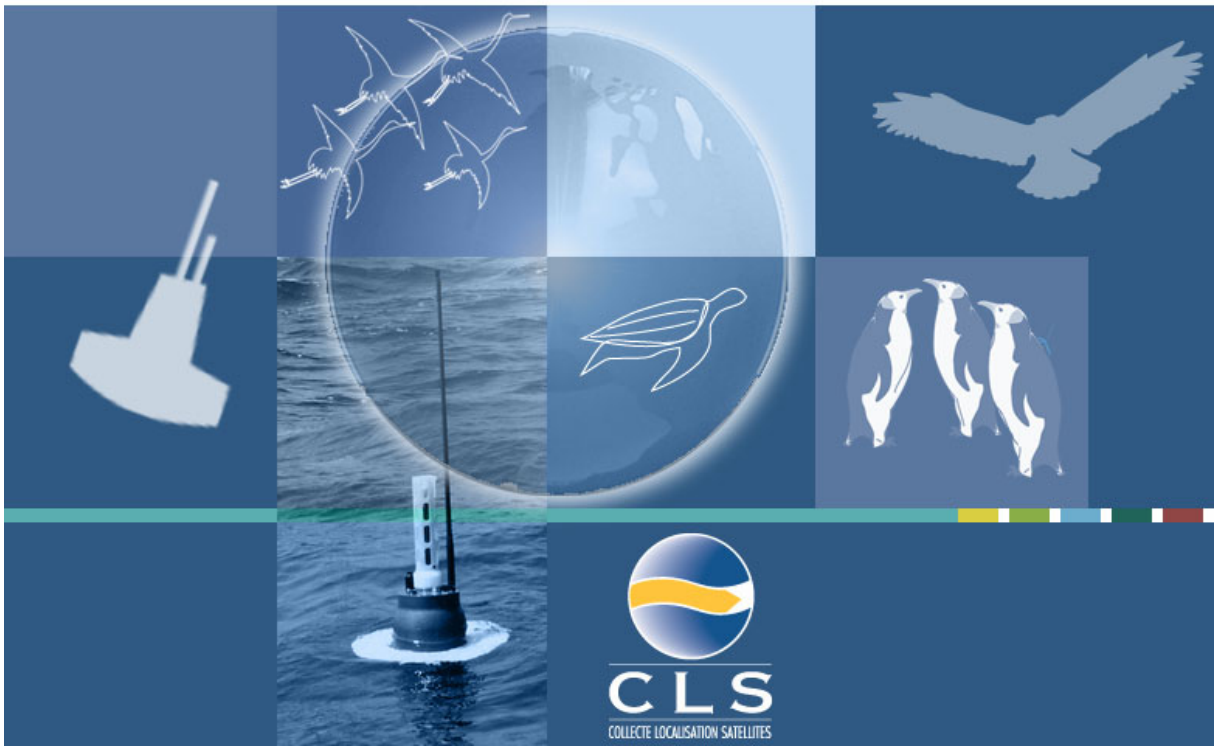
Argos User's Manual

Worldwide tracking and environmental monitoring by satellite



CLS
COLLECTE LOCALISATION SATELLITES

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1. Introduction

Argos is a global satellite-based location and data collection system dedicated to studying and protecting our planet's environment.

It allows any mobile object equipped with a compatible transmitter to be located across the world. It also offers the possibility of collecting data from measurement sensors connected to this transmitter. The rules of the Argos system restrict its use to programs for studying and protecting the environment and protecting human life or programs of declared government interest.

The Argos system results from Franco-American cooperation involving:

- CNES (*French Space Agency*),
- NOAA (National Oceanic and Atmospheric Administration), with support from NASA (National Aeronautics and Space Administration),
- CLS (*Collecte Localisation Satellites*), operator of the system.

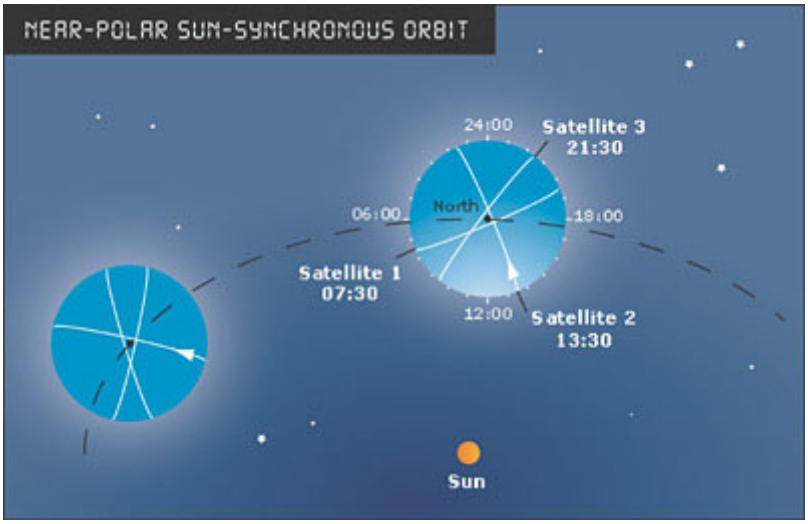
In 2006, Eumetsat (European meteorological organization) joined the Operations Committee.

2. System components

2.1 Overview

1/ Argos platforms automatically transmit messages that are received by satellites in low polar orbit.

2/ The satellites then transfer the messages to ground receiving stations.



3/ The ground stations automatically transfer the messages to Argos Processing Centers. The Processing Centers calculate the position of the transmitters and process the data measured by the sensors.

4/ Finally, the Processing Centers automatically deliver the results to the users. Several methods of data access are available:

- secure connection to the **ArgosWeb** (www.argos-system.org) website,
- **ArgosDirect automatic distribution** (e-mail, ftp, fax or data transmission network, or CD-ROM),
- connection to **ArgosServer** transmission network (Telnet),
- custom types of dispatch (archiving data for up to twelve months, during which they can be sent on request).

2.2 Platforms

A platform refers to **any equipment integrating an Argos-certified transmitter**. Each platform is characterized by an identification number specific to its transmission electronics. A platform transmits periodic messages characterized by the following parameters:

- **transmission frequency** (401.650 MHz ± 30 kHz), which must be stable as the location is computed on the basis of Doppler effect measurement (see **Chapter 3.2**),
- **repetition period**, which is the interval of time between two consecutive message dispatches, varying between 90 and 200 seconds according to the use of the platform,
- **platform identification number**,
- **all collected data**.

The transmission duration of each message is less than one second.

2.3 Satellites

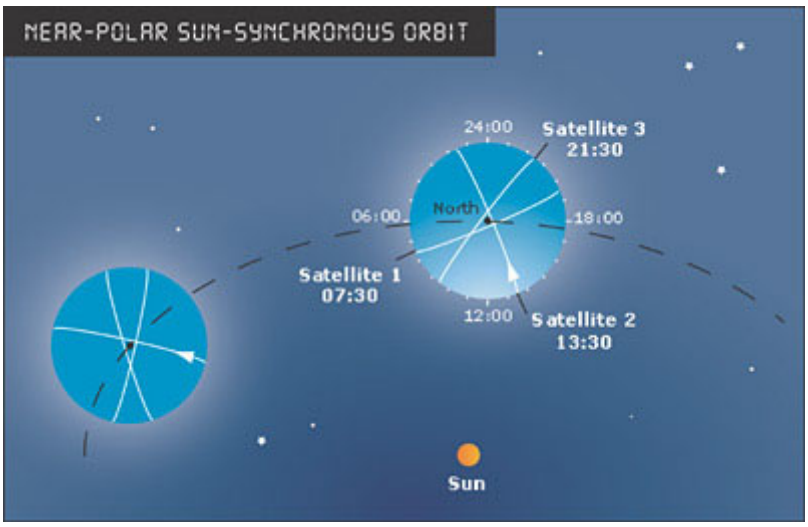
The Argos instrument flies aboard **POES (Polar Orbiting Environmental Satellites) satellites** of the National Oceanic and Atmospheric Administration (NOAA) and MetOp, of the European Organization for the Exploitation of Meteorological Satellites (Eumetsat). The first **MetOp** satellite was launched on 19 October 2006.

The next instruments will be carried on board the two MetOp satellites (planned for 2010 and 2014) and on NOAA N' (planned for 2009). Cooperation projects with other space agencies are currently being studied.

Argos messages are received by the satellite then simultaneously:

1/ stored on the onboard recorder and retransmitted to the ground each time the satellite passes over one of the three main receiving stations: Wallops Island (Virginia, United States), Fairbanks (Alaska, United States), and Svalbard (Norway), or
2/ retransmitted to the ground to regional reception stations in the satellites's field of view.

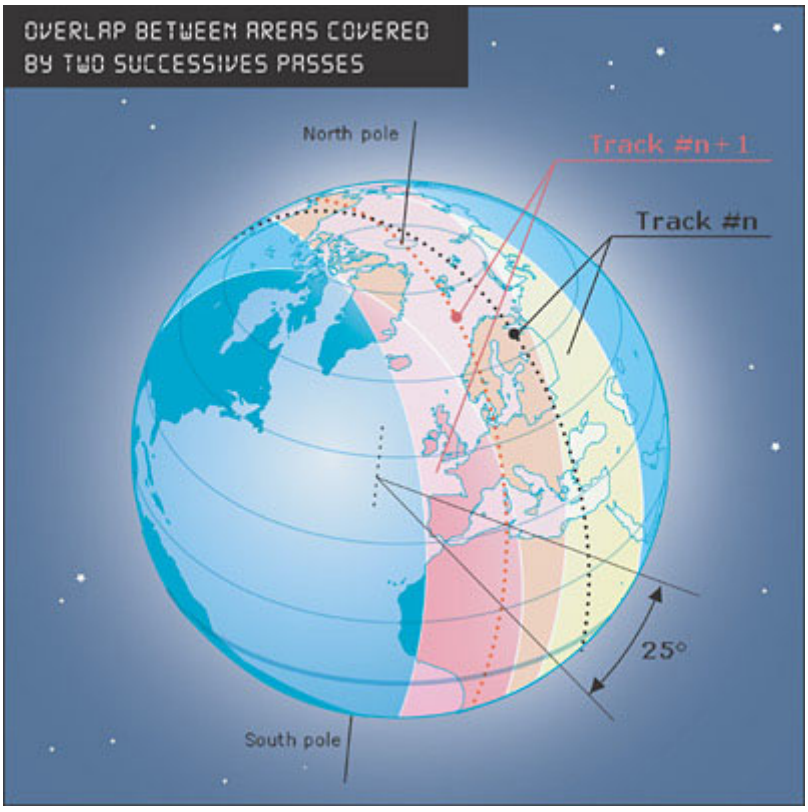
The satellites are on a **polar orbit at an altitude of 850 km**: the satellites see the North and South Poles on each orbital revolution. The orbit planes revolve around the polar axis at the same speed as the Earth around the Sun, i.e. one revolution a year. Each orbital revolution transects the equatorial 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.



At any given time, each satellite simultaneously "sees" all transmitters within an **approximate 5000 kilometer diameter "footprint", or visibility circle**. As the satellite proceeds in orbit, the visibility circle sweeps a 5000 kilometer swath around the Earth, covering both poles.

Due to the Earth's rotation, the swath shifts 25° west (2800 km at the Equator) around the polar axis at each revolution. This results in overlap between successive swaths. Since overlap increases with latitude, the number of daily passes over a transmitter also increases with latitude.

At the poles, **the satellites see each transmitter on every pass, approximately 14 times per day per satellite**.



The **period during which the satellite can receive messages from a platform** is equivalent to the time during which the platform is within its visibility. **On average this is 10 minutes**.

2.4 Receiving stations

Nearly 50 stations receive real time data from the satellites and retransmit them to processing centers.

This network of L band antennas, distributed to provide worldwide coverage, is a key element of the Argos service.

Main receiving stations

The three main receiving stations collect all the messages recorded by the satellites during an orbit, thus providing worldwide cover. These three stations are Wallops Island and Fairbanks in the United States and Svalbard in Norway.

Data received by the satellites are retransmitted to regional stations in real time if the station is within satellite visibility. The main receiving stations also receive data in real time.

2.5 Processing centers

Two processing centers with redundant operation, one near **Washington D.C. (United States)** and the other in **Toulouse, France**, process all received data. The computers calculate locations and process the received data.

The following processing is carried out at the global processing centers:

- check of message quality, reception level, time-tagging, transmitter identification number, sensor message lengths and received frequency value (to compute the location);
- message time-tagging in coordinated universal time (UTC);
- message classification by platform and by chronological order;
- data processing.

All these results are stored and made available to users.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2.6 User Services centers across the world

The User Services teams are the first contact points for any request for service or technical support from Argos users. They manage all data base declarations to allow users to obtain data correctly and act as an interface with Argos's technical staff. If they cannot respond directly to user requests, they will direct users to experts able to provide a satisfactory answer.

