



Satellite services and products for Automatic Weather Stations

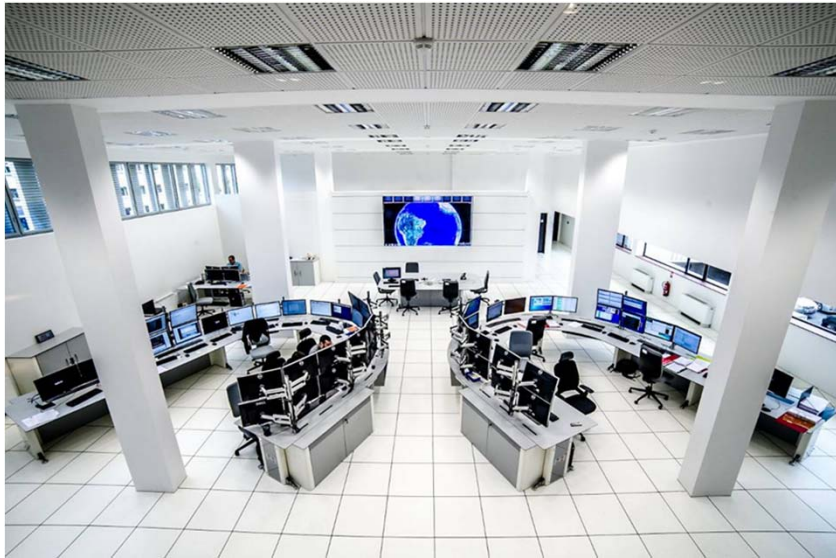
Sophie Baudel
sbaudel@cls.fr

ARGOS



- Share basic knowledge on telemetry services used by meteorologists and oceanographers for **autonomous platforms** not connected to the land neither to vessel satcom (no Inmarsat/VSAT)
- Present 2 satellite systems: Argos & Iridium & associated services



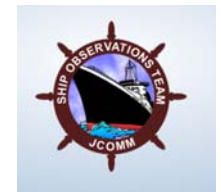


CLS is a **subsidiary of the French Space Agency (CNES)**

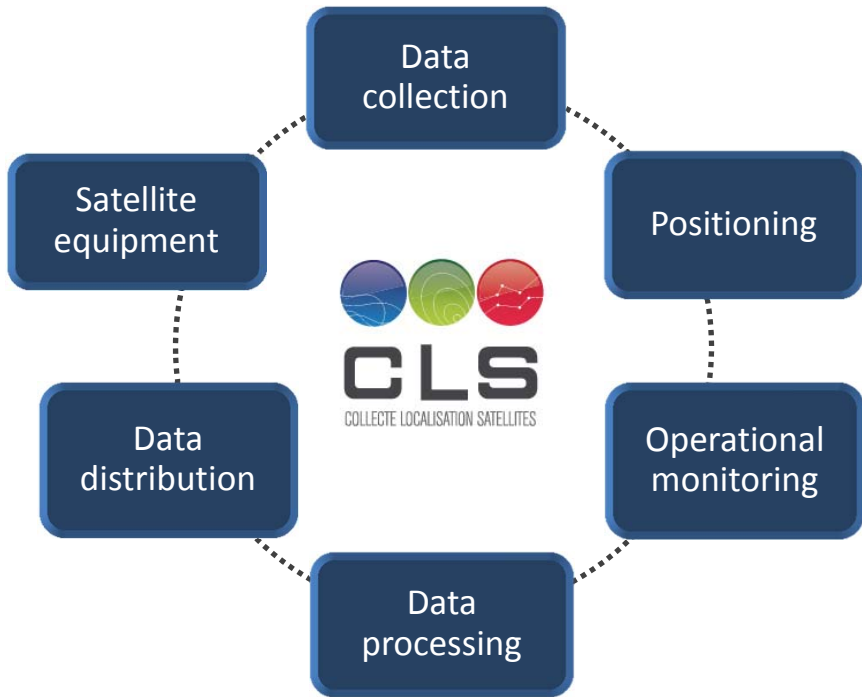
- ✓ **Unique operator of the Argos system**
- ✓ **Iridium services provider** dedicated to ocean & meteo platforms

