

Name of research institute or organization:

**Bundesamt für Landestopografie / Swiss Federal Office of Topography  
(swisstopo)**

Title of project:

Automated GNSS Network Switzerland (AGNES)

Project leader and team:

Dr. Elmar Brockmann,  
Dominique Andrey, Daniel Ineichen, Leïla Kislig, Christian Misslin, Dr. Stefan Schaer,  
Dr. Urs Wild

Project description:

The station is part of the Automated GNSS Network of Switzerland (AGNES) consisting of 31 sites, partly equipped with GPS and GPS-GLONASS (the Russian equivalent of GPS) combined receivers and antennas. Due to the extreme weather conditions a special antenna is installed at Jungfrauoch. This antenna is unfortunately not capable to receive the Russian GLONASS satellite data.

AGNES is a multipurpose network which serves as reference for surveying, real-time positioning (positioning service swipos GIS/GEO) and for scientific applications (geotectonics and GNSS-meteorology). The GPS station JUJO is mainly contributing to scientific applications. Important results from the swisstopo processing of the GPS data of JUJO, the troposphere path delays, are provided to MeteoSwiss on an hourly basis. Furthermore, the data are sent to the European meteo community EUMETNET, where the data are available for all meteo agencies for numerical weather predictions. At the moment, UK METO, MeteoFrance, DMI, and KNMI are using the GNSS-derived troposphere models routinely in the weather forecasts. This activity is coordinated by the EGVAP project. The results are also sent to the Institute of Applied Physics (IAP) of the University of Berne where the data contribute to the STARTWAVE database.

In 2012, the complete data flow of the raw GNSS data for all AGNES stations was re-organized. In April 2012, all users of the swisstopo positioning service were moved to a new computer central facility operated by the private hoster BEGASOFT and not any longer operated in the federal infrastructure. Beside new redundant processing queues, also a test infrastructure was built according to Fig. 1. Due to the high altitude, JUJO data are not used for the commercial positioning system.

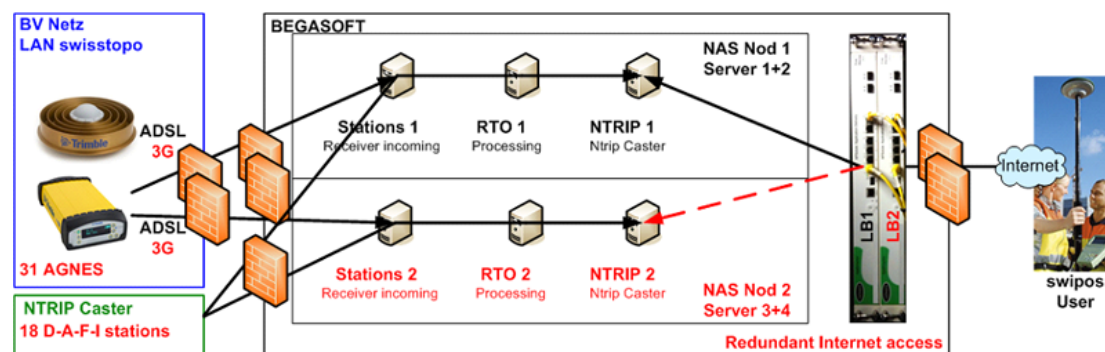


Figure 1. New swipos infrastructure of the computer center (in place since April 2012).

Furthermore, the data flow of the raw files was completely modified starting end of October 2012. Instead of a direct data download of the archive RINEX files every hour and every day to swisstopo pncac computers, the data are transferred every hour in a binary mode to the above mentioned new computer center. Here, all AGNES data are converted to RINEX files and are finally submitted to the swisstopo data archive, from where the data are used for the data processing (hourly and daily) and for generating the above mentioned results. Fig. 2 gives an idea of the new data flow.

