

## Students' union news

Every two years elections for the faculty students' union representatives and the University of Zagreb students' union representatives are being held on the University of Zagreb and also on our faculty. The elections were held on May 5 and 6, 2010. From each year of undergraduate, graduate and postgraduate studies two representatives were chosen to become members of Students' union of the Geodetic faculty.

On the meeting of the Union which was held on September 13 2010. members of previous Union gave the leadership to newly elected members. The members were elected for the Teaching board, Faculty council and Science board. New president of the Union was also elected. Based on his experience, engagement and success, Mario Božić was unanimously elected as new president of the Students union.

We would like to use this opportunity to congratulate the new leadership on winning the elections and we wish them a lot persistence, luck and skills to achieve their initial goal; to bring closer the work of Students' union of Geodetic faculty to each student, and especially to the youngest who are getting familiar with the new surroundings.

During the last academic year new regulations regarding the geodesy and geoinformatics undergraduate studies were voted and became official. Changes are related to the curricula and we hope that they will be positive, for students and for professors.

Geodetic faculty students' union organized a field trip for our students. The trip included visiting Croatian hydrographical institute in Split and Observatory on Hvar. 80 students went on this trip and we can conclude that the journey was a great mixture of gaining new knowledge and having pleasant time together. Much more from the trip to Hvar you will read in the Aprils 2011 issue.

The Union has a continuous vision of organizing trips and social events in agreement with other students who show their interest.

### Members of newly formed students' union

#### » UNDERGRADUATE STUDIES

**Representative and deputy representative of the first year:**

Doris Klačar (1) and Vesna Jurić (2)

**Representative of the second year:**

Matea Hlupić (3)

**Representative and deputy representative of the third year:**

Ivan Topolovec (4) and Stipe Vranković (5)

#### » GRADUATE STUDIES

**Representative and deputy representative of the first year:**

Mario Božić (6) and Petra Dobravac (7)

**Representative and deputy representative of the second year:**

Ivan Branišelj (8) and Tanja Špodnjak (9)

#### » GRADUATE STUDIES (OLD PROGRAM)

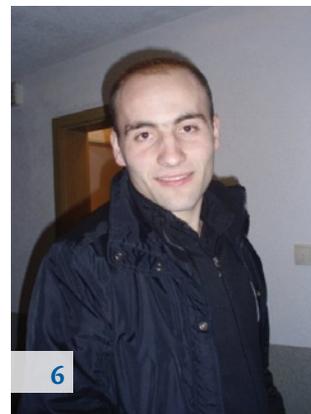
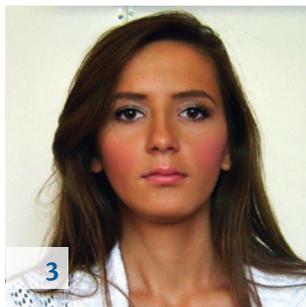
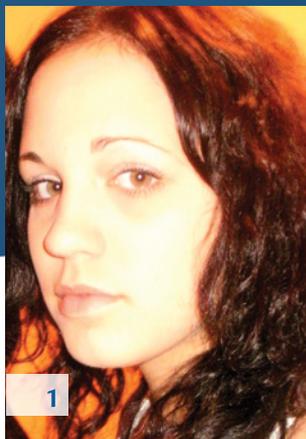
**Representative and deputy representative:**

Tihana Griparić (10) and Hrvoje Mahović (11)

#### » POSTGRADUATE STUDIES

**Representative and deputy representative:**

Dražen Odošašić (12) and Olga Bjelotomić (13)



# Extracurricular activities

There are many sections within the Students' union. Sport sections are: soccer, basketball, rowing and water polo section. Students' magazine Ekscentar has been active for many years and is very proud of its large number of reader and its large printing run of 3.000 copies. From this year there will be a new informatics section.

Members of our sport sections are achieving outstanding results on the University level. We would like to use this opportunity to invite all interested students to choose one of the given sections and join us by contacting one of our section representatives.

Section representatives:



**Ekscentar**  
Matej Varga  
mvarga@geof.hr  
ekscentar@geof.hr

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**Handball section**  
Dino Dobrinić  
ddobrinic@geof.hr

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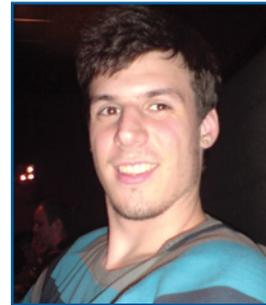
**Water polo section**  
Igor Šarić  
isaric@geof.hr

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**Informatics and photo section**  
Hrvoje Bogner  
hbogner@geof.hr

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**Basketball section**  
Vanja Miletić  
vmiletic@geof.hr

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**Soccer section**  
Marijo Vuljanić  
mvuljanic@geof.hr

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**Rowing section**  
Frane Kalcina  
fkalcina@geof.hr

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## Geodesy and Geoinformatics Forum

We would like to remind you of our students' internet website called: Geodesy and Geoinformatics Forum, popularly called Forum.

Forum is used for socializing, discussions and information exchange along with every other content which is useful for students and geodesists in general. All topics about geodesy along with other suitable topics can be posted and are more than welcome. It was founded by the Faculty of geodesy students and primarily for the students of the Faculty of geodesy but also for other users who share interests with our profession. It is also intended for everyone who can contribute to discussions and forum amenities.

We invite all users to continue with their active engagement; all of those who are already following us and still haven't registered, to do so; and all of those who still don't know about the forum to go and visit this site: <http://forum.student.geof.hr>

As our administrators like to say, forum brought a lot of positive things. It simplifies life to its users every day and we can say that during these last six years its role for students of the Faculty of Geodesy has been irreplaceable.

Their moto is also an invitation: "Build, work, communicate and enjoy!"

# Awards and recognitions

The pride of every faculty, and that includes ours, is awards and recognitions to our students for their extraordinary engagement in the field of geodesy and geoinformatics.

In the academic year 2009./2010. our faculty students were given these awards:

## Faculty award for excellence:

### UNDERGRADUATE STUDIES:

Ivan Puklavec, I year

Ivan Racetin, II year

Antonio Luketić, III year

### GRADUATE STUDIES:

Marijan Grgić, I year

Igor Tomić, II year



## Dean's award for the best students' paper:

Frane Glasinović author of paper:

"Implementation of GIS functionality in CAD environment using open source module FDO",  
mentor prof. dr. sc. Damir Medak.

Hrvoje Lovrić and Luka Švanderlik, authors of paper:

"Use of geoinformational technology in planning of electricity production from the Sun",  
mentor doc. dr. sc. Robert Župan.

Awards in stated categories were assigned on the Faculty council ceremony which was held on the Faculty Day, September 24, 2010.



## Rector's award in the field of technical sciences:

Ivan Topolovec for a project work called: "Analysis of the positional accuracy of triangulation, trilateration and combined 2D network of special purpose",  
mentor prof. dr. sc. Nevio Rožić.

## Special rector's award in the field of technical sciences:

Hrvoje Mahović, Sandra Keran, Petra Dobravac, Damir Kontrec, Mario Božić, Albert Hrženjak, Luka Pavličić and Leonida Klarić for the organization of International geodetic students meeting in Zagreb.  
Rector's and Special rector's awards were assigned on the University ceremony, June 18, 2010.

# 2ND TRADITIONAL INDOOR SOCCER TOURNAMENT OF THE FACULTY OF GEODESY - GEOLAJKA



The best indoor soccer players from our college gathered again on the second Faculty competition on April 10 and 11, 2010. There were 9 teams (GPS, Geodetski referentni invalidi, Lignje iz Odeona, Pingvini, Geotrip, Geozezija, Football Factory, Latifundija, Los Galacticos). Slight favorites were the last year winners and the freshmen team, Football Factory, was quite mysterious, since it was made out of very good individuals who were not yet spoiled by the unbridled student life. This year, the organizers Jakov Maganić and Matej Varga got support from the Student Union of the Faculty of Geodesy which is really great.

The weather was perfect both days and 19 games took place. The winners of the second tournament is the team Los Galacticos who have

beaten the team Football Factory in the uncertain finale 3:1. The winners received gold medals and large amounts of „healthy golden liquid“ made out of hop.