North America
CLS America Inc.
1441 McCormick Drive, Suite 1050
Largo, Maryland 20774

Tel: +1 301 925 4411
Fax: +1 301 925 8995
Email: userservices@clsamerica.com

Japan
Cubic-I Ltd
Bluebell bldg.7F
2-15-9 Nishi-Gotanda
Shinagawa-ku - Tokyo 141-0031

Tel: +81 3 3779 5506
Fax: +81 3 3779 5783
Email: argos@cubic-i.co.jp

Australia and South Pacific
CLS Argos Aust-NZ-South Pacific
(Satellite IT Pty Ltd)
Suite 706, 1 Queens Road
Melbourne
Victoria 3004

Tel: +61 3 9863 9650
Fax: +61 3 9863 9675
Email: guan@clsargos.com.au

South America
CLS Perú

Jr. Trinidad Moran 639
Lince, Lima
Peru

Tel: +51 1 440 2717
Fax: +51 1 421 2433
Email:
gsirech@clsperu.com.pe

Southeast Asia

PT CLS Argos Indonesia
Jl Jend Gatot Subroto, Kav 56
Kuningan Timur, Setiabundi
Jakarta, Selatan, 12950,
Indonesia

Tel: +62 215 264 266
Fax: +62 215 264 265
Email: sales@clsargos.co.id

Worldwide

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
Email: useroffice@cls.fr

3. Location calculations

3.1 Overview

Argos platforms automatically transmit messages which are received by satellites and relayed to Argos processing centers to compute results and make them available.
Locations are computed from all the messages received during a satellite pass. Argos system users have the advantage of two independent positioning modes:

- **Argos location:** Argos centers calculate a transmitter's location using the Doppler Effect on transmission frequency.
- **GPS positioning:** On request from the user, a specific processing module extracts the GPS positions included in the messages, validates them and distributes them in the same format as the Argos locations.

In both cases, the coordinates used are the latitude and longitude and the reference system is WGS 84 (World Geodetic System 1984).

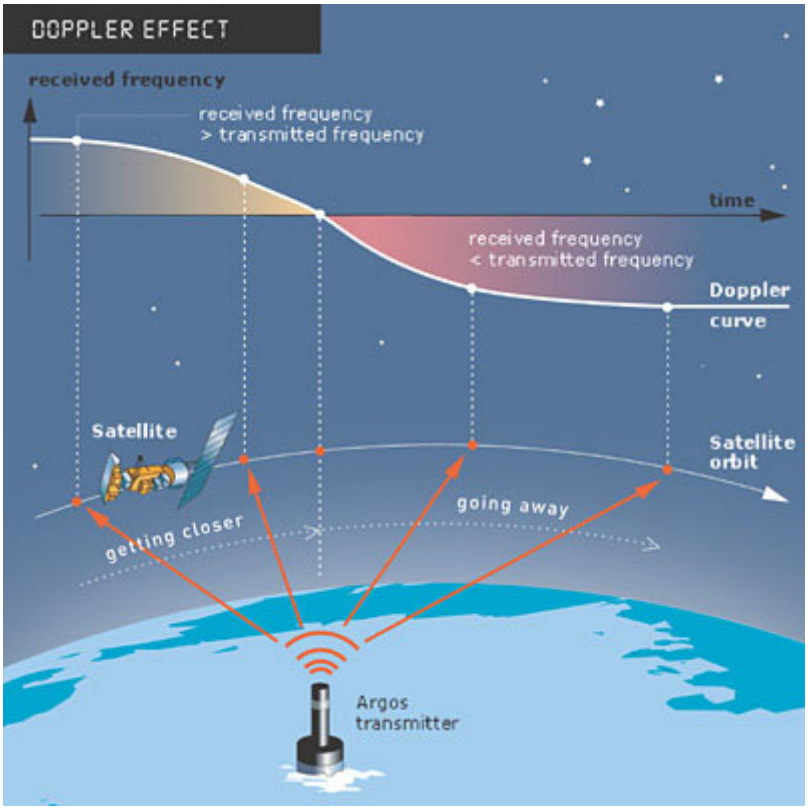
Consulting a platform's location with ArgosWeb.

3.2 Argos location principle

The Argos system calculates locations by measuring the Doppler Effect on transmission frequency. The Doppler Effect is the change in frequency of a sound wave or electromagnetic wave that occurs when the source of vibration and observer are moving relative to each other.

The Doppler Effect

The classic case is when an observer notices a change in the sound when a train approaches and moves away. Similarly, when the satellite approaches a transmitter, the frequency of the transmitted signal measured by the onboard receiver is higher than the actual transmitted frequency, and lower when it moves away.



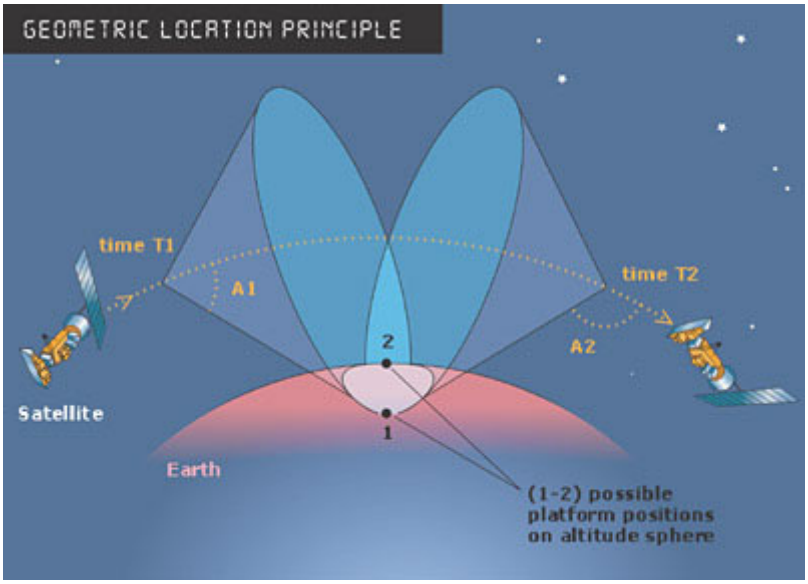
Each time the satellite instrument receives a message from a transmitter, it measures the frequency and time-tags the arrival. The Argos processing centers compute the locus of possible positions for the transmitter, a cone defined by:

- a **vertex at the position of the satellite when it received the message**,
- **the angle at the vertex**, a function of the difference between the frequency measured on board the satellite and the transmitter frequency.

Location calculations

If four or more messages are received by the satellite, the location calculation process follows the following steps.

An initial estimate of the platform position is computed from the first and last messages collected during a single satellite pass and the last computed frequency of the transmitter. The intersection of the cones for these two messages with the terrestrial radius plus the height declared for the transmitter (altitude sphere) gives two possible locations.



For each of the two possible locations, a least-squares analysis is used to refine the estimates of the transmitter's position and transmit frequency. If this analysis fails, the location calculation process cannot continue and no location is provided.

The **location with the minimal residual error is chosen, and its plausibility is tested**.

Plausability tests

Four plausibility tests are used to validate the location:

- **Minimum residual error**,
- **Transmission frequency continuity**,
- **Minimum displacement** (shortest distance covered since latest location),
- **Plausibility of velocity between locations**.

Two tests must be positive for the location to be validated. If the first location fails more than two tests, the second possible location is tested. If both locations fail more than two tests, then the location is not distributed to users, unless they subscribe to Service Plus/Auxiliary Location Processing (See Chapter 3.5 for more information).

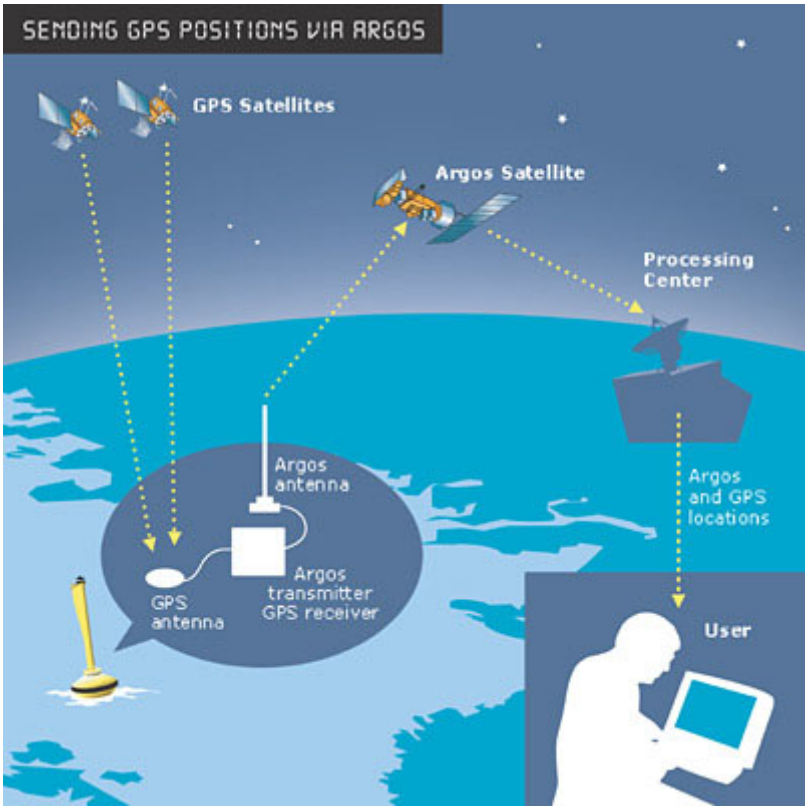
A location class (estimation of the location accuracy) is calculated using the residual error and the satellite pass characteristics.

Altitude estimations

Location computations are extremely sensitive to altitude variations. A significant error in altitude can considerably reduce the accuracy of a location, especially if satellite visibility is unfavorable.

To improve location accuracy, a **digital elevation model (DEM)** is automatically included in all location computations for ground mobiles and birds. The DEM used is based on the USGS GTOPO30 model. It is broken down into squares with sides of 30 arc seconds of an arc and is used to estimate platform altitude.

3.3 Transmitting GPS data via Argos



The Argos system can be used to transmit GPS positions. The advantages are:

- **Positions are more accurate and do not depend on transmitter quality**,
- **Positions can be collected more regularly over the day**.

The GPS positions are transmitted in Argos messages. To allow GPS positions to be processed and presented in Argos location form, their decoding must be declared to User Services.

3.4 Location classes

Locations are classified according to the following criteria:

- **type of location** (Argos or GPS),
- **estimated error***,
- **number of messages received** during the pass.

Class	Type	Estimated error*	Number of messages received per satellite pass
G	GPS	< 100m	1 message or more
3	Argos	< 150m	4 messages or more

2	Argos	150m < < 350m	4 messages or more
1	Argos	350m < < 1000m	4 messages or more
0**	Argos	> 1000m	4 messages or more
A	Argos	No accuracy estimation	3 messages
B	Argos	No accuracy estimation	2 messages
Z	Argos	Invalid location (available only for Service Plus/Auxiliary Location Processing)	

***The error affecting Argos locations is assumed to be Gaussian** and the estimated error corresponds to a sigma.

****** Class 0 locations** are available by request only.

3.5 Service Plus/Auxiliary Location Processing

This value-added service **provides users with complementary information about transmitter performance**. It also distributes **non-standard locations**, including locations calculated with less than four messages (Locations classes A, B, and Z) and locations that fail plausability tests. This service is very useful in certain cases, and is thus activated by default for a number of applications, including animal tracking.

4. Data processing

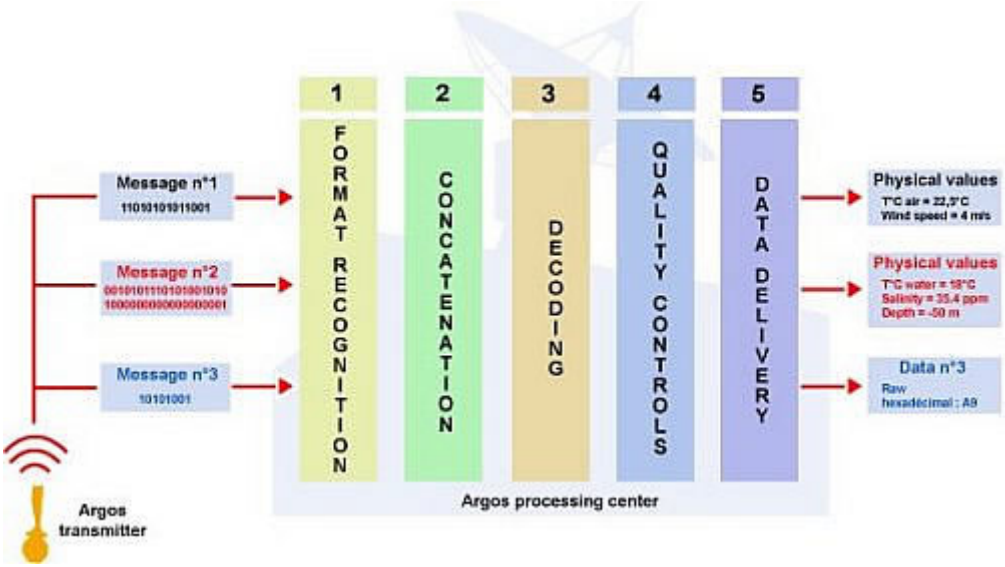
4.1 Overview

Argos messages are sequences of binary digits. The data contained in these messages are processed then distributed by the Argos system. Data processing operations range from straightforward binary-to-decimal conversion to sophisticated transfer functions.