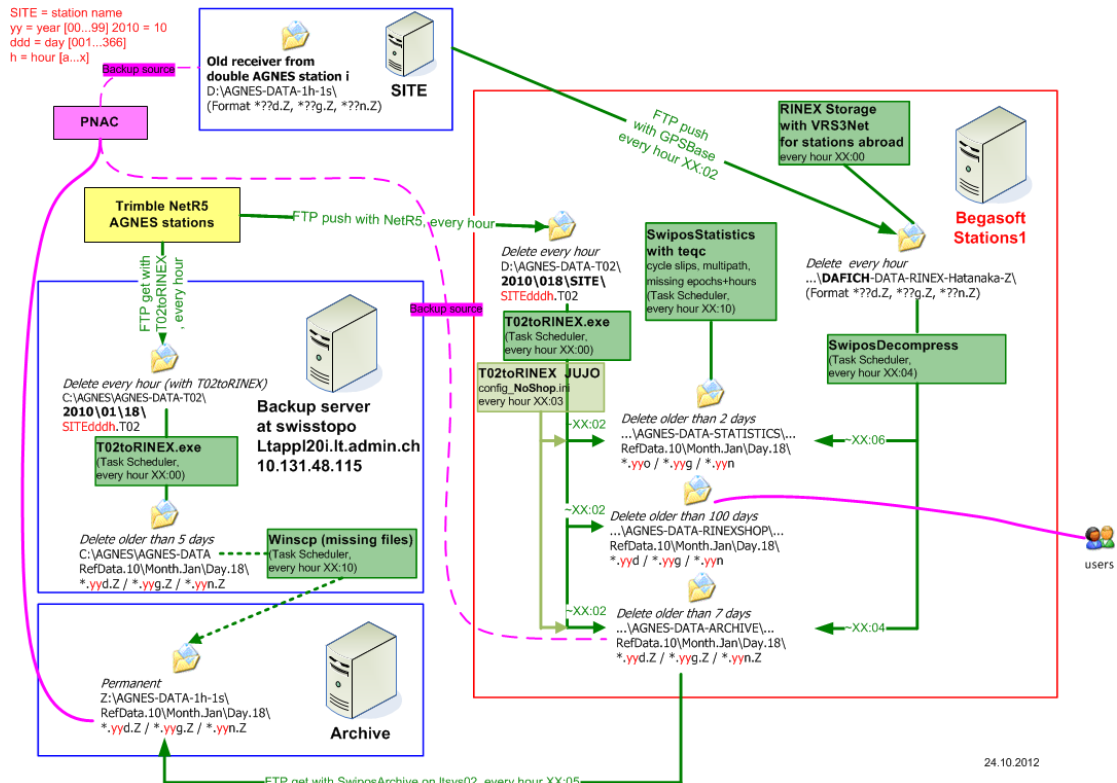


Figure 2. New data flow of raw data (in place October 2012).

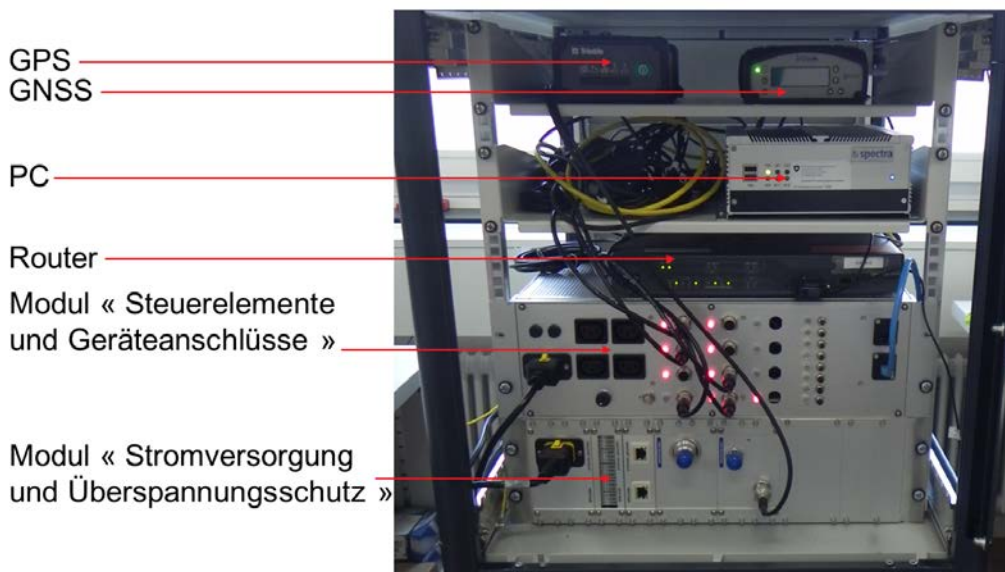


Figure 3. New station design (without a PC on single stations)- here an example for a double station (with a PC, a GPS and a GNSS receiver).

Finally, the station setup on-site was modified for almost all AGNES stations till end of 2012. For JUJO, the installation is scheduled for the beginning of 2013. Fig. 3 gives an overview of the new station concept, where a PC is only necessary on double stations (the single station JUJO therefore does no longer need a station PC).

In 2013, it is planned that all GPS data of JUJO back to 1998 are consistently reprocessed. The EU-COST project GNSS4SWEC will be launched at the beginning of 2013 to analyse the long-term results of the troposphere parameters and to derive possible statements concerning climate change.

Key words:

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GPS, GLONASS, GNSS, Meteorology, Positioning, Integrated Water Vapor, Zenith Path Delay, GPS Tomography, Geotectonic

Internet data bases:

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<http://www.swisstopo.ch/pnac> ; <http://egvap.dmi.dk/> ;  
<http://www.iapmw.unibe.ch/research/projects/STARTWAVE/>

Collaborating partners/networks:

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Astronomical Institute (AIUB), University of Berne  
MeteoSwiss, Zurich and Payerne  
Institute of Applied Physics (IAP), University of Berne  
Institute of Geodesy and Photogrammetry, ETH Zürich  
E-GVAP II (EUMETNET GPS Water Vapor Programme)

Scientific publications and public outreach 2012:

**Conference papers**

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Brockmann E. et al., EUREF'12: Paper contributions to the EUREF-Symposium in Paris, June 6-8, 2012:  
«National Report of Switzerland» and «Geodetic control surveys at the Geostation Zimmerwald», swisstopo-report 12-07  
<http://www.swisstopo.admin.ch/internet/swisstopo/de/home/docu/pub/geodesy/report.parsys.70206.downloadList.45836.DownloadFile.tmp/report1207.pdf>

Address:

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Bundesamt für Landestopografie (swisstopo)  
Seftigenstrasse 264  
CH-3084 Wabern

Contacts:

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Dr. Elmar Brockmann  
Tel.: +41 31 963 2111  
Fax.: +41 31 963 2459  
e-mail: [elmar.brockmann@swisstopo.ch](mailto:elmar.brockmann@swisstopo.ch)  
URL: <http://www.swisstopo.ch>