Individual Stations

Status of the IGS Stations Provided by the Norwegian Mapping Authority in 1997

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1 Introduction

In 1997, the Norwegian Mapping Authority (NMA) provided data from two continuously operating stations in Norway, namely Ny-Ålesund and Tromsø, to IGS. In addition, NMA gathered and distributed data from the Scandinavian stations Onsala, Metsahovi and Thule.

2 Operation and Changes at the Sites

During the year, we experienced considerable problems with old Rogue SNR-8 receivers at Ny-Ålesund and Tromsø. However, with extensive support from JPL, we were able to get them operational again.

For several reasons, we could not guarantee the stability of our antenna pillars in Tromsø and Ny-Ålesund. Therefore, new antenna pillars were built at both sites. On these new pillars, a Rogue SNR-800 was installed in Tromsø, and a Rogue RM-12 at Ny-Ålesund. The old Rogue SNR-8 receivers and their antennas will be kept working on their old antenna pillars as long as possible for investigation of imaging.

At Høfn, Iceland, a new station has been established with NMA equipment. However, due to environmental problems, it was not possible to get our equipment operational in 1997 and to download data reliably.

We decided to operate our antennas without radomes. In order to avoid problems with snow, the antennas are mounted on steel towers of 3 to 5 m height. The plates at the top have minimal sizes thus reducing multi path.

3 Data

As a result of the problems with the Rogue SNR-8 receivers the stations did not provide data reliably over the complete year. In particularly, Tromsø did not produce data for several months.

The download software has been modified. It now handles data from different receivers, and data are download every hour. At Ny-Ålesund and Tromsø, the computers used for down-loading are parts of NMA-LAN and connected to Internet. At Høfn, the computer is connected to a ISDN line.

Within a JPL project related to low orbiting satellites, JPL collects the data direct from the stations operated by NMA every hour. NMA collects data from the stations

once a day, concatenates the hourly files to one daily file, RINEXes the data and FTPs these files to IGS.

4 Outlook

In 1998, NMA will incorporate a quality check of all data as a part of the RINEXing program.

This quality check will aim at increasing the data coverage and the reliability and consistency of the data. Furthermore, it is planned to create a data archive for our IGS, as well as other continuously operating stations, where authorized users will get access to current and past RINEX files.

UPAD Status Report for 1997

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1 Introduction

The GPS station UPAD of the University of Padova has been operating since 1994 as a permanent installation in support of the International GPS Service for Geodynamics (IGS), and of the European initiatives EUREF and CERGOP. In 1997, our University joined UNAVCO. The UPAD station serves the scientific and tutorial needs of the Department of Geology, Palaeontology and Geophysics for the application of GPS data to Earth Sciences, and of the Interdepartmental Center for Space Activities (CISAS) for the application of GPS techniques to Space Engineering, Space Communication and Navigation. The station is located in downtown Padova, on the roof of the University Main Building, near a Geodetic Dome formerly used for astrolabe observations.

