
ARGOS-3
THE NEW GENERATION

INTRODUCTION

Argos-3: A new generation of data collection

The first Argos-3 instrument is launched aboard Eumetat's MetOp satellite. Designed to improve the overall performance of the Argos system while ensuring system continuity, Argos-3 introduces:

- Two-way communication capability
- Greater volume of data transmitted during each satellite pass (ten times the capacity of Argos-2)
- More efficient data collection
- Platform remote control and programming

What is Argos?

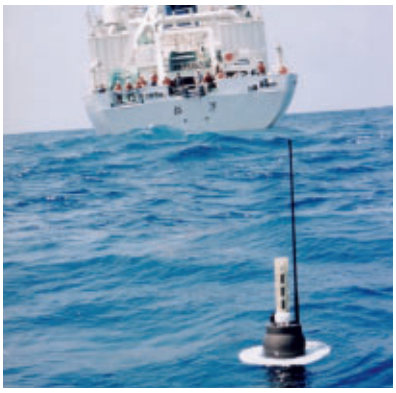
Argos is a unique worldwide location and data collection system dedicated to studying and protecting the environment by satellite.

Since 1978, Argos has responded to the needs of the world's scientific and industrial communities. Argos gives scientists a tool to enhance their understanding of our environment and helps industry comply with environmental protection regulations. Today, over 16,000 Argos transmitters are active each month worldwide.

Applications of the Argos system include:

- Locating buoys, fishing vessels, wildlife and any mobile platform carrying an Argos transmitter
- Collecting environmental data, from ocean temperature profiles to river levels or animal heart rates
- Observing the oceans and measuring currents, temperature and salinity
- Monitoring public health, managing fisheries, enforcing maritime security
- Tracking adventurers, yacht races, hazardous materials

Governments use Argos to protect marine ecosystems and ensure responsible fishing.



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Argos is used to observe the oceans and understand climate change.

Yacht races depend on Argos beacons to track race progress.

© Adrian Aebischer

Scientists use Argos to better monitor and understand wildlife.

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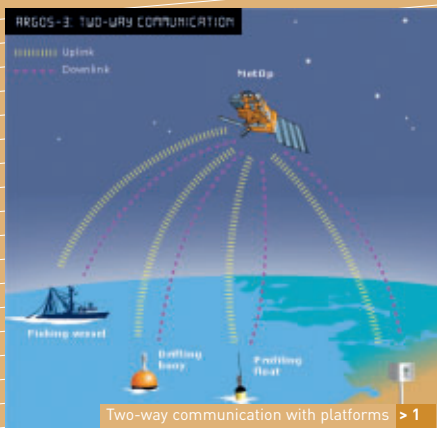
Publication director : Christophe Vassal
Editors in chief: Marianna Childress, Marie-Claire Demmou
Contributing editors: Christian Ortega (CLS), Michel Sarthou (CNES), Bill Woodward (CLS America), Michel Guigue (CLS), Bruno Coulon (CLS), Matthieu Belbeoch (JCOMMOPS)
Design and layout: Ogham (N°7621) - June 2006

NEW FEATURES

What's new with Argos-3?



Two-way communication with platforms > 1

Two-way communication with platforms

Argos-3 features two-way communication via a downlink with a new generation of Argos platforms — the Platform Messaging Transceivers (PMTs). All downlink communication is managed by the Downlink Messaging Management Center (DMMC), operated by CLS for the French Space Agency, CNES, in Toulouse, France.

Greater volume of data transmitted during each satellite pass

Argos-3 features a high speed 4.8 kbit/s uplink, allowing ten times more data to be transferred per satellite pass than before. Combined with the downlink capability, the high data rate link increases the amount of data collected.

More efficient data transfer

The one-way Argos system (Argos-1, Argos-2) requires redundant messages to increase the probability of data being received by satellites error-free. With Argos-3, redundant messages are no longer necessary, since the downlink allows the Argos-3 instrument to send an "Acknowledgement" signal to the PMT once data has been received error-free. Once the PMT receives the "Acknowledgement," it stops sending the message.

Furthermore, all PMTs are equipped with satellite pass forecasting software and are able to calculate the exact time and duration of the next satellite pass, thanks to information communicated by system operators via the downlink. PMTs only transmit when a satellite is in view, reducing transmission time, conserving energy and extending platform lifetime.

Platform remote control and programming

Users have the opportunity to send short messages to their platforms (up to 128 bits by 8 bit increments) via the Downlink Message Management Center (DMMC). Typical applications include switching a transmitter on or off, changing time or date configurations, modifying a sensor sampling rate or any other possible remote command allowed by the platform. The DMMC will relay the command, allowing users to program their platforms remotely.

System continuity

The Argos-3 instrument — as well as all future two-way instruments — is completely compatible with existing platforms.

