

Procedure for becoming a SIRGAS-CON station

Version 1.4. March 13, 2017

(Previous release: Version 1.3. March 12, 2013)

Changes/Additions:

March, 2017: Update of some Internet links.

March, 2013: Update of some Internet links.

November, 2010: Recommendations about i) number of photos per station, ii) availability of observations in HATNAKA format, and iii) structure of directories containing daily observations are included. These recommendations were given by the SIRGAS 2010 General Meeting (November 11 and 12, 2010 in Lima, Peru).

September, 2010: The new SIRGAS FTP server is included.

This document describes the guidelines to integrate a new continuously operating GNSS station into the SIRGAS-CON network. It was prepared by the SIRGAS-WGI and complemented with suggestions sent by SIRGAS colleagues who carefully read its content. This support is highly appreciated.

In order to keep this document up-to-day, we thank you for sending comments, questions, and suggestions to Víctor Cioce, president of the SIRGAS-WGI: Reference System (vcioce@fing.luz.edu.ve).

SIRGAS was initially realized by two GPS campaigns, one in 1995 (SIRGAS95) with 58 stations, and one in 2000 (SIRGAS2000) with 184 stations. Today, SIRGAS is realized by a network of continuously operating GNSS stations with precisely known coordinates (referred to an specific reference epoch) and their changes with time (station velocities). This SIRGAS Continuously Operating Network (SIRGAS-CON) is currently composed by approximately 400 GNSS sites, see www.sirgas.org.

Since the national reference frames in Latin America are being modernized by the installation of new permanent operating GNSS stations, and these stations must be integrated into the SIRGAS-CON network to be compatible with the continental reference frame, the SIRGAS Working Group I (Reference System) presents in the following a set of basic guidelines to facilitate the addition of new permanent sites into the SIRGAS-CON structure.

SIRGAS-CON Structure

The main components of SIRGAS-CON are (see: ***“Guidelines for the Coordination of the SIRGAS Continuously Operating Network, SIRGAS-CON”***):

- **Operational Centres (OC)**, in charge of installing and ensuring the adequate functioning of the tracking stations;
- **National Data Centres (NDC)**, in charge of managing, storing, and making available the station observations to the users;



- **Regional Data Centre (RDC)**, in charge of archiving in a long-term basis the observational data of the SIRGAS-CON stations processed in the frame of IGS-RNAAC-SIR (IGS Regional Network Associate Analysis Centre for SIRGAS);
- **Analysis Centres** (Processing and Combination Centres), in charge of processing the station observations and estimating, among others, coordinates and velocities for the stations;
- **Network Coordinator**, responsible for the general management of the SIRGAS-CON network. The Network Coordinator corresponds to the SIRGAS-WGI President and can also be identified as the SIRGAS-CON Coordinator.

Data Policy

Operational Centres and National Data Centres are institutions or organizations in a SIRGAS member country that are willing to provide free-of-charge observational data from one or several continuously operating GNSS station to SIRGAS on a long-term basis. The SIRGAS Analysis Centres are also institutions or organizations which voluntarily participate in SIRGAS by processing a set of SIRGAS-CON stations following specific standards and conventions to guarantee the quality of the SIRGAS-CON products (see *“Guidelines for SIRGAS Analysis Centres”*). The solutions (in form of station coordinates and velocities, SINEX files, time series for station coordinates, etc.) generated by the Analysis Centres are free-of-charge and available for everyone. Nevertheless, the SIRGAS Analysis Centres, as well as the Regional Data Centre, can not provide observational data of the SIRGAS-CON stations to third parts without authorization of the corresponding Operational Centre or National Data Centre. Each governmental, academic, scientific, or private institution joining SIRGAS has to agree with this data policy.