✓ 3 redundant processing centers operational 24/7

✓ CLS involved in the main global ocean observing programs



Some of our Partners



+ Customer support

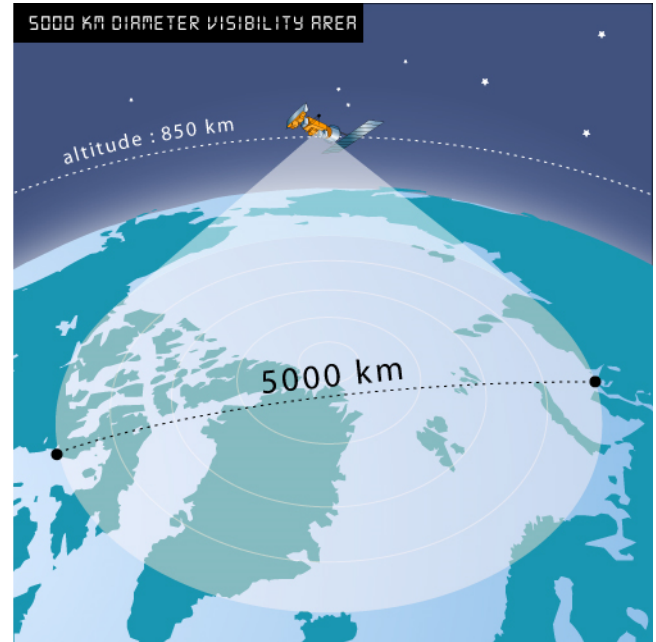




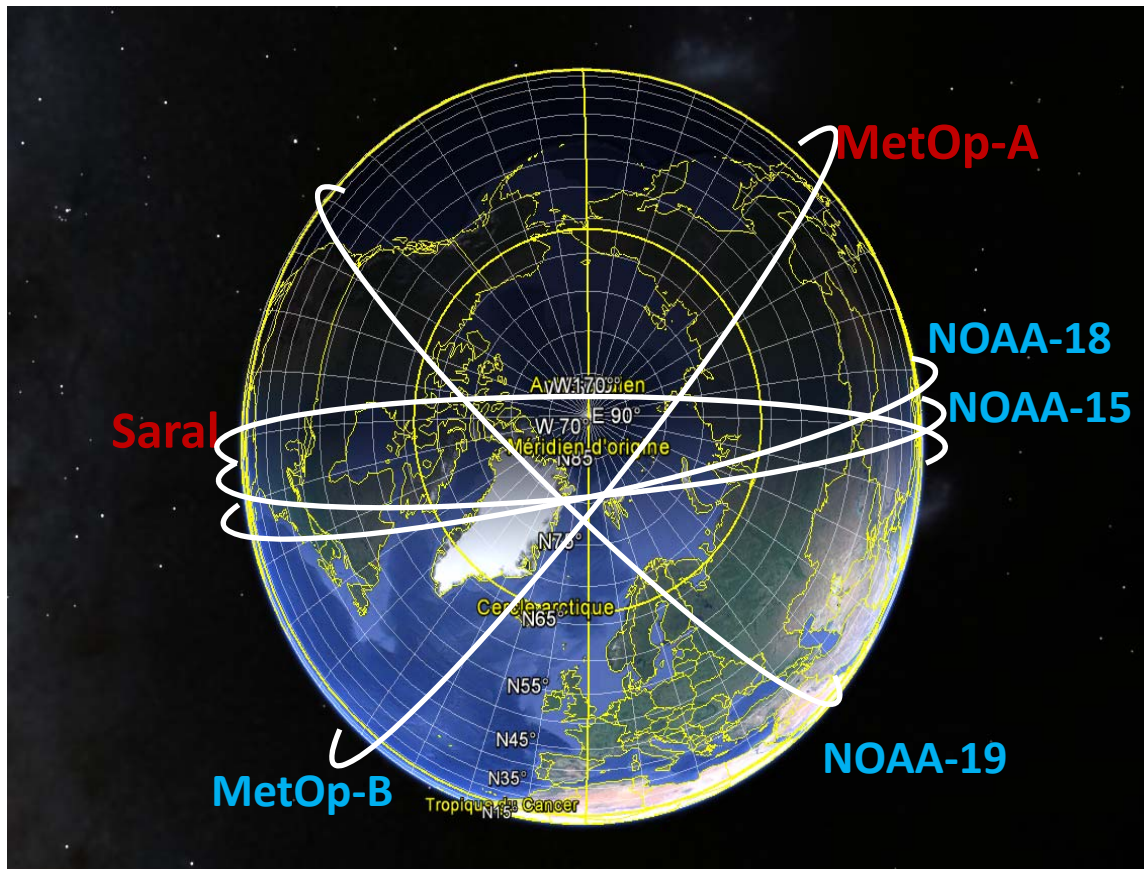
Argos is a global, non profit satellite-based data collection and positioning system, dedicated to studying and protecting the earth's environment.