NEW FEATURES

An example

Argos-3: Improving our understanding of climate change

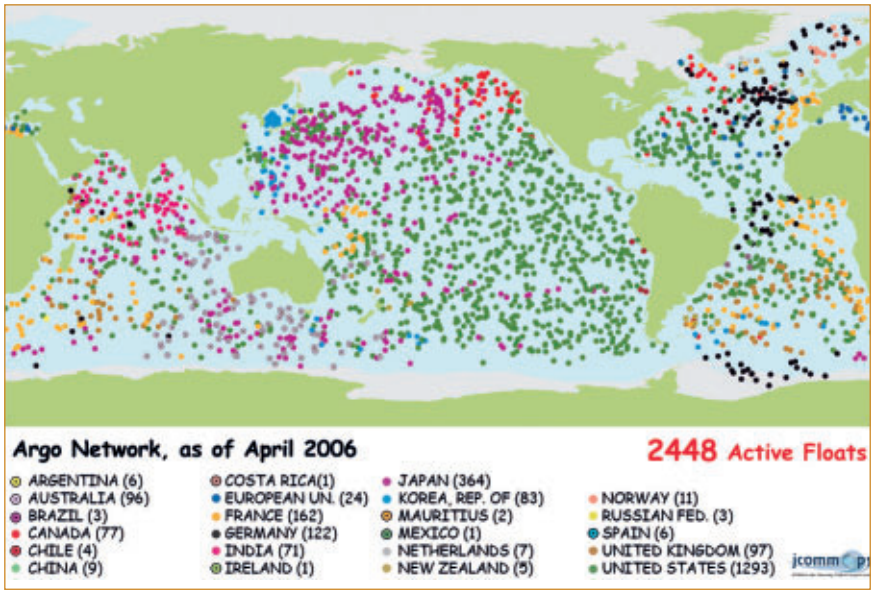
Profiling floats are part of the international Argo program to monitor the ocean and understand climate. Over 2,500 Argo floats are deployed worldwide with a target number of 3,000 in operation by 2007. Designed to collect temperature, salinity and velocity profiles of the upper 2,000 m of the world's ocean, floats are sophisticated scientific devices. Programmed before deployment, they drift at 1,000 m beneath the ocean's surface for up to ten days, then dive to a depth of 2,000 m. During their trip, they record ocean profiles. They return to the surface to transmit recorded data using the Argos satellite system. Data are received on land, checked, processed and relayed to worldwide users. Today floats need between six to ten hours of surface time to transmit all recorded profiles.

Argos-3: Enhancing float performance

Argos-3 features allow floats to transfer recorded data in just a few minutes of surface time. Equipped with an Argos-3 compatible Platform Messaging Transceiver (PMT), profiling floats can :

- Calculate the date and time of satellite pass, surfacing only when a satellite is in view
- Transmit more data per satellite pass
- Receive acknowledgement when a message has been received error-free
- Be programmed remotely thanks to dowlink messaging

This is just one example of how Argos-3 can contribute to a better understanding of ocean and climate interactions, essential for the scientific and international community in the twenty-first century.



ARGOS APPLICATIONS

What does Argos do?

Argos is used by scientists, governments, industry and international organizations. To meet the system use requirements, all programs using Argos have to be related in some way or form to environmental protection, awareness, study, or protecting human life. Applications for which a clear governmental interest prevails are also approved.

Tracking

Argos tracks any mobile platform fitted with an Argos transmitter for scientists, governments and industry. The positions collected can be used for many applications, including monitoring the route of a fishing vessel, following large migrations of birds and other animals, or tracing oceanographic buoys and their route through the ocean based on currents.

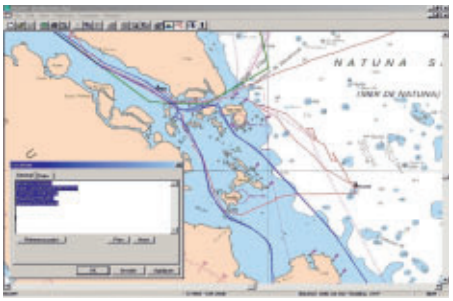
Monitoring

Argos provides environmental monitoring from remote platforms, either fixed or mobile, fitted with an Argos transmitter. Sensors on Argos platforms collect data on atmospheric pressure, sea temperature, animal heart rates and water level, for example.

Users program their transmitters and choose adequate sensors for the type of observations they need. These observations are especially important for creating comprehensive global data sets that are used by people working together around the world on the same or similar topics.

Scientists use Argos to track animals and study their behavior.

Argos is used to monitor freshwater resources.



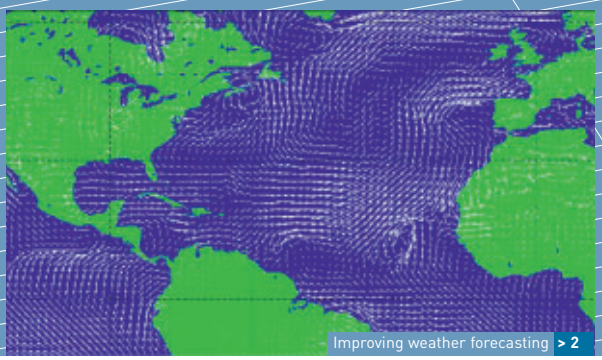
Governments use Argos to track fishing vessels in their Exclusive Economic Zone.

International organizations such as the World Food Program use Argos to monitor school attendance and aid delivery.

ARGOS APPLICATIONS

What does Argos do?

