

CEGRN Consortium

A Seedbed of New European Projects and Initiatives

J. SLEDZINSKI¹, I. FEJES²

Astract

On September 5th, 2001 the CEGRN (Central European GPS Reference Network) Consortium was established with the aim to maintain, upgrade and develop the CEGRN as well as to perform coordinated monitoring GPS campaigns. Data Centre and Processing Centres will also be maintained. This Consortium is a follow-up action of the first phase of the Project CERGOP (Central Europe Regional Geodynamics Project) launched in 1993 by the CEI (Central European Initiative) Working Group Science and Technology Section C "Geodesy". It is anticipated that the institutes participating in the CERGOP programme will be regular members of the Consortium. The Memorandum of Agreement signed in Budapest ensures the long-term continuation of the Project CERGOP, the maintenance of CEGRN and high quality data products. The Consortium serves as a platform for launching new international initiatives and projects. The paper describes the brief outline of the history of CERGOP, background of creation, organisation, general policy of its activity and a near future plan of actions.

1. Historical Background – The Cergop Project

Creation of the CEGRN Consortium is the follow-up action of the Project CERGOP (Central Europe Regional Geodynamics Project) launched by the CEI (Central European Initiative) Working Group "Science and Technology" Section C "Geodesy" in 1993.

The main objectives of CERGOP are:

- to integrate the geodynamic research in the Central European region based on high accuracy space geodetic measurements,
- to investigate the most profound geotectonic features in the Central European region, as well as
- to provide a stable Central European GPS Reference Network (CEGRN) for sub-regional, local or across the borders investigations and deformation studies.

The first phase of the Project was concluded in 1998 and now the second phase of the Project is being realised. The following 14 countries participate in the Project: Albania, Austria, Bosnia&Herzegovina, Bulgaria, Croatia, the Czech Republic, Germany, Hungary, Italy, Romania, Poland, Slovakia, Slovenia and Ukraine. The Project is chaired by Hungary (Istvan Fejes) and Poland (Janusz Sledzinski).

The first phase of the Project CERGOP was financially supported from the Programme COPERNICUS of the European Commission. The EC coordinator was the Institut für Angewandte Geodäsie (now Bundesamt für Kartografie und Geodäsie), Frankfurt a.M, Germany (SLEDZINSKI, 2001a).

The dominant part of the activities within the Project CERGOP is carried out by Study Groups (see Table 1).

Table 1. CERGOP-2 Study Groups (CSGs)

CERGOP Study Group	Subject	Chairmanship
CSG.1	CERGOP stations and site quality monitoring	G. Virag (Hungary)
CSG.2	Coordination of CERGOP analysis centres	G. Stangl (Austria)
CSG.3	CERGOP Reference Frame and geokinematic modelling	J. Hefty (Slovakia)
CSG.4	Improvement of height determination to accuracies comparable with horizontal coordinates"	J Simek (Czech Rep.)
CSG.5	Geotectonic analysis of the region of Central Europe	J. Sledzinski (Poland), P. Vyskocil (Czech Rep.)
CSG. 5/1	Monitoring of recent crustal movements in Eastern Alps and the North and Eastern Adriatic with GPS	C. Marchesini (Italy)
CSG.5.2	Three dimensional plate kinematics in Romania	D.Ghitau (Romania)
CSG.5/3	Integration of present geodynamic investigations in the Pannonian Basin	G. Grenerczy (Hungary)
CSG.5/4	International geodynamic test area Plitvice Lakes	D. Medak (Croatia)
CSG.5/5	Geodynamics of the Tatra Mountains	K. Czarnecki (Poland), M. Mojzes (Slovakia)
CSG.5/6	Geodynamics of Northern Carpathians	F.Zablotskij (Ukraine)
CSG.5/7	Geodynamics of Balkan Peninsula	G. Milev (Bulgaria)
CSG.6	Real time monitoring by GPS	A. Nardi (Italy).