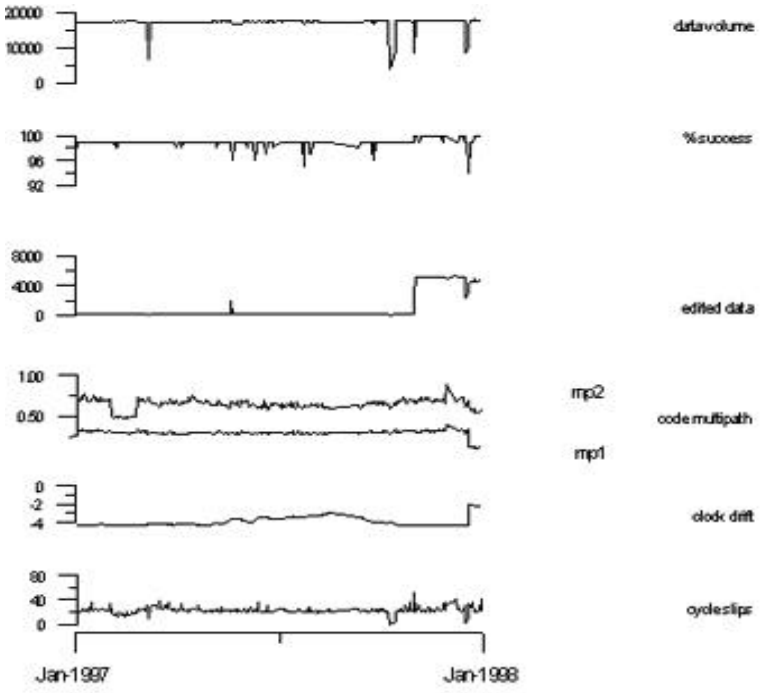

Figure 1: daily statistics of the UPAD data computed with QC. All unitless except clock drift (msec/hour)

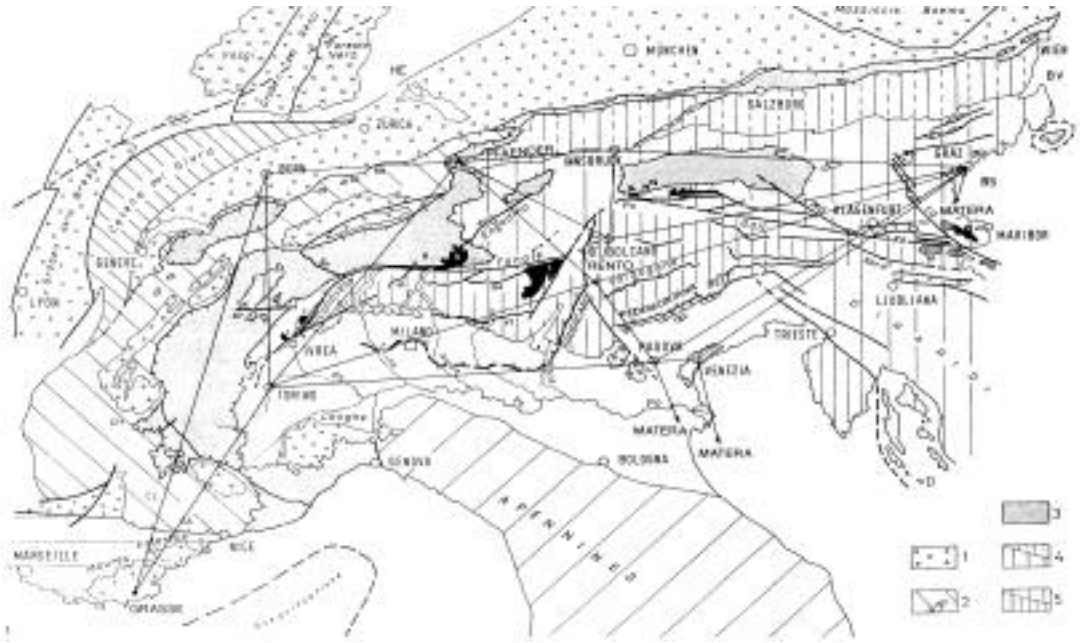

Figure 2: Network of permanent stations processed at UPAD. Units shown are Molasse(1), External units (2), Penninic- oceanic (3), Austroalpine (4) and Southalpine and Dinaric (5).

2 Instrumentation

As in the previous years, the station operated throughout 1997 with the TRIMBLE 4000SSE receiver and geodetic antenna with groundplane,. In September, new equipment was tested off-line. This included a TRIMBLE 4000 Ssi, chocke ring antenna and the control software URS, under OS2. The tests occasionally implied a period of down-time for the 4000 SSE receiver. Before the new system went to regular operation, an increase of edited data, as reported by the QC program (Figure 1), was noticed. This was probably due to a transmitter nearby, but the final computation of the baselines seems unaffected. The receiver clock also showed a decrease in drift this summer, caused by temperature gradients in the room housing the receiver. Multipath was at nominal values and dropped sensibly after Dec. 21 with the new system, indicating a higher immunity of the chocke ring antenna. A new modem was installed to support the local BBS. The local PC is configured as a FTP server to provide both by phone and Internet/FTP access.

3 Analysis Software

Bernese 4.0 was installed on a dedicated PC Pentium 266MHz in April. Systematic, semiautomatic analysis started in July 1997, with data from 11 stations being processed with analysis strategies recommended for regional networks (Figure 2).

