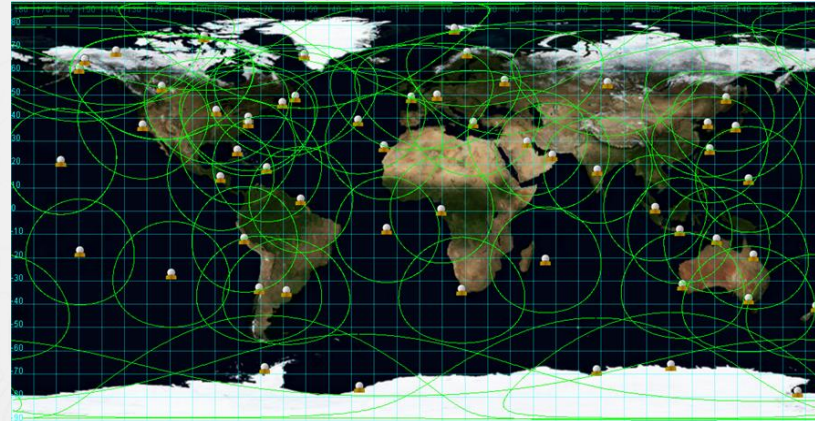
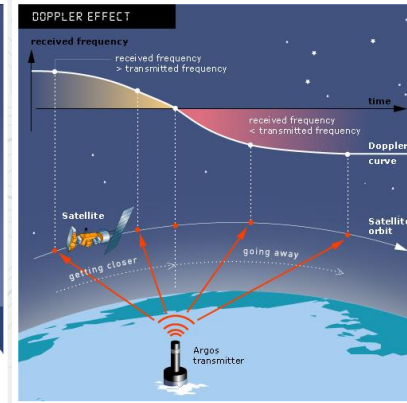
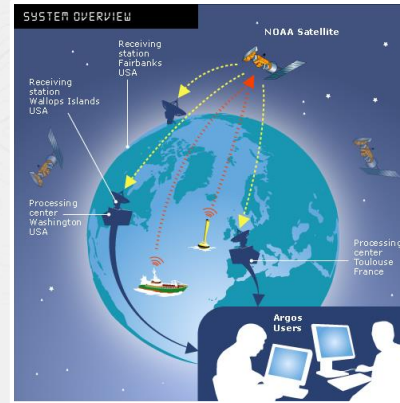
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“Argos is a global, non profit satellite-based data collection and positioning system, dedicated to studying and protecting the earth’s environment.”

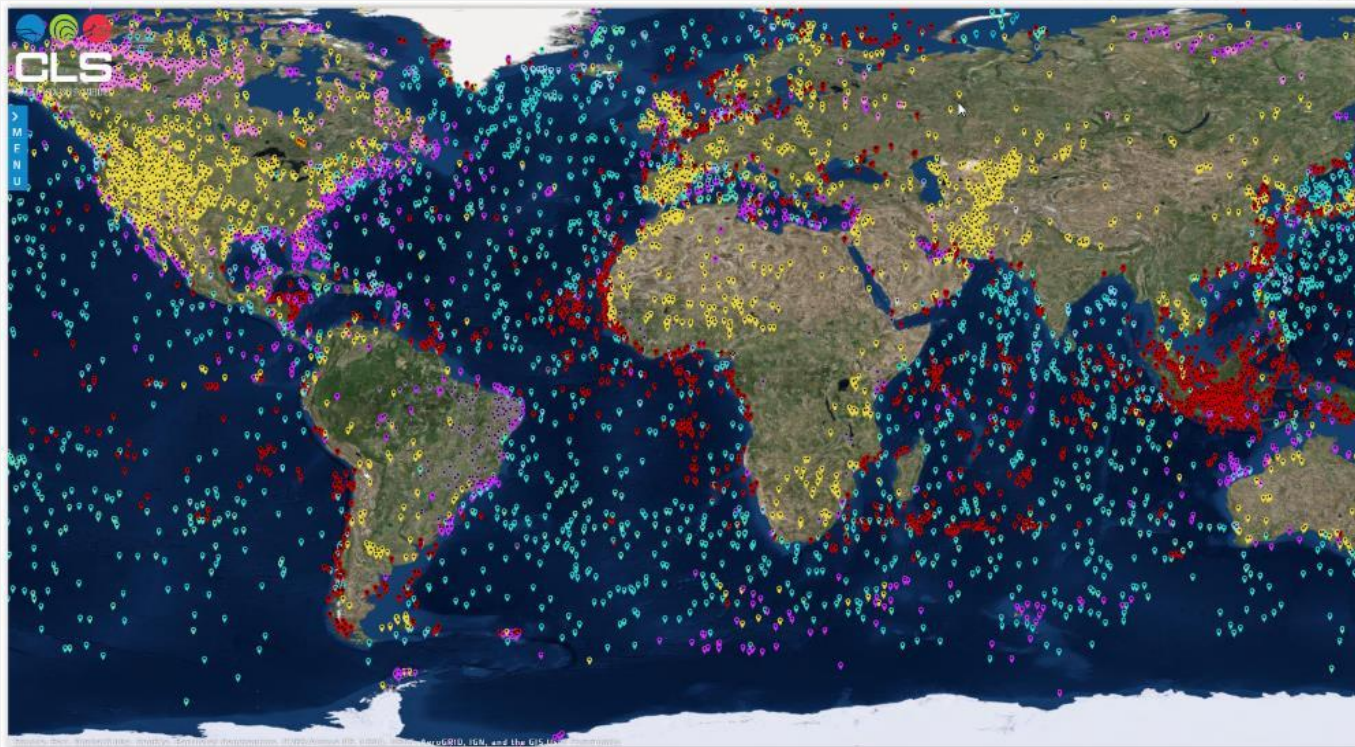
Argos is operated by CLS, and governed through a partnership between NOAA, NASA, CNES, ISRO and EUMETSAT.