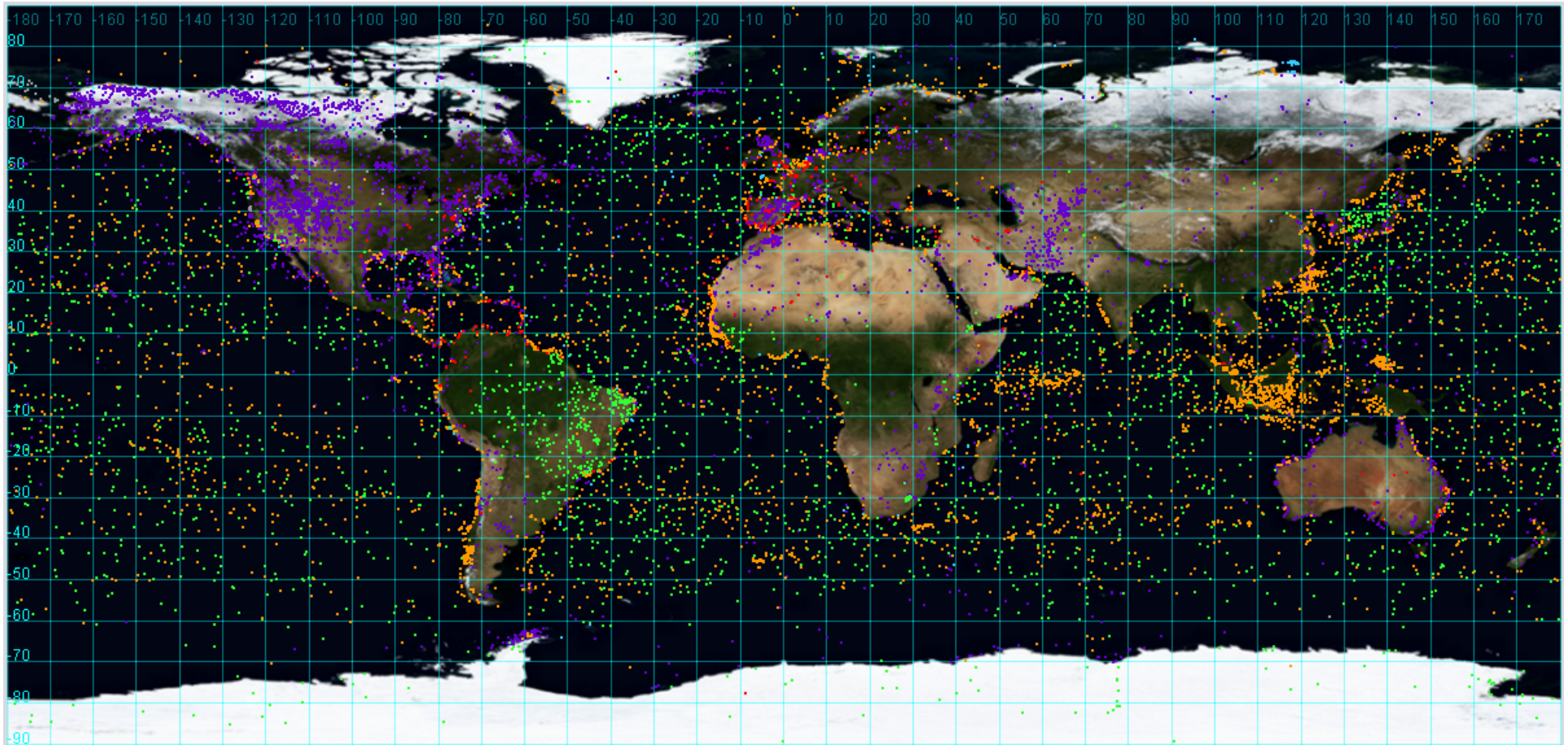
- ✓ 6 operational satellites (2017)
- ✓ Low Earth Orbit (LEO) : 850 km altitude



- ✓ Frequency band: 401.650 MHz +/- 30 KHz
- ✓ Transmission power from 0.1 to 2 Watt
- ✓ Short messages of 30 bytes
- ✓ +/- 30 KB/day according the latitude