The best scorer was Marijan Dešman from Lignje iz Odeona team who scored 8 goals in 3 games. The best player was Jure Bonaca from Los Galacticos team who showed the best qualities during the tournament. We congratulate the winners and all the other players and teams. We will also mention the supporters who were in a small number, but that is exactly why we want to mention them :)

We can also announce the 3rd Geolajka that will take place during the first weekend after Easter.

## ADMISSIONS DEGREES DOCTORATES

Undergraduate study of geodesy and geoinformatics in the academic year 2009./2010. admitted 97 students. Three students: Filip Pavelić, Lucijo Martinić and Jurica Bogović achieved direct faculty enrolment based on achieved results on the 15th National competition of students from the construction and surveying schools from the Republic of Croatia.

Graduate study in academic year 2009./2010. admitted 80 students; 47 were admitted on geodesy course and 33 on geoinformatic course. Along with students who finished their undergraduate studies on our faculty, 12 more students came from other faculties; 6 students came from undergraduate studies in Sarajevo, 3 students came from the Faculty of science, Zagreb, Geography course, one student from the Faculty of architecture in Zagreb, one student from the Faculty of chemical engineering and technology in Zagreb and one foreign citizen from Ukraine.

In academic year 2009./2010. 18 students from the first generation of Bologna process graduated.

Adam Vinković, student of graduate studies of geoinformatics is spending his winter semester of the academic

year 2009./2010. on the Faculty of civil engineering and surveying at Technical university in München. More information can be found on: <http://www.bv.tum.de/> and <http://www.gug.gv.tum.de/>.

It is also important to point out that in the academic year 2009./2010. 4 employees from the Faculty of geodesy were promoted to PhD by defending their doctoral thesis:

- **Danko Markovinović:** Gravimetrical referent system of the Republic of Croatia.
- **Mladen Zrinjski:** Definition of scale of calibration base of the Faculty of geodesy with the application of electro optical telemeter and GPS.
- **Marko Šljivarić:** Optimization methodology of three-dimensional inter-date transformation in Croatia.
- **Rinaldo Paar:** Geospatial databases of objects in the highway system in the Republic of Croatia.



# Publications

## 1. EKSCENTAR

In 2010. two issues were published. Editorial staff is very pleased with what is done, but there is always space for improvement and finesse. Editorial staff assembled in the beginning of this academic year and we are using this opportunity to call all interested students to join us with their ideas and visions and to help us improve. Next issue is planned for April 2011.

## 2. GEODETSKI LIST

Geodetski list, the official press of Croatian geodetic society, should also be mentioned. This magazine has been delivered to geodetic offices and companies for four times a year for the past decades. It has a long tradition and it is one of the pioneers of the geodetic magazines in the world. It publishes scientific articles from the field of geodesy, Terrestrial informational systems (ZIS), GIS, GPS and all other fields that deal with spatial data; it also publishes ideas from other fields which are important for the development of geodesy.

It publishes everything in the field of geodesy in Croatia and in the world, data from the history of geodesy and the activities of Croatian geodetic society and International society of geodesists.

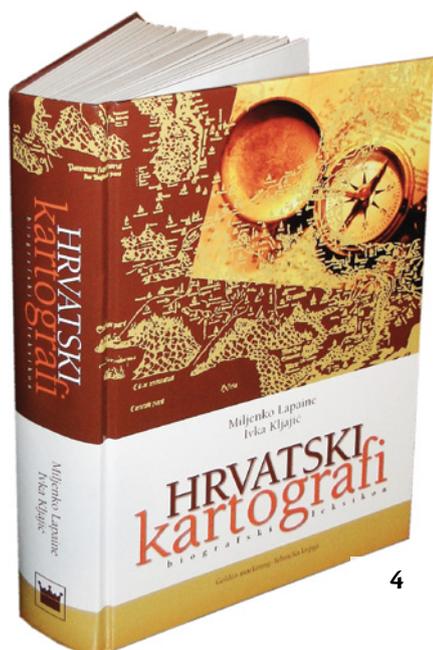
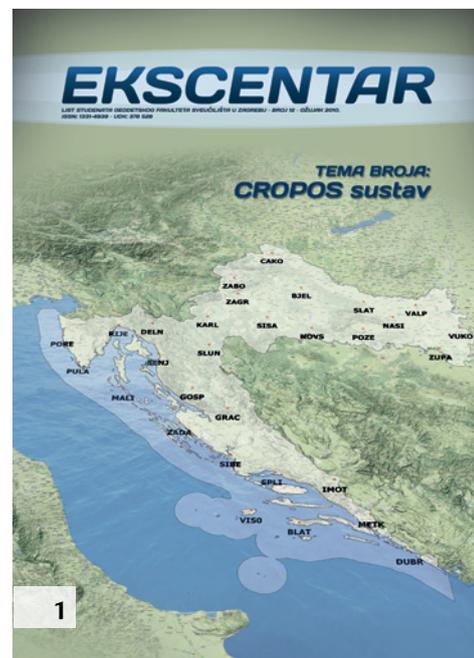
Chief editor of Geodetski list is prof. dr. sc. Damir Medak.

## 3. CARTOGRAPHY AND GEOINFORMATION

The thirteenth number of scientific-professional-informative magazine of the Croatian cartographic society has been issued in June. It covers the fields of geodesy and geoinformatics. The magazine is published twice a year and it is bilingual i.e. all of the texts are written both in English and in Croatian. As far as this number is concerned the first part covers scientific works. The first scientific work deals with the modern theme of determining visibility as the factor of evaluating immovables in urban areas. The other two are concerned with the theme of unexplored cartographic treasure kept in the State archive in Zadar. The other part of the magazine presents new magistrates of science, publications, software's, conferences etc. The work and life of dr. Mirko Tomić is described in the section Anniversaries due to his 100th birthday. As the chief editor of K&G, prof. dr. sc. Miljenko Lapaine, says mister Tomić is a living legend of Croatian geodesy, and they honor, congratulate and thank him.

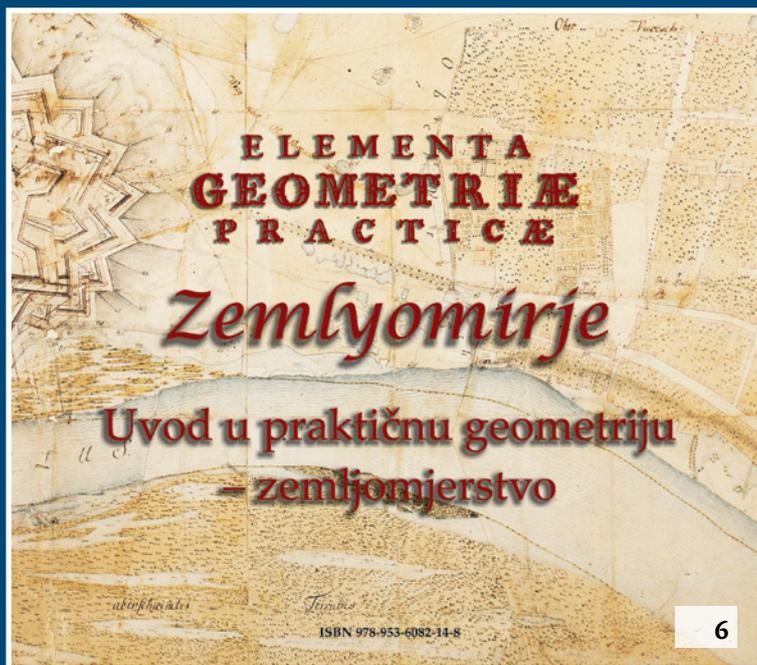
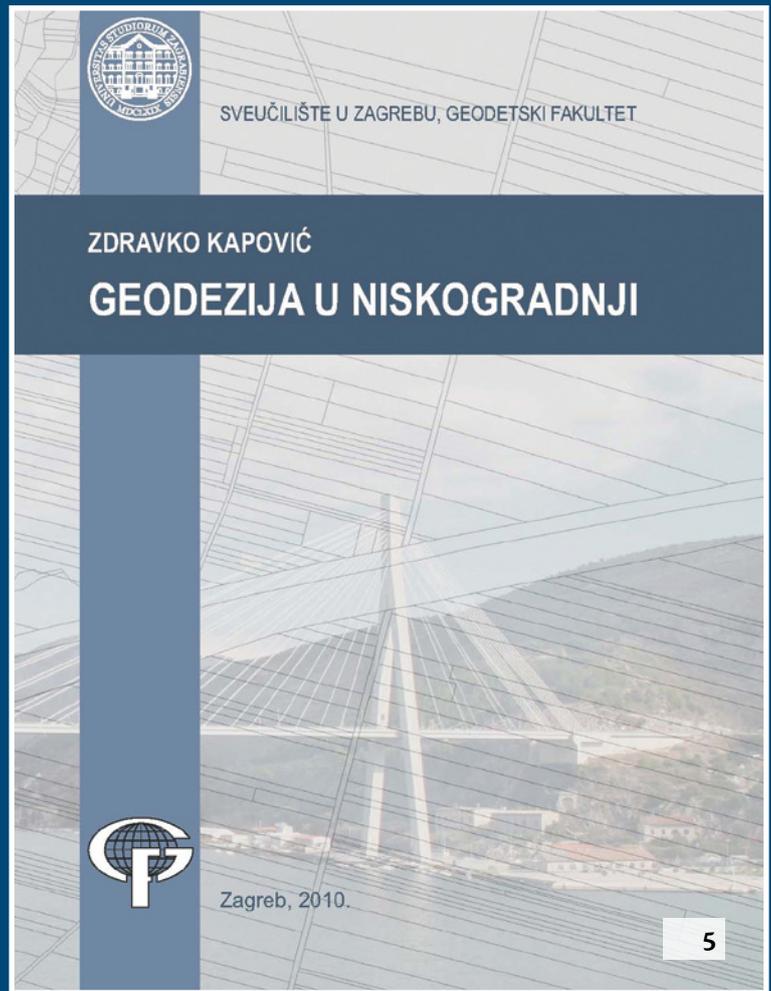
## 4. BIOGRAPHICAL LEXICON CROATIAN CARTOGRAPHERS