Understanding climate change > 1



Improving weather forecasting > 2

Understanding climate change

Thousands of buoys and floats worldwide are equipped with Argos transmitters, sending regular information via the Argos system to help scientists understand and predict climate change. Nearly 10,000 drifting buoys, deep floats, moored buoys and fixed stations fitted with Argos transmitters measure ocean currents and send millions of measurements including atmospheric pressure, wind speed and direction, sea temperature and more to follow climate evolution. These Argos transmitters are important components of the World Climate Research Program (WCRP) programs, through TOGA, WOCE and now GOOS/GCOS, CLIVAR and GODAE programs and experiments. > 1

Improving ocean and weather information and forecasting

In addition to climate research, oceanographers and meteorologists also use Argos to gather in situ observations for operational oceanography and meteorology. Argos buoys, floats and fixed stations collect data for operational programs such as World Weather Watch (WWW). Over 70 percent of Argos data are exchanged on a global and voluntary basis for insertion into numerical ocean and weather prediction models via Global Telecommunication System (GTS). Furthermore, Argos offers ocean data telemetry services for a broad spectrum of applications including ocean modeling, moored buoy monitoring and more. > 2

Protecting biodiversity

Thousands of animals, including birds, fish and marine and land animals, are fitted with miniaturized Argos transmitters and tracked worldwide. Along with data collected from sensors, position information allows biologists to better understand animals' behaviour: feeding strategies, breeding, adaptation to their environment, etc. Such observations provide the basis for conservation measures aimed at helping many endangered species. In addition to its ecological value, this work allows the international community to learn more about our environment's natural resources and interactions between humanity and wildlife. > 3

Protecting biodiversity >3

ARGOS APPLICATIONS

What does Argos do?

Protecting public well-being > 4

Protecting public health and well-being

In developing countries, the risk of food shortage and epidemic outbreak is high. Yet, there are often no surveillance systems in place to detect early warning signs. Because they are dependable and easy-to-use, Argos terminals are used by many humanitarian aid programs to relay crucial information from remote areas. In Congo, Mozambique, Malawi and Pakistan, Argos terminals are used by the World Food Program (WFP) to monitor school attendance and food supply. Argos terminals can also be used to detect epidemic crises (such as malaria outbreaks), by relaying information about case loads and drug availability from remote areas to international centers. Information relayed by Argos allows local, national or international organizations to better monitor and manage aid programs and prevent humanitarian crises. > 4

Monitoring water ressources > 5

Monitoring water resources

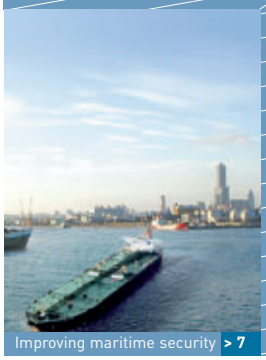
Fresh water resources and supplying enough water for the world's growing population are increasingly important issues. Today, water in rivers, lakes and wetlands only represents 0.3% of the world's freshwater. The loss of freshwater resources has an impact on food availability, water quality, public health, climate and can even lead to environmental disasters. Major national and international programs run by national governments or the World Meteorological Organization (WMO) use Argos to relay key data: water level of a river, snow cover, state of installed equipment or dams. These Argos-based monitoring programs increasingly help the global community to better manage and distribute available water resources. > 5

Managing and protecting marine ecosystems

The future of our fisheries depends to a large extent on our ability to preserve stocks effectively. As a result, most coastal nations now mandate fishing vessels operating within their Exclusive Economic Zone (EEZ) to be equipped with a satellite-based vessel monitoring system (VMS). Argos provides a global solution, ArgoNet, which meets the requirement for monitoring fishing vessels and their catches. Argos has been certified by most of the leading seaboard nations around the world and is already operating on thousands of vessels worldwide.

ARGOS APPLICATIONS

What does Argos do?



Improving maritime security > 7

Tracking yacht races > 8

Improving maritime security

To improve the security of maritime transportation, the International Maritime Organization (IMO) has mandated all passenger and cargo ships over 500 gross tonnage to install a Ship Security Alert System (SSAS). The comprehensive ShipLoc product uses the Argos system to allow ship owners to meet IMO standards and keep constant track of their fleet. If intruders board a ship, ShipLoc lets the crew send an alert signal automatically and discreetly to teams ashore. ShipLoc is part of an exclusive agreement with the International Maritime Bureau's Piracy Reporting Center and is the only product on the market to be a proven anti-piracy tool. > 7

Tracking adventurers and yacht races

Argos has been a reference for over 25 years for adventurers and yacht racers as the unique location and data collection system fully adapted to the most extreme environments on the planet. The trustworthy Argos transmitter sends fully automatic signals at regular intervals, tracking the exact progress of expeditions and reassuring the adventurers' family and base. Similarly, yacht racers count on the robustness of Argos to track their boats as they whip around the globe through treacherous waters. The Argos processing centers are open 365 days/year, 24 hrs/day, monitoring all incoming data and location calculations, and ensuring the most accurate and up-to-date information possible. > 8

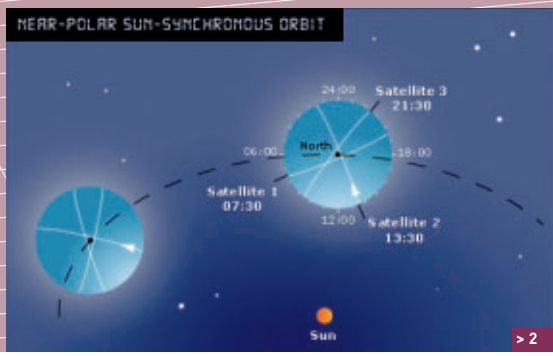
And more...

Argos is also an important part of programs to prevent and manage human and natural disasters. Argos buoys deployed in oil spills help scientists and governments to lead targeted clean-up efforts, by tracking the spill's movement. Furthermore, Argos platforms are part of early warning systems for volcanic activity in Japan and Indonesia, alerting observatories as soon as seismic activity is detected. When it comes to managing energy resources, Argos is present as well, helping electrical companies in France and Switzerland predict the amount of hydraulic energy they will produce each year based on snow melt rates and water levels high in the mountains. > 9

Monitoring oil spills > 9

SYSTEM

How does Argos two-way work?