33111BSHPTQMBUCPSNTONFOUIWDB128

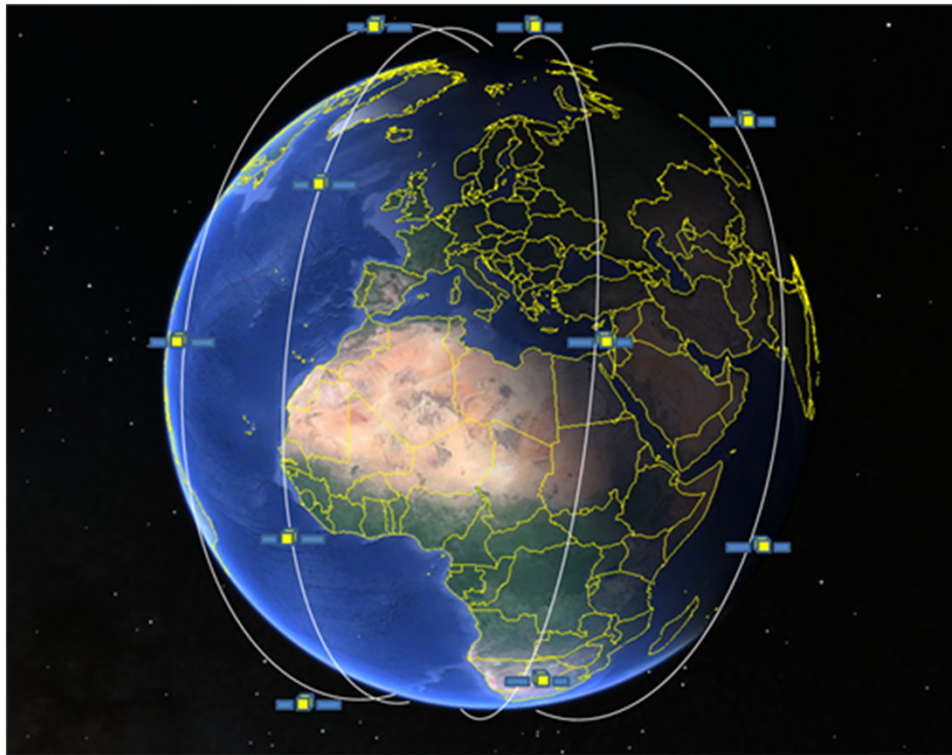


- | | | | | |
|----------|-----------|-------------|--------------|--------------|
| AIRCRAFT | DRIFTER | CONTAINER | ICE_BUOY | BIRD |
| CAR | MOOR_BUOY | FIX_STATION | UNDW_STATION | FISH |
| LAND_VEH | SHIP | PEDESTRIAN | | LAND_ANIMAL |
| RAILCAR | | SUB_FLOAT | | MARIN_ANIMAL |
| | | UNDW_VEH | | |



A new ARGOS constellation is currently being designed by CNES :

- ✓ ANGELS (Argos NEO Generic Economic Light Satellites): prototype of a 1st nanosatellite. Launch: 2019
- ✓ 15 to 20 Nanosatellites deployed in 4 to 5 years



Argos 4 new capabilities:

- Downlink
- High data rates 1200-4800 bps
- More frequency bands (600 kHz)
- Revisit time < 20 mn
- 50.000 platforms/month (22.000 2017)

New price in 2018: 60€/month unlimited





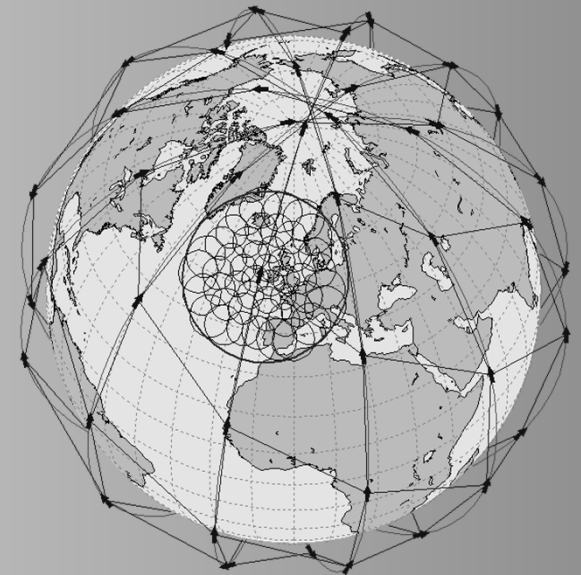
Global mobile satellite communications system, with **voice and data solutions**

66 satellites : world's largest commercial satellite constellation

Satellites are cross linked : data calls are relayed from one satellite to another until the Gateway in Arizona, USA.

