Name of research institute or organization:

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

Title of project:

Automated GPS Network Switzerland (AGNES)

Project leader and team:

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

Project description:

Conversion of AGNES to GPS/GLONASS

The Automated GNSS Network for Switzerland (AGNES) and the Swiss Positioning Service (swipos) constitute an important part of the geodetic infrastructure of Switzerland. In order to meet the demands required by various applications, the systems must be continually adapted to the newest technical developments of the Global Navigation Satellite Systems (GNSS). The **enhancement** of the AGNES infrastructure to include the Russian navigation system GLONASS is one such development tackled in 2007.

Conversion

GNSS is the general term used for all operational satellite navigation systems or those being developed. The evolution is characterized by the introduction of new signals for civil applications in the American GPS system, the deployment of the Russian system GLONASS as well as the development of new systems such as the European system Galileo. All major manufacturers of GNSS receivers have been designing combined receivers for both GPS and GLONASS since 2006. In order to keep step with this development, swisstopo adapted its network AGNES, consisting of 31 permanently operating stations, to the new technical demands.

Since AGNES is a multifunctional reference network not only for applications in national surveying but also for scientific studies and positioning services, swisstopo had to find a compromise between the continuity of the observations and the rapid alignment to the demands and developments of the market.

To assure continuity, conventional GPS receivers operate simultaneously with new GPS/GLONASS receivers on ten AGNES stations. At the end of 2007, seven stations were equipped with the new receivers, and the remaining three stations should be completed by the end of March 2008.

The rest of the 21 AGNES stations were converted during summer 2007. The swipos positioning service was at that time already operating in vast parts of Switzerland with receivers of the newest generation. To guarantee highest precision, all of the new GNSS antennas were first calibrated by a specialized firm in Germany. Switzerland is one of the first organizations in Europe having taken this step.

Applications

Because of the still very limited number of available GLONASS satellites, the modernization of the AGNES stations has not brought about any dramatic increase of accuracy in national surveying. However, the greater number of satellites does bring about improvements in the positioning service swipos because the availability and performance of the service has increased in difficult terrain (built up areas, narrow valleys, etc.).

An interesting collaboration has evolved over the past years with MeteoSwiss. The hourly analysis of data from the AGNES network yields not only coordinates but also meteorological parameters which can then be used by MeteoSwiss and other European institutions in making weather predictions. At the present the information is being analysed by MeteoSwiss for testing purposes. Because some of the AGNES stations are installed right next to MeteoSwiss sites, further synergies and benefits are gained by the direct comparison of results.