> 2

Transmitters send signals to satellites

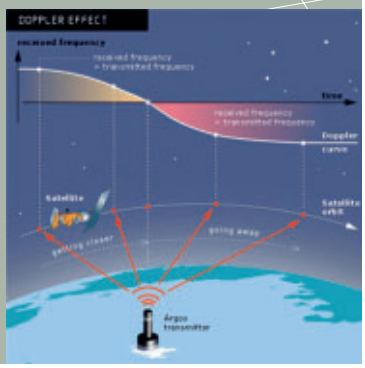
Transmitters are programmed to send messages to satellites at periodic intervals. Each message lasts 360 to 920 milliseconds. With Argos-3, transmitters can be programmed to transmit only when a satellite is in view.

The transmitter message includes:
A preliminary synchronization sequence, statement of message length, transmitter ID number, sensor data or user data (32 to 256 bits for Argos-2; 512 to 4608 bits for Argos-3) and a checksum.

Argos-3 signal characteristics

TRANSMIT FREQUENCY:
401.650 MHz +- 30 kHz plus a high data rate bandwidth.

VARIABLE REPETITION PERIOD:
assigned according to application.
Since the Argos location calculation is based on measurements of the Doppler effect on the signal, the frequency allocated to each transmitter within this range must remain stable.



Polar-orbiting satellites collect data

Argos instruments fly on board the National Oceanic and Atmospheric Administration (NOAA) Polar-Orbiting Environmental Satellites (POES). These polar-orbiting satellites fly on a sun-synchronous orbit, at 850 km altitude, picking up signals and storing them on-board, or relaying them instantaneously (in real-time) back to Earth. At least two satellites are operational at any time.

Argos-3 instruments will fly on board the three MetOp satellites (planned for 2006, 2010 and 2014) of the European Organization for the Exploitation of Meteorological Satellites (Eumetsat), NOAA N' (planned for 2009), and a fifth instrument will fly aboard a satellite that is yet to be determined.

Both MetOp and NOAA satellites see the North and South Poles on each orbital revolution. The orbital plane rotates around the polar axis at the same rate as the Earth around the Sun, or one complete revolution per year. Each orbital revolution transects the equatorial plane at fixed local solar times. Therefore, each satellite passes within visibility of any given transmitter at almost the same local time each day. The time taken to complete a revolution around the Earth is approximately 100 minutes. > 2

How does Argos two-way work?

> 3


Upgrading the ground segment > 4

At any given time, each satellite simultaneously "sees" all transmitters within an approximate 5,000 kilometer diameter "footprint", or visibility circle. The visibility circle sweeps around the Earth as the satellite proceeds in orbit. When a satellite equipped with an Argos instrument "sees" a transmitter, it receives the messages that the transmitter is sending. > 3

Satellites send acknowledgement signals to transmitters

Thanks to new Argos-3 two-way communication, the satellite sends a signal back to the platform when a message has been correctly received. Furthermore, the satellite can send messages from users to any Platform Messaging Terminal (PMT).

Ground antennas relay data from satellites to processing centers

Over 40 antennas located at all points of the globe collect data from satellites in real-time and relay the data to the processing centers. This L-band antenna network, a key element of the Argos service, is disseminated all over the globe to obtain worldwide coverage. This network is currently being updated to match MetOp's new downlink technology. Twelve of the network antennas belong to CLS, others belong to environmental partners, such as meteorological or space agencies. Most of the partners have started upgrading for the downlink. Four of CLS's antennas will be ready before the end of 2006: Indonesia (2), Peru, Japan. > 4

Processing centers collect all incoming data, process them and distribute them to users

There are two global Argos processing centers, one located just outside of Toulouse in Southwestern France, and the other near Washington, DC, USA. Once the data arrive at a processing center, locations are automatically calculated, all data are processed, and information is made available to users. > 5

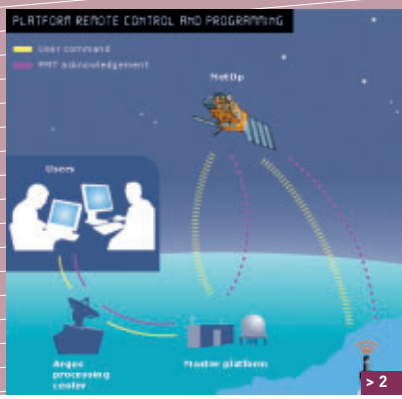
Argos users around the world receive data

Argos users around the world receive data directly in their office or on-site depending on what they choose (email, fax, web, cd-rom, or directly on mapping software). Once the data are received, they may be shared with the scientific community, governments or institutions that use the data as important management tools.

> 5

SYSTEM

How does Argos two-way work?



> 2

Argos-3 downlink messaging

Argos-3 makes two-way communication with all platforms equipped with a Platform Messaging Transceiver (PMT) possible. In addition to satellite acknowledgement of messages received error-free, the downlink makes it possible for users to program their platforms remotely.

Users send messages to the Downlink Message Management Center (DMMC)

Argos users send messages via a web interface. Their commands are processed by the DMMC, operated by CLS and the CNES in Southwestern France.

DMMC relays messages to master platforms

The DMMC relays messages to master platforms, located in Toulouse, Fairbanks and Svalbard. A master platform is a powerful PMT, capable of communicating with the Argos-3 instruments aboard satellites. > 1


Master platforms in Svalbard > 1

Master platforms upload messages to satellite

Master platforms automatically upload messages on the next satellite pass.