Biographical lexicon Croatian Cartographers was recently published by Golden marketing - Tehnicka knjiga (2009.). The editors are prof. dr. sc. Miljenko Lapaine and doc. dr. sc. Ivka Kljajic. The lexicon includes about 2.000 people who contributed to Croatian cartography. The goal of the Croatian Cartographers project, which is being carried out at the Faculty of Geodesy of the University of Zagreb, is the acquisition of biographies of Croatian cartographers. The term „Croatian Cartographers“ includes Croatians or people of Croatian origin who worked in the field of cartography; members of other nations and nationalities who were born in Croatia, regardless of where they lived; and foreigners who lived and worked in Croatia, contributing to cartography. This book was published on the occasion of fourteen years of work on the Croatian Cartographers project. Now it is perfectly clear that is no end to this work because Croatian cartographic heritage is really great, but still insufficiently explored.



## 5. GEODESY IN STRUCTURAL ENGINEERING

After a while, a new textbook was promoted on our faculty. As a longtime teacher at the Faculty of geodesy, who deals with geodesy in structural engineering, prof. dr. sc. Zdravko Kapović gathered all his knowledge and manuscripts in one and released a university textbook Geodesy in structural engineering. Geodesy in structural engineering is an interesting and demanding area, and was partially covered in the textbook written in Croatian and published in 1966. (Janković: Engineering geodesy). The fact that many years have passed since the publication of the mentioned textbook, highlights the necessity of publishing a new textbook to cover the area of engineering geodesy. The whole active life of professor Kapović has been oriented towards the problems of constructing and controlling big infrastructural objects in the Republic of Croatia. This textbook is a logical sequence inspired by the wish to pass knowledge in this area to new generations. The critics are unanimous in their evaluation when they say that this textbook is just what the students of geodesy need and what will contribute to the experts in their practical work. The textbook covers one big, interesting area of geodesy and it represents a big reinvigoration in the field of geodesy.



## 6. ELEMENTA GEOMETRIÆ PRACTICÆ ZEMLYOMIRJE

Faculty of Geodesy in Zagreb and Croatian geodetic society in Zagreb in the end of June 2010 published Elementa Geometriae Practicae Zemlyomirje - Introduction to practical geometry / surveying edited by Miljenko Lapaine from Zagreb and Dušan Marjanović from Szeged, Hungary. So far it was practically unknown that the oldest book on surveying in Croatia was written by Matija Petar Katančić in year 1787 under the title "Pridhodna Bilixenja od Dillorednog' Zemlyomirja". It remained as a manuscript and is kept in the Franciscan Monastery in Budapest. It is the translation of the book "Elementa Geometriae Practicae" written in Latin by the famous Hungarian mathematician, physician and philosopher Pál Makó. The book is intended for everyone who is working with or is interested in the history of schooling, especially geodetic, in Croatia, but also for experts who study geometric and geodetic terminology through history. No matter that the translation has never been published, it is the oldest geodetic book in Croatian and that is why this book is dedicated to it.

## Media about the IGSM

The important part of organization was to inform media about our meeting, who then recognized our potential and made several reports about the organization.

President of the organization board, Hrvoje Mahović and vice president Sandra Keran gave two interviews for HRT – Croatian radio television. The reports were emitted and accompanied by statements given by professor PhD Damir Medak in "Dobro jutro Hrvatska" (May 5, 2010) and "Znanstvene vijesti" (May 12, 2010).

Regarding radio emitting, the news about the IGSM was broadcasted on Radio Novska and Open radio, The president of the organization board gave a statement in morning news on May 3, 2010.

The news about IGSM was also printed in Večernji list on May 2, 2010. Regarding the fact that we led some of our participants to Zadar, the local newspapers, Zadarski list, published a report and the city of Zadar web page uploaded a small gallery with photos of the event.

Besides all of this, IGSM was mentioned on the University of Zagreb web pages and also on the web page of the Faculty of Science in Zagreb.



## IGSM museum

To make this meeting a warm and long lasting memory, the organizers decided to make an IGSM museum on the 1st floor of our faculty where we placed the list of students who were the most responsible for the organization, souvenirs brought by participants, brochures and pamphlets which were used to seek sponsors and by which we invited student to participate in the organization process, the schedule of events, photographs of the whole event and majority of gifts received from our quests from around the world!

The gifts symbolize our guests' home countries, and among them you can find tourist books, maps, flags and souvenirs like: puppets dressed in Bulgarian traditional clothes, coffee set from Turkey, "beer giraffe" from Slovenia, memory game with photos of Switzerland, Australian Koala bears and many others.



## Photo and video

The whole meeting was filmed and we also hired a few people who were taking pictures so that we could have something to remember our meeting by. Even though it is impossible to use picture or video to show all the experience and knowledge we gathered, it provides a decent view of the whole meeting. The main photographers were Ivan Tomljenović, Hrvoje Bogner and Ozren Buriša, and the main cameraman was Tomislav Mateo Klarić who made a 20 minute film about the whole meeting. Link for pictures of IGSM: <http://igsm2010.geof.hr/gallery/index.php>  
Link for video: <http://vimeo.com/12555779>

## Members of organizational board recieved a special rector's award

Regarding the amount of work implemented in the organization of the whole meeting, members of the organization board decided to write a paper about the whole IGSM project and the faculty leadership applied it on a competition for special rector's award.

Rector recognized the work and value of the whole project and awarded members of the organization board with special rector's award. Out of 13 different papers only 11 of them were awarded.

The ceremony was held on July 2, 2010. on the Faculty of Medicine in Zagreb. Our dean, prof. dr. sc. Stanislav Frangeš, also participated in this event. Presentation of all the awarded papers was held during the ceremony and our students also participated with a poster about the awarded project.



## Introduction to IGSM 2011

IGSM 2011 will be hosted by Geomatics students at Newcastle University, United Kingdom. It will take place from the April 14 to 19, 2011.

Zagreb 2010 will prove a tough year to beat after an amazing week, but we are certainly going to try!

Participants should get their applications in early if they do not want to miss what the IGSM 2011 committee have in store!

Aside from traditional workshops, presentations and posters, there will be a return of the Geodetic Olympics, and an excursion to the surrounding countryside where we will visit the famous Hadrian's Wall, later experiencing some Scottish tradition of Ceilidh dancing.

Participants will get the opportunity to view Geodetic techni-

es in action at the nearby new Tyne Tunnel project, a large-scale development, constructing a new tunnel under the river Tyne, East of Newcastle!

Take part in a treasure hunt using handheld GPS in order to explore the historic city of Newcastle upon Tyne before retiring to the award winning Albatross hostel in the centre of the city to put on your party clothes and experience the famous night life we have to offer!