¹ Janusz Sledzinski, Warsaw University of Technology, Poland

² Istvan Fejes, FÖMI Satellite Geodetic Observatory Penc, Hungary

The extension of the project in its second phase resulted in accepting in total of 63 CERGOP (CEGRN) sites (Fig. 1 and Table 2). The calculation and interpretation of the 3D tectonic velocity field covering the Central European Region will be continued. This information is essential for the IAG Commission XIV "Crustal Deformation" since now the research and interpretation of recent crustal movements detected by satellite techniques as well as the constructing

Earth deformation models were recognised as most important and urgent action of the Commission. The cooperation of the CEI Section C with the International Association of Geodesy resulted in the creation in 1996 of IAG Subcommission "Geodetic and Geodynamic Programmes of the CEI". Now the Subcommission is acting within the IAG Commission XIV "Crustal Deformation" of the IAG Section V "Geodynamics" (SLEDZINSKI, 2001b).



Fig. 1: Central European GPS Geodynamic Reference Network CEGRN-2 (I. Fejes. April 2002)



Permanent stations



Epoch stations

Table 2: The Central European GPS Geodynamic Network (CEGRN-2)

Country	Site	Code	P/E	Lat.	Long.	Tectonic area
ALB	Tirana	TIRA	P*	41° 19°	19° 46°	Dinarides
AUT	Graz	GRAZ	P	47° 04°	15° 30°	Tertiary Basin
	Hutbiegl	HUTB	E	48° 39°	15° 36°	Bohemian Massif
	Innsbruck	HFLK	P	47° 19°	11° 23°	Upper East-Alpine Nappe
	Reisseck	GRMS	P*	46° 55°	13° 22°	Central East-Alps
	Salzburg	SBGZ	P	47° 48°	13° 07°	Upper East-Alpine Nappe
BIH	Sarajevo	SRJV	P	43° 52°	18° 24°	Dinarides
BUL	Harmanli	HARM	E	41° 53°	25° 51°	Rhodope Massif
	Sofia	SOFI	P	42° 33°	23° 24°	Sredna Gora
	Gabrovo	GABR	E	42° 58°	25° 16°	Fore Balkan
	Kavarna	KAVA	E	43° 25°	28° 22°	Moesian Platform
CRO	Brusnik	BRSK	E	45° 35°	15° 34°	Julian Alps, Savic Folds
	Hvar	HVAR	E	43° 11°	16° 27°	Adriaticum
	Osijek	OSJE	P	45° 34°	18° 41°	Tisza-Unit
	Dubrovnik	DUBR	P	42° 38°	18° 07°	Dinarides
CZE	Pecny	GOPE	P	49° 55°	14° 47°	Bohemian Massif
	Polom	POL1	E	50° 21°	16° 19°	Bohemian Massif, Variscan Folds
	Lysa Hora	LYSA	E	49° 33°	18° 27°	Outer West Carpathians, Silesian Unit
	Brno	TUBO	P	49° 12°	16° 36°	Bohemian Massif
GER	Hohenpeissenberg	HOHE	E	47° 48°	11° 01°	Upper East-Alpine Nappe
	Kirschberg	KIRS	E	51° 13°	14° 17°	Variscan Complex, Lausitz Folds
	Potsdam	POTS	P	52° 23°	13° 04°	Precambrian-Platform, German-Polish Depression
	Wettzell	WTZR	P	49° 09°	12° 53	Moldanibikum, Variscan - Komplex
	Dresden	DRES	P	51° 02°	13° 44°	Variscan Complex
HUN	Csarnóta	CSAR	E	45° 53°	18° 13°	Tisza-Unit
	Diszel	DISZ	E	46° 53°	17° 29°	Alpine-North Pannonian Unit
	Penc	PENC	P	47° 47°	19° 17°	Alpine-North-Pannonian Unit
	Tarpa	TARP	E	48° 08°	22° 33°	Alpine-North-Pannonian Unit
	Csanádalberty	CSAN	E	46° 19°	20° 40°	Tisza-Unit
ITA	Padova	UPAD	P	45° 24°	11°53°	Adriatic Microplate
	Trieste	BASO	P	45° 39°	13° 53°	Adriatic Microplate
	Medicina	MEDI	P	44° 31°	11° 39°	North Appenines Foreland
	Matera	MATE	P	40° 39°	16° 42°	Adriatic Microplate
	Perugia	UNPG	P	43° 07°	12° 21°	Central Appenines
	Bolzano	BZRG	P	46° 29°	11° 22°	Southern Alps
POL	Borowiec	BOR1	P	52° 17°	17° 04°	Paleozoic Platform, German-Polish Depression
	Grybów	GRYB	E	49° 38°	20° 57°	Outer- or Flysh-Carpathians
	Józefos ³ aw	JOZE	P	52° 06°	21° 02°	Precambrian Platform, German-Polish Depression
	Lamkówko	LAMA	P	53° 54°	20° 40°	Precambrian Platform, German-Polish Depression
	Œenieka	SNIE	E	50° 44°	15° 44°	Variscan Mountains
	Wroc ³ aw	WROC	P	51° 07°	17° 04°	German-Polish Depression
ROM	Tismana	TIS3	E	45° 08°	23° 08°	South Carpathian Orogeny
	Gilau	GIL2	E	46° 41°	23° 03°	Muntii Apuseni
	Iasi-Repedea	IAS3	E	47° 05°	27° 39°	East-European Platform
	Macin	MAC5	E	45° 15°	28° 11°	Dobrogea Orogeny
	Bucharest	BUCU	P	44° 21°	26° 03°	Moesian Platform