The system can run different types of processing on the same data, so that raw data can be distributed as validated physical values as well. In addition, if the messages contain GPS positions, these may also be decoded and distributed in the same way as Argos locations.

The Argos processing system can handle several message formats for one transmitter. A message format is a specific type of message sent by an Argos platform. Each format has a specific structure. The Argos processing system can now handle processing of a variety of formats for the same platform.

Here is an example of **how the processing system works** for an Argos platform transmitting three different types of messages:



Three different types of messages from one platform are converted into physical values by the Argos processing system.

4.2 Message format recognition

Once the system recognizes a binary message based on its Argos ID number, then the message format must be recognized, so that specific processing can be applied. Several identification procedures are available:

1/ ***The system recognizes all messages from a platform and systematically applies the same processing.*** This type of recognition offers the possibility of processing messages of varying length in an identical manner (no default is available).

2/ ***The system recognizes the message format through its length***

and processes accordingly. If the length of the received message is different than the declared length, the data are distributed in 8-bit hexadecimal words (default format).

3/ ***The system recognizes the message format through an equation*** of the type [f(Ax + By + C)], x and y being 2 values encoded in a part of the message, and processes accordingly. With this type of recognition, if no equation is verified the data will be distributed in 8-bit hexadecimal words (default format).

4.3 Message segmentation

During this step, messages are segmented according to their format. A segment is defined by a position in a message, a length in bits and a specific type of binary decoding. This segment is called a binary element.

There are three types of binary elements:

- a **standard element**,
- a **checksum**,
- a **block** (set of standard elements repeated n times in a message).

Binary segmentation is determined by the platform manufacturer.

Standard element

A **standard element is a series of bits which, after decoding, provides a value** (integer or real) or a string.

Checksum

A **checksum is an encoded binary element used to validate the integrity of an Argos message**. Bit errors may slip in as messages are transmitted through space: platform to satellite to reception antenna to processing center.

Using an encoding algorithm, the platform computes a sum and encodes it in the message. Argos processing uses the same algorithm to decode this sum. If the two sums are identical, the message is considered to be valid. Checksums only apply to parts of Argos messages. Several checksums may be encoded in one message.

Block

A **block is a binary element of fixed length repeated n times and containing one or more standard elements**. The block may have a fixed or variable length. This type of element is used to declare measurement sets (e.g. Temperature-Salinity-Pressure triplets) repeated several times in an Argos message.

4.4 Data decoding

Data decoding converts a raw binary value into a physical value. The first step consists in decoding the binary elements. The data can be computed from two binary elements. The second step is to restore the physical value using a transfer function. Once processed, the data (or physical values) are defined by an output format:

- **Decimal** (e.g. 158)
- **Hexadecimal** (e.g. 9E)
- **Scientific** (0.158E + 3).

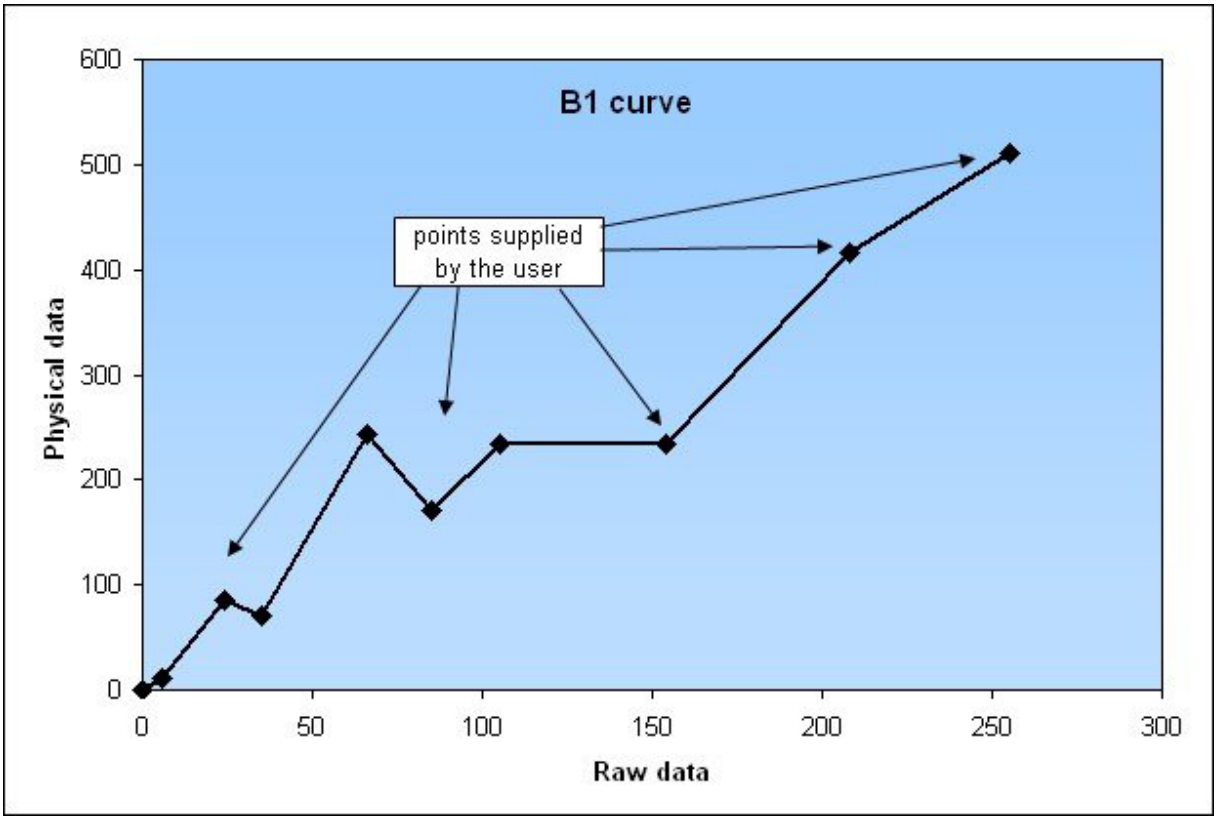
The main transfer functions available to convert your data are listed in the table below:

Transfer function	Description
B1 Curve	Calibration table: linear function
B2 Curve	Calibration table with a compensating sensor: linear function
B3 Curve	Polynomial function (2nd degree) with one

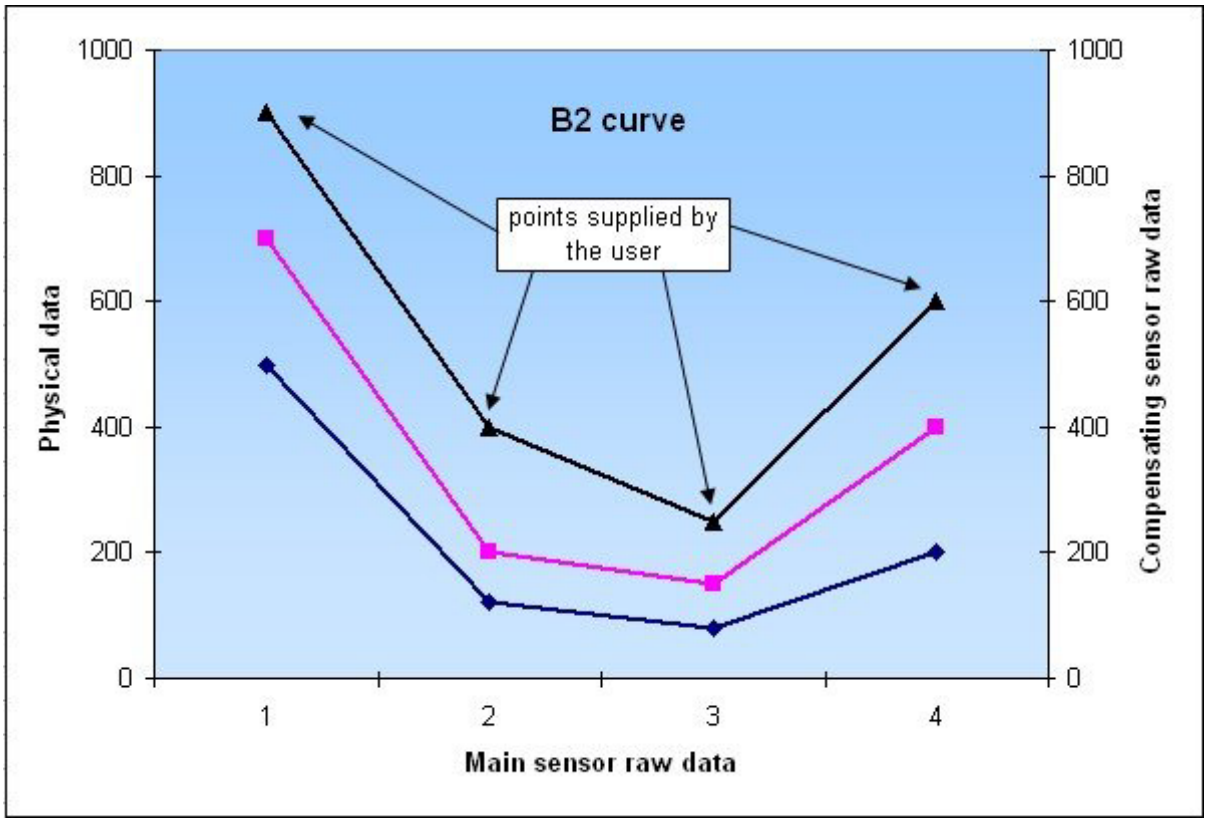
	compensating sensor
B4 Curve	Polynomial function (5th degree) with one compensating sensor
Exponential	Exponential function with a compensating sensor
Identity	Decimal conversion of the raw value without transfer function
Polynomial XY	Polynomial function (4th degree) with one or two compensating sensors
Polynomial XZY	Polynomial function (3rd degree) with 2 or 3 compensating sensors
Weather modules	Specific modules for calibration of weather data
Lookup Table	Table converting decimal data into characters
Table	Extraction of a physical value from a table

If your calibration does not correspond to these standard functions, it may be possible to develop a specific processing module (software module), subject to acceptance by Argos processing experts.