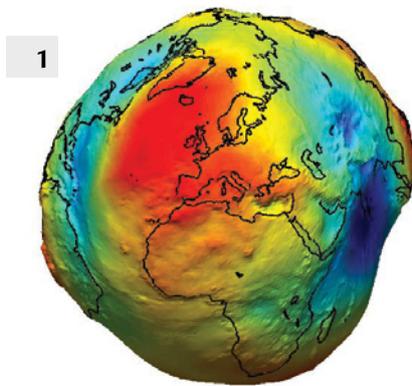
To end a week of non-stop fun, there will be a Grand Ball where everyone puts on their posh clothes to dine, drink and dance the night away. So what are you waiting for? Visit our website [www.igsm2011.org.uk](http://www.igsm2011.org.uk) or join our Facebook Group "IGSM 2011 – Newcastle" for more information on when to register!

Hope to see you there!

*IGSM 2011 Committee, Newcastle University.*

# NEWS FROM GEODESY AND GEOINFORMATICS

## ESA made first GOCE dataset available

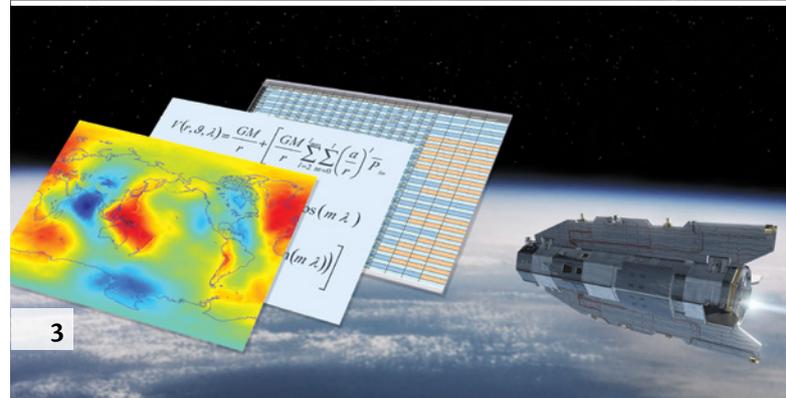


The first products based on GOCE satellite data are now available online through ESA's Earth observation user services tools. ESA launched the satellite in March 2009 on a mission to map Earth's gravity with unprecedented accuracy and spatial resolution.

The final gravity map and model of the geoid based on GOCE data will provide users with well-defined products that will be instrumental in advancing science and applications in a broad range of disciplines.

However, there are a number of steps that have to be taken in order to turn the raw data into suitable products for users. Raw data are downlinked from GOCE to the ground stations in Kiruna, northern Sweden, and on Svalbard, Norway. They are immediately forwarded to the Flight Operations Segment at ESA's European Space Operations Centre (ESOC) in Darmstadt, Germany, which then links them through to the Payload Data Ground Segment at ESA's European Space Research Institute (ESRIN) in Frascati, Italy. Through a process of calibration and validation, the data undergo an important transformation from telemetry to 'level-1b' data products. Level-1b products are the time series of converted, calibrated and validated measurements taken by GOCE. They consist mainly of the gravity gradients in the instrument reference system and the orbit data (satellite-to-satellite tracking observations, positions and velocity) in an Earth-fixed coordinate system.

In addition, satellite data such as the attitude of the spacecraft and other housekeeping data complete the level-1b data. These level-1b data, covering the period November 1 to 30, 2009, are available free of charge to scientific and non-commercial users, and much more will come in the following weeks and months. Subsequently, these level-1b data will be processed to level-2 through the High-level Processing Fa-



cility (HPF). Under ESA's control, 10 European universities and research facilities that have complementary expertise in gravity and geodesy-related science fields, have joined together and will be operating the HPF throughout GOCE's lifetime.

The first gravity field model (level-2 data) was released at ESA's Living Planet Symposium in Bergen, Norway, from June 28 to July 2, 2010. The final gravity map and model of the geoid will provide users with well-defined data products that will be instrumental in advancing science and applications in a broad range of disciplines, ranging from geodesy, geophysics and surveying to oceanography and sea-level research.

Figure 1. Earth gravity field (link: [http://esamultimedia.esa.int/images/goce/C71\\_geoid\\_smooth4.jpg](http://esamultimedia.esa.int/images/goce/C71_geoid_smooth4.jpg))

Figure 2. GOCE in Orbit

Figure 3. GOCE will advance many fields of science

SOURCE: [http://www.esa.int/SPECIALS/GOCE/SEMB1EPK2AG\\_0.html](http://www.esa.int/SPECIALS/GOCE/SEMB1EPK2AG_0.html)

# Biggest FIG Congress in the history full of professional highlights

Sydney, Australia  
April 11-16, 2010



Congress moto: Facing Challenges - Building the Capacity

The XXIV FIG Congress Facing the Challenges – Building the Capacity held in Sydney, Australia and turned out to be the biggest FIG congress ever. With more than 2.200 participants from 100 countries it gathered the biggest attendance to an FIG event. The technical program with more than 1.000 offered papers out of which more than 700 were presented in Sydney was a big hit. In totally there were more than 150 technical and flash sessions, workshops and special seminars. The total number of presented papers exceeded 800.

At the congress there were four plenary sessions. In the first session that focused on the FIG achievements, 2007-2010, President Enemark



summarized the most important activities that have been taken during the last four years. The second plenary session focused on spatially enabled society. The third plenary session focussed on the big challenges facing surveyors and society as

a whole focussing on climate change, natural disasters, urban growth, and land governance. E.g. there are five million new urban residents every month in the developing world and the sea level rise threatens hundreds of millions of people living in deltas. The cities have a key role in adaptation to climate change. In the last plenary session on technological futures the speakers included Dr. Mary O’Kane and Mr. Ed Parsons, who discussed the Google Earth and internet approaches.

Croatia also had the delegation participating on the congress (from the Faculty of Geodesy and State Geodetic Administration).

Figure 1. FIG banner

Figure 2. Aboriginal welcome at the Opening Ceremony

SOURCE: <http://www.fig.net/news/fig2010/index.htm> (May 25, 2010)

## INTERGEO - Conference and trade fair for geodesy, geoinformation and landmanagement

Cologne, October 5-7, 2010

Conference moto: Knowledge and action for planet Earth

INTERGEO is the world’s largest event and communication platform for geodesy, geoinformation and land management. It is the only event of its kind that covers the complete range of current and forward-looking products, technologies and system solutions in their entire breadth and depth. The trade fair and conference cover all the key trends that crop up along the entire value-added chain – from geo-based information surveys and data processing to integrated applications. As a result, it is the industry’s largest and most important gathering. The range of exhibits covers all aspects of surveying, GIS, remote sensing and photogrammetry as well as complementary solutions and general technologies.

It is also a platform for the very latest pioneering developments: the success of sensors that use complex systems to simplify data capture, street cars for 3D recording of neighborhoods - initial new or advanced application developments are expected in 2010, 3D applications, satellites/positioning services, the trend towards geo web solutions, particularly important in the context of INSPIRE.

Figure 1. Intergeo world

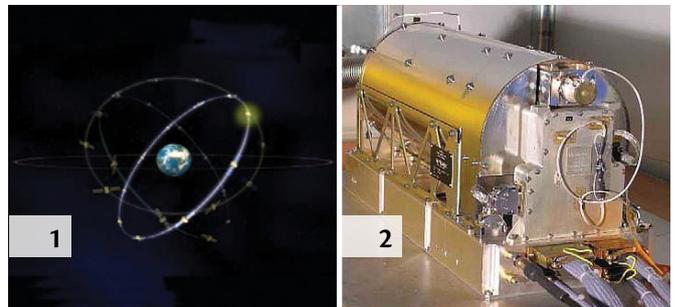
Figure 2. Intergeo logo

SOURCE: <http://www.intergeo.de/en/englisch/intergeo/profil.php?navid=1> (October 10, 2010)

**INTERGEO®**  
Kongress und Fachmesse für Geodäsie,  
Geoinformation und Landmanagement



## Edinburgh’s SELEX Galileo to Supply Atomic Clocks for 14 Galileo Satellites



SELEX Galileo, an Edinburgh, Scotland company, has signed a €30 million contract with Surrey Satellite Technology LTD (SSTL) to supply PHM atomic clocks for all 14 Galileo FOC (full operational capability) satellites.