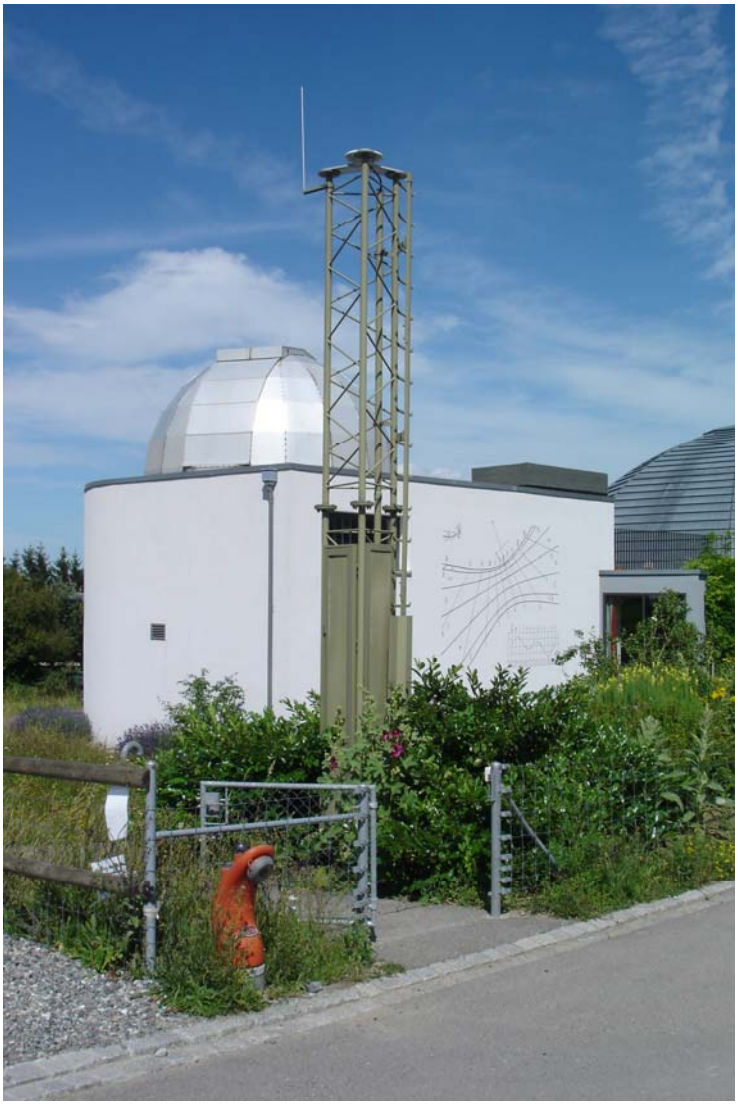

Fig.1: The sucessful replacement of the antenna at the AGNES station Kreuzlingen

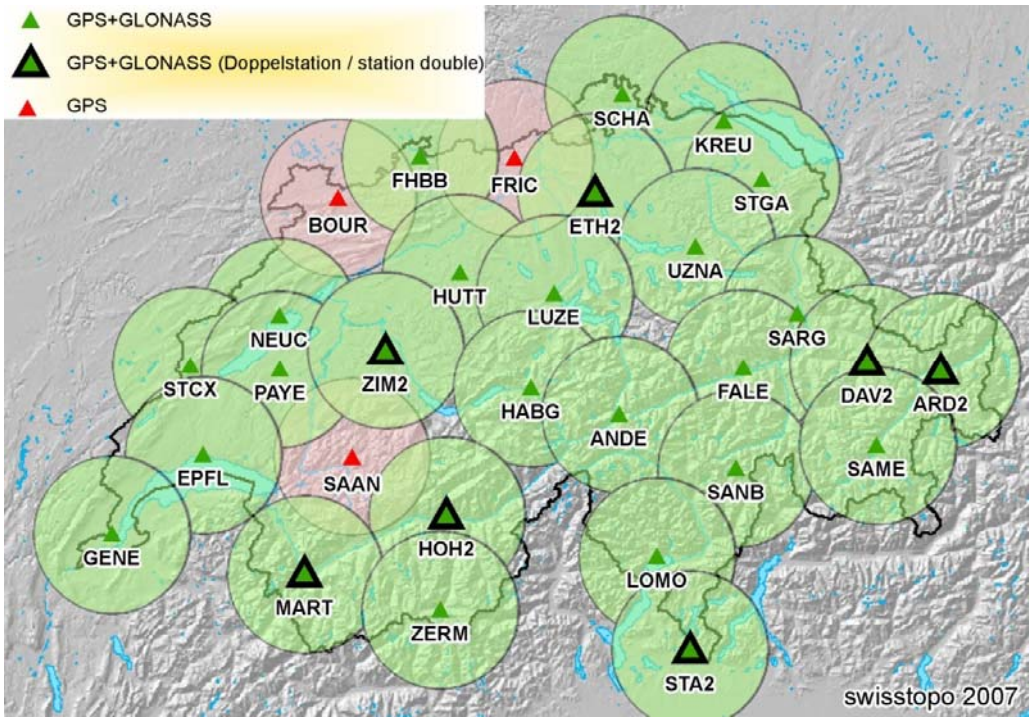

Fig.2: Status of the conversion (end of 2007)

Key words:

GPS, GLONASS, GNSS, Meteorology, Positioning, Intergrated Water Vapour, Zenith Path Delay, GPS Tomography

Internet data bases:

http://www.swisstopo.ch; http://egvap.dmi.dk/

Collaborating partners/networks:

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 (EUMETNET GPS Water Vapor Programme)

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Newsletters

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