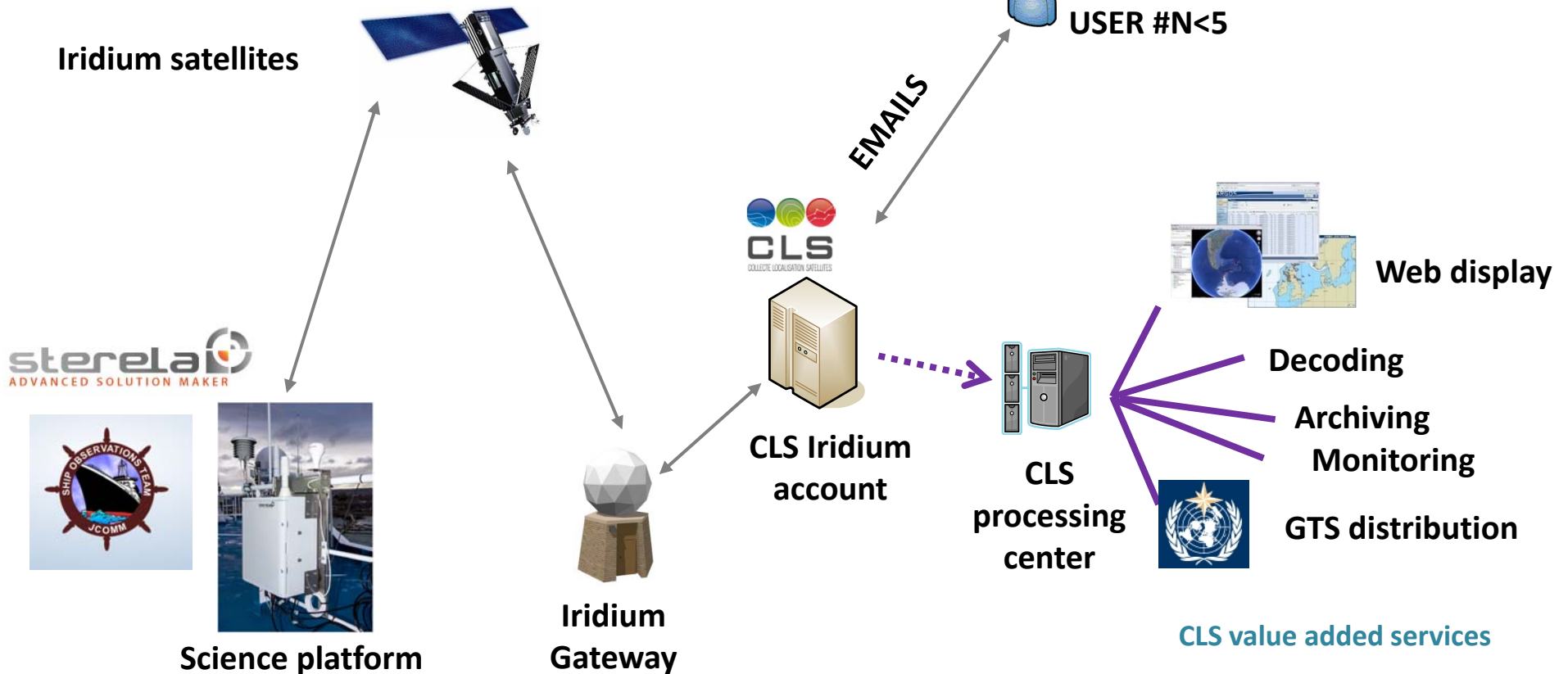
Global + continuous coverage = real time satellite system

- Low Earth Orbit (LEO) = **780 km altitude**
- The Iridium satellite system uses a frequency in **L band** (1616 - 1626.5 MHz)



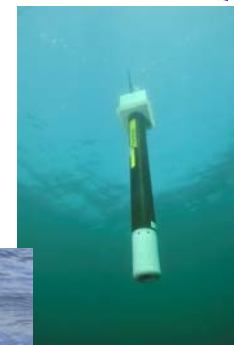
- ✓ Usage < 100 kBytes / month
- ✓ Short messages (up to 2 kBytes for largest modems)
- ✓ SIM-less
- ✓ Latency 5-20 sec
- ✓ Invoicing based on data usage (kBytes/month)