The PHM-Passive Hydrogen Maser clock is the most stable for space applications and has been tested successfully in GIOVE-B, the Galileo system’s second validation satellite, which was launched in 2008.

Swiss company Spectratime is a subcontractor on the project. The two companies are also developing the Mini MASER, a second generation product funded by ESA for the miniaturisation of the PHM.

SSTL will supply the payloads for all of the planned satellites in Europe’s publicly-funded GNSS. In addition to the clocks, those include signal generators, high power TWTAs and antennas.

SELEX Galileo is part of Finmeccanica S.p.A., a space, defense and transport conglomerate partly owned by the Italian government.

Figure 1. Galileo Satellite

Figure 2. Passive Hydrogen Maser (PHM)

SOURCE: <http://www.insidegnss.com/node/2221> (August 05, 2010)

## Two years in space for GIOVE-B

On the April 27, 2010. ESA celebrated the completion of GIOVE-B's second year in orbit. The satellite was launched from Baikonur Cosmodrome on April 27, 2008. to help validate the technologies developed for the Galileo navigation constellation.

After two years in space, the second 'Galileo In-Orbit Validation Element' satellite is still in perfect condition and its experimental equipment has delivered important results. Flown for the first time on a navigation satellite, the passive hydrogen maser clock has demonstrated its reliability by operating continuously for more than 400 days. The GIOVE-B maser clock has shown that it is the most stable clock ever flown in space and the technology best suited to navigation services. GIOVE-B carries a navigation signal generator that was designed to meet the specification for the Galileo signal that will be available to the public. The results of this experiment were fully consistent with expectations, achieving improved accuracy for users. The good health of GIOVE-B will allow it to provide further data, acquired either via telemetry at the Ground Control Centre in Fucino, Italy, or from the navigation signals received by a worldwide network of sensor stations. These signals are analysed at the GIOVE Processing Centre hosted in the Navigation Laboratory at ESA's European Space Research and Technology Centre (ESTEC) in Noordwijk, the Netherlands.

GIOVE-B was built by a consortium led by EADS Astrium GmbH and is operated by Telespazio SpA. It was launched using services procured by Starsem on a Soyuz launcher.



Figure 1. Second Galileo test satellite; GIOVE-B (source: ESA)

Figure 2. The Soyuz-Fregat launch vehicle carrying GIOVE-B (source: ESA)

SOURCE: [http://www.esa.int/esaNA/SEM162HMI8G\\_index\\_0.html](http://www.esa.int/esaNA/SEM162HMI8G_index_0.html) (July 5, 2010)

## GLONASS-M Satellite Launch Highlights Ambitious Promotion of Russia's Revitalized GNSS

A Proton-M carrier rocket successfully launched three GLONASS-M satellites into orbit early in the morning at September 2, 2010, MST) from the Baikonur space center in Kazakhstan. Another launch on November 30 will send three more M-type satellites into orbit, and the first GLONASS-K is scheduled to go up on December 25. The imminent completion of a full constellation by the end of the year is accompanied by a vigorous policy initiative to promote Russia's revitalized GNSS. Moscow news media have reported that Vladimir Putin, Russian Federation prime minister and former president who got GLONASS's revitalization started in 2001, says that the government will spend an additional 48 billion rubles (\$1.6 billion) on GLONASS over the next year and a half. Russia is considering imposing an import duty of up to 25 percent on GNSS navigation equipment (read "GPS receivers") that don't also have GLONASS chips.

Although some sources say that there are only 43.000 GLONASS receivers currently in operation, the nation is energetically courting foreign (Nokia, Motorola, Qualcomm) and domestic manufacturers of mass-market products to incorporate the Russian technology.

The GLONASS system currently has 21 operational satellites transmitting healthy signals with another two new spacecraft in orbit as spares. Another triple launch of GLONASS-M satellites is scheduled for December as well as a prototype next-generation GLONASS-K.

Figure 1. GLONASS-M satellite

Figure 2. GLONASS-K satellite



SOURCE: <http://www.insidegnss.com/node/2288> (June 28, 2010)

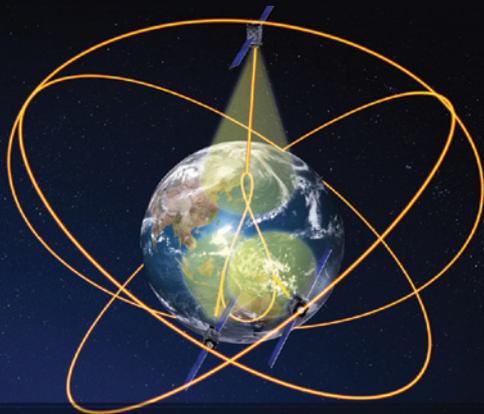
## Land surveyor killed in Kenya

A land surveyor was killed and two people needed to be treated for gunshot wounds after a fight over the ownership of the farm. The deceased, a middle-aged man was killed by a gang of armed Maasai morans, who entered the farm in an attempt to stop the sub-division of the land. Armed security personnel were deployed in the area to try and quell the skirmishes and pursue the killers said to have hailed from the neighbouring Narok County. Trouble started when the morans moved in to repulse some surveyors hired to subdivide the land. A rival group was claiming ownership of the land and had hired the surveyors to carry out the subdivision.

The attackers came from the neighboring district and used arrows. They also hacked one of the surveyors to death before police arrived. The attack had raised fear and tension in the area where clashes over the piece of land have left over 100 people dead and property worth thousand of shillings destroyed.

SOURCE: [http://www.gim-international.com/news/id5039-Surveyor\\_Killed\\_over\\_Disputed\\_Land.html](http://www.gim-international.com/news/id5039-Surveyor_Killed_over_Disputed_Land.html) (August 20, 2010)

# "MICHIBIKI", Japan's First QZSS Navigation Satellite, Takes Off



1

Quasi-Zenith Satellite-1 "MICHIBIKI"  
To be launched in summer 2010!

Japan's first quasi-zenith satellite launched successfully from the Tanegashima space center at 8:17 a.m. (Japan Sidderal Time) in the morning of September 11, 2010. The H-IIA launch vehicle released the satellite, nicknamed Michibiki, at 28 minutes and 27 seconds after liftoff.

Michibiki means to guide or lead the way, appropriate for the first entry into Japan's satellite augmentation program that will vastly improve GNSS accuracy over Japan and the rest of East Asia. The Quasi-Zenith Satellite System (QZSS) is designed to maintain at least one satellite in place near zenith over Japan. It will transmit signals that are compatible and interoperable with existing and future modernized GPS signals and a novel indoor messaging system.

Figure 1. Orbit of the Michibiki (source: JAXA)

Figure 2. QZSS logo (source: JAXA)

SOURCE: <http://www.insidegnss.com/node/2316> (August 16, 2010)



2

## Maps as Passwords

Between super-powered hacker computers and keystroke recording malware, traditional passwords may no longer be secure enough. A computer scientist by the name of Bill Cheswick has created map based passwords that could be more secure than traditional typed in passwords.

Speaking at the New York Institute of Technology Cyber Security Conference, Cheswick described how users could memorize the exact spot on a satellite photo, with the longitude and latitude serving as the access code. By zooming down through the map to the high level of resolution, users can graphically produce a nearly unbreakable password that neither people nor viruses could track.

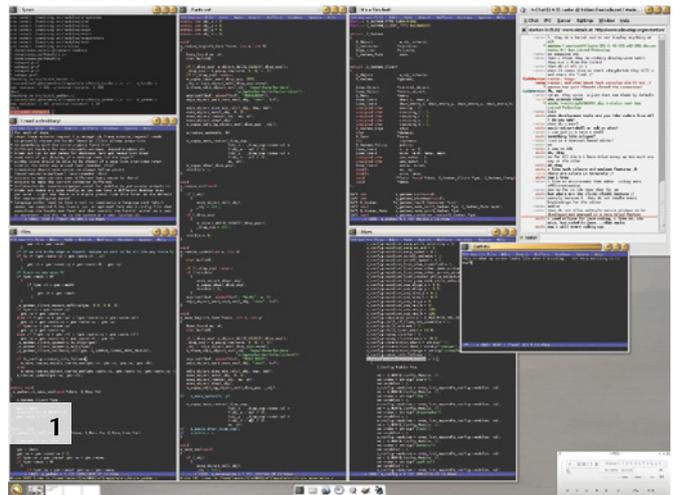
The key idea is that you have a data set with very deep data, and you have to drill down. You could drill down on a map of anything. Probably better if it's a map of someplace you've never been, so you're not tempted to pick your childhood home. You could have a 10 digit latitude, and a 10-digit longitude, then you have an unbreakable 20-digit password.