THE CURRENT SYSTEM

- ✓ **Currently 7 operational satellites :**
 - *From 3 Kbytes to 5 Kbytes of data can be transmitted through Argos every day
- ✓ **GLOBAL coverage system:**
 - *Global Coverage thanks to polar orbits (LEO)
 - *7 Global & 65 Regional real-time stations
- ✓ **Low transmission power :**
 - *<1W (long lifetime autonomy)
- ✓ **Satellite Pass Duration:** up to ~10-12 min
- ✓ **DOPPLER Positioning**
 - ***GPS free** positioning system
 - *Accuracy up to **250 m**
 - *For more accuracy GPS could be added



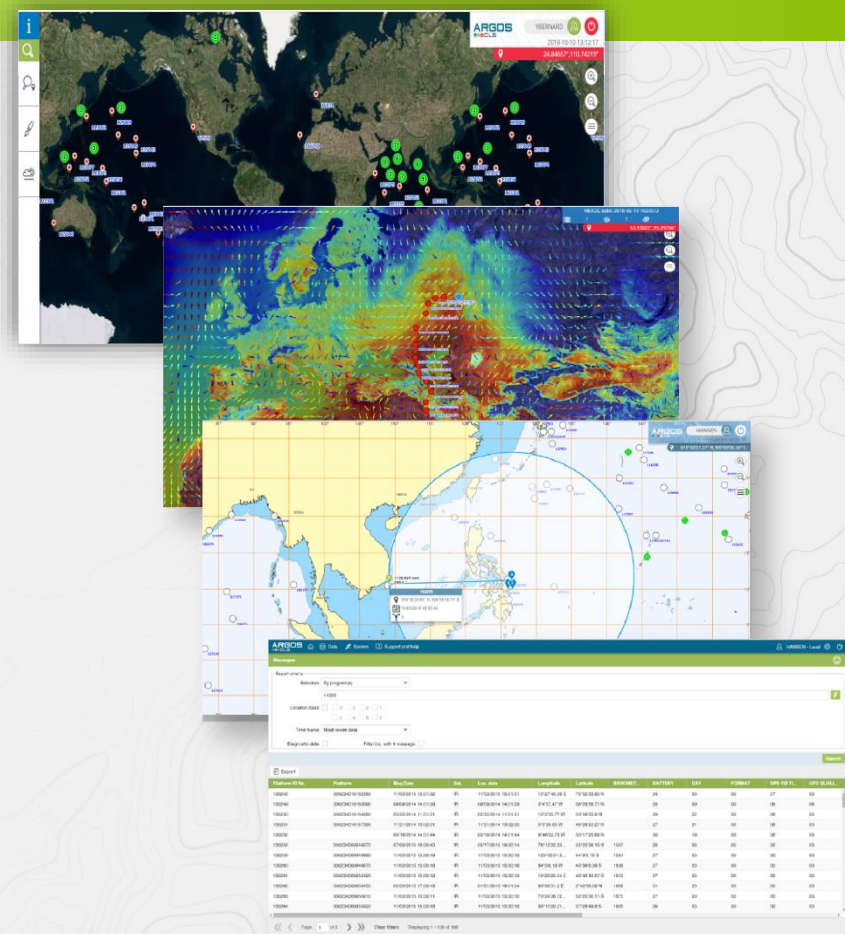
18 000 ACTIVE TRANSMITTERS



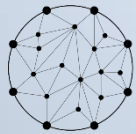
- AIRCRAFT
- BIRDS
- CONTAINERS
- DRIFTER
- FISH
- FIXED STATION
- ICE BUOY
- LAND ANIMALS
- MARINE ANIMALS
- MOORED BUOY
- SHIP
- SUBSURFACE FLOAT
- UNDERWATER STATION
- UNDERWATER VEHICLE
- UNKNOWN PLATFORM TYPE

Portfolio of ARGOS Services

- Data collection & positioning
- Data decoding & GTS encoding
- Customer Support
- Access to **ARGOSWEB**, a single secured web site to:
 - View all positions on a map
 - Download all available data
 - Export Google Earth files
 - Manage users settings



Updates on ARGOS



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ARGOS LEGACY : A SECURED FUTURE



Now! A new satellite with an Argos payload has just been launched (successfully) and is operational (Feb, 2019) : METOP-C



Autumn 2019 : CNES is launching the Argos ANGELS project (Argos NEO Generic Economic Light Satellites) with the launch of the 1st Argos CubeSat in 2019