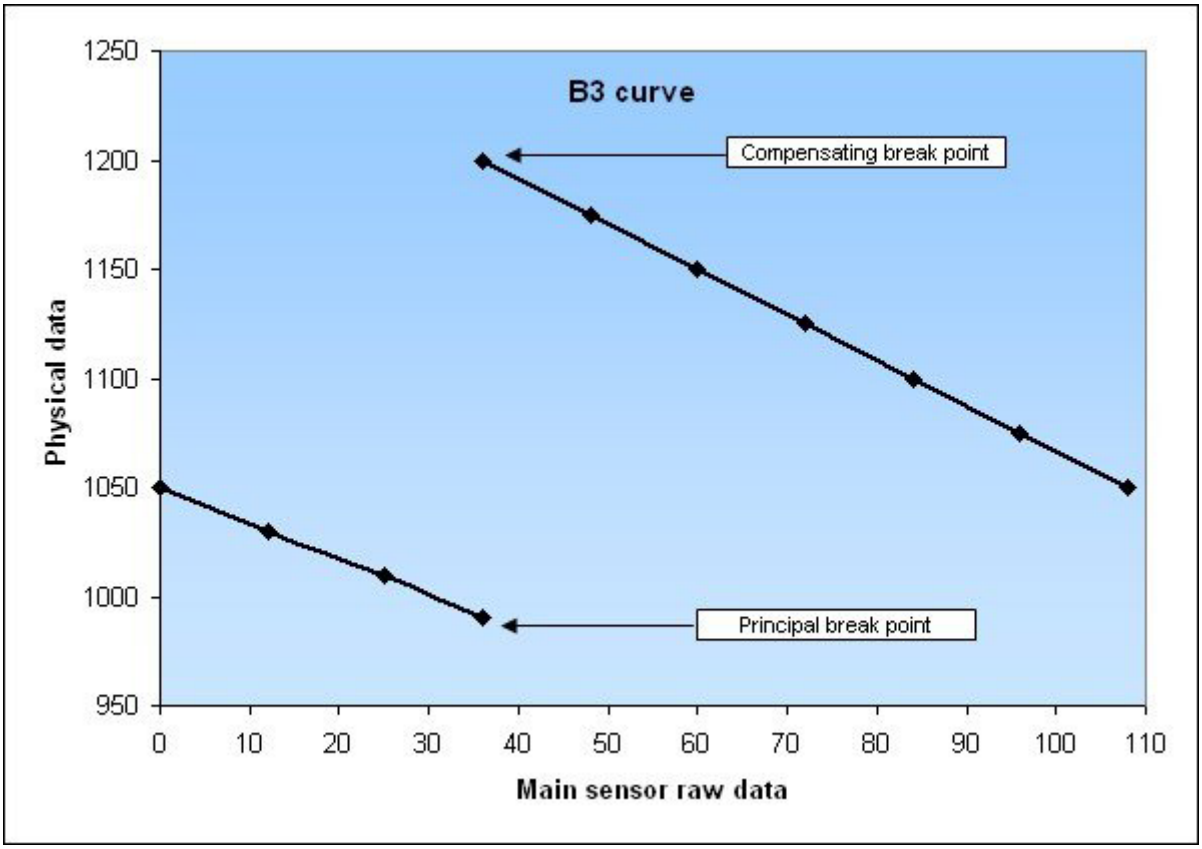
B1 Curve



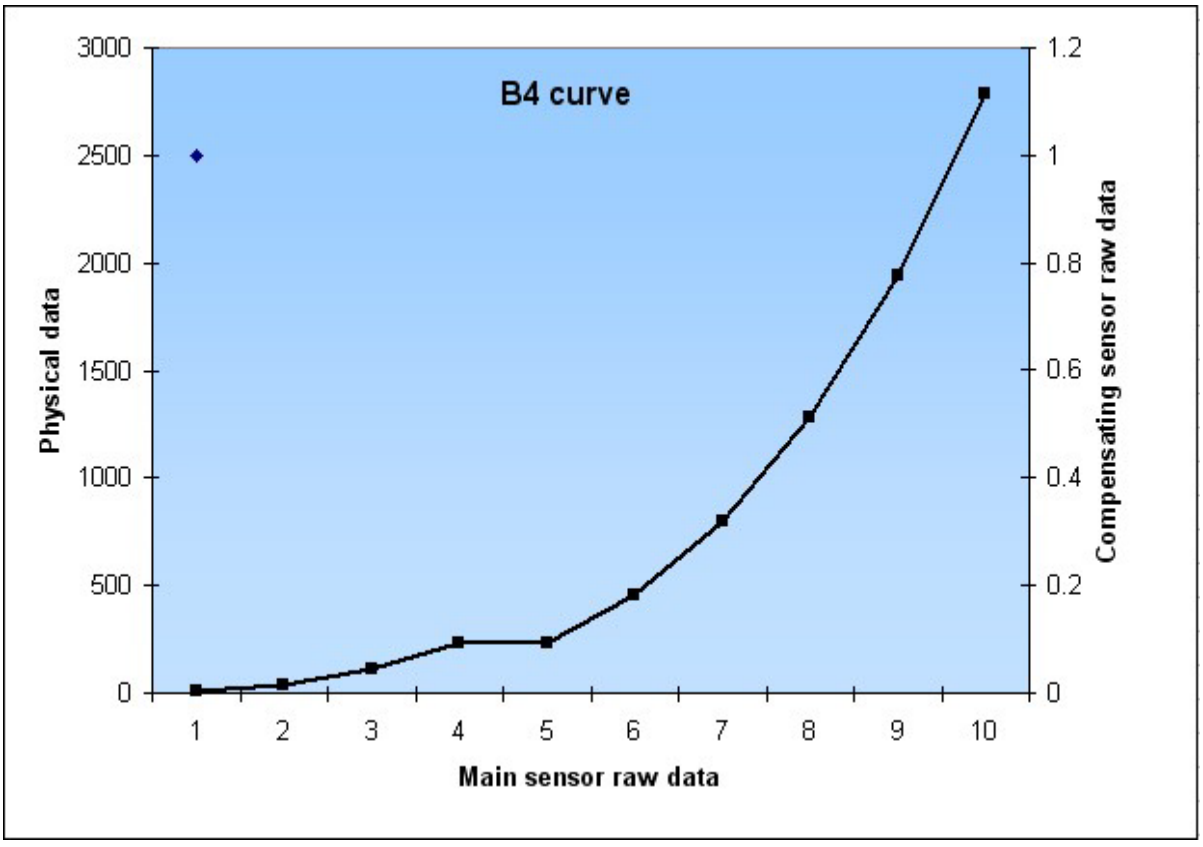
B2 Curve



B3 Curve


B3 curve
Compensating break point
Principal break point
Physical data
Main sensor raw data
1250
1200
1150
1100
1050
1000
950
0
10
20
30
40
50
60
70
80
90
100
110

B4 Curve


B4 curve
Physical data
Compensating sensor raw data
Main sensor raw data
3000
2500
2000
1500
1000
500
0
1.2
1
0.8
0.6
0.4
0.2
0
1
2
3
4
5
6
7
8
9
10

5. How to open an Argos account

5.1 Obtaining a program

5.1.1 Filling out an SUA form and ID number request form

The SUA (System Use Agreement) form

Argos is a location and data collection system designed for studying and protecting the environment. Use of the Argos system is subject to approval from the Operations Committee made up of representatives from the:

- French Space Agency (CNES),
- National Oceanic and Atmospheric Administration (NOAA),
- European Organization for Exploitation of Meteorological Satellites (Eumetsat).

The objective of an Argos program must comply with the rules of use defined by the Operations Committee as referred to in the SUA, which can be downloaded from **https://www.argos-system.org/html/userarea/forms_en.html**.

To open an Argos program simply fill out an SUA and send it duly signed to the CLS regional correspondent (office or branch) or, for North American users, to CLS America, who will submit it to the Operations Committee for approval.

Once the SUA is approved by the Operations Committee, the corresponding Argos program can be opened.

This agreement has a time limit and must be renewed periodically as specified in Article 4 of the SUA form.

Platform identification number request form (ID number)

All SUA forms must be accompanied by an ID number request form. This form is also used to request any extra ID

numbers.

Platform characteristics and the required message processing are also specified on this form.

Platform messages are processed and decoded in compliance with the information supplied for declaration in the system. For standard platforms, models predefined in cooperation with manufacturers are applied. Users encountering any difficulty in filling out this form may contact the platform manufacturer and obtain the information required for processing.

For a non-standard platform model (generating specific messages requiring an interpretation method unknown to CLS), the user must ask the manufacturer to contact User Services to provide the definition of the associated processing.

5.1.2 Choosing the services (price list)

The various "basic" or "value added" Argos services and the applicable prices are described in the price list.

The price list is updated annually.

5.1.3 Filling out the service contract/order form

Once the SUA is confirmed, the User Services sends a service contract/order form with the applicable price list. This contractual document recapitulates the subscribed services for processing and invoicing. It must be filled out and signed by the user then sent to the User Services so that the program can be created and the ID numbers assigned.

Any modification to the service contract/order form must be expressed in writing and sent to User Services for acknowledgement.

5.1.4 Receiving confirmation of program creation

Once the signed order form has been received, User Services sends a **Program Overview** informing users about their program, data access codes and the ID numbers assigned to their platforms. Upon user request, the ID numbers can also be sent to the platform manufacturer so that they can be programmed as early as possible.

Users with several Argos programs may ask to keep the same data access codes (username/password pair) for all their programs or, if necessary, ask for separate access codes.

5.2 Managing a program

5.2.1 Testing and deploying platforms

Before deploying the platforms, it is important to test them under conditions as similar as possible to those of their operating environment to check that they operate correctly.

It is also recommended to check that the following information has been sent to User Services:

- Description of Argos message processing, (especially for non-standard platforms),
- Coordinates and date of deployment,
- Programmed transmitter frequency,
- Mean altitude of the platform for users who do not want the Digital Elevation Model to be applied (see **Chapter 3.2**).

The various types of processing are explained in Chapter 3.

5.2.2 Accessing data

The user can access data in various ways:

- by connecting via the secure dedicated website ArgosWeb (https://www.argos-system.org), or remote querying of TELNET data servers. Data for the last 9 days plus the current day are available on line.
- by subscribing to the ArgosDirect Service to receive data automatically.

ArgosWeb	ArgosWeb (https://www.argos-system.org) proposes advanced functions such as position display on maps (land, maritime or polar), export to Google Earth and data downloads in various tabular formats that can be personalized. (see **Chapter 6.2**)
ArgosServer	Users can also access recent data via a **TELNET** TCP/IP terminal by using specific commands to query the CLS servers. (See **Chapter 6.3**)
ArgosDirect	In addition to the ArgosWeb and ArgosServer data access methods, users can opt for the ArgosDirect value-added service to receive data automatically from the selected platforms. ArgosDirect offers the following data reception modes: • Electronic mail

	(either in the body of the message or as an attached file) • FTP • CD-ROM (monthly dispatches) Data are sent to users at the frequency they choose: • at each satellite pass • at a set period (4 days maximum) • every month

5.2.3 Choosing value-added services

ArgosShare	Argos users can share data in various ways: • by authorizing "on copy" service, so data are available to other users who are able to access the corresponding data (via ArgosWeb or Telnet) (see **Chapter 6.5**, ArgosShare), • by requesting User Service to send the data to various addresses (see ArgosDirect) (see **Chapter 6.4**, ArgosDirect), • by requesting User Service to send meteorological data via the Global Telecommunication System (GTS), a public network run by WMO (World Meteorological Organization) for worldwide weather centers (see **Chapter 6.5**, ArgosShare)

ArgosMonitor	ArgosMonitor is a range of services developed to monitor performance, platform positions and collected data values. If a predefined event is detected during monitoring, a warning is automatically sent to the user by fax, SMS or e-mail.
Argos DataBank	Data can be sent on a monthly basis (CD-ROM, ftp or e-mail). All Argos data are stored for 12 months. On request, User Services can send stored data to users.

5.2.4 Settling invoices

Argos services are billed monthly. The invoice is based on:

- requested and supplied services,
- the price list that applies.

5.3 Modifying program parameters

Examples:

- Changing data access codes
- Requesting creation of subprograms: if required, users can create subprograms for easier management of their platforms in subgroups
- Requesting new ID number

User Services is the dedicated point of contact for any modification to programs, platforms or services. Modifications can only be taken into account if confirmed in writing.

Modifying platform technical parameters

Platform technical parameters, such as message format or maximum speed of movement, allow the corresponding processing to be optimized.

Turning in Identification Numbers

If a platform is no longer used, its ID number must be turned in for recycling and reassignment to a future program. This simply requires informing User Services once it is certain that the platform is permanently out of use and will no longer transmit.

Modification of services

Examples:

- Subscribing to ArgosDirect, ArgosShare, ArgosMonitor
- Activating the "location plus"/ "auxiliary location processing (ALP)" service
- Transmit meteorological data on the GTS (Global Telecommunication System)

5.4 Terminating a program

To terminate a program, users must be certain that the platforms will no longer transmit and must turn in the corresponding ID numbers. They must then request permanent deletion by writing to their User Services.

However, if users wish to keep the program for a future project, the corresponding SUA must be renewed upon its expiration date, if necessary redefining the program objective.

User Services is the dedicated point of contact for terminating a program. Termination can only be taken into account if confirmed in writing.

6. How to access Argos data

6.1 Overview

Here are several ways to access Argos data:

ArgosWeb	ArgosWeb, www.argos-system.org, is a secure website that allows users to consult their locations in map format or download all collected data.
ArgosServer	ArgosServer allows users to remotely access their Argos data with TELNET.
ArgosDirect	ArgosDirect automatically delivers data to users by e-mail, FTP or CD-ROM.
ArgosShare	ArgosShare allows users to share data with their colleagues and collaborators.
ArgosMonitor	ArgosMonitor monitors platform state, position, and sensor data values, alerting users of any change in state by e-mail, SMS or fax.

6.2 ArgosWeb

6.2.1 Why use ArgosWeb

Argos users can access their data via the Internet, by logging on to a secure website (https://www.argos-system.org) with their username and password (assigned to them by User Services). A detailed description of ArgosWeb's functions and capabilities is provided by online help (https://www.argos-system.org/cwihelp/en/globalhelp.html) pages.