Satellites download messages to Platform Messaging Transceivers (PMTs)

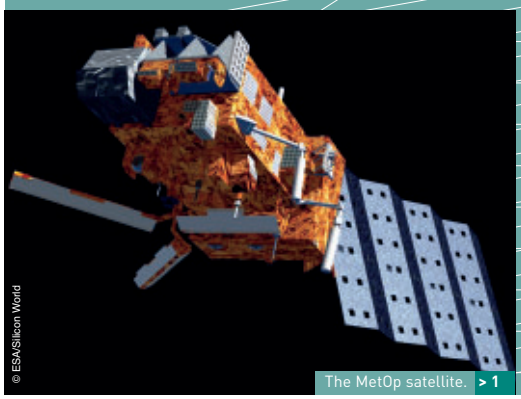
When the satellite recognizes its target platform, (platform to which the message is addressed, identified by its ID number), it sends the message, via the downlink, to the PMT. The satellite also sends system information via the downlink on the pass (system information includes time and orbit information, allowing the PMT to calculate the next satellite pass).

PMT receives message

Upon receiving the message, the PMT sends an acknowledgement that it has received the message error free; then processes the command contained in it. It uses system information to calculate the next satellite pass, then waits for the next satellite pass in energy-saving mode. > 2

Argos-3

Instrument



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The MetOp satellite. > 1

New digital technology

The Argos-3 instrument aboard the MetOp satellite was built by Thales S.A. and Alcatel/Alénia Space under the supervision of the French Space Agency (CNES).

The fully digital instrument enhances system performance via a unique downlink and high data rate uplink, while ensuring complete compatibility with existing platforms. Thanks to digital processing, the new instrument is lighter and more compact than its analog predecessors and can be programmed from the ground. Composed of a Receiver Processor Unit and a Transmitter Unit, the Argos-3 instrument is capable of receiving messages from over 1,000 Argos beacons transmitting simultaneously within the satellite's field of view. > 1

Argos-3 satellites

2006 — MetOp A

2009 — NOAA N'

2010 — MetOp B

2014 — MetOp C

Timeline

The Argos-3 project began in 1997. Delivered in 2002, the instrument received new versions of the management and processing software in 2004 and was tested extensively, at satellite level by Astrium, and in conjunction with the operational ground segment by Eumetsat. All integration activities and associated tests with the Argos-3 instrument are managed by the CNES Argos team.

Five Argos-3 flight models exist and will be launched aboard MetOp A,B,C, NOAA N' and a fifth satellite that is yet to be confirmed.

Evolution of Argos payload capabilities

Center Frequency: 401.65 MHz	Argos-1	Argos-2	Argos-3
Frequency range	24 kHz	80 kHz	110 kHz
Processing units	4	8	9 low data rate + 3 high data rate
Uplink data rate	400 bps	400 bps	400 bps (low) + 4800 bps (high)
Downlink	NO	NO	YES
Downlink data rate	—	—	400 bps (nominal) or 200 bps
Satellites	< NOAA K	NOAA K,L,M,N	MetOp A, B, C, NOAA N', NPOESS C2
Data transmitted per satellite pass	500 bit	500 bit	Up to 30 kbit

Argos-3

Instrument

Receiver Processor Unit (RPU):

The RPU processes received uplink signals @ 401.6 MHz, measures the incoming frequency, time-tags the message, creates and buffers mission telemetry, manages the downlink and acts as interface between the receiver, the TXU and the satellite. Featuring fully digital processing, the RPU stores messages and either relays them in real-time to the nearest regional antenna (maintained by CLS or national meteorological services) or in deferred time to a global center (maintained by NOAA, Eumetsat). A backup RPU is included as part of the device.

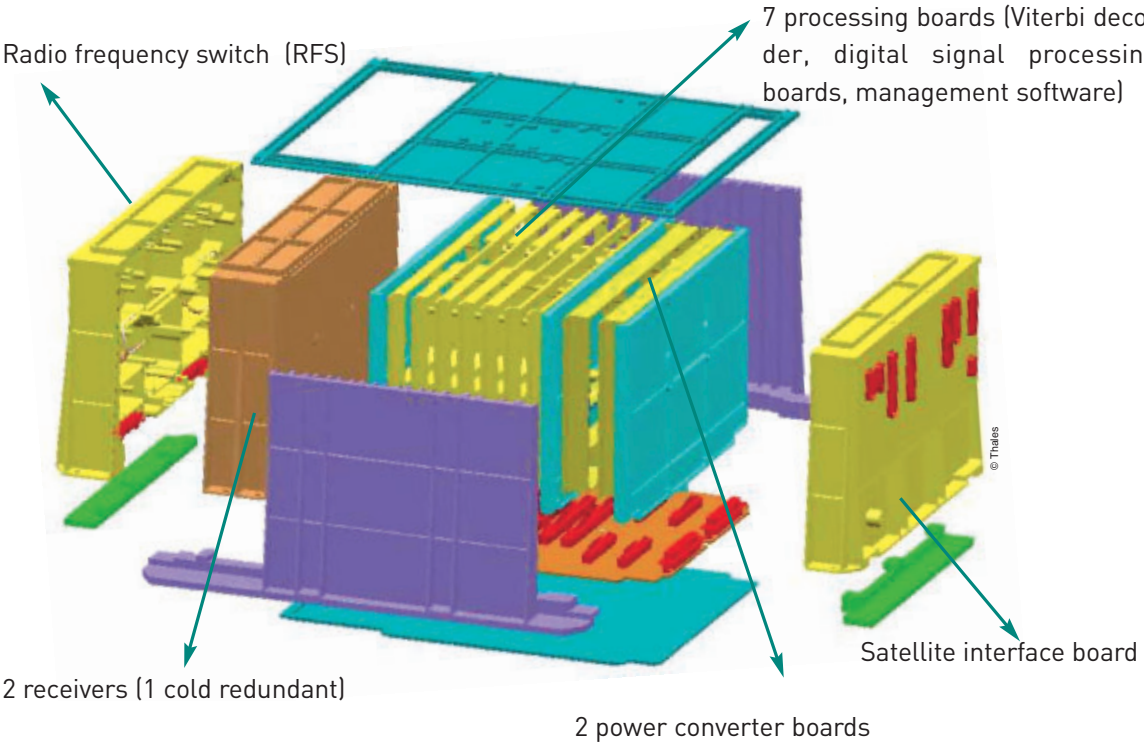
Transmitter Unit (TXU):