Country	Site	Code	P/E	Lat.	Long.	Tectonic area
	Fundata	FUN3	E	45° 25°	25° 15°	Southern Carpathians
	Vrancea	VRN1	E	45° 51°	26° 39°	Vrancea zone
	Vatra Dornei	VAT1	E	47° 27°	25° 21°	East Carpathians
SVK	Strazna Hora	STHO	E	48° 13°	19° 32°	Vepor Unit , Inner-Carpathian Volcanic Arc
	Modra-Piesky	MOPI	P	48° 22°	17° 16°	Tatran Unit, West-Carpathians
	Skalnate Pleso	SKPL	E	49° 11°	20° 14°	Tatran Unit, West- Carpathians
	Partizánske	PART	E	48° 36°	18° 20°	Vepor Unit
	Kamenica nad Cirochou	KAME	E	48° 56°	22° 01°	Vihorlat-Gutin Chain
SLO	Ljubljana	LJUB	E	46° 03°	14° 30°	In between the Julian Alps and the Dinarides
	Tosko Celo	TOSK	P*	46° 05°	14° 25°	Northeastern Dinarides
	Malija	MALJ	E	45° 30°	13° 39°	Adriatic Microplate
	Bozica	BOZI	E	46° 16°	13° 29°	In between the Adriatic Microplate and the Southern Alps
	Lendavske gorice	LEND	E	46° 34°	16° 29°	In the Mid Hungarian Shear Zone between the Tisza-Unit and North Pannonian Unit
UKR	Uzhgorod	UZHJ	P	48° 34°	22° 27°	Vihorlat-Gutin Volcanic Chain, North-East Carpathians
	Lviv	LVIV	E	49° 55°	23° 57°	East-European Platform
	Sulp	SULP	E	49° 50°	24° 01°	East-European Platform
	Shazk	SHAZ	E	51° 28°	23° 51°	East-European Platform

The Central European GPS Reference Network with accuracy of 2-4 mm in horizontal coordinates and 4-8 mm in vertical coordinates is now firmly established as a result of six epoch five-day monitoring campaigns carried out in 1994, 95, 96, 97, 99 and in 2001. The CERGOP Data Centre was established in 1994 and is hosted by the Observatory Lustbuehel, Graz, Austria. The satellite observational data of the CEGRN monitoring campaigns are processed in CERGOP Processing Centres (SLEDZINSKI, 2001c).