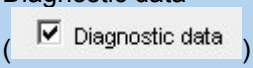
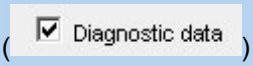
ArgosWeb gives users secure and easy access to Argos data via an attractive and user-friendly website. With ArgosWeb, users can view platform trajectories on land and marine maps. Users can also personalize data download formats (table or map format). Users have immediate access to information on their Argos account, as well as platform and program settings.

6.2.2 Capabilities of ArgosWeb

View Argos locations on a map	
View locations on a map	Consultation / Map
	Consultation / Map
• View point information (exact location)	
• View sensor data and trajectory information	
• Zoom in	
• Zoom out	
• Change a map view, center map view around a new point	
• Measure distance	
• Remove or add map layers (latitude and longitude lines, night shadow, scale, platform trajectories)	

• Save a view or zoom 	
• Open a saved view or zoom 	
Change trajectory view and platform information	Preferences / Map
Change type of map: Mercator marine, Mercator land or orthographic land	Preferences / Map
Export data with Google Earth	Consultation / Data table / Export () Consultation / Data download / Download ()

Access data	
View data on-screen before downloading or exporting	Consultation / Data table
Download data directly without viewing on screen	Consultation / Data download / Download ()
Download data in COM/PRV/DIAG formats	Consultation / Download COM/PRV/DIAG / Download ()
View most recent data (Locations and/or sensor data)	Consultation / Most recent data
Add diagnostic data by using the icon  and clicking on	Consultation / Data table / () Consultation / Most

Diagnostic data ()	recent data / () Consultation / Data download / ()
Personalize visible table columns and options for data viewing with the icon 	Consultation / Data table Consultation / Most recent data Consultation / Data download

Manage program and platform settings	
View platform settings (location parameters, sensor parameters, or platform manufacturer)	Settings / Platforms
View and download a list of user platforms	Settings / Platforms / Export ()
View and modify contact information for a program manager	Settings / User parameters

Other functions	
Create a template for search criteria	Users can save search criteria (Platforms or program numbers, time frame, location class....) by creating a template with the icon  . This icon  should be used to open a template and perform a search using saved search criteria on Map, Data table or Data download screens.
Track a platform	To track a platform by

by its name	its name, users must go to Settings / Platforms and Platform name. For this name to appear on maps, users must go to Preferences / Map and choose Name as a characteristic of a point.
Share data from a program or platform with another Argos user (ArgosShare)	Sharing data with Argos users is easy. While connected to ArgosWeb (Settings / Platforms or Settings / Programs), users can "Add an account on copy" by typing a colleague's user name and establishing a start (and end) date for ArgosShare.
Predict satellite passes over a platform, reception antenna or latitude/longitude	In the left menu bar, click on Satellite pass predictions.
Online help	Users can access online help from the left menu bar (click on Online help) or by clicking on the icon  in the top right-hand corner of each screen.

6.3 ArgosServer

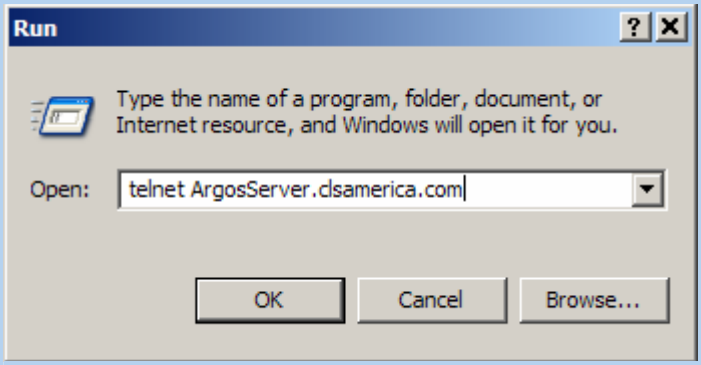
6.3.1 Accessing Argos data via Telnet

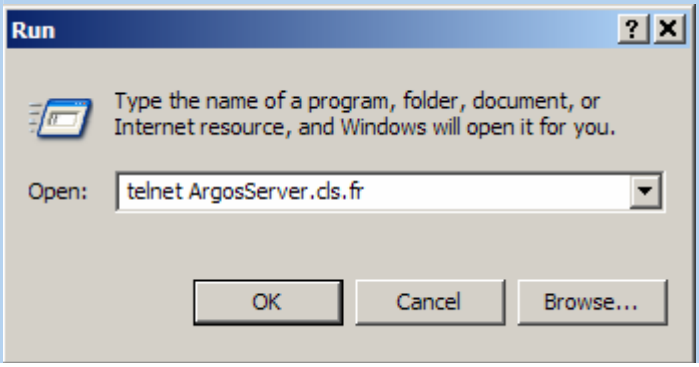
With this service, users can logon to Argos Processing Centers and access their data via TELNET. **TELecommunication NETwork** is a network protocol used by all TCP/IP compatible networks. A Telnet session with CLS's servers can be opened by typing the "Telnet" command on most operating systems (Windows, Unix...).

- **ArgosServer.cls.fr**
- **ArgosServer.clsamerica.com (for North American users)**

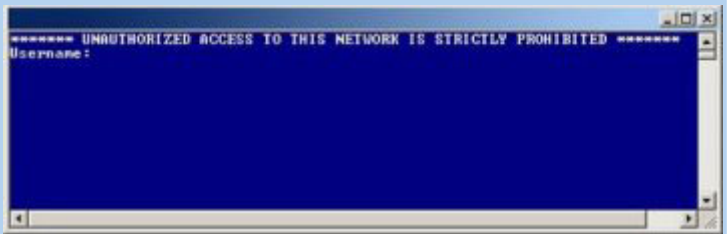
Here is the basic procedure for starting a Telnet session:

The user connects to the Argos processing center: **ArgosServer.cls.fr** or **ArgosServer.clsamerica.com** with Telnet.





The user types in his/her user name and password



After the connection with the Argos center has been established via Telnet, the message ARGOS READY followed by a carriage return will automatically appear on the screen. Above this text, the user will see a string of numbers corresponding to the calendar day as well as the UTC time that the connection was made, followed by the calendar day and UTC time of the user's last access.

Example:

LOGIN AT 046/1256 LAST ACCESS AT
046/1103 UTC

ARGOS READY
/

The user will be able to access their data as long as the user's platforms have been declared correctly in the Argos system, and are transmitting properly.

The user types in the appropriate commands for consulting their data.

The user ends the session with the LOGOUT command.

6.3.2 Data formats

Argos data can be distributed in the following formats (users must specify their preferred format when declaring their Platform with User Services):

- **decimal: ex. 158**
- **hexadecimal: ex. 9E**
- **scientific: ex. 0.158E+3**

6.3.3 List of commands

Basic commands

Command	Abbreviation	Data/Results	For more information
COM	**C**	For most recent data	**Chapter 6.3.4**
PRV	**P**	For the current day's and previous nine days' results	**Chapter 6.3.5**
DIAG or PRV/A	**DIA**	For rejected locations and diagnostic information	**Chapter 6.3.6**

Options

Options	Syntax	Description	For more information
DS	**PRV,,DS**	For all messages received by the satellite.	Chapter 6.3.5.1
TX	**PRV,,TX**	For the most significant message per satellite pass (message received from the transmitter the most times, consecutively, in	Chapter 6.3.5.2

		identical form)	
/C	**COM/C** **PRV/C** **DIAG/C**	For results in compressed format: a single space between each location or value to reduce data volume.	**Chapter 6.3.7**
ALL or A	**COM,,,ALL** **COM,,,A**	For the most recent results for all the user's platforms or all the platforms in a program.	

Basic command syntax

Each command line the user enters will usually consist of:

- the **name of the basic command** to use, followed by a comma (example: **COM**)
- the **program number**, followed by a comma (example: **#prg**)
- the platform ID numbers with results to display (example: **#ptf**)
- the **time period**, between commas. For example, the current day since 9:00 AM, (example: ,09,)
- a **Carriage Return** to validate.

Some rules

The maximum number of characters per command (in capital or lower case letters) is 80. Only results for the current day and previous nine days are available.

Queries should be made using the calendar day and UTC time, if necessary (for example: to obtain results from February 6, the user would enter the corresponding calendar day (037) in command syntax). Only the current day's results will be available if no calendar day is indicated.

To interrupt access to results at any time, users should enter **Control-S** (no need for a Carriage Return) and **Control-Q** to resume.

If a platform stops transmitting, its last message will be saved for one year. Users can access this result with the **COM** command.

If a session is inactive for three minutes, the session will automatically be disconnected.

All Argos data from the current month and the 12 previous months are archived. **Argos Data Bank** service makes archived results available to users. (for more information, please see Chapter 6.4.2)

6.3.4 View most recent results: COM command

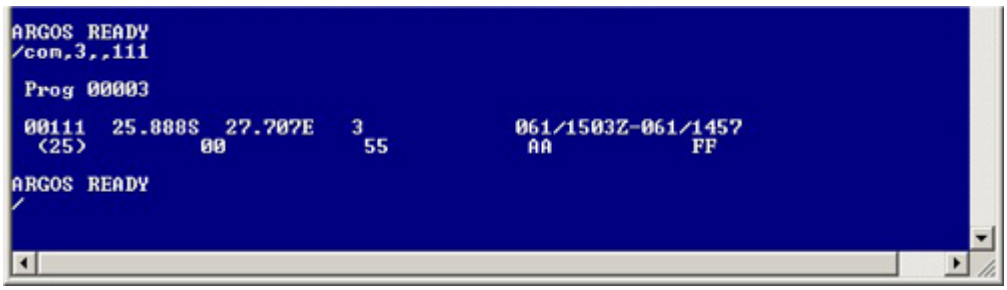
For locations and data collected during the most recent satellite pass

COM/C, #prg,,#ptf		
/C **Optional:**	**#prg** (Program #)	**#ptf** **Choose**

To download **compressed results** (with a single space between each location or value)	**Optional:** • To download results for all the transmitters in one program • To access data for which a user is on copy (ArgosShare)	**between:** • Argos platform ID number *-or-* • ALL, to access data from all platforms in a program, *-or-* • a series of platforms from the same program, separated by a dash, *-or-* • list of platforms in the same program, separated by a comma

Examples:

COM,,,ALL (to view results for all platforms that belong to this user)
COM,3,, (to view results for all platforms in Program #3)
COM,,,111 (to view results for Platform #111)



Interpreting COM results

Prog 00003	*Program number*

00111	*Platform number*
25.888S	*Platform latitude in degrees and thousandths of a degree*
27.707E	*Platform longitude in degrees and thousandths of a degree*
3	*Location class (see table of location classes Chapter 1.2.3)*
061/1503Z	*Calendar day and UTC time (in hours and minutes) of most recent data collection*
-061/1457	*Calendar day and UTC time (in hours and minutes) of m*ost recent location
(25)	*Compression index: number of identical, consecutive messages received during satellite pass*
00	*Value for sensor 1*
55	*Value for sensor 2*
AA	*Value for sensor 3*
FF	*Value for* sensor 4

6.3.5 View results from the current day and the past 9 days: PRV command

The PRV command allows users to show results for the current day and previous nine days for one or several platforms in the same program. The user can also enter a time frame for data display, by typing a Start date (optional) and End date (optional).

Two possibilities for this command are available:

PRV with DS: To view all messages received by all satellites
PRV with TX: To view the most significant message per pass

If the user has signed up for Location Service Plus/Auxiliary Location Processing (see Chapter 6.2.6), he/she will receive **class A and B locations** (see Chapter 3.3) as well as standard Argos locations (0,1,2,3).

The command syntax for the **PRV with DS or TX** is identical.

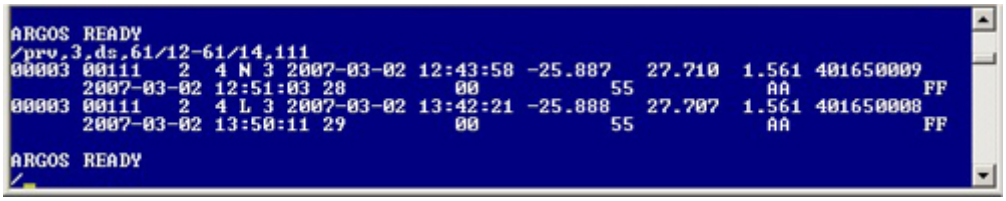
6.3.5.1 PRV,,DS command: all messages received by the satellite

PRV/C, #prg, DS, start date/time-end date/time, #ptf			
/C **Optional:** To download **compressed results** (with a single space between each location or	**#prg** (Program #) **Optional:** Mandatory in order to access results from one program only (results from all user programs	**start date/time-end date/time** **Optional:** Sets a time frame for results. Start date and end date, separated by a dash, each	**#ptf** **Choose between:** • Argos platform ID number *-or-* • ALL, to

value)	will be displayed by default)	date can be followed by a slash (/) and a time	access data from all platforms in a program, *-or-* • a series of platforms from the same program, separated by a dash, *-or-* • list of platforms in the same program, separated by a comma

Examples:

PRV,3,DS,,ALL (PRV DS on platforms from Program 3 on the current day)
PRV,,DS,51, ALL (if today is calendar day 60 and the user wants to retrieve data from the previous 9 days from all platforms associated with their account)
PRV,,DS,61/12-61/14,111 (PRV DS data for platform #111 in program 3, received on calendar day 61 between 12:00-14:00 UTC).



