

NATIONAL REPORT OF SLOVENIA to the EUREF 2011 Symposium in Chisinau

K. MEDVED¹, K. BAJEC², S. BERK², D. RADOVAN², B. STOPAR³

1 Introduction

This paper is the review of activities regarding the adoption of the ESRS and other related activities in Slovenia, during the period 2010–2011. Activities presented in this report were partially supported by a grant from Norway through the Norwegian Financial Mechanism. A four-year project of establishing the national network of permanent GNSS-stations and the European Spatial Reference System in Slovenia finished at the end of 2010.

2 The SIGNAL Positioning Service

The SIGNAL network of GNSS stations is owned by the Surveying and Mapping Authority of the Republic of Slovenia (SMARS) and operated by the Geodetic Institute of Slovenia. The network consists of 15 stations. Five of them support GPS and GLONASS signal tracking and the others GPS signal tracking only. At the moment, 12 additional stations from the neighbouring countries are included in the network: five Austrian (APOS) stations, one Hungarian (GNSSnet.hu) station, and six Croatian (CROPOS) stations, see Figure 1.

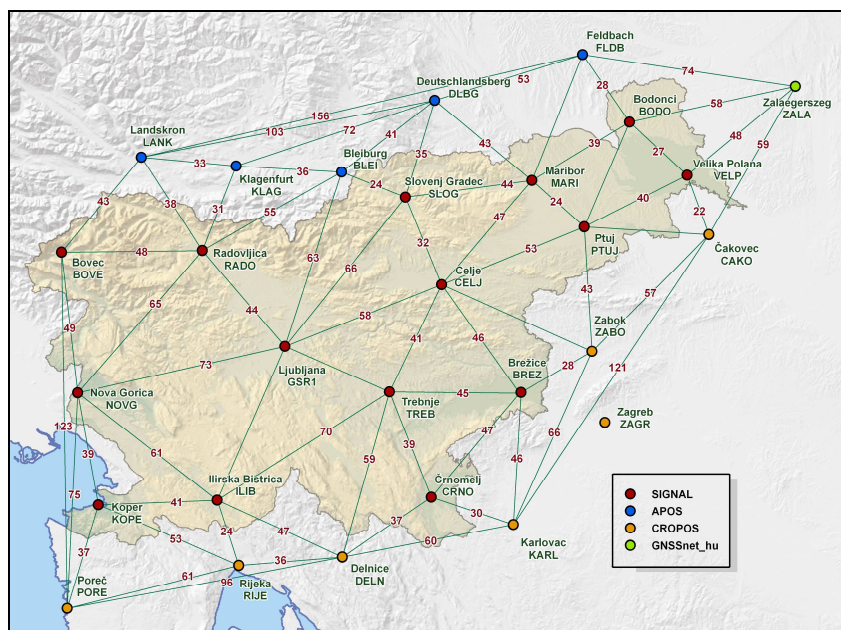


Figure 1: Currently used stations in the SIGNAL network.

Croatian station (Zagreb) would be used if needed – in case of failure of any of the neighbouring stations. Five more stations from Italy (Friuli Venezia Giulia) are now being used for testing purposes. So, a total of 33 stations can be used in the current SIGNAL network configuration.

¹ Surveying and Mapping Authority of the Republic of Slovenia

² Geodetic Institute of Slovenia

³ University of Ljubljana, Faculty of Civil and Geodetic Engineering

Real-time services are payable since 1st April 2010. At the moment the users can choose between two real time data distributors. RINEX data for postprocessing are available for free of charge for registered users.

SIGNAL Positioning Service started with the automatized data processing on daily basis. The processing routine for Bernese software was developed in 2010 by the Geodetic Institute of Slovenia and reviewed by the Faculty of Civil and Geodetic Engineering of the University of Ljubljana.

Currently, the SIGNAL network is run by VRS3Net software. The transition from the past version of the Trimble network software was realized in June 2011.

A slight fall-back of users was detected in 2010, when real-time services became payable. Number of active users by year is shown in Figure 2. For 2011 data until the end of February are used and the expected number of users for 2011 should be very similar to the number in 2010 (Barborič et al., 2010).

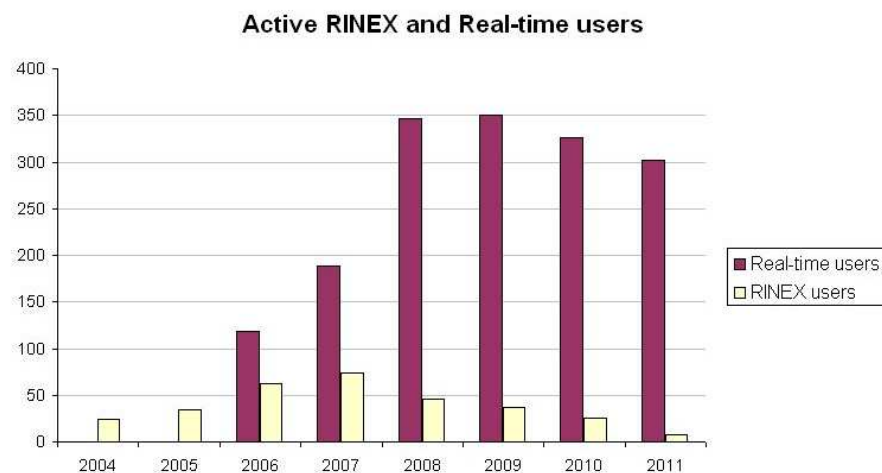


Figure 2: Number of active RINEX and real-time users by year.