The TXU sends signals to platforms equipped with transceivers (PMTs) @ 466 MHz, including error-free message acknowledgement signals. The downlink will also allow users to send defined PMT instructions (TXU can selectively address one or more PMTs) and system operators to send global messages/commands such as satellite ephemeris or broadcasting time. Downlink software was specially designed for Argos-3. A backup TXU is included.

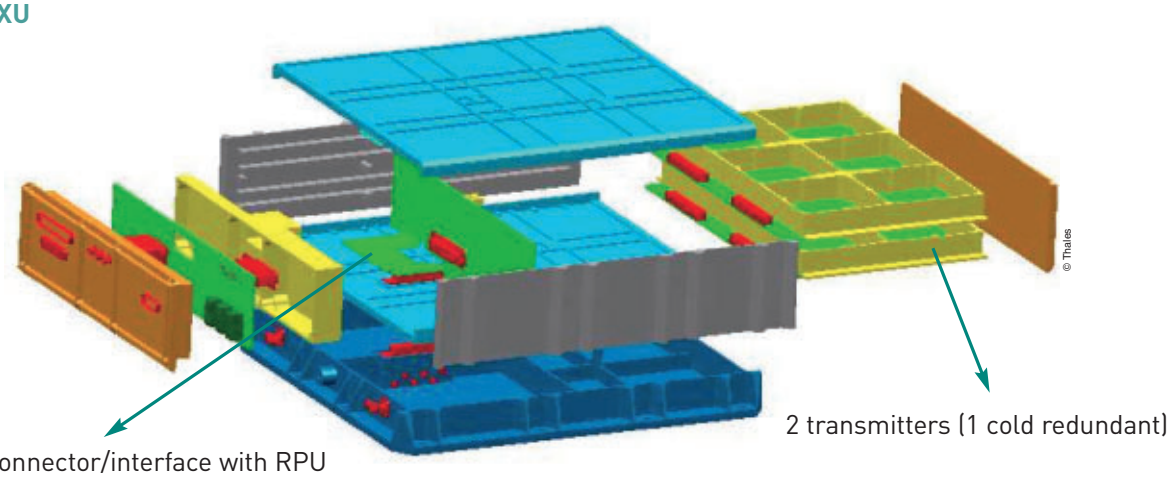
	Weight	Height	Width	Length
Receiver (RPU)	16 kg	365 mm	280 mm	365 mm

	Weight	Height	Width	Length
Transmitter (TXU)	8 kg	100 mm	280 mm	310 mm

RPU


Radio frequency switch (RFS)
7 processing boards (Viterbi decoder, digital signal processing boards, management software)
2 receivers (1 cold redundant)
2 power converter boards
Satellite interface board
© Thales

TXU


Connector/interface with RPU
2 transmitters (1 cold redundant)
© Thales

ARGOS-3
Platform

New, light-weight PMTs designed by ELTA.
Height: 2.5cm - Width: 4.2cm - Length: 10cm > 2

PMT designed by Kenwood. Height: 2.5cm
Width: 6cm - Length: 8cm (without antenna connetor) > 1

Argos-3: The Platform Messaging Transceiver (PMT)

Argos-3 and all future two-way communication satellite instruments are completely compatible with existing transmitters. However, to benefit from the downlink and high data rate link unique to Argos-3, user platforms must be equipped with a new generation of Argos-3 compatible terminals called Platform Messaging Transceiver (PMT). The innovative and new PMT is capable of sending and receiving messages to/from satellite, as well as processing commands. Users equipped with a PMT and subscribed to the downlink service will fully benefit from the new communication capabilities made possible with Argos-3.

First PMTs

The first PMT prototypes were developed for the ADEOS-II satellite, a Japanese satellite (JAXA) launched in 2002. Since then, smaller prototypes have been developed, capable of transmitting larger volumes of data. Furthermore, PMTs are able to receive and process system information and remote commands from users.

First generation PMTs (1G-PMT) will be available for the first pilot projects, beginning in 2007, several months after MetOp is launched. Along with the pilot projects planned by PMT integrators, CLS has planned pilot operations in the following fields: fishing, floats, weather balloons, Doris platforms, etc...

Smaller, lighter, higher performance

Two manufacturers have been selected to develop and manufacture industrial PMTs. The second generation PMTs (2G-PMT) will be smaller and cheaper, making them a viable investment for government, scientists and industry. > 1 / 2

Intelligent platforms

PMTS COMMUNICATE INTELLIGENTLY WITH THE ARGOS-3 INSTRUMENT

- Once the PMT receives acknowledgement that a message has been received error-free, it stops sending this message.
- When the PMT receives a user command, it sends acknowledgement to the satellite, then processes the command.
- When the PMT receives system information, it calculates the orbit of the different satellites, thus sending messages efficiently and intelligently, only when a satellite is in sight.
- These are some examples, but many other improvements will be revealed once the first pilot projects have yielded results...