2. Consortium for Central European GPS Geodynamic Reference Network (Cegrn) – Organisation And Scope Of Work

Long-term experience gained from the realisation of the Project CERGOP has proved the importance of international collaboration in the field of space geodesy, geodynamics and Earth sciences and the need for a coherent, high accuracy and high quality reference network in Central Europe for geodynamic investigations. It became evident that only a coordinated programme of measurements, scientific and technical development of methods and international access to wide amount of monitoring results gathered in a long period of time can give the proper background for any further geodynamic interpretations (FEJES, 2002).

The CEGRN Consortium is a non-profit organisation of institutes that supports and promotes

- coordinated establishment, maintenance and upgrade of CEGRN sites,
- monitoring the CEGRN by permanent and epoch type measurements and

- the establishment, maintenance and development of CEGRN Data Centre and Processing Centres.

The member institutes contribute to the CEGRN with their own established and accepted sites, with site maintenance and with coordinated observations on these sites. They are committed for the highest quality standards and a minimum of 5*24 hours observations every second year. They supply observational data to the common Data Centre. Additional contribution of designated institutes consists of operation the Data Centre and/or Processing Centres. The Consortium shall agree on a programme for the development of scientific potential of the CEGRN and shall formulate and submit proposals for new scientific and technological developments. These proposals may specify the member institutes in which such developments should be carried out. The Consortium may submit proposals either to national or international entities.

According to the organisational setup the governing body of the Consortium consists of the representatives of the member institutes as appointed by the institute's directors. The governing body is called CEGRN Consortium Governing Board (CCGB). The CCGB appoints a chair and a co-chair from its members who will remain in office for a 3-year period. The chair, the co-chair and additional 2 members selected by the CCGB forms the CEGRN Steering Committee for facilitating operation and prompt decision making. Further it was decided that the CCGB would meet once a year. Extraordinary meetings shall be convened on request of the majority of the members or on request of the chair. The CCGB convenes Users Meetings at least once every second year for the purpose of obtaining feedback from the user community on the performance of CEGRN and on directions of future developments.

The "Memorandum of Agreement" of the Consortium was signed on 5 September 2001 in Budapest, Hungary. The Agreement shall remain in force for a period of five years, and will be renewed automatically at the end of that period unless the CCGB decides to terminate it. The representatives of the following institutions have signed the Memorandum of Agreement:

- Space Research Institute, Austrian Academy of Sciences, Graz, Austria
- Central Laboratory for Geodesy, Bulgarian Academy of Sciences, Sofia, Bulgaria
- Research Institute of Geodesy, Topography and Cartography, Zdiaby, Czech Republic
- Faculty of Civil Engineering and Geodesy, University of Bundeswehr, Munich, Germany
- Institute of Geodesy Cartography and Remote Sensing (FÖMI), Budapest, Hungary
- Centro di Geodesia, Agenzia Spaziale Italiana, Matera, Italy
- Institute of Geodesy and Geodetic Astronomy, Warsaw University of Technology, Warsaw, Poland
- The Institute of Cadastre, Geodesy, Photogrammetry and Cartography, Bucharest, Romania
- Dept. of Theoretical Geodesy, Slovak University of Technology, Bratislava, Slovakia
- Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia
- Chair of Geodesy and Astronomy, Lviv Polytechnic National University, Lviv, Ukraine

The 1st meeting of the CEGRN Consortium Governing Board was held in Matera, Italy on 17 November 2001 and was hosted by Agenzia Spaziale Italiana Centro di Geodesia Spaziale.