Jan. 2020 : New generation of satellite instrument Argos-4 will be launched in 2020 by ISRO on OceanSat-3



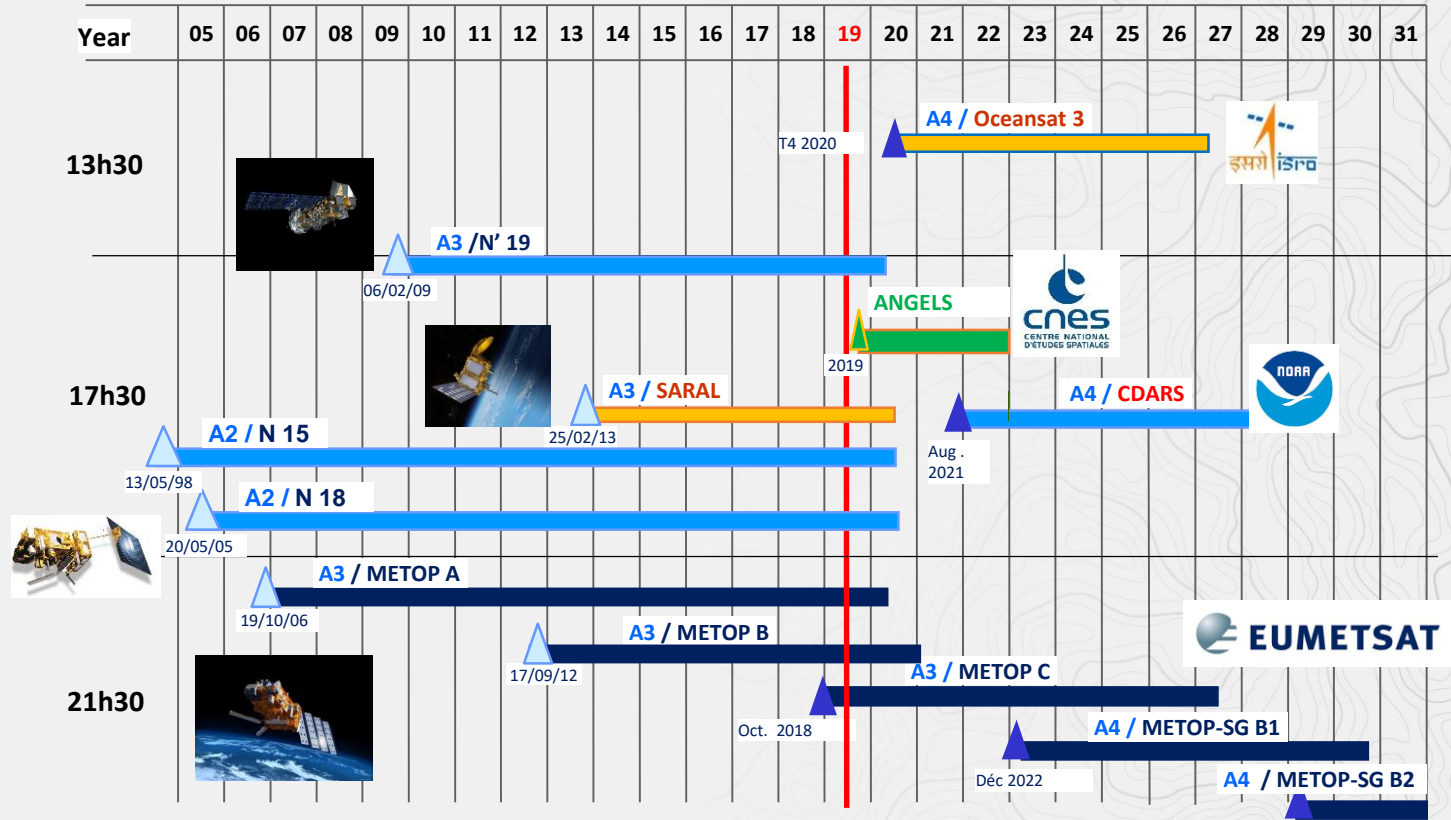
End 2021 : NOAA, will also launch an Argos-4 instrument on CDARS



Now, until 2036 : EUMETSAT committed to Argos until 2036



ARGOS LEGACY : A SECURED FUTURE



ARGOS EVOLUTION

ARGOS-2

- ✓ **Uplink** - All satellites

ARGOS-3

- ✓ **Uplink** - 5 out of 7 satellites - **better reception on board A3/A4 satellites**
- ✓ **Downlink** - 3 out of 7 satellites
- ✓ **high data rate** - 3 out of 7 satellites

ARGOS-4

- ✓ First satellite will be OceanSat-3 in **2020**
- ✓ Uplink A2/A3 & Downlink A4 (new better modulation – spread spectrum)
- ✓ New high data rate

ARGOS 4 : SYSTEM IMPROVEMENTS

Improved high data rate performance (1200- 4800 bps)

- ✓ **4 dB improvement**, automatic switch between medium and high data rates
- ✓ New downlink, spread spectrum - compatible with international frequency regulation
- ✓ A2/A3 uplink