Interpreting PRV,DS results

The above results include data collected by two satellites. The first two fields after the command represent the data collected from the first satellite pass during the designated time frame:

00003	*Program number*
00111	*Platform number*
2	*Number of lines of data per satellite pass*
4	*Number of sensors*

N	*Satellite identifier, in this case, NOAA-N*
3	*Location class*
2007-03-02	*Date (Year, Month, Day) for locations calculated during the satellite pass*
12:43:58	*UTC time of the location calculation in Hours, Minutes, Seconds,*
-25.887	*Platform latitude in degrees and thousandths of degrees* *Northern latitudes are positive, Southern latitudes are negative*
27.710	*Platform longitude in degrees and thousandths of degrees, starting from the East (255.452 = 104.548° W)*
1.561	*Platform altitude in km (provided by the user)*
401650009	*Calculated frequency*
2007-03-02	*Date (Year, Month, Day) that data was collected*
12:51:03	*Time-stamp in UTC (Hour, Minute, Seconds) that data was collected*
28	*Number of identical messages received*
00	*Value of sensor n°1*
55	*Value of sensor n°2*
AA	*Value of sensor n°3*
FF	*Value of sensor n°4*

The third and fourth lines are the results from the second satellite pass.

6.3.5.2 PRV with TX: the most significant message per satellite pass

PRV/C,#prg,TX, start date/time-End date/time,#ptf			
/C **Optional:** To obtain compressed results (only one space between fields)	**#prg** (Program #) **Optional:** Mandatory in order to access results from one program only (results from all user programs will be displayed by default)	**start date/time-end date/time** **Optional:** Sets a time frame for results. Start date and end date, separted by a dash, each date can be followed by a slash (/) and a time	**#ptf** **Choose between:** • Argos platform ID number *-or-* • ALL, to access data from all platforms in a program

, *-or-*
- a series of platforms from the same program, separated by a dash, *-or-*
- list of platforms in the same program, separated by a comma

The most significant message per satellite pass refers to the message that is repeated the greatest number of times in a row (highest compression index).

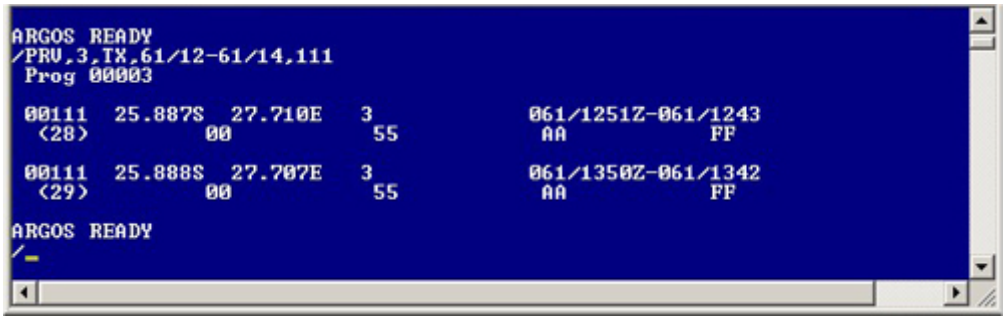
If the satellite receives two identical messages twice each, Argos will keep the last (most recent). If Argos receives four different messages, it will keep the second to last (statistically more reliable than the first or last message).

Therefore, if over the course of one satellite pass, Argos receives the following messages in their respective order:

A,A,A,B → A is considered to be the most reliable message
A,A,B,B → B is considered to be the most reliable message
B,A,A,B → A is considered to be the most reliable message
A,B,C,D → C is considered to be the most reliable message

Examples:

PRV,3,TX,,ALL (PRV TX for all platforms in program 3 for the current day)
PRV,,TX,51,ALL (If today is calendar day 60 and the user wishes to get data from the past 9 days for all of the platforms in their account)
PRV,,TX,61/12-61/14,111 (PRV TW data for platform #111 in program 3, received on calendar day 61 between 12:00-14:00 UTC).



Interpreting PRV TX data

The first two lines after the program number represent the results of the most significant message for the first satellite pass in the period.

Prog 00003	*Program number*
00111	*Platform number*
25.887S	*Platform latitude in degrees and thousandths of degrees*
27.710E	*Platform longitude in degrees and thousandths of degrees*
3	*Location class (See Chapter 1.2.3)*
061/1251Z	*Date (calendar day) and UTC time (Hours and Minutes) of data collection*
-061/1243	*Date (calendar day) and UTC time (Hours and Minutes) of location*
(28)	*Message compression index: number of identical messages received during satellite pass*
00	*Value for sensor 1*
55	*Value for sensor 2*
AA	*Value for sensor 3*
FF	*Value for sensor 4*

The third and fourth lines are the results from the second satellite pass in the period.
The location and sensor data have been updated: a new location was calculated based on the second satellite pass.

6.3.6 Get diagnostic results: DIAG and PRV/A commands

To use DIAG and PRV/A commands, users must subscribe to Location Service Plus (Auxiliary Location Processing) (see **Chapter 3.2**).

DIAG and **PRV/A** commands give users:

Locations • in classes 3, 2, 1, 0, A, B as well as sensor data, also

available using the **PRV** and **COM** commands

Extra information

- locations rejected during the calculation, called Class Z results,
- the other possible location or "mirror image" solution: the Argos system calculates two locations for transmitters and supplies the more probable of the two via the COM and PRV commands. This is called Solution 1. **DIAG** and **PRV/A** also give users Solution 2 (the mirror image of Solution 1 in the satellite ground track),
- residual error on the frequency calculation, and transmitter oscillator frequency drift between two satellite passes. These two diagnostic indicators produce an indicator called IQ,
- transmission frequency,
- the best signal strength received by the satellite,
- the number of messages received by the satellite.

DIAG

DIAG gives you the most significant message received during each satellite pass (message received from your transmitter the most times, consecutively, in identical form) for the previous nine days and the current day. This command allows users to sort by date and time. The extra information (see above) appears in the last four lines of the results.

Unlike PRV/A, **DIAG** tells users how many location plausibility checks (0-4) gave a positive result. This is called NOPC, or Number Of Plausibility Checks. If NOPC is greater than or equal to 2, Solution 1 will be available with COM and PRV commands. DIAG also gives users the satellite pass duration in seconds. **DIAG** results are displayed in a specific format.

PRV/A

The **PRV/A** command allows users to consult results from the previous nine days and the current day from one or more platforms, as well as the extra information listed in the table above. Users can sort by date and time.

6.3.6.1 DIAG command

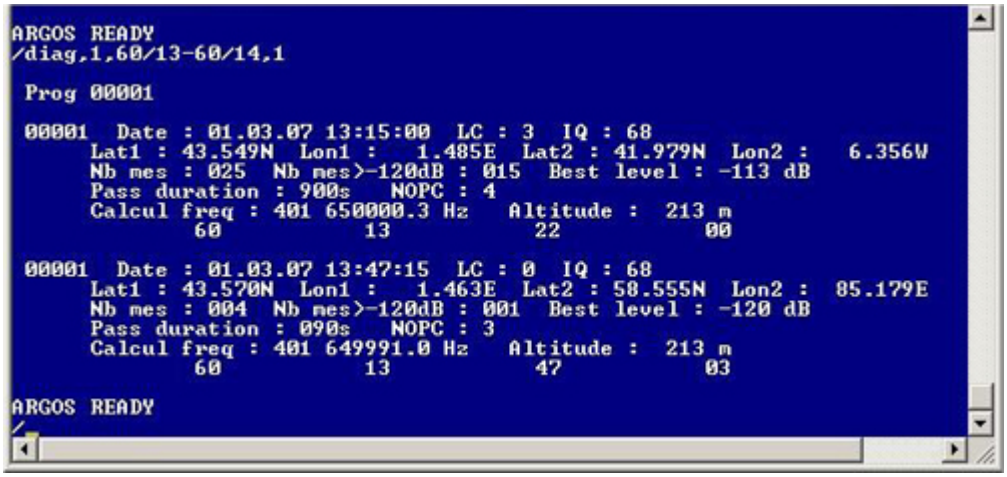
Locations and sensor data + Transmitter diagnostic information

DIAG/C, #prg, start date/time-end date/time, #ptf		
/C	**#prg** (Program	**start date/time- #ptf**

Optional: **For compressed results** (only one space between fields)	#) **Optional:** Mandatory in order to access results from one program only.	**end date/time** **Optional:** Sets a time frame for results. Start date and end date, separated by a dash, each date can be followed by a slash (/) and a time	**Choose between:** • Argos platform ID number *-or-* • ALL, to access data from all platforms in a program, *-or-* • a series of platforms from the same program, separated by a dash, *-or-* • list of platforms in the same program, separated by a comma

Examples:

DIAG,3,,ALL (DIAG for all platforms in program 3 for the current day)
DIAG,,51,ALL (DIAG if today is calendar day 60 and the user wishes to get data from the past 9 days for all of the platforms in their account)
DIAG,,61/12-61/14,111 (DIAG data for platform #111 in program 3, received on calendar day 61 between 12:00-14:00 UTC).



Interpreting DIAG results

For the time frame in the example, 2 satellite passes occurred. Here are the details concerning the first satellite pass:

Prog 00001	*Program number*
00001	*Platform number*
Date : 01.03.07	*Location date*
13:15:00	*UTC Time (Hours, Minutes, Seconds) for the location*
LC : 3	*Location class: 3, 2, 1, 0, A, B, Z (see Chapter 3.4)*
IQ : 68	*IQ = Quality indicator. This indicator gives information on the transmitter in terms of X and Y.* • *X indicates residual error on the frequency calculation (see table of X, Y values). Here, X = 6* • *Y indicates transmitter oscillator frequency drift between two satellite passes. Here, Y =8* *See Section 6.3.6.3 for X,Y values*
Lat1:43.549N	*Solution 1. Platform latitude in degrees and thousandths of degrees*
Lon1:1.485E	*Solution 1. Platform longitude in degrees and thousandths of degrees*
Lat2:41.979N	*Solution 2. Platform latitude in degrees and thousandths of degrees*
Lon2 6.356W	*Solution 2. Platform longitude in degrees and thousandths of degrees*
Nb mes : 025	*Number of messages received*
Nb mes>-120 dB: 015	*Number of messages received by the satellite at a signal strength greater than -120 decibels*
Best level : -113 dB	*Best signal strength, units are dB*

Pass duration : 900s	*Time elapsed between the first and last message received by the satellite*
NOPC = 4	*Number Of Plausibility Checks successful (from 0-4)*
Calcul Freq : 401 650000.3	*Calculated frequency*
Altitude : 213 m	*Altitude used for location calculation*
60	*Value of sensor n° 1*
13	*Value of sensor n° 2*
22	*Value of sensor n° 3*
00	*Value of sensor n° 4*

6.3.6.2 PRV/A Command

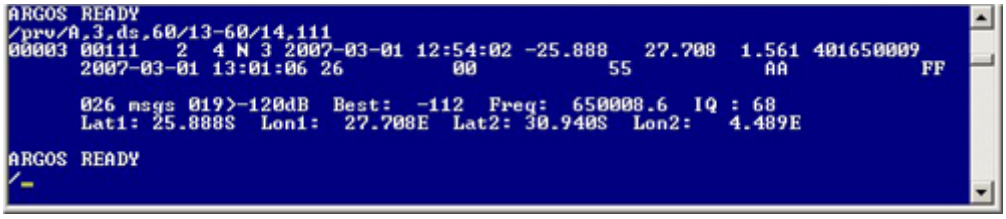
Locations and sensor data + transmitter diagnostic information

PRV/A/C, #prg, DS or TX, start date/time-end date/time, #ptf				
/C **Optional:** For compressed results (only one space between fields)	**#prg** (Program #) **Optional:** Mandatory in order to access results from one program only.	**DS, TX,** **Choose between:** DS, For all messages received during a satellite pass TX, For the most significant message per sat pass	**start date/time-end date/time** **Optional:** Sets a time frame for results. Start date and end date, separated by a dash, each date can be followed by a slash (/) and a time	**#ptf** **Choose between:** • Argos platform ID number *-or-* • ALL, to access data from all platforms in a program, *-or-* • a series of platforms from the same program, separ

	ated by a dash, *-or-* • list of platforms in the same program, separated by a comma

Interpreting PRV/A results

Examples: PRV/A, 3, DS, 60/13-60/14, 111 (PRV/A,,DS for platform 111 in program 3 for calendar day 60 between 13:00 and 14:00 UTC).