Data are received in binary or text format in attached file (.sbd)

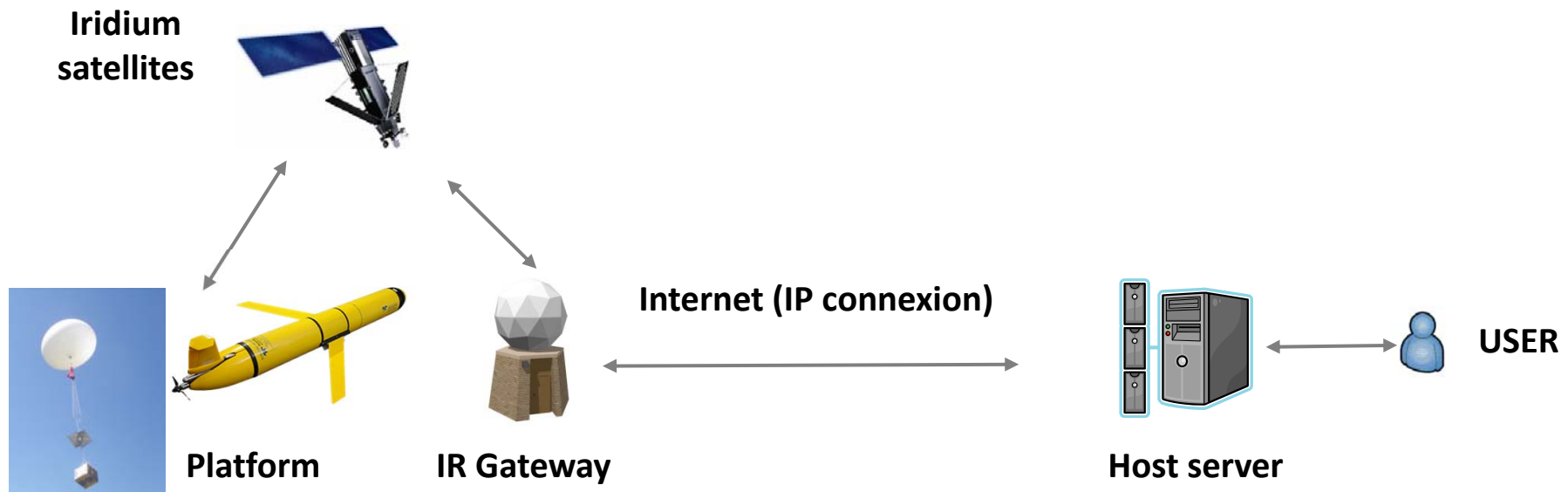


GTS processing & insertion

- GTS processing and distribution for all met. & ocean platforms, including main international programs
- Real-time QC according WMO standards, distribution in BUFR formats
- Cooperation with Météo France and the NOAA for GTS insertion

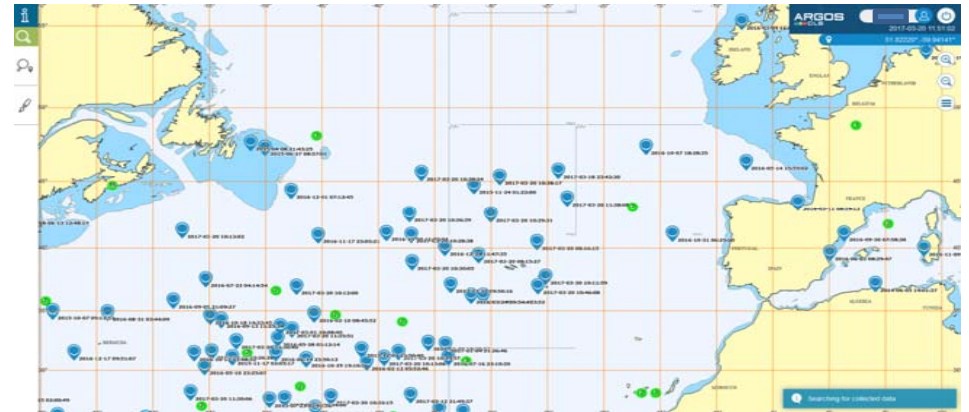


- ✓ Usage > 100 KBytes/month
- ✓ End-to-end IP connection (Internet)
- ✓ All traffic from a group of terminals routed to a unique destination IP
- ✓ Usage: telemetry from floats, gliders, AUVs, weather balloons, drones
- ✓ Invoicing based on call duration (seconds)
- ✓ **SIM based**
- ✓ **Low data rate (2400 bps)**
- ✓ **Real transfer rate : 10-12 KB / min**