Increased system capacity

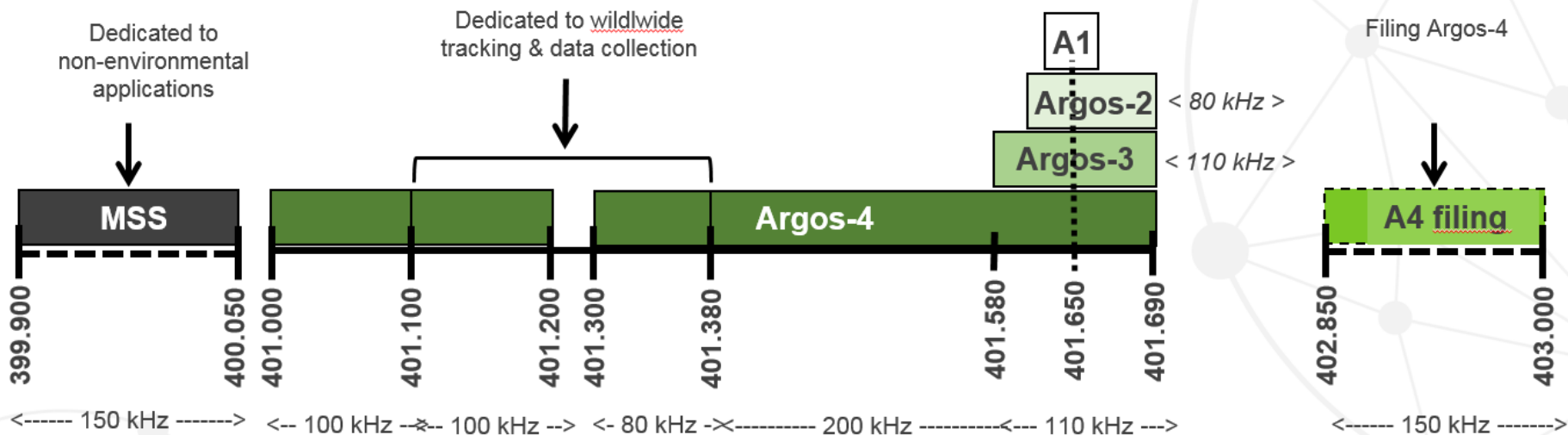
- ✓ High increase of frequency bandwidth (600 kHz instead of 110 kHz on Argos-3)
- ✓ More than 50 000 beacons will be processed (20 000 today), better performance regarding detection

Improved performance for very low power transmitters

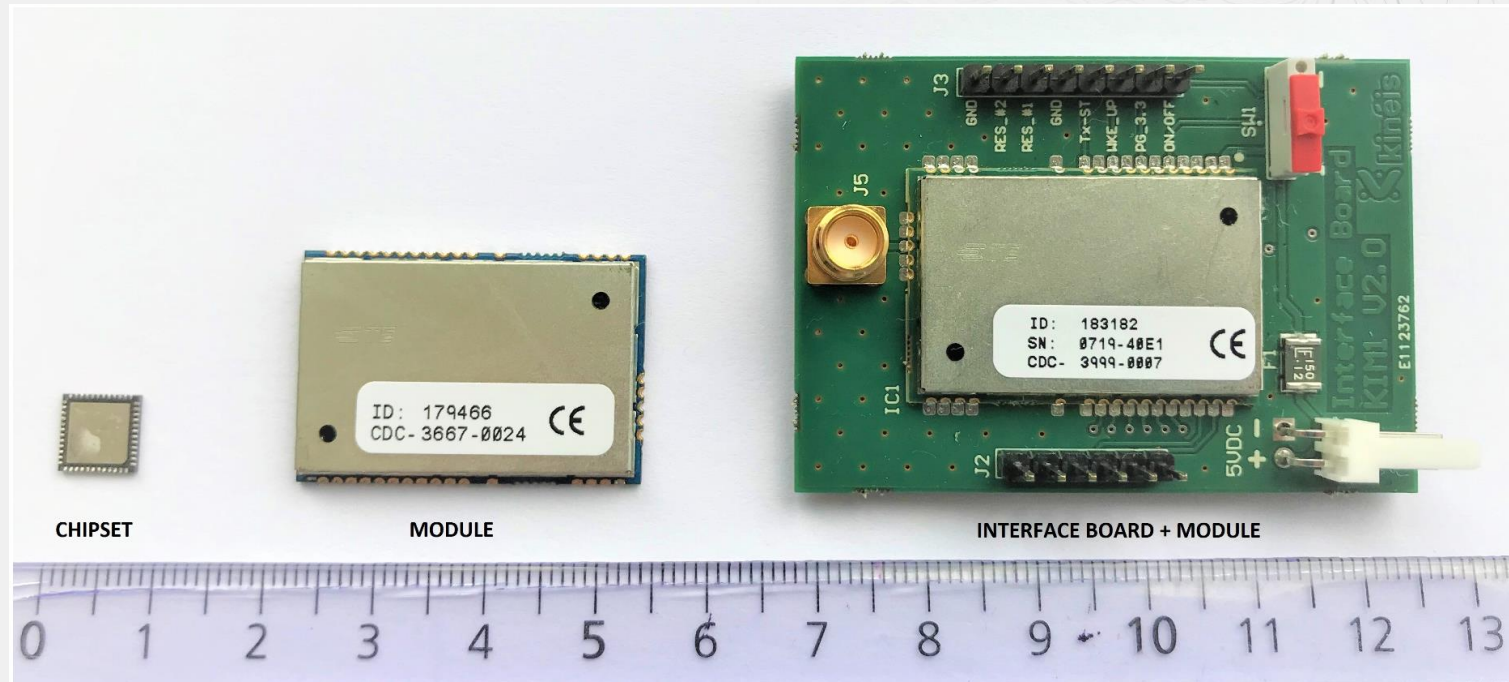
Objective : to decrease the transmitter output power : **down to 100 mWatt**