Interpreting PRV/A results

00003	*Program number*
00111	*Platform number*
2	*Number of lines in the DS message*
4	*Number of sensors*
N	*Satellite name, in this case, NOAA-N*
3	*Location class : 3, 2, 1, 0, A, B, Z (see location class table, Chapter 3.4)*
2007-03-01	*Location date*
12:54:02	*Location time*
-25.888	*Solution 1. Platform latitude in degrees and thousandths of degrees*
27.708	*Solution 1. Platform longitude in degrees and thousandths of degrees*
1.561	*Altitude (in km)*
401650009	*Frequency*

2007-03-01	*Date of the last data collection*
13:01:06	*Time of data collection*
26	*Number of identical messages received*
00	*Value for sensor n° 1*
55	*Value for sensor n° 2*
AA	*Value for sensor n° 3*
FF	*Value for sensor n° 4*
026 msgs	*Number of messages received by the satellite*
019>-120 dB	*Number of messages received by the satellite with a signal strength greater than -120 decibels*
Best: -112 dB	*Best signal strength, Units are dB*
Freq: 650008.6	*Calculated frequency 401 650008.6 Hz*
IQ : 68	*IQ = Quality indicator. This indicator gives information on the transmitter in terms of X and Y.* • *X indicates residual error on the frequency calculation (see table of X, Y values, Section 6.3.6.3). Here, X = 6* • *Y indicates transmitter oscillator frequency drift between two satellite passes. Here, Y =8*
Lat 1: 25.888S	*Solution 1. Platform latitude in degrees and thousandths of degrees*
Lon 1: 27.708E	*Solution 1. Platform longitude in degrees and thousandths of degrees*
Lat 2: 30.940S	*Solution 2. Platform latitude in degrees and thousandths of degrees*
Lon 2: 4.489E	*Solution 2. Platform longitude in degrees and thousandths of degrees*

6.3.6.3 Interpreting diagnostic information in DIAG and PRV/A results

The IQ transmission diagnostic indicators appear in the form XY. The meanings are:

X = 0	**No calculation of residual frequency error (fewer than four messages received)**
X = 1, 2, 3	**Unsatisfactory convergence of calculation**
X = 4	**Residual frequency error > 1.5 Hz**
X = 5	**0.15 Hz < residual frequency error < 1.5 Hz**
X = 6	**Residual frequency error < 0.15 Hz**
Y = 0	**No check on transmit frequency drift, as the two results are more than 12 hours**

	apart.
Y = 1	**Frequency discrepancy > 400 Hz** **Probably due to transmit frequency discrepancy, change of oscillator, etc.**
Y = 2	**Previous location is less than 1/2 hour old.** **Frequency discrepancy > 30 Hz, i.e. F/F (over 10 min) >2.5 E-8**
Y = 3	**Frequency drift > 4 Hz/minute, i.e. F/F (10 min) > 1.10-7**
Y = 4	**Frequency drift < 4 Hz/minute, i.e. F/F (10 min) < 1.10-7**
Y = 5	**Frequency drift < 2 Hz/minute, i.e. F/F (10 min) < 5.10-8**
Y = 6	**Frequency drift < 1 Hz/minute, i.e. F/F (10 min) < 2.5 . 10-8**
Y = 7	**Frequency drift < 0.4 Hz/minute, i.e. F/F (10 min) < 1.10-8**
Y = 8	**Frequency drift < 0.2 Hz/minute, i.e. F/F (10 min) < 5.10-9**

6.3.7 Get compressed results: /C

When /C is added after the first word in a command (ex: COM/C, DIAG/C, PRV/C), data will be expressed in compressed format (only one space between each field) to reduce data volume.

Interpreting compressed results is very similar to interpreting non-compressed results (as explained in preceding chapters).

Example:

COM/C,3,,111

Results:

Interpreting /C results

Prog 00003	*Program number*
00111	*Platform number*
25.888S	*Platform latitude in degrees and thousandths of degrees*
27.706E	*Platform longitude in degrees and thousandths of degrees*
3	*Location class (see location class table Chapter 1.2.3)*

064/0827Z	*Date (calendar day) and UTC time (Hours and Minutes) of the last data collection*
-064/0442	*Date (calendar day) and UTC time (Hours and Minutes) of the last location*
(30)	*Message compression index: number of identical messages received during a satellite pass*
00	*Value of sensor n° 1*
55	*Value of sensor n° 2*
AA	*Value of sensor n° 3*
FF	*Value of sensor n° 4*

6.3.8 Secure SSH connection

SSH (Secure Shell) refers to a network protocol as well as a group of programs using this protocol. SSH allows users to establish a secure connection and transfer files between a remote and a local computer.

SSH provides confidentiality and integrity of data exchange, as the connection is encrypted. Furthermore, SSH uses a double client/server message authentication code to prevent non-authorized users from accessing the server.

To take advantage of the SSH TELNET connection with Argos centers, users must contact User Services.

6.4 ArgosDirect

6.4.1 Why use ArgosDirect

ArgosDirect automatically sends data to users by e-mail, FTP or CD-ROM. ArgosDirect allows users to receive their data in table format or in the same formats as ArgosServer (see **Chapter 6.3**).

ArgosDirect is a flexible service, designed to meet your needs. Subscribing to this service is easy. To do so, a program manager merely needs to fill in the **ArgosDirect form**, which can be downloaded from our website: **https://www.argos-system.org/html/userarea/forms_en.html**. For any additional information or advice, please contact your local User Services.

6.4.2 Delivery frequency and options

Data can be sent at the following frequencies:

Every satellite pass	Users can request that their data be sent as soon as received and processed by the Argos center. This regular delivery service ensures that data is sent to the user almost immediately after each new location or message is

	processed.
Pre-defined period	Establishing a pre-defined period for data allows data to be collected over time, minimizing the number of individual files or e-mails to be sent to the user. (from one to four days maximum)
Several times per day	Data can be sent several times per day (every *x* hours).
Every month	Argos data can be sent to users once a month.

Argos DataBank: All Argos data is kept in our archives for 12 months. Users can request that their archived data be sent to them, subject to charges. Please contact the local User Services to request an invoice and use this service.

Data can be sent in the following manners:

FTP	Data will be transferred to a predefined folder on the user's server via the Internet.
E-mail	User's data will be sent to their email inbox (either as an attachment or in the text body).
Postal service	For archived data on CD-ROM (sent by Argos DataBank).

6.4.3 Data formats

Data is sent in the same formats as for ArgosServer. Data can also be sent to users in table format, in a .CSV file.

For messages received during a satellite pass (See Chapter 6.3.6.2)

```
00009 00001  10  4 D 1 2007-03-23
08:16:30  43.552    1.483  0.213
401650001
     2007-03-23 08:14:00  1
082          08          14          00
     2007-03-23 08:15:00  1
```

```
082          08          15          00
     2007-03-23 08:15:30  1
082          08          15          03
     2007-03-23 08:16:00  1
082          08          16          00
     2007-03-23 08:17:00  1
      082          08          17          00
     2007-03-23 08:17:30  1
082          08          17          03
     2007-03-23 08:18:00  1
082          08          18          00
     2007-03-23 08:18:30  1       082
  08          18          03
     2007-03-23 08:19:00  1
082          08          19          00
```

For the best or most significant message per satellite pass (See Chapter 6.3.6.2)

```
Prog 00009

 00001  43.552N   1.483E   1
082/0818Z-082/0816
  ( 1)       082          08          18          03
```

Diagnostic data (See Chapter 6.3.6.1)

```
Prog 00009

 00001  Date : 23.03.07 08:16:30  LC : 1
IQ : 68
     Lat1 : 43.552N  Lon1 :   1.483E  Lat2 :
57.258N  Lon2 :  73.021W
     Nb mes : 009  Nb mes>-120dB : 001
Best level : -120 dB
     Pass duration : 300s   NOPC : 4
     Calcul freq : 401 650000.6 Hz
Altitude :  213 m
           082          08          18          03
```

All messages per satellite pass + Transmitter diagnostic information (See Chapter 6.3.6.2)

```
00009 00001  10  4 D 1 2007-03-23
08:16:30  43.552    1.483  0.213
401650001
     2007-03-23 08:14:00  1
082          08          14          00
     2007-03-23 08:15:00  1       082
  08          15          00
     2007-03-23 08:15:30  1
082          08          15          03
     2007-03-23 08:16:00  1
082          08          16          00
```

```
    2007-03-23 08:17:00  1
082         08          17          00
    2007-03-23 08:17:30  1
082         08          17          03
    2007-03-23 08:18:00  1
082         08          18          00
    2007-03-23 08:18:30  1
082         08          18          03
    2007-03-23 08:19:00  1
082         08          19          00

    009 msgs 001>-120dB  Best:  -120
Freq:  650000.6  IQ : 68
    Lat1: 43.552N  Lon1:   1.483E  Lat2:
57.258N  Lon2:  73.021W
```

6.4.4 Security options

Users may request that their data be encoded for all email or FTP deliveries, at no additional cost. The user should contact User Services to request encoding. User Services will send a guide to explain the encoding process.

6.5 ArgosShare

6.5.1 Why use ArgosShare

Argos users can share their data in the following ways:

- by authorizing "Accounts on copy" so other users can access their data via ArgosWeb or TELNET
- by asking User Services to send data to different addresses
- by requesting meteorological data to be posted on the Global Telecommunications System (GTS), a public network run by the World Meteorological Organization (WMO) for worldwide weather centers

6.5.2 Criteria for sharing data

Data selection	**By program:** Data from one or more program(s) can be shared. **By platform:** Access to data can be restricted to one or several designated platforms.
Options	**By date:** For each platform or program in ArgosShare, the user chooses a Start Date and End Date. By default, the Start Date is the day the service was requested, but the Start Date can

	also be programmed in advance. The Start Date cannot be retroactive. The End Date is optional. If it is left blank, ArgosShare will be effective as long as the platform is active. **By geographic zone:** ArgosShare can be linked to a particular geographic zone. Users on copy will only have access to data when the platform is in the particular zone. If the platform leaves the zone, the data it transmits will not be shared. The geographic zone can either be a polygon (defined by latitude and longitude), a circle (defined by its center point and radius), or any combination of several polygons and circles. 

The above options also apply when sharing data with Argos users (or non-users) via **ArgosDirect**.

6.5.3 How to set up ArgosShare

The user can easily set up ArgosShare by contacting User Services.

It is also possible to set up ArgosShare on ArgosWeb. The user just needs to logon and click on Settings → Program or Settings → Platform in the left menu. Online help pages explain the process in detail.

6.6 ArgosMonitor

6.6.1 Why use ArgosMonitor

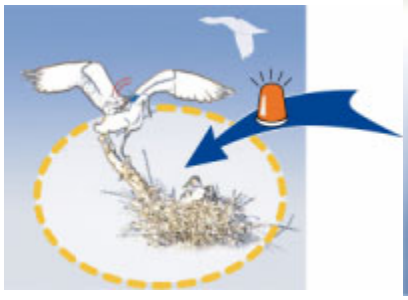
ArgosMonitor is a value-added service that allows users to monitor their platforms remotely. ArgosMonitor reports on the position and the activity of your platforms, as well as their current state. As soon as ArgosMonitor detects an anomaly in a platform's behavior, ArgosMonitor will alert the user by email, fax, or sms.

6.6.2 Alert services

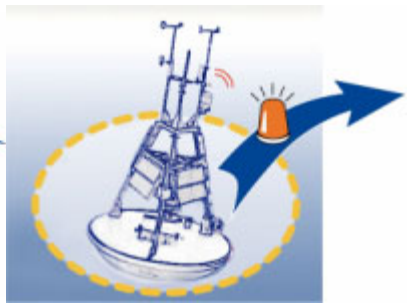
This service alerts users when an "event" that they have identified with the User Services occurs. For example, ArgosMonitor sends an alert if:

- a sensor changes state
- a platform that is meant to be stationary suddenly moves significantly (for example, your moored buoy starts to float away...)
- a platform enters/exits a pre-defined zone (a bird returning to its nest...), etc.
- a platform stops transmitting for an abnormally long period of time

All alert messages are sent by email, fax, or sms, according to the user's preference.



ArgosMonitor service for biologists



ArgosMonitor service for meteorologists and oceanographers

6.6.3 How to set up ArgosMonitor

To subscribe to this service, please download the ArgosMonitor form, fill it in and send it back to User Services. This form is available: **https://www.argos-system.org/html/userarea/forms_en.html**

6.7 GTS

6.7.1 About GTS distribution service

The Global Telecommunication System (GTS), is a network run by the **World Meteorological Organization (WMO)**, to facilitate data exchange between national weather centers. Data from a number of Argos programs are important for the GTS, namely because they can be fed into national weather centers' real-time weather forecasting models.