A single secured web site to:

- ✓ View all positions on a map
- ✓ Download all available data
- ✓ export Google Earth files
- ✓ Manage users settings
- ✓ Copy other users & create guest accounts
- ✓ Web services (M2M)



ARGOS
 Messages

Search criteria:
 Selection: (by program(s))
 Location class:
 Time frame: For last days and hours
 All received messages
 Must significant or best on satellite pass
 Diagnostic data
 Filter loc. with 1 message

Platform ID No.	Platform	Prog No.	Pass dir. (°)	Msg Date	Stat	Alarm	Platform name	Loc. date	Longitude	Latitude	Altitude	Heavt.	Speed
2416	1053	809	10302015 03:30:31	NP	N	ARGOS 41	10302015 03:30:31	156°37'2.48...	71°19'22.19 N	0.000			
2416	1053	809	10302015 03:40:01	NP	N	ARGOS 41	10302015 03:39:58	156°37'2.48...	71°19'20.19 N	0.000			
2416	1053	809	10302015 03:44:31	NP	N	ARGOS 41	10302015 03:39:58	156°37'2.48...	71°19'20.19 N	0.000			
2416	1053	719	10302015 03:40:01	MA	N	ARGOS 41	10302015 03:43:01	156°36'54.5...	71°19'27.05 N	0.000			
2416	1053	719	10302015 03:47:31	MA	N	ARGOS 41	10302015 03:43:01	156°36'54.5...	71°19'27.05 N	0.000			
2416	1053	719	10302015 03:49:01	MA	N	ARGOS 41	10302015 03:43:01	156°36'54.5...	71°19'27.05 N	0.000			
2416	1053	810	10302015 03:59:31	MA	N	ARGOS 41	10302015 04:00:16	156°37'2.03...	71°19'17.51 N	0.000			
2416	1053	810	10302015 04:07:01	MA	N	ARGOS 41	10302015 04:00:16	156°37'2.03...	71°19'17.51 N	0.000			
2416	1053	800	10302015 04:35:31	MB	N	ARGOS 41	10302015 04:37:46	156°36'40.2...	71°19'18.7 N	0.000			
2416	1053	800	10302015 04:40:01	MB	N	ARGOS 41	10302015 04:37:46	156°36'40.2...	71°19'18.7 N	0.000			

Export
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✓ Online data consumption : for all services (SBD, RUDIC, CSD, etc.)

MYDATA

brobert
 Time Zone : GMT+1.0

CLS APPLICATIONS CLS Group worldwide tracking and environmental monitoring by satellite
 Data Access - Command - Email Settings - Reports - Tools

Data Filter

Time Frame

Since (days / hours) /

From:

To:

Report type: Detailed

Selection

Type	Id	Mobile
	023406496169	
	023406496954	
	8988169234001289529	
	8988169234001289552	