ARGOS-4 FREQUENCY BANDS

Argos dedicated frequency bands



How to easily integrate ARGOS into any platform?



And now the bright future of ARGOS...



With Kinéis, ARGOS becomes IoT Everywhere



20

NANOSATELLITES
INTEGRATED PROPULSION



25

GROUND STATIONS



3

STRATEGIC
PARTNERS



NEXEYA
LET'S MERGE OUR TALENTS

ThalesAlenia
Space



2021

PUT INTO ORBIT



2022

OPERATIONAL SYTEM

ARGOS 2022 : A system with multiplied capacities



TOTAL CONTINUITY OF SERVICE WITH THE ARGOS SYSTEM

- Total compatibility between Argos generations



INCREASING REVISIT TIME

- 10 to 12 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 GUARANTEED

- A constellation fully equipped to communicate with transmitters



 **iridium**[®]
Everywhere

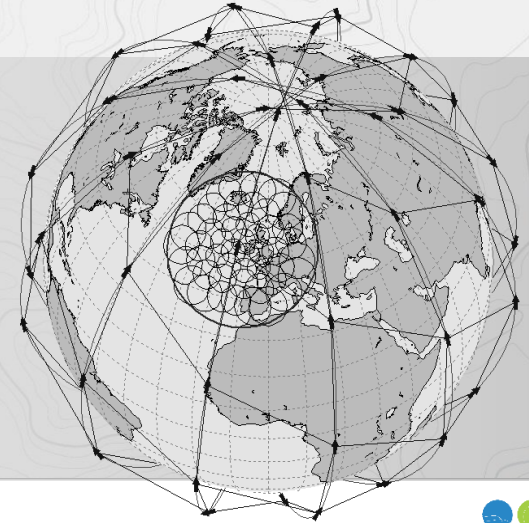
The current IRIDIUM System



Global mobile satellite communications system,
with **voice and data solutions**

66 satellites : world's largest commercial satellite constellation

- **6 polar orbital planes** with **11 satellites** per plane
- Low Earth Orbit (LEO) = **780 km altitude**
- **Global coverage** (incl. poles), **2-way, real time**
- The Iridium satellite system uses a frequency band **in L band** (1616 - 1626.5 MHz)



EXAMPLE OF PLATFORMS USING IRIDIUM

OCEANOGRAPHIC



Drifting buoys



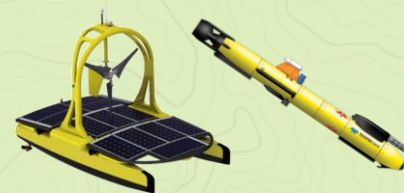
Moored buoys



Gliders



Profiling floats (ARGO)



AUV & USV

METEOROLOGICAL



Automatic Weather Stations (AWS)