Report on IGS Global Station Jozefoslaw (JOZE)

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The IGS permanent GPS station Jozefoslaw (JOZE) is located at the Astrogeodetic Observatory of the Institute of Geodesy and Geodetic Astronomy of the Warsaw University of Technology, 14 km southwards from the Warsaw city center. The Observatory was established in 1959 and at present, the following permanent services are maintained:

- GPS permanent service has been maintained since August 1993. Earlier, the station participated in the IGS Epoch'92 Campaign. As a basic GPS equipment the Trimble 4000SSE receiver serial No. 3249A02090 and antenna Trimble Geodetic L1/L2 No. 3247A66429 are used. Three rubidium frequency standards are available at the station; one of them is used as an external standard for IGS service. On January 1, 1995 the second GPS receiver, a TurboRogue SNR8000, serial No. 339 with the antenna type Dorne Margolin T No. 442, was installed at the station. The permanent GPS IGS service is maintained by both receivers (Trimble 4000SSE and TurboRogue SNR8000). The Trimble 4000SSE serves as the main receiver and the observations collected by this receiver are transmitted to the international data centers. The observations from Jozefoslaw are used for both IGS service and for maintenance of the EUREF system. The observations of the TurboRogue SNR receiver are available upon request for all interested centers for scientific research. Additionally, in some periods of 1996 and 1997, other types of GPS receivers were temporary installed at the station Jozefoslaw. They were: Ashtech ZXII-3, Leica SR9500 and Zeiss RM24. The observations were performed to study some instrumental effects, multipath and atmospheric (ionosphere and troposphere) influences.

- The station JOZE takes part in the works of the IGS Ionosphere Working Group.

- Gravimetric permanent tidal observations are carried out using LaCoste & Romberg, mod. G gravity meter. This service has been maintained since November 1993. The Observatory is incorporated to the international network of tidal observatories of the International Center for Earth Tides (ICET) of the Federation of Astronomical and Geophysical Data Analysis Services (FAGS) as station No. 0909. The Observatory Jozefoslaw is one of the fundamental points of the Polish national gravimetric network; many absolute gravity determinations

have been performed by Polish and international observing groups. The Polish absolute gravity meter is installed at the station. A meridional gravimetric baseline, 26 km long, was established at the Observatory in 1976; periodic observations are made four times a year. The observations are used jointly with classical astrometric determinations for monitoring the changes of the vertical.

- Astrometric latitude observations have been carried out since 1959 in the international cooperation with BIH and IPMS and now the observations are used by Shanghai Observatory (international coordinator of the optical astrometry) and GOSTSTANDARD, Moscow. These observations are still used as complementary ones for the analyses of the time variations of the plumb line.

- Meteorologic service maintained at the station can be supported by nearby permanent meteo service of the Warsaw airport (Warszawa-Okecie). The station Jozefoslaw is located in a distance of a few kilometer from the Warsaw airport.

- In some periods the observations of atmospheric electricity are made at the Observatory by the team of the Polish Academy of Sciences.

The monumentation of the reference point for IGS GPS observations was made according to the IGS standards. The network of control points is available. Due to the geological situation the pillar could not be monumented on the bedrock. Station Jozefoslaw is the reference point of several international GPS networks, e.g. EUREF (European Reference Frame), EXTENDED SAGET (Satellite Geodetic Traverses), CEGRN (Central Europe GPS Reference Network realized in the frame of the project CEI CERGOP (Central European Initiative Central Europe Regional Geodynamics Project) and BSL (Baltic Sea Level Project). The eccentricity of the EUREF point with respect to that of other campaigns is X = 0.079 m, Y = 0.030 m, Z = 0.108m. In the 1960ties, 1970ties and 1980ties the Observatory also participated in other astrometric as well as satellite Doppler and GPS campaigns.

The Institute's Processing Center acts as IGS Regional Network Associate Analysis Center, EUREF Local Analysis Center and as CEI CERGOP Processing Center. The routine permanent GPS data processing and transmission are made for IGS and EUREF; also other GPS campaigns organized in Central Europe for geodynamic studies of the Teisseyre-Tornquist Contact Zone, the Carpathians Belt and Subalpine Regions are processed in the Center.