Reports - Detailed calls

Export

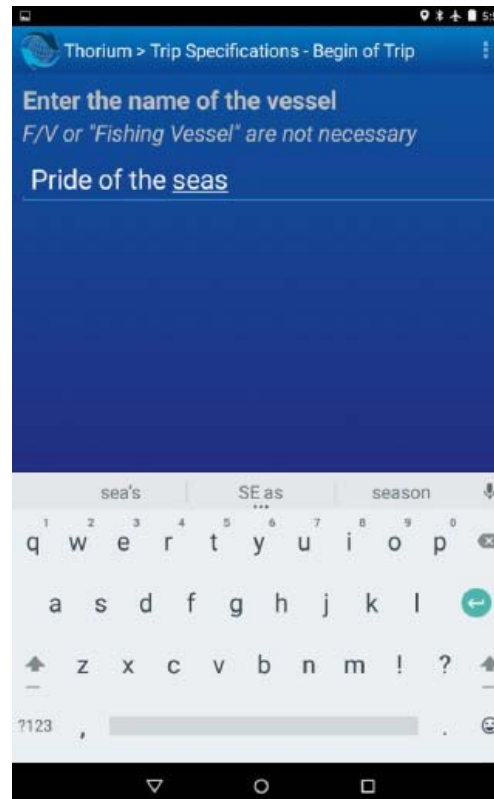
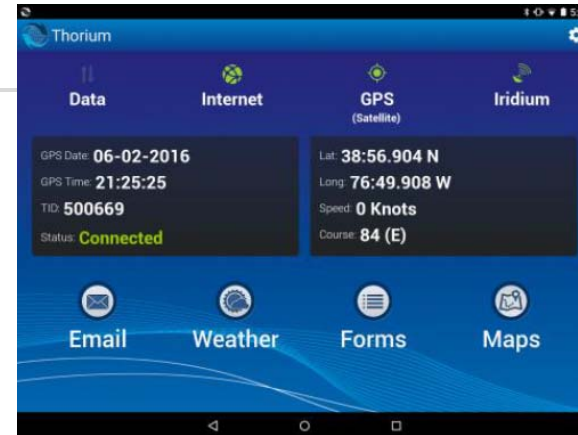
Call date	Id	Bytes	Seconds	Service	Type	Supplementary ...	ICCID Number	IMEI	Called number
2016/07/21 15:37:02	8988169234001...		60	CSD RUDICS	DATA		8988169234001...	901032340128955	0033603757350
2016/07/21 15:35:03	8988169234001...		60	CSD RUDICS	DATA		8988169234001...	901032340128952	0033603757350
2016/11/08 11:28:21	8988169234001...		20	CSD RUDICS	DATA		8988169234001...	901032340128952	0033681357829
2016/11/08 11:25:19	8988169234001...		60	CSD RUDICS	DATA		8988169234001...	901032340128952	0033695174995
2016/08/01 17:22:02	8988169234001...		1690	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/01 15:28:11	8988169234001...		760	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/02 14:13:03	8988169234001...		3500	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/01 17:53:48	8988169234001...		320	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/02 14:12:16	8988169234001...		20	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/02 14:10:09	8988169234001...		80	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/02 10:48:19	8988169234001...		360	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/02 10:46:35	8988169234001...		100	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/02 07:47:01	8988169234001...		840	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/01 16:59:28	8988169234001...		1300	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/01 16:31:02	8988169234001...		600	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/01 16:41:25	8988169234001...		20	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/01 16:08:06	8988169234001...		1350	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/07/21 16:14:35	8988169234001...		860	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/01 16:51:18	8988169234001...		480	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/01 12:51:34	8988169234001...		100	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/01 16:43:44	8988169234001...		120	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/01 16:41:54	8988169234001...		40	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/01 16:46:58	8988169234001...		80	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/01 12:38:47	8988169234001...		140	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/02 13:22:02	8988169234001...		260	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/02 11:23:16	8988169234001...		160	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/02 13:19:01	8988169234001...		160	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/01 15:41:17	8988169234001...		1340	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/02 11:17:54	8988169234001...		220	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/02 11:15:45	8988169234001...		120	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/02 11:04:43	8988169234001...		520	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/02 07:46:32	8988169234001...		20	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/02 13:08:26	8988169234001...		500	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959
2016/08/02 13:47:35	8988169234001...		180	CSD RUDICS	DATA		8988169234001...	901032340128952	00881622402959

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FYB N Q M F P G I B S E X B S F ; U I P S J N Y



- ✓ Ruggedized, water proof
- ✓ Iridium SBD modem with GPS (+ internet + Wifi + 3G/4G)
- ✓ Use case for AWS?
 - ✓ Enter visual observations
 - ✓ Data Automatically collected (NMEA 2000 bus)





Thank you!

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ARGOS



The FUTURE : Iridium Next

- ✓ Project for 81 satellites
- ✓ The new constellation will completely replaces the current constellation
- ✓ More bandwidth and higher speeds :
up to 1.5 Mbps (vs. 2400 bps) = **increase of x 625 !**
- ✓ Service continuity & backwards compatibility
- ✓ Expected operationality : end 2018 / beg. 2019



METEOROLOGICAL



Hydro stations



Ice beacons



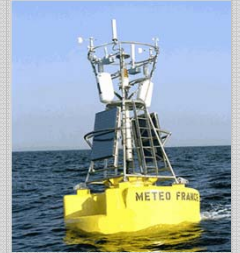
Research aircrafts



drones



Weather balloons



Moored stations

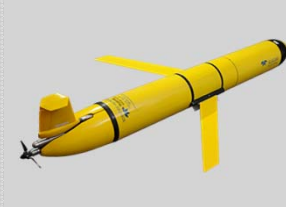
OCEANOGRAPHIC



Drifting buoys



Subsurface beacons



Gliders



Profiling floats (ARGO)



AUV & USV