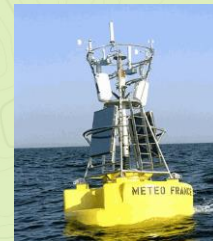
Land Stations



Ice beacons

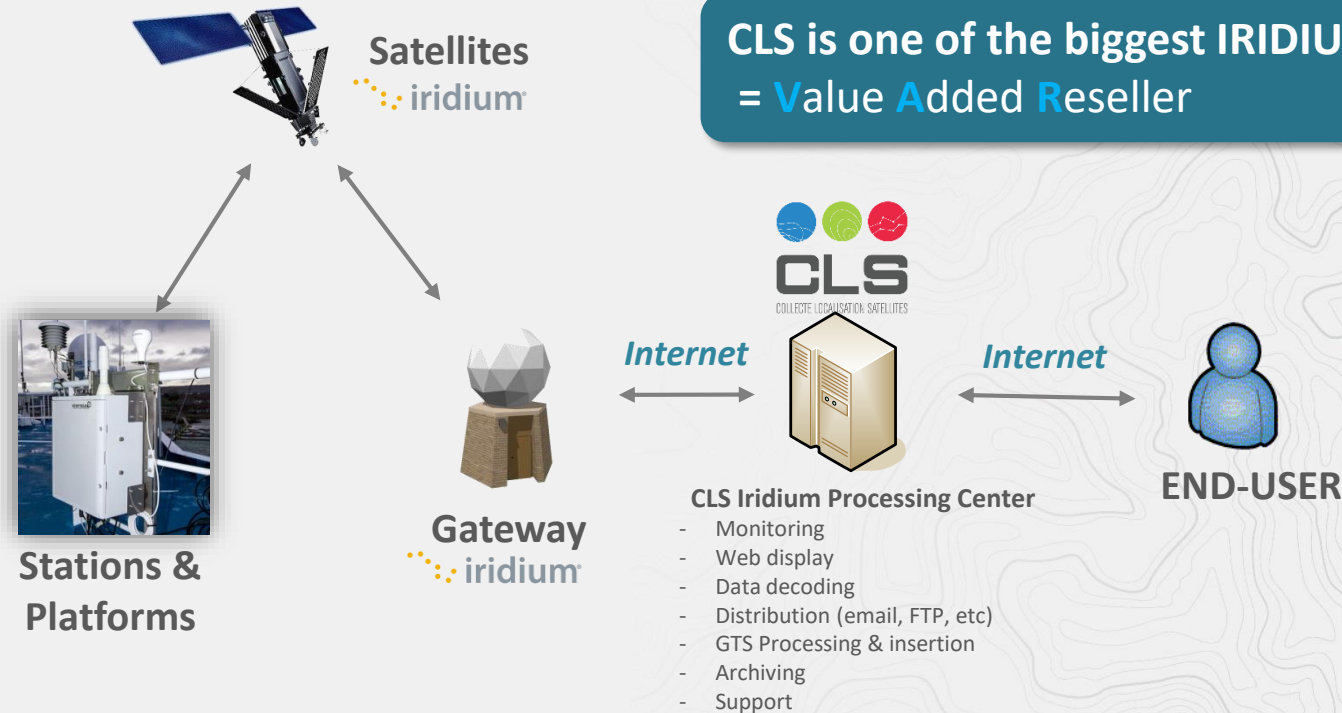


Weather balloons



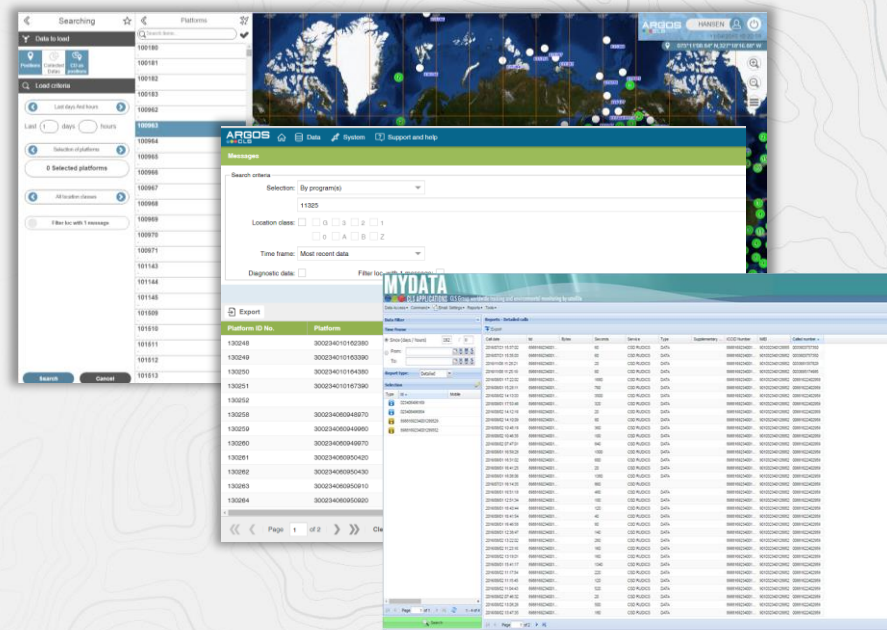
Moored stations

IRIDIUM & CLS: The BIG picture



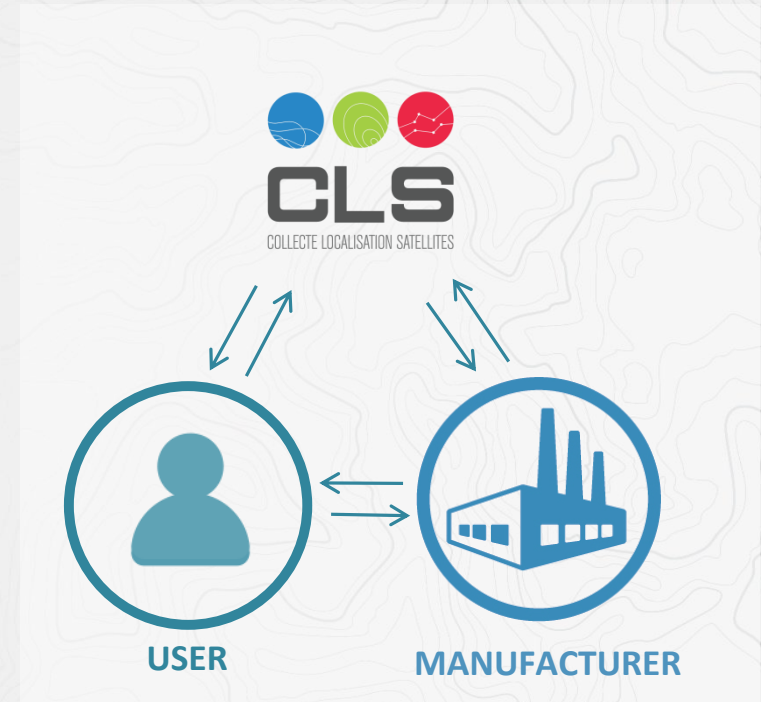
IRIDIUM Value-Added Services with CLS

- ✓ Compatible with most manufacturers & Platform
- ✓ Data processing
- ✓ Data distribution (email, FTP, etc)
- ✓ GTS Processing & insertion
- ✓ Data & positions display (web portal)
- ✓ Customized alerts (geofencing, sensor value) sent by email / SMS
- ✓ Automatic data archiving & back-up
- ✓ Online data consumption (My Data web portal)



CLS Advantages as an Iridium VAR

- ✓ CLS is specialized in ENV applications, not a generic provider
- ✓ Unique one-stop shop for ARGOS & IRIDIUM
- ✓ CLS provides integration support
- ✓ We sell the hardware & the service
- ✓ 30 years expertise in oceanography
- ✓ 24/7 operability of our systems (+backup)