Figure 1. Code lines

Figure 2. Example of the coding system

SOURCES: [http://www.msnbc.msn.com/id/39276642/ns/technology\\_and\\_science-security/](http://www.msnbc.msn.com/id/39276642/ns/technology_and_science-security/) (August 18, 2010)

<http://gislounge.com/maps-as-passwords/> (August 18, 2010)



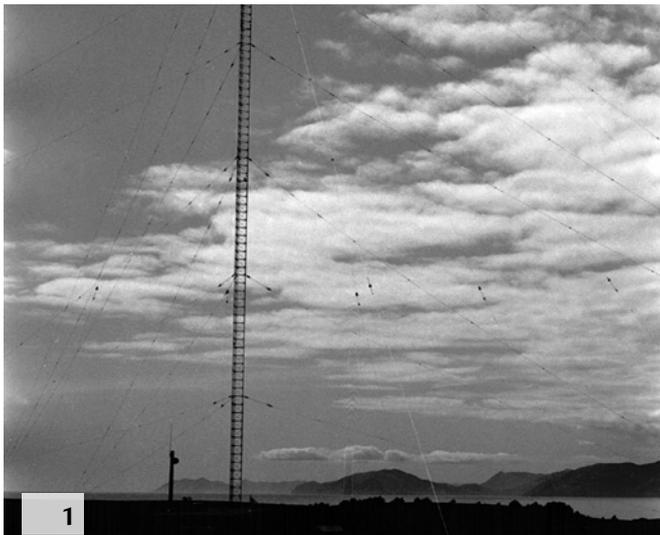
1

2



יה אל צפנ אלהים אמת Yah is God; God encoded truth.  
Alternate translation: Yah God encoded, God is truth.  
יה ראה רעש נרם Yah considered the commotion of their light.

# Loran-C Towers Bite the Dust



The LORAN system began as a radio-based navigation system during World War II and provided the Allied forces with a reliable and accurate means of navigation at sea in any weather. As a result of its effectiveness, LORAN was expanded for aircraft and merchant use with Coast Guard broadcast stations being established throughout the world.

Due to technological advancements in the last 20 years, LORAN has become an antiquated system no longer required by the armed forces, the transportation sector or the nation's security interests and is used only by a small percentage of the population. The decision to cease transmission of the LORAN-C signal reflects the American president's pledge to eliminate unnecessary federal programs. The Loran-C signal was active for 67 years, 8 months and 24 days.

Budget cuts and better technology sealed the fate of radio towers that have been providing navigation signals. American Congress voted to cut the Long Range Aids To Navigation (Loran-C) system in the 2010 budget after it was determined it wasn't needed as a back up to GPS technology, a much-disputed decision among GPS experts.

On April 28, 2010, explosives felled a 400-ton, 1.357 foot tall structural steel U.S. Coast Guard Navigation Tower in Port Clarence, Alaska.

The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) have discussed ways to provide terrestrial back up for GNSS (eLoran) in its global radionavigation plan. However, the navplan was written before the United States decision to close down Loran. According to IALA spokespersons, India and Canada have followed the U.S. Loran policy and will close down their stations. Reportedly, the International Maritime Organization (IMO) will "note" the input of IALA and include it in further discussions on e-navigation.

Figure 1. LORAN-C tower (source: [www.kadiak.org](http://www.kadiak.org))

Figure 2. US Coast Guard LORAN-C team Logo (source: <http://www.loran-history.info/yap/Yap.htm>)

SOURCES: <http://www.gpsworld.com/gnss-system/augmentation-assistance/news/loran-c-towers-bite-dust-10374> (May 21, 2010)  
<http://coastguard.dodlive.mil/index.php/2010/02/coast-guard-terminates-loran-c-broadcast/> (May 21, 2010)



# Visualizing the BP Oil Spill

An explosion on the BP operated Deepwater Horizon oil rig killed eleven crew members on April 20, 2010, sparking the greatest environmental disaster in United States history. In combination with the Texas City Refinery Explosion and the Prudohoe Bay Oil Spill, this marked the third serious incident involving BP in the United States in five years. Scientific estimates put the amount of oil that was being discharged from the broken well at above 1.470.000 US gallons per day! There are over 400 different species of animals living in the area affected by the spill. 464 sea turtles and 60 dolphins were found dead within the spill area. BP operated oil skimmers and other cleanup tools to try to remove oil from the water and Louisiana began building oil containment berms to halt the spread of oil. On July 15, 2010 BP successfully stopped the flow of oil from the wellhead, after spilling 190 million gallons of oil into the gulf over a period of 3 months.

Figure 1. Oil spill in the Gulf

Figure 2. Deepwater Horizon in flames after the explosion

Figure 3. The "Oil bird"

SOURCE: <http://www.ifitweremyhome.com/disasters/bp> (September 3, 2010)



# Navigation satellites contend with stormy Sun

As we grow used to satellite navigation in everyday life, media reports argue that a coming surge in solar activity could render satellite navigation devices useless, perhaps even frying satellites themselves. It is a fact that variations in the gigantic unshielded fusion reactor we call the Sun have effects that extend far out into the Solar System. And the solar activity follows a roughly 11-year 'sunspot cycle'. That means the next 'solar maximum' – solar max for short – is due in 2013, not long after ESA launches its first four operational Galileo satellites. Galileo In-Orbit Validation (IOV) satellites will indeed go up during a period of enhanced solar activity.

But the solar max is hardly a surprise event. Astronomers counting sunspots have tracked the solar cycle for more than 250 years. All the indications are this solar max will not be especially energetic – the last solar minimum has been unusually long and deep. The Sun has various potential impacts that SatNav system designers must take account of. The first can indeed affect satellites themselves: electromagnetic radiation and charged particles from solar flares can disrupt satellite electronics, induce potentially harmful electrostatic charging and damage onboard materials. All satellites run these risks but for satellite navigation constellations, the danger is severe. Placed at relatively high altitudes of about 22000 km in the case of Europe's Galileo – they pass through belts of charged particles funnelled by Earth's magnetic field.

The satellites are built with radiation-hardened components and shielding, and boast redundancy in key subsystems. Error detection and correction routines guard against charged particles randomly 'flipping' bits of computer memory.

Galileo satellites were designed with precise data on the radiation hazard they faced: in 2005 and 2008 a pair of test satellites, Galileo In Orbit Validation Element (GIOVE) –A and –B, were launched into the

constellation's future orbit. The satellites were fitted with radiation monitors, still returning data to this day.

The Sun also has a continuing influence on the outermost layers of Earth's atmosphere, with energetic solar radiation splitting scanty air molecules to form an electrically-charged 'ionosphere'. Radio pioneers used the ionosphere to reflect signals beyond Earth's horizon, but for satellite navigation it is more a hindrance than a help.

Dual GNSS receivers receiving two different frequency signals can correct for most of the errors, although such receivers tend to be too bulky for in-car or personal use. Smaller GPS systems rely on a regularly-updated error estimate broadcast in the satellite signals themselves.

Benefiting from four decades of computer advances since the GPS system was designed, each Galileo receiver incorporates a sophisticated ionosphere-modelling plug-in for error estimation – GPS makes use of a simplistic 2D 'eggshell' ionosphere model instead.

Added certainty is given by regional overlay systems: the Wide Area Augmentation System (WAAS) for North America and the European Geostationary Navigation Overlay Service (EGNOS) for Europe, with other systems in development.

What EGNOS offers is an assurance of integrity for European users of GPS and later Galileo signals. As well as checking the correctness of satellite orbits and clocks, its pan-European network of ground stations measure small changes in the total electron content of the vertical ionosphere above them to deliver local corrections. This is vital when it comes to planned 'safety-of-life' uses such as civil aviation.