SIGNAL users have been doing very little post-processing compared to real-time positioning and among all of the real-time services, active GNSS network services are most often used, see Figure 3.

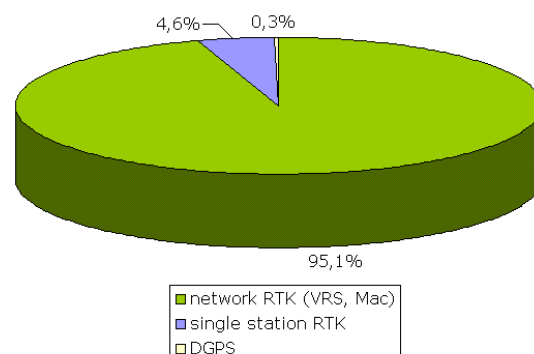


Figure 3: Usage of SIGNAL services in 2010.

3 Horizontal System

The quality of the country-wide triangle-based transformation model, Version 3.0, has been checked in the eastern part of the country (Berk et al., 2011). The consistency analysis of

D48/GK and D96/TM coordinates of more than 62,000 cadastral boundary points shows some deviations in the areas with low density of tie points used.

An outline project within the target research project, supported by the Slovenian Research Agency, has started in 2010. The goal of the project is integration of spatial and gravity related reference networks in Slovenia. The idea will be realized through the set up of the combined geodetic network of Slovenia.

4 Height and Gravimetric Systems

For the purpose of the realization of the new height system, in 2006 we started, according to previously defined plane with the reobservation of the first order levelling lines. Altogether, 610 km of levelling lines were measured till the end of 2010, which present 37 % of all planned levelling lines, see Figure 4. The RMS of the performed measurements is 1.07 mm/km (Koler et al., 2011).

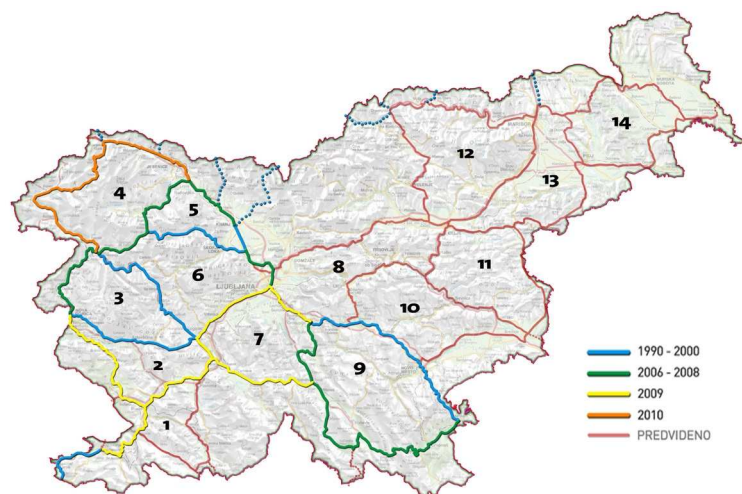


Figure 4: Relevelled first order levelling lines.

Gravimetric surveys were also performed along these new levelling. In the last 4 years, more than 700 new points were observed, see Figure 5. In 2010 the Surveying and Mapping Authority also realized the purchase of the new relative gravimeter Scintrex CG-5.

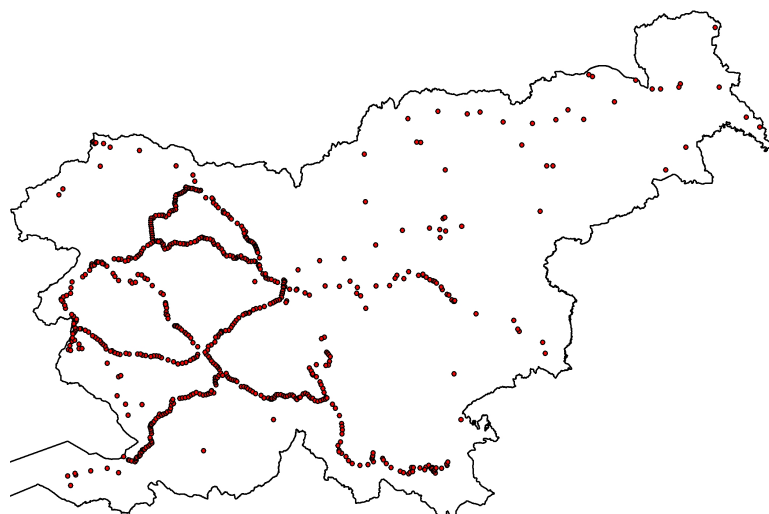


Figure 5: Measured gravity points from 2006 till 2010.