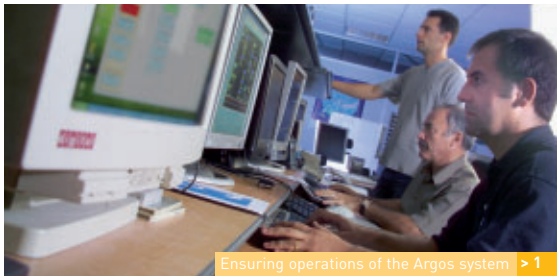
Origins of Argos

The Argos system was created in 1978 by the French Space Agency (CNES), the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA), originally as a scientific tool and way of collecting and relaying meteorological and oceanographic data around the world.

In 1986, CNES created a subsidiary, CLS, to operate, maintain and commercialize the Argos system. North American CLS and Service Argos, Inc., were created at the same time to serve the North American user community, merging to become CLS America in 2006.

International cooperation

Currently, several other international space agencies also actively participate in the Argos system including Eumetsat (European Organization of the Exploitation of Meterological Satellites) and the Brazilian National Institute for Space Research (INPE). Contacts have been made with the Indian Space Research Organization (ISRO) in order to embark an Argos instrument on an Indian platform in the near future.



© Christian Rivière

Ensuring operations of the Argos system > 1

Oceanography and marine meteorology

As a result, the Argos system is a working system exploited by a number of international programs. It is the main transmission channel and processing chain for data gathered by the following major international ocean observation programs:

- Data Buoy Cooperation Panel (DBCP), network of drifters and moored buoys
- Ship of Opportunity Program (SOOP), Expendable Bathythermograph (XBT) lines
- Argo profiling float project

Implemented under the auspices of the World Meteorological Organization and International Ocean Commission (IOC) of UNESCO, these programs collect invaluable data which are assimilated into ocean circulation models and used for climate and weather forecasting, marine safety, maritime transport, fishery management, offshore industry and defense. They are coordinated by the Joint Commission for Oceanography and Marine Meteorology Observing Platform Support Center (JCOMMOPS).

A practical and historical relationship links JCOMMOPS to Argos. Aside from providing guidance and support to programs that use Argos's worldwide coverage to relay ocean observations, JCOMMOPS operates out of CLS's corporate headquarters in Toulouse, in close proximity to where collected data are processed and disseminated. > 1

PERSPECTIVES

Where we're going

Argos and GEOSS

In future, Argos will be an important part of GEOSS, the Global Earth Observation System of Systems.

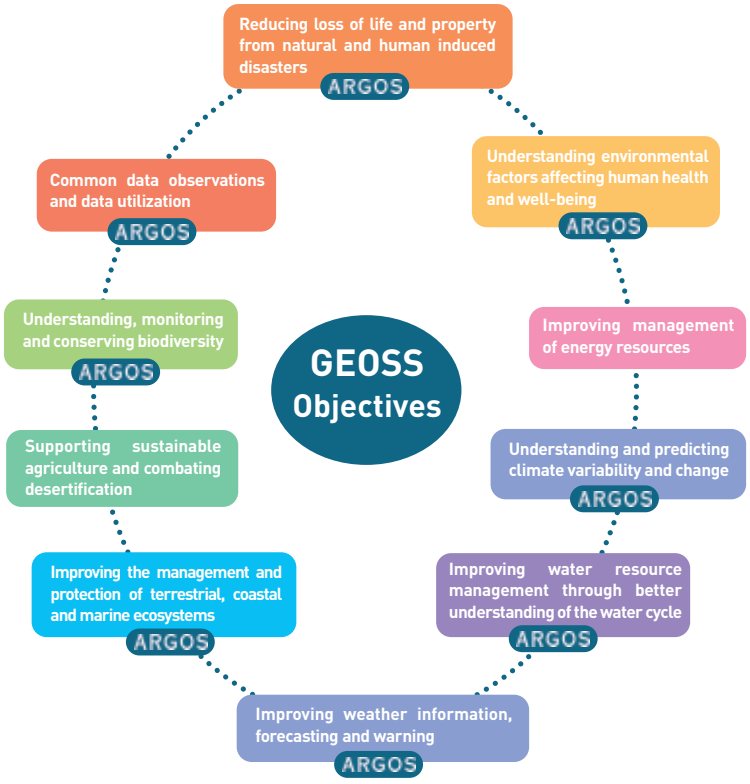
GEOSS is an international initiative approved by over 60 governments and the European Commission and designed to improve our understanding of the Earth system. Its goal is to streamline and optimize existing systems, from preliminary observation to data processing and dissemination. GEOSS aspires to involve all countries of the world, and to cover in situ, airborne and space-based observations.

Argos: a worldwide system

Argos is an existing worldwide system dedicated to Earth observation and scientific and environmental research. With over 30 years of experience in satellite-based location and environmental data collection services, the Argos system has an excellent track record for data collection, processing and dissemination to the scientific and international community. It offers a robust and proven tool for understanding environmental factors affecting human health and well-being, assessing and predicting climate variability and change, improving water cycle management, managing and protecting marine ecosystems, and more.... In many ways, the Argos system fits perfectly into the framework defined by the emerging Global Earth Observation System of Systems.