SOURCE: [http://www.esa.int/esaNA/SEMCDTDODDG\\_galileo\\_0.html](http://www.esa.int/esaNA/SEMCDTDODDG_galileo_0.html)

Figure 1. (background) Solar storms sometimes reach Earth

Figure 2. Galileo constellation

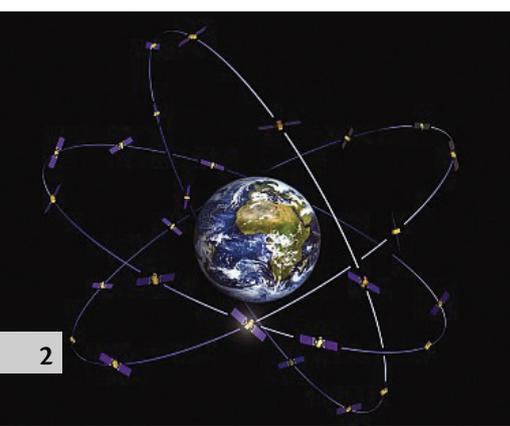
Figure 3. 'Space weather' affects satellites

Figure 4. Galileo satellite

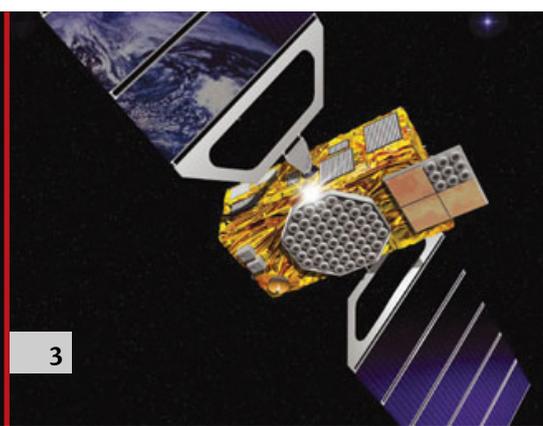
Figure 5. Solar storm

Figure 6. Ionosphere map

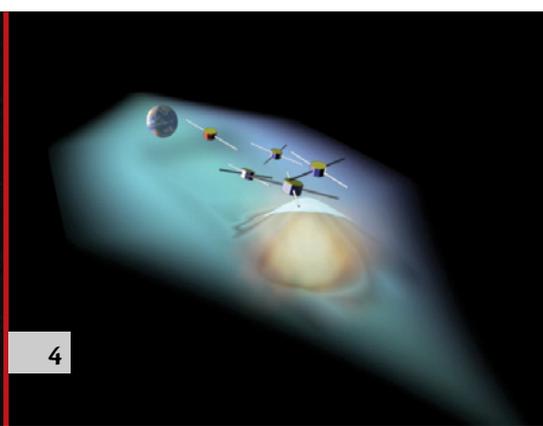
Figure 7. EGNOS overlays European territory



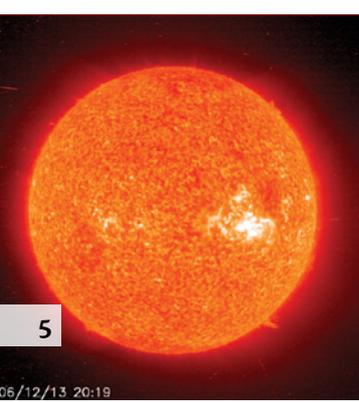
2



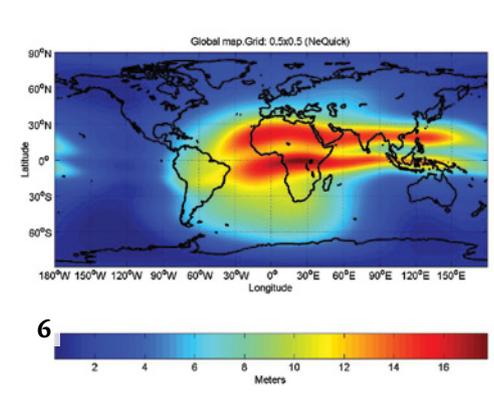
3



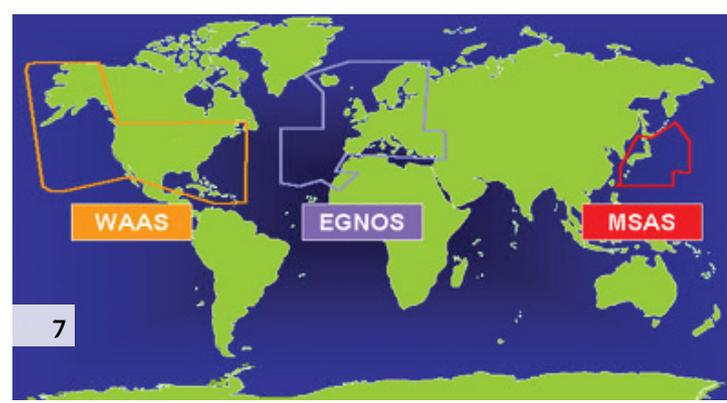
4



5



6



7

## 3rd authorized engineers of geodesy symposium Opatija, October 22-23, 2010.

Gis, photogrammetry and remote sensing in geodesy and geoinformatics

The aim of the Symposium is to give the review of conditions and the role of photogrammetry and remote sensing in geodesy and geoinformatics. A special part includes GIS as an important link between geodesy/geoinformatics and final users. The symposium will give the review of new information and Orders from legal regulation and review of their application. Cadastral surveys make an important segment of construction today and the wish of the Chamber is to show advanced achievements with clear markers of efficiency, economy and quality control of these geodetic works. One of the topics will be the price of works in Croatia.

source: <http://www.hkoig.hr/kongresi-simpoziji-seminari-dogadjanja-2/> (October 5, 2010)

## Webshop application of permanent points of geodetic basis

State geodetic authorities has developed and maintained database of permanent points of geodetic basis together with the appropriate web application for internet access to these permanent points. The web application that has become official, enables registered users to download location descriptions of permanent points on the internet. You can access the application here: <http://www.geotocke.geo-portal.hr/dg-ushop/>. It enables the choice of location (GNSS and trigonometric) and elevation points via general map (topographic map 1:25000, cadastral district) or attribute selection (point number, name of cadastral district, revision data...), creation and download of orders (location description in .pdf format). Data on permanent points are charged for in accordance with the Order on real costs setting of state survey and real estate cadastre documentation usage (Pravilniku o određivanju visine stvarnih troškova uporabe podataka dokumentacije državne izmjere i katastra nekretnina) (NN 148/08).

source: <http://www.dgu.hr/default.asp?ID=389> (October 15, 2010)

## Obligatory insurance of authorized engineers of geodesy from professional responsibilities during geodetic jobs performance

Croatian Chamber of authorized engineers of geodesy signed a contract with the insurance company (Contract on perennial obligatory insurance of the authorized engineers of geodesy from professional responsibilities during geodetic jobs performance) for the period from June 2010 to June 1, 2013.

It was agreed on the insurance for all engineers who are active in the chamber in the amount of insurance for basic cover and assets damage of 1.000.000,00 HRK on every adverse event. The overall aggregate limit for basic cover and assets damage amounts to 3.000.000,00 HRK for every member.

source: <http://www.hkoig.hr/obvezno-osiguranje-ovla-tenih-in-enjera-geodezije-od-profesionalne-odgovornosti-u-obavljanju-geodetskih-poslova/> (October 8, 2010)

## International multidisciplinary scientific geo - conference - SGEM 2010, Bulgaria

From June 20 to 26, 2010 in Albena at the Black Sea the 10th international multidisciplinary geo-conference – SGEM took place.

Over 250 participants from 15 countries could have participated at the presentations dealing with the ecology, geophysics, hydrology, etc. and for us as geodets the most interesting topics in sessions were: geodesy, digital cartography and GIS, geoinformatics, and photogrammetry and remote sensing.

The member of the Institute Branka Vorel participated at the conference, where she during geodesy session presented the co-authors' work of the members from the Cadastral survey department:

B. Vorel, B. Barišić, S. Hofer, A. Hazdovac: "CADASTRAL PLAN GEOMETRIC ACCURACY IMPROVEMENT".

At the congress there were also presented some interesting works dealing with geodesy in service of environment protection and ecology, and usage of GIS in different industry branches.

4 employees from the University of Zagreb, Faculty of Geodesy presented their works:

- Loris Redovniković: "Geodetic works on the breakthrough of the tunnel through Biokovo",
- Krešimir Babić: "Quality analysis of geodetic control for Arena Zagreb construction",
- Mario Mađer: "Monitoring of movements and deformation analysis on a protected cultural monument",
- Baldo Stančić: "Spatio-temporal databases".