The CCGB elected Prof. Istvan Fejes chairman and Prof. Janusz Sledzinski co-chairman of the Consortium. The CCGB elected also Dr. Peter Pesec and Dr. Francesco Vespe members of the CEGRN Consortium Steering Committee. Dr. Gyula Grenerczy acts as the secretary of the Consortium. The secretariat is hosted by FÖMI Satellite Geodetic Observatory, Penc, Hungary and act under the supervision of Prof. Istvan Fejes. The secretariat will establish and maintain the website of the Consortium where all relevant information concerning the Consortium will be available. The preliminary (test) version of the website can be found at www.fomi.hu/cegrn (Veres and Grenerczy 2002).

It was agreed that the Space Research Institute of the Austrian Academy of Sciences, Graz would act as CEGRN Data Centre. The coordination of the CEGRN Processing Centres is the task of the CSG2 chaired by Guenter Stangl.

Five following institutes have declared to maintain and operate CEGRN Processing Centres:

- FÖMI, Satellite Geodetic Observatory, Penc, Hungary,
- Institute of Geodesy and Geodetic Astronomy of the Warsaw University of Technology, Warsaw, Poland,

- Agenzia Spaziale Italiana Centro di Geodesia Spaziale, Matera, Italy,
- Space Research Institute of the Austrian Academy of Sciences, Austria,
- Department of Theoretical Geodesy of the Faculty of Civil Engineering of the Slovak University of Technology, Bratislava, Slovakia.

The CCGB discussed the concept of the CEGRN data availability. This is regulated the following way:

- The CEGRN data are freely available for the CEGRN Consortium member institutes.
- The member institutes are free to decide on the transfer of their own data for external parties.
- The CEGRN data availability is generally restricted for institutes outside of the Consortium until the CCGB decides to release the data.
- Requests for CEGRN data export for outside users should be approved by the CCGB on case-by-case basis or - in urgent cases - by the Steering Committee of the CEGRN Consortium.
- Any publication of results based on CEGRN data should contain the respective note of acknowledgement.

3. Consortium as a Forum for Discussions on New Projects and Initiatives

The CEGRN can be considered as a well-established research infrastructure in Central Europe for Earth sciences. Therefore this infrastructure can be used as a prominent research and educational tool in the region. Most of participating institutions are university institutes with educational experience in Earth science disciplines. Therefore the Consortium can also be a forum for a wide educational activities. Some training programmes initiated and organising by the Section C Working Group on University Education Standards can be realised in cooperation with the Consortium.

The consortium, by operating this extraordinary research tool, is bound to initiate new research fields and projects. Last year we have submitted a research proposal titled "A Multipurpose and Interdisciplinary Sensor Array for Environmental Research in Central Europe" (CERGOP-2/Environment)" in the frame of the EU 5th RTD Framework Programme. The EC coordinator is P. Pesec of the Austrian Academy of Sciences, Graz, Austria. The project was accepted and now preparation for the contract is under way (P. PESEC, 2002). We expect that CERGOP and the underlying organisation, the CEGRN Consortium, will significantly contribute to high quality mapping and better understanding the current tectonic intraplate processes in Europe.

The Consortium provides an open discussion forum for institutes from all European countries, it forms a broad platform for European international cooperation in the field of Earth sciences, in particular in space geodesy and geodynamics. We expect that the number of member-institutes will increase in the near future.

4. Conclusion

The CEGRN Consortium serves as the organisational structure of CERGOP. International cooperation among the institutes of the Consortium will ensure the long-term continuation of the Project, the maintenance of CEGRN and high quality data products. The Consortium shall work on the development of scientific potential of the CEGRN and shall formulate and submit proposals for new scientific and technological initiatives. The CEGRN serves as a virtual large-scale facility in Central Europe for a large number of projects in Earth sciences. The Consortium will contribute to further development of the links with universities and regional education centres leading to introduction of new curricula and training of students in interdisciplinary fields of Earth sciences.

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