The BOR1 IGS Station

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Stability of the Borowiec Local Network

The geodetic network at Astrogeodynamical Observatory in Borowiec consists of few points which are using for different applications.
Most important from them are:

- 12205M002 Borowiec – SLR 7811 marker (BORL),
- 12205S002 BOR1 – permanent IGS marker with ROGUE SNR–8000 receiver,
- 12205S001 BORO – EUREF marker (0216 BOROWIEC) used in GPS campaigns in Poland,

Vectors between these three points were measured with GPS and classic techniques for comparison and stability analysis.

Below, in Table 1, we present values for height differences and distances for 6 years period from selected campaigns.

Mean values of differences of geodetic and cartesian coordinates for vector BOR1–BORO are presented in Table 2.

Table: 1 Results obtained from selected campaigns

BOR1- BORL		BOR1 - BORO		BORO - BORL		observations	
Δh	s	Δh	s	Δh	s	period	campaign
		7.535	134.497			14 days	epoch'92
		7.532	134.497	5.811	98.604	2 days	LASER1'93
		7.536	134.496	5.819	98.603	4 days	LASER3'94
1.723	77.318	7.533	134.499	5.811	98.607		classic
		7.533	134.499			3 days	Jaworski '97
		7.533	134.500			19 days	Jaworski '98

Table 2. The eccentricity values in geodetic and cartesian components for vector **BOR1 -BORO**

ΔB [° ′ ″]	ΔL [° ′ ″]	Δh [m.]
+0° 00' 03.03712"	- 0° 00' 05.06454"	7.533
ΔX [m]	ΔY [m]	ΔZ [m.]
-38.382	-112.239	63.397

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Peculiarity of POL2, SELE GPS Stations Operations

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The POL2 station operates in Kyrgyzstan (TIEN SHAN) from the 10th of May 1995 and SELE - from the 08 of May 1997. TurboRogue SNR 8000 receivers have been installed at both stations. Short Haul Modems are used for data downloading.

Some of SVs (or each of SVs) disappearing during TurboRogue operation without any reason is the one usual problem of the stations and of course, pauses in data flow. Sometimes TurboRogue hangs up for no reason whatever (owing to TR firmware bugs, probably), so it doesn't allow to download the data and simply doesn't react on **'bang'** command. The TurboRogue dispower/power process can only fix this problem. So, the necessity in frequent visits to the station is obvious.

The TurboRogue doesn't operate properly sometimes, when the computer used for downloading process is restarted. We can also get the same result after sending any disorder message to TurboRogue. In this case the reply would be as follows:

"User unknown" or **"Data not found**"

and the data would stay not downloaded.

TurboRogue operates better, when FreeWave modems are used, because the computer connects to TurboRogue only close to the downloading process and after the data is downloaded, this communication line becomes disconnected.

To avoid such troubles we decided to undertake the below solution. One commutator was installed between Short Haul Modem and TurboRogue to increase the TurboRogue operation reliability of POL2 and SELE. The commutator is controlled by two special sequences of 3 bytes. One sequence provides connection of the Short Haul Modem and TurboRogue and another - disconnection of them. Before the start of data downloading computer sends one sequence of bytes to commutator and the commutator switches SHM to TR. After the downloading, computer sends to commutator another sequence of bytes and the commutator switches SHM from TR. So, all the time between downloading process, the TurboRogue is not connected to computer serial port and SHM too. This solution decreases the quantity of pauses in data flow.

If the TurboRogue is hung up, the third and forth control sequences of bytes are used. The third sequence disconnects the power supply from TurboRogue and the forth connects the power supply to TR. The tracking is stopped at first by the **'terminate'** command, then the power supply becomes disconnected from TurboRogue by the third sequence of bytes, then the power supply becomes connected to TurboRogue by the

forth sequence of bytes after a short delay. The TurboRogue starts automatically and writes data on the Flash Card.

All control sequences are sent automatically by XTalk program according to the TurboRogue messages within the downloading process.

For more information, please email matix@gdirc.ru.