In cooperation with the Norwegian Mapping Authority (Staten Kartverk) a new test geoid model was computed. The first results show great improvements, but input data have to be further examined according to the possible presence of gross errors. The lack of gravimetric data on the western part of the country should also be solved before a new geoid would be released (Kuhar et al., 2011).

5 References

- BARBORIČ, B., BAJEC, K., RADOVAN, D., FABIANI, N., JANEŽIČ, M., OCEPEK, S., ARH, I., *SIGNAL GPS Service annual report* (in Slovenian). Ljubljana: Geodetic Institute of Slovenia, 2010, 2 vol., 20 p. + supplements.
- BERK, S. (ed.), *Establishing European Spatial Reference System in Slovenia* (in Slovenian). Project proceedings. Ljubljana: Surveying and Mapping Authority of the Republic of Slovenia, 2010, 80 p.
- BERK, S., BAJEC, K., KOZMUS TRAJKOVSKI, K., STOPAR, B., *Status of the SIGNAL Positioning Service and Transformation between the Local and ETRS89 Coordinates in Slovenia*. 2. CROPOS Conference. Zagreb, 8 April, 2011. Conference proceedings. Zagreb: State Geodetic Administration, 2011, pp. 73–82.
- BERK, S., KOMADINA, Ž., TRIGLAV, J., *Consistency Analysis of D48/GK and D96/TM Coordinates of Cadastral Boundary Points in the Mura Region* (in Slovenian). Geodetski vestnik, vol. 55, no. 2. Ljubljana, 2011, pp. 269–283.
- KOLER, B., VARDJAN, N., URBANČIČ, T., *Status of the New Height System Development* (in Slovenian). Geodetski vestnik, vol. 55, no. 2. Ljubljana, 2011, pp. 215–225.
- KUHAR, M., BERK, S., KOLER, B., MEDVED, K., OMANG, O., SOLHEIM, D., *The Quality Role of Height System and Geoid Model in the Realization of GNSS Heighting* (in Slovenian). Geodetski vestnik, vol. 55, no. 2. Ljubljana, 2011, pp. 226–234.
- MEDVED, K., BAJEC, K., BERK, S., KOLER, B., KUHAR, M., RADOVAN, D., STERLE, O., STOPAR, B., *National Report of Slovenia to the EUREF 2010 Symposium in Gävle*: TORRES, J. Agria (ed.), HORNIK, H. (ed.). Report on the Symposium of the IAG Subcommission for Europe (EUREF) held in Gävle, 2–5 June, 2010. Reports of the EUREF Technical Working Group – TWG (EUREF Publication, no. 20). Frankfurt on the Main: Verlag des Bundesamtes für Kartographie und Geodäsie, 6 p. (in press).
- OVEN, K., BERK, S., BAJEC, K., PEGAN ŽVOKELJ, D., KLANJŠČEK, M., DEMŠAR, J., VRABIČ, R., DROŠČAK, B., ZORE, M., FABIANI, N., JANEŽIČ, M., RADOVAN, D., STOPAR, B., KOLER, B., KUHAR, M., STERLE, O., PAVLOVČIČ PREŠEREN, P., AMBROŽIČ, T., KOGOJ, D., SAVŠEK, S., *Development of a national geodetic system – Introduction of a new coordinate reference system* (in Slovenian). Final report. Ljubljana: Geodetic Institute of Slovenia, 2010, 2 vol., 318 p. + 234 p. supplements.
- STOPAR, B., KOLER, B., KUHAR, M., MOZETIČ, B., MEDVED, K., BERK, S., RADOVAN, D., *National Report of Slovenia*: TORRES, J. Agria (ed.), HORNIK, H. (ed.). Report on the Symposium of the IAG Subcommission for Europe (EUREF) held in Florence, 27–30 May, 2009. Reports of the EUREF Technical Working Group – TWG (EUREF Publication, no. 19). Frankfurt on the Main: Verlag des Bundesamtes für Kartographie und Geodäsie, 7 p. (in press).
- STOPAR, B., STERLE, O., WEBER, J., VRABEC, M., *The Role and Importance of GNSS for Geodynamics*. 2. CROPOS Conference. Zagreb, 8 April, 2011. Conference proceedings. Zagreb: State Geodetic Administration, 2011, pp. 39–42.
- SIGNAL Positioning Service* (in Slovenian). Surveying and Mapping Authority of the Republic of Slovenia. <http://www.gu-signal.si/>.