- ✓ Value added services (SBD, hosting for ARGO)
- ✓ Close collaboration and long standing relationship with most manufacturers
- ✓ Excellence in customer service
- ✓ Network of Offices & Subsidiaries !
- ✓ Win-win collaborations (projects)





Satellite Services & Products for ocean weather observation programs

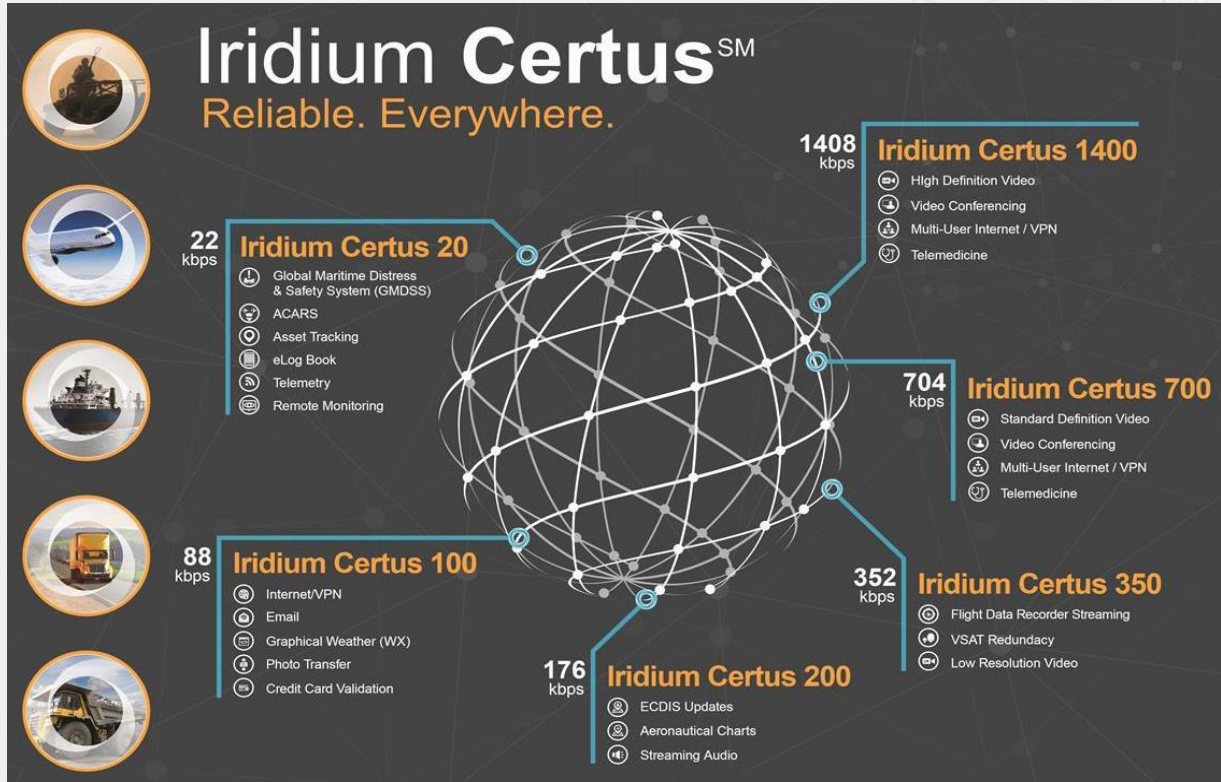
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Iridium NEXT : launches just completed !

- ▶ \$3 B Project for 81 satellites
 - 8 launches from Jan 2016 to Jan 2019
 - 66 new operational satellites
 - 9 in-orbit spares, 6 ground spares
- ▶ Retains 66-satellite LEO architecture:
 - Same orbits, same planes, same number of sat/plane as Block-1: 6 planes, 11 sat./ orbit, 780 km alt.
 - Global coverage (incl. poles), 2-way, real time
- ▶ **Range of new services : CERTUS**
 - Full backward compatibility with Iridium Block1:
 - Greater data speeds => x10
 - Certus 350 commercial service available 01/2019, full availability 2020.