Argos users can contribute by authorizing the distribution of their meteorological and oceanographic data to the GTS processing system, free of charge.

Data are automatically quality-controlled and put into WMO formats in order to be posted on GTS.

Nevertheless, posting data onto the GTS does not impact the structure or content of the initial Argos data. Therefore, users may request other formats than GTS formats for the data they receive. For example, the Argos processing center can apply different types of processing and calibration curves according to whether the data is to go onto the GTS or to the Principal Investigator (PI). The PI can receive the raw data. Similarly, file updates on GTS requirements/specifications (e.g. removing a transmitter, or removing or recalibrating a sensor) have no impact on a user's Argos requirements/specifications.

6.7.2 How to set up GTS distribution service

Users can request that their data be distributed on the GTS by contacting User Services and filling out a GTS technical file. The user must also contact the **DBCP** in order to **obtain a WMO number**, essential for transmitting data via GTS.

To suspend or cancel authorization at any time, the user must contact User Services.

Glossary

A

Account: An Argos account is set up for every user. Each account is assigned a user name and password used to access data. A user may have more than one account.

Argos: Satellite-based location and data collection system dedicated to studying the environment, developed as a result of French-American cooperation between CNES and NOAA.

Argos message processing: Decoding the binary sequences that form Argos messages. This processing converts raw data into physical values.

Argos processing system: A set of software used to process and distribute Argos data.

ArgosDirect: Automatic data distribution service that uses email, FTP, CD-ROM or Fax.

ArgosFlash: Publication featuring all the latest technical news about using and operating the system together with all the new services available.

ArgosForum: Publication in which users can present their projects and the results they have achieved using the Argos system.

ArgosServer: The Argos data access service available by connecting to one of the two CLS servers using TELNET protocol: - ArgosServer.cls.fr, - ArgosServer.clsamerica.com (for users in North America).

ArgosWeb: Data access service that uses a secure network interface accessible via the website www.argos-system.org. Several other functions are also available via this service: display or download data in different formats (maps and tables), change parameters, forecast satellite passes, etc.

B

Beacon: An alternative term for an Argos platform or transmitter.

Binary sequence: A sequence of binary values that forms a message, made up of 0's and 1's.

Bit: Binary unit. This is the basic digital communication character, which has a value of 0 or 1.

Block (binary element): A block is a sequence of standard elements repeated several times in the same Argos message. This type of element is used to declare sets of measurements (e.g.: the Temperature, Salinity, Pressure triplet) that are repeated several times in an Argos message.

Bps: Bits per second. The unit used to measure data transmission speed. It is usually used in terms of multiples: Kbps (thousands of bits per second).

Byte: String of 8 bits.

C

Calendar day: The number of the day counted since the beginning of the year. For example, February 10 is Day 41.

Calibration curve: Set of values or coefficients used to describe the transfer function used by the Argos processing system to convert binary data from sensors into physical values.

Certification: Every type of Argos transmitter or transmitter/receiver has to be tested and certified by CLS to ensure compliance with the Argos system. A list of certified transmitter manufacturers can be found via on the Argos website, www.argos-system.org.

Checksum: Part of the transmitted message used to check data integrity. Using a coding algorithm, the platform computes a sum and encodes it in the message. Argos processing uses the same algorithm to decode this sum and check it.

CLS: CLS, (Collection, Location, Satellites), is the name of the company set up to operate the Argos system.

CNES: CNES (Centre National d'Etudes Spatiales), French Space Agency. Project Manager for the manufacture and development of Argos instruments carried on board satellites. This agency is CLS's main shareholder.

Compression (Index): All identical and consecutive Argos messages received from the same transmitter during a satellite pass are presented as a single message. This message is signaled by a "Compression index", indicating the number of messages received and transmitted.

D

Databank: ArgosDirect sends the databank to users every month, on CD-ROM or by email.

DBCP: Data Buoy Cooperation Panel. http://www.jcommops.org/dbcp/

Digital elevation model (DEM): Topographic representation based on standard grids.

Doppler Effect: The Doppler Effect is the change in frequency of a sound wave or electromagnetic wave occurring when the source of vibration and observer are in motion relative to each other.

Drifter: Drifting measuring instrument used in Oceanography, Glaciology and Maritime Meteorology. Thousands of drifters fitted with various kinds of sensors (temperature, salinity, pressure, wave direction, etc.) and Argos transmitters are deployed throughout the world's oceans.

Duty Cycle: Argos platforms may either transmit at all times or according to a duty cycle adapted to each application. Examples of duty cycles: - 12 hours transmission ON, 8 hours transmission OFF, - 10 hours every two day.

E

EUMETSAT: EUropean organisation for the exploitation of METeorological SATellites. http://www.eumetsat.int/Home/index.htm

F

Frequency: Frequency is the number of times that an event has been or is observable over a given period of time. Frequency is thus the inverse (in mathematical terms) of the period. f = 1 / t. If the unit of time chosen is the second, then frequency is measured in hertz (Hz), named after the physicist Heinrich Hertz. • Argos transmission frequency: Frequency at which the platform transmits. It should be between 401.620 MHz and 401.680 MHz. • Receive Frequency: Frequency measured by the Argos receiver on board the satellite. This is the transmission frequency distorted by the Doppler Effect. • Computed frequency: Since the actual transmission frequency is not known, it has to be computed and updated after every location calculation.

FTP: File Transfer Protocol. Communication protocol dedicated to electronic file transfer over a TCP/IP network. It is used for sending files between computers.

G

Gaussian: Said of a result distribution, or a related phenomenon, when its graphic transposition gives a Gauss curve.

GPS (Global Positioning System): GPS is a satellite-based positioning system.

GTS: Global Telecommunication System: Data interchange network for the meteorological offices of all the countries involved in the World Weather Watch (WWW).

H

Hexadecimal: The hexadecimal system is a numeral system with a radix, or base, of 16.

I

Identification (Number) - ID: Every Argos transmitter is programmed with a unique ID number made up of 20 or 28 bits. CLS is the only organization authorized to allocate Argos ID numbers.

IFREMER: Institut Français pour la Recherche et l'Exploitation de la Mer - French Research Institute for Exploitation of the Sea. http://www.ifremer.fr/anglais/ One of CLS's main shareholders.

L

Least squares method: The least squares method, independently developed by Gauss and Legendre, is used to compare experimental data, generally subject to measurement error with a mathematical model assumed to describe these data. This model may take various forms. It may involve energy conservation laws with which the quantities measured must comply. The least squares method therefore serves to minimize the impact of measurement error by "adding information" in the measurement process. Usually, the model is a family of functions $f(x,á)$ of one or more dummy variables (x), indexed according to one or more unknown parameters (á). The least squares method is used to select the function that reproduces the experimental data most closely. We also talk of adjusting according to the least squares method. If the parameters have a physical significance, the adjustment procedure also gives an indirect statistical estimate of the value of these parameters.

Location class: The location class is a rating allocated to every location computed depending on the error estimation. The error estimation depends on the geometrical conditions of the satellite pass at the time of receiving messages and on the stability of transmitter frequency.

Location Service Plus/Auxiliary Location Processing: This value-added service provides additional information concerning transmitter performance and non-standard locations, for example, locations calculated using less than four messages (Class A, B and Z locations). Location Service Plus/Auxiliary Location Processing is activated by default for some applications, such as wildlife monitoring.

M

Message: Series of bits transmitted by an Argos transmitter. A message may vary in length from 32 to 248 (or 256) bits.

MetOp: A series of meteorological satellites developed by Eumetsat, (http://www.eumetsat.int/Home/index.htm) as part of the European Space Agency's (ESA) meteorological missions (http://www.esa.int/esaLP/LPmetop.html).

MHz: Megahertz. (1 million hertz) Hertz is the unit of measurement for frequency.

N

NASA: National Aeronautics and Space Administration (United States). Project Manager for the integration and launch of NOAA satellites.

NESDIS: National Environmental Satellite, Data and Information Service. A department of NOAA, the NESDIS manages satellites in orbit and ground stations, collects remote measurement dataflow, deals with demultiplexing and relays satellite data to the Argos global processing centers located in Maryland, USA and Toulouse, France.

NOAA: National Oceanic and Atmospheric Administration. http://www.noaa.gov/ By extension, the name given to satellites launched by NOAA, for example, NOAA-K.

O

Operations Committee (OPSCOM): International committee that supervises operation and use of the Argos system. It includes members from CNES, NOAA and Eumetsat. The Operations Committee examines and approves applications to use the system (System Use Agreements, or SUA).

Orbitography beacon: An Argos beacon fitted with a highly stable transmitter whose geographical position is known precisely. The network of orbitography beacons is used to determine the exact orbits of Argos system satellites, essential for Argos location calculations.

Oscillator: Component of an Argos transmitter that controls transmission frequency. The more stable the oscillator, the more accurate the location calculations.

P

Platform: Equipment used for measurement (a set of sensors) and communication (certified transmitter/receiver). Synonym: beacon.

Platform model: The name of the equipment sold by the manufacturer.

POES: Polar Orbiting Environmental Satellite. Name of the series of NOAA satellites carrying Argos instruments onboard.

Polar orbit: The orbit of a satellite that passes over or close to the Earth’s poles.

Processing Center: Processing centers receive raw satellite telemetry data, using it to calculate locations and process messages to send data to users. Two processing centers, one in Maryland in the United States and the other in Toulouse, France, ensure continuity of service.

Program: A program includes all Argos platforms used for the same project, belonging to a user and for which a System Use Agreement (SUA) has been approved. Every program is allocated a unique number by CLS.

PTT: Platform Transmitter Terminal. One-way transmitting platform. See “Platform”

Purchase Order: Contract between CLS and the user defining the services ordered by the user.

R

Raw telemetry data: Messages received and stored on board the satellite, which are then transmitted to the ground for processing.

Real time/deferred time: See Receiving antenna

Receiving antenna: Ground antennas that receive Argos data from satellites. There are two types of receiving antennas: • Global receiving antenna: There are three main antennas, also known as global receiving stations, in the world. Two of these are NOAA stations on Wallops Island and at Gilmore Creek/Fairbanks in the United States. They are used to send commands to satellites and especially to “dump” data stored on onboard recorders. The third is a station operated by EUMETSAT in Svalbard. • Regional receiving antenna: Regional receiving stations receive data in real time, when a satellite passes through their area of visibility. Thus, all the data from platforms is received when simultaneously within the area of visibility of the antenna and the satellite. These antennas are also known as “real-time” stations.

Repetition period: The interval between two consecutive message transmissions from the same transmitter. It is related to the ID number that CLS allocates to every transmitter.

S

Satellite pass: Period of time during which a satellite receives messages from a platform. A pass generally lasts for ten minutes.

Sensor: An electronic measurement instrument that converts physical values (pressure, temperature, wind strength or direction, etc.) into digital signals.

Sigma: Standard deviation of a Gauss curve. See “Gaussian”

Significant (most significant message): The most frequently-received message from a platform, from a series of identical consecutive messages, during one satellite pass.

SSH: Encryption protocol for data transfer. Connection to the ArgosServer can be SSH-secured upon request to CLS.

Standard element: A standard element is a sequence of bits which, once decoded, provides a value (integer or real) or character chain.

Sun-synchronous orbit: A geocentric orbit where the satellite's orbit period is commensurate with the period of the Earth's orbit around the Sun.

System Use Agreement (SUA): The agreement covering use of the Argos system. A form that all future users must fill in to use the Argos system. The SUA must be approved by the Operations Committee for the creation of new programs and renewal of existing programs.

T

TELNET: TELecommunication NETwork is a network protocol used on any network that supports TCP/IP protocol. A Telnet session can be opened on a CLS server by entering "Telnet" on the command prompt using most operating systems (Windows, Unix, etc.).

Transfer function: Algorithm used at Argos processing centers to convert the raw data contained in messages from a platform into physical values. A transfer function describes all the mathematical operations that define the relation between system input and system output.

Transmitter: Argos platform transmission electronics, also known as a Platform Transmitter Terminal (PTT). Must comply with the specifications furnished by CNES if it is to be certified by CLS.

U

User Services: User Services is the users' contact point for managing their Argos programs. There are User Services Groups in various countries.

UTC: Universal Time Coordinates, or Greenwich Mean Time 0°. Also called Zulu Time (Z).

V

Visibility (Circle of): Each satellite sees, simultaneously and constantly, all the platforms within a circle 5,000 km in diameter, known as the circle of visibility.

W

WGS 84: World Geodetic System 1984: latest revision of 1984. Argos locations are computed in this reference frame.

WMO: World Meteorological Organization www.wmo.int