Thanks to the cooperation of national and international space agencies such as Eumetsat, NOAA and CNES, Argos has offered reliable service to its users for over 30 years. With the continuing cooperation of national and international space agencies, Argos-3, the third generation of Argos technology, will guarantee system continuity and offer an even better, faster service for users in science, industry and governments around the world.

Where Argos and GEOSS intersect



ABOUT CLS

Who operates Argos?

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CLS corporate headquarters in France > 1

CLS: Worldwide Argos operator

CLS, a subsidiary of CNES (French Space Agency), IFREMER (French Research Institute for exploration of the sea) and several French financial institutions, operates the Argos system for users around the world. CLS offers satellite-based environmental data collection and location services to a broad range of professionals including: government, industry and the scientific community.

Since its creation in 1986, CLS has grown to become an international company with 270 employees: 210 at company headquarters in Southwestern France, near Toulouse, and 60 at its offices and subsidiaries around the world. > 1

Data processing and receiving

At CLS, more than 40 specialists operate a full set of systems, keeping ground segments, networks, data processing and storage servers, as well as databases up and running.
CLS processing centers ensure the continuous operations of 40 orbiting instruments. Services provided by CLS include:

- ensuring compliance with operating requirements
- corrections and modifications, tests, checks, commissioning, and qualification
- performance assessment and monitoring
- quality control and client support

CLS is constantly coming up with innovative, new operations concepts thanks to its qualified and adaptable staff and resources.

Data analysis

Operational oceanography today relies on in-situ and satellite observation networks to supply data for customers' numerical prediction models. CLS is actively involved in this process, collecting observations at sea through the Argos system; observing the oceans from space to derive a comprehensive range of satellite altimetry products; measuring sea-surface temperature and ocean color; and developing analysis and prediction systems through its contribution to the MERCATOR project and its European extension MERSEA (Marine Environment and Security for the European Area). CLS continues to work to develop the satellite oceanography field, serving a growing portfolio of institutional and private clients.

Engineering

Faced with the growing complexity of satellite-based systems, offering integrated solutions has become the rule: antennas, monitoring centers, multi-system data centers, regional access and control of data, applications, specially designed platforms, software... CLS designs, supplies and implements systems to meet its clients' requirements around the world.

CLS's team maintains operational sites remotely in close partnership with their clients.

CLS
COLLECTE LOCALISATION SATELLITES

CONTACT US
worldwide

CNES: Centre Spatial de Toulouse
18, avenue Edouard belin
31401 Toulouse Cedex 09
Tel. + 33 (0)5 61 27 31 31
Fax + 33 (0)5 61 28 19 95
www.cnes.fr

Argos-3 contacts :
- **Michel Sarthou,** Project Manager
  e-mail: michel.sarthou@cnes.fr
- **Mario HUCTEAU,** Program Manager
  e-mail: mario.hucteau@cnes.fr

Headquarters:
CLS
8-10, rue Hermès
Parc Technologique du Canal
31520 Ramonville Saint-Agne, France
Tel. + 33 (0) 5 61 39 47 20
Fax + 33 (0) 5 61 39 47 97
e-mail: info-argos@cls.fr
www.cls.fr

Argos-3 contacts:
- **Christian Ortega,** Head Argos Science Team
  e-mail: cortega@cls.fr
- **Michel Guigue,** Engineering Manager
  e-mail: michel.guigue@cls.fr

North America:
CLS America, Inc.
1441 Mc Cormick Drive, Suite 1050
Largo, MD 20774, USA
Tel. + 1 301 925 4411
Fax + 1 301 925 8995
e-mail: userservices@clsamerica.com
www.clsamerica.com

Argos-3 contact:
- **Bill Woodward**
  e-mail: bwoodward@clsamerica.com

Australia and South Pacific:
SIT, Satellite Information Technology PTY-Ltd
Suite 706, 1 Queens Road
Melbourne, VIC 3004, Australia
Tel. + 61 (0) 3 9863 9650
Fax + 61 (0) 3 9863 9675
e-mail: guan@clsargos.com.au

Japan: Cubic-I-Ltd
Bluebell Building 7F
2-15-9 Nishi Gotanda
Shinagawa-ku
Tokyo 141-0031, Japan
Tel. + 81 (0)3 3779 5506
Fax + 81 (0)3 3779 5783
e-mail: argos@cubic-i.co.jp

Peru: CLS Perú
Jr. Trinidad Moran 639
Lince, Lima, Peru
Tel. + 51 1 440 2717
Fax + 51 1 421 2433
e-mail: gsirech@clsperu.com.pe

Chile: Cunlogan S.A.
Almirante Señoret 70 of 74
Valparaiso, Chile
Tel. + 56 32 25 28 43
Fax + 56 32 25 72 94
e-mail: cbull@cunlogan.cl

Southeast Asia:
PT CLS Argos Indonesia
Adhi Graha, It 17, Suite 1701
JI Jend Gatot Subroto, Kav 56
Kuningan Timur, Setiabudi
Jakarta Selatan, 12950, Indonesia
Tel: + 62 215 264 266
Fax: + 62 215 264 265
e-mail: sales@clsargos.co.id

Korea: KL Trading
Room No. 328, Obelisk Bldg. 492-4
Dapshimni-5 Dong, Dongdaemun-Gu
Seoul, Korea
Tel. + 82 2 2215 7134/5
Fax + 82 2 2215 7136
e-mail: klsckim@kornet.net

Russia: ES-PAS
15-73 Léningradskoe Chaussée
125171 Moscow, Russia
Tel: + 7 495 150 0332
Fax: + 7 495 150 0332
e-mail: a.salman@es-pas.com