Iridium NEXT new services: Certus



ARGOS vs IRIDIUM

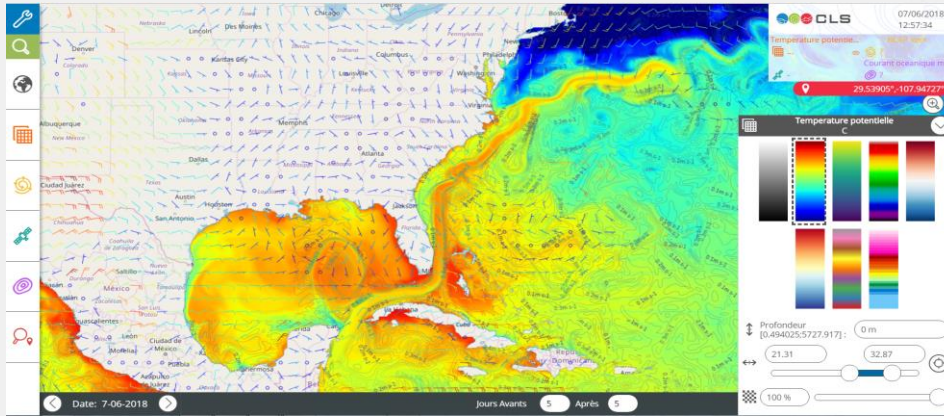
	IRIDIUM	ARGOS
Type of system	Commercial	International collaboration between space agencies
Ground infrastructure	3 antennas	65 antennas
Satellites	66 satellites	7 satellites today ; 2022 : > 25
Coverage	Global	Global
Delay	Real time	Currently : ~1h - 2022 : 15mn
Pricing	Per volume If not in use : fees apply	Per day (unlimited use for fixed price) ; Price will decrease again in 2022 - If not in use : no charge
Bi-directionality	YES	Today : partially (A-3) - 2022 : YES
Volumes	SBD : 0,34KB / 1,9 KB (large modems)	0,5 KB / message (ARGOS high data rate)
Power consumption	> 1W	Down to 0.1 W
Service includes	Raw data, customer support	Raw data, customer support, data processing, webportal, data archiving, ARGOS positioning, data delivery, GTS, custom alerts, geofencing.

CLS PRODUCTS & SERVICES

FOR most important ocean in-situ programs



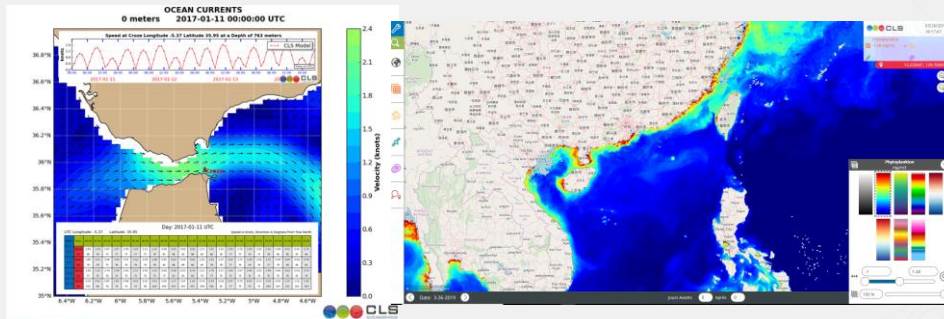
Data services « One Stop Shop »



A lot of valuable data

Various distribution media:

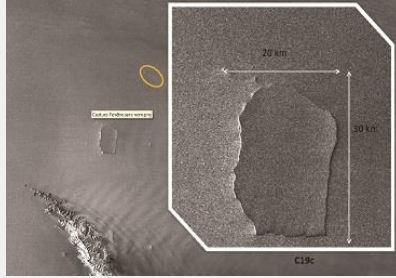
- ✓ SST
 - ✓ Chorophyll
 - ✓ Phytoplankton
 - ✓ Ocean current
 - ✓ Ocean salinity
 - ✓ Ice coverage
 - ✓ ...
- ✓ Bulletin
 - ✓ Webservices
 - ✓ Viewer
 - ✓ Custom offer (hardware, data, software)



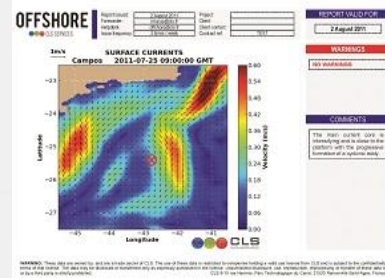
Support for campaigns at sea



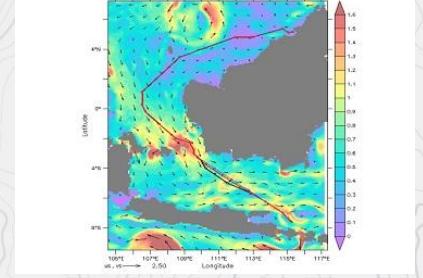
Satellite communication



Sea Ice Detection



Met-ocean forecast



Vessel route optimization



Thank you for your attention !

Questions ?

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