Initial steps to become a SIRGAS-CON station

1. Contact the Network Coordinator concerning the intent to install the station, the schedule for implementation, and a statement of desire for the station to be considered as part of SIRGAS-CON;
2. Make sure the station satisfies the SIRGAS-CON station requirements (See *“Guidelines for the installation of SIRGAS-CON stations”*);
3. Once the station is installed and operational, choose a 4-character station identifier. To prevent duplication, the selected identifier must be checked at: <ftp://igs-rf.ign.fr/pub/DOMES/codomes.snx>;
4. Request a Domes number for the new station to the IERS (International Earth Rotation and Reference Systems Service): http://itrf.ensg.ign.fr/domes_request.php;
5. Prepare a site log file (station information) for the new station. A blank site log form is available at <http://www.igs.org/network/information>. It must be completed including the Domes number given by the IERS and following the instructions given at ftp://www.igs.org/pub/station/general/sitelog_instr.txt. Examples of site logs are accessible at <ftp://ftp.sirgas.org/pub/gps/DGF/station/log>;
6. Once all this information is ready for use, address a communication to the SIRGAS Network Coordinator indicating the operability and data availability of the new station. The following station information must be included:



- a. A letter of support subscribed by the SIRGAS national representative or his substitute.
- b. A complete site log file, specifying responsible institution and name, mailing address and e-mail/phone/fax of at least two contact persons;
- c. Site photographs. It is recommended to send four photographs: a photograph showing the monument (pillar/braced/building) and antenna, a photograph showing the mark (i.e. a close-up photograph that shows how the antenna is attached to the monument) and two additional photographs showing name, type, and series number of the receiver and of the antenna;
- d. Data access information: server address, login, password and directory. The preferred access protocol is FTP, because data can be uploaded by Processing Centres in an automatic way;
- e. The observations shall be available in compressed RINEX format, the so-called HATANAKA format (<http://sopac.ucsd.edu/hatanaka.shtml>) and stored following the structure

/year/day of year/

For instance, observations of station CONZ on August 26, 2010 shall be given in:

2010/238/CONZ2380.10d

7. After reception of this communication, the SIRGAS Network Coordinator will give you a first indication on the suitability of the station to be included in the SIRGAS-CON network. Afterwards, subscribe to the SIRGAS Mail (instructions at <http://sirmail.dgfi.tum.de/>);
8. Once the Network Coordinator has accepted and approved the site log file and has checked the data flow (FTP access), he will provide these information to the Processing Centres responsible for processing the sub-network where the station will be included;
9. When the data quality and consistency controls performed by the Network Coordinator are successful, the station will officially be integrated into the SIRGAS-CON network previously agreement with the SIRGAS Executive Committee. The Network Coordinator will announce, through the SIRGAS Mail Explorer, the addition of the new station and the Processing Centres in charge of its processing.

Tasks and Responsibilities of the SIRGAS Operational Centres

The Operational Centres control a set of stations (local or national network) from the operational point of view. They are the link between the tracking stations and the National Data Centres, which make available the observational data to the Analysis Centres. In the particular case of SIRGAS, the Operational Centres of some national reference networks are the same National Data Centres; therefore, they shall also assume the Operational Centre responsibilities.

The Operational Centres are responsible for:

1. Downloading raw data from the receivers of the local network. The communication between the tracking stations and the Operational Centre can be done through dialup



modem, Internet, special-purpose data links, Inmarsat, etc. Internet connections are highly recommended;

2. Archiving the original raw data from sites in a long-term basis. All observational data should be preserved in order to make them available, if a reprocessing of the stations is necessary;
3. Reformatting of the raw data into the RINEX format (Receiver Independent Exchange Format). It is desirable to generate daily archives (24 hours), containing the observations collected between 00:00:00 and 23:59:30 GPS time. The sampling rate (observation interval) should be 30 seconds. In case of a higher original observation rate a decimation of the data to the currently adopted 30 seconds (i.e. 5, 10, or 15 seconds) is advisable. Only RINEX observations files are necessary;
4. Preparing the RINEX files in HATANAKA format and compressing them using the standard Unix compress programs or freeware compression software for Windows, for example, Winzip, 7zip, etc. The observation files have to be named according to the following table:

File Type	ASCII File	Compressed File	
		Unix	Windows
Observation file in HATANAKA format	<i>sssdddf.yyd</i>	<i>sssdddf.yyd.Z</i>	<i>sssdddf.yyd.gz</i>
Observation file in RINEX format	<i>sssdddf.yyO</i>	<i>sssdddf.yyO.Z</i>	<i>sssdddf.yyO.gz</i>

sss 4-character station code
ddd day of the year of the first record
yy 2-digit year
f file sequence number within the day (0: containing all data of the day)

5. Providing the header of RINEX file with the correct information (in agreement with the site log file), especially
 - a. four-character site code (“MARKER NAME” field);
 - b. DOMES number (“MARKER NUMBER” field);
 - c. the North, East and Up eccentricities of the antenna (“ANTENNA: DELTA H/E/N” fields);
 - d. the receiver serial number, type and firmware version (“REC # / TYPE / VERS” fields);
 - e. the antenna serial number and type including the radome information (“ANT # / TYPE” fields).

This information has to be up-to-date and has to strictly follow the agreed-upon IGS conventions (see ftp://igs.org/pub/station/general/rcvr_ant.tab).

6. Performing a quality check of the data before making them available to the Processing Centres. The TEQC software (<http://www.unavco.org/facility/software/teqc/teqc.html>) or the BNC Tool (BKG Ntrip Client, (<http://software.rtcn-ntrip.org/export/HEAD/ntrip/trunk/BNC/src/bnchelp.html>)) can be used for this task. A minimum verification should consist of a check of: total number of observations, total number of observed satellites, date of the first observation record in the file, station



- name, receiver/antenna types, and antenna height. Files, which do not meet the minimum verification, should not be available for the Processing Centres;
7. Making RINEX files available to the National Data Centre or SIRGAS Processing Centres within the two days following the observation date;
 8. Subscribing to the SIRGAS Mail Exploder (see instructions at <http://sirmail.dgfi.tum.de/>) in order to inform about changes in the stations;
 9. Updating site log files, if any modification (especially changes in antenna, radome, and physical space surrounding the antenna) occurs on the station. The updated site log file has to be sent within the two following days to the Network Coordinator. The changes must also be reported through the SIRGAS Mail Exploder (see section ***“SIRGAS Mail Exploder messages”*** at the end of this document). If an advisory of site log inconsistencies is received from the Network Coordinator, the site log must be corrected as soon as possible;
 10. Reviewing and updating site log files at least once per year. Modified log files shall be sent as soon as possible to the Network Coordinator;
 11. Informing any operational problem (abnormal conditions) related to the station, for instance, data interruptions due to equipment or infrastructure problems. This report shall be distributed through the SIRGAS Mail Exploder within the two days following the event.

SIRGAS Mail Exploder messages

When sending a message to the SIRGAS Mail Exploder about a particular station or stations, include the four-character site abbreviation in the subject field. Instructions on sending a SIRGAS mail are available at <http://sirmail.dgfi.tum.de/>.

An advisory SIRGAS mail message should be sent in the following cases, in advance if possible, otherwise within two business days:

- a. Changes in antenna, radome, monument, receiver, cabling, frequency standard, receiver configuration such as elevation cut off angle, or environment (such as tree removal or building construction). In general, any change which can affect position solutions. Briefly describe in the message what was changed;
- b. If a station is expected to be unavailable for more than one day;
- c. When a site is decommissioned permanently;
- d. When a problem or error in the station or its site log is discovered and corrected. Briefly describe in the message what was changed;
- e. When a RINEX file has to be replaced (resubmitted) because the original one has a problem;
- f. The agency accepting responsibility for proper station operation must read the SIRGAS mail on a regular basis, either by subscribing or regularly checking the web archive. See <http://sirmail.dgfi.tum.de/> for subscription information.