More information about the congress can be found on: <http://www.sgem.org/>

# CROATIAN GEODETIC INSTITUTE united with STATE GEODETIC ADMINISTRATION!

Croatian geodetic institute (CGI) was founded in 2001 (first director was: prof. dr. sc. Nevio Rožić from 2001 to 2006, second director: prof. dr. sc. Tomislav Bašić from 2006 to 2010) according to the Law on state survey and real estate cadastre (NN 128/1999) as an institution specialized in completion of highly-professional and research and development jobs in the field of geodesy and geoinformatics which are of special interest for the Republic of Croatia, especially state survey and real estate cadastre, that arise from the Law on state survey and real estate cadastre and Law on completion of geodetic works. The institution has been the main and the only independent quality controller of geodetic products that are produced for needs of State Geodetic Administration (SGA) and state as a whole (national infrastructure of spatial data NISD) by the private geodetic sector.

On July 26, 2010, the web page of the Croatian geodetic institute, i.e. the director ([www.cgi.hr](http://www.cgi.hr)), prof. dr. sc. Tomislav Bašić informed the public about the decision of the Government of Croatia to unite the CGI with the SGA as a part of the Activity plan program for the recovery of Croatian economy and so the CGI lost its legal subjectivity and SGA took over the jobs, employees, rights and obligations of the Institute and financial funds needed for the completion of those jobs.

The new public communication of the Croatian geodetic institute from September 9, 2010 signed by prof. T. Bašić brings the following:

- No member of the Government has consulted the director and asked for his opinion on the decision to cancel the Institute from July 23, 2010.
- The Government of Croatia renamed prof. Bašić, on April 1, 2010 (3 and a half months before cancellation), the director of the CGI for another 4 years time.
- The director of the Institute, prof. Bašić, thinks that in such a society of knowledge, that Croatia should be, the Institute had to survive, since it is the practice in other democratic countries and he enumerates all the projects, quality controls, programs and works the Institute has been successfully doing for years.

• Finally, in his communication, the Director asks the Government to reassess their decision on cancellation of legal subjectivity of CGI and if that doesn't happen to keep the employees of CGI together as a part of an organizational unit of the State Geodetic Administration.

Disappointed with all that has happened and is happening to CGI and having no support from the State Geodetic Administration, the director prof.dr.sc. Tomislav Bašić on his own request has left that position and with October 1, 2010 returned to his old job as the Professor at the Faculty of Geodesy.

The whole statement which prof. dr. sc. Željko Bačić, the director of State geodetic administration, sent to our magazine Ekscentar:

"According to the decision of the Croatian Government from July 23, 2010 and the proposal of the changes of the Law on state survey and real estate cadastre, on October 29, 2010 the Croatian Parliament adopted the Act that cancelled the Croatian geodetic institute as such and united it with the State geodetic administration.

Contrary to the plans and projections we had for the development of the Institute that anticipated, based on acknowledged needs, the ex-

pansion of activities to other bodies of state administration as well as on the area within the geodetic-cadastre system, the harsh reality and the decision of the Government led to the different end.

This certainly caused great damage to the geodetic-cadastre system in Croatia and the State geodetic administration has a difficult task in front, to unite these two institutions and minimize damage, which is not easy at all, but which has to be accomplished.

We have to point out that in nine years of existence the Institute has contributed a lot to the development and has brought new quality to the Croatian geodesy. The fact that it has all been acknowledged can be seen from the continuous support given to the Institute through work conditions insurance and financial funds.

Only time will show the effects of the Act, i.e. the need for such an institution. Until then, the state geodetic administration and previous members of the Croatian geodetic institute need to carry out the transition and ensure the functioning of the system. "

The President of Croatian geodetic society, Jožef Delak, on September 10, 2010, on the web page of Croatian geodetic society (<http://www.hgd1952.hr/>) wrote the statement in which he said that the decision of the Government to unite the Institute with the State Geodetic Administration, based on the Activity plan program of the recovery of economy, wouldn't contribute the aim of business rationalization and better organization of the public administration. Croatian geodetic society, having done thorough analysis and acknowledging the attitude and opinion of the Government, called all competent institutions to reconsider their decision and to do the organizational step that would enable further operation of CGI in the system in such a way to keep its independence and to prevent quality decay of top experts in new conditions.

On September 9, 2010, Croatian chamber of authorized engineers of geodesy (HKOIG, <http://www.hkoig.hr/>) gave the public communication in which they took their stand on cancellation of the Institute. The decision is, according to that communication, not good for the following reasons:

- high scientific-professional level of the Institute,
- independent quality controller of many geodetic products of SGA and private sector,
- active involvement in professional perfecting of experts, implemented by HKOIG,
- employment of young and perspective staff, etc.

Finally, the Steering committee of HKOIG, in their statement asked the competent institutions to revise their decision and to explain to the geodetic public the reasons for the cancellation of the CGI, that they haven't given so far and to give directions as to who will do quality control of geodetic products in the future.

#### READ MORE ON:

<http://www.cgi.hr/news/prekidHGI.html>

[http://www.cgi.hr/doc/HGI\\_objava%20za%20javnost.pdf](http://www.cgi.hr/doc/HGI_objava%20za%20javnost.pdf)

<http://www.hgd1952.hr/?p=143#more-143>

<http://www.hkoig.hr/priop-enje-hkoig-o-ukidanju-hgi/>

# PRODUCT NEWS

## The Trimble NetR9-a highly versatile, ground-breaking GNSS reference receiver for infrastructure and network applications

The Trimble NetR9 Global Navigation Satellite System (GNSS) reference receiver series consists of full-feature, top-of-the-line receivers designed to provide network operators with maximum features and functionality from a single receiver platform.

Current satellite signals tracked simultaneously: GPS: L1 C/A, L2C, L2E (Trimble method for tracking L2P), L5, GLONASS: L1 C/A and unencrypted P code, L2 C/A2 and unencrypted P code, Galileo GIOVE-A and GIOVE-B, SBAS: L1 C/A, L5 supporting WAAS, EGNOS and MSAS, L-Band OmniSTAR VBS, HP and XP.

### POSITIONING PERFORMANCE

Code Differential GNSS Positioning:

- horizontal: 0.25 m + 1 ppm RMS,
- vertical: 0.50 m + 1 ppm RMS,
- WAAS differential positioning accuracy: typically <5 m 3D RMS.

### Static GNSS Surveying

Baseline <30 km:

- horizontal: 3 mm + 0.1 ppm RMS,
- vertical: 4 mm + 0.4 ppm RMS.

Baseline >30 km:

- horizontal: 4 mm + 0 ppm RMS,
- vertical: 9 mm + 0 ppm RMS.

### Real Time Kinematic Surveying

Single Baseline <30 km:

- horizontal: 8 mm + 1 ppm RMS,
- vertical: 15 mm + 1 ppm RMS.

Networked RTK:

- horizontal: 8 mm + 0.5 ppm RMS,
- vertical: 15 mm + 0.5 ppm RMS,
- initialization time: <10 seconds,
- initialization reliability: >99.9%.



## Trimble S8: The power to Excel

The S8 Total Station family boasts Trimble's most innovative and advanced total station technology and has firmly established itself as Trimble and KOREC's premier Robotic Total Station. The range includes two main models with a broad base of standard inclusions and configuration options for flexibility in a wide variety of application areas.

As well as delivering unsurpassed performance and productivity in land surveying, the S8 range is also ideal for more specialised engineering applications including rail schemes and monitoring.

Trimble S8 – key features:

- video-assisted robotic measurement,
- visual verification with data overlay,
- Trimble DR Plus for longer range and fewer setups,
- specialised configuration options include 0.5" angular accuracy.

## Topcon IS-201

Topcon's ground breaking imaging station featuring TopSURV OnBoard with Roads, Image Scan, Monitor and adds Imaging functionality

including iSCAN and iDRIVE technologies. With over 20 languages available for universal usage. Integrating a long range Class 1 laser EDM and XTrac7 tracking system. SS Radio and optional optical link (RC-3) optional for one-man operation. Two digital cameras, one wide angle and one co-axial can be used to provide live oneman operation video feed to facilitate target pointing and simple prism reacqisition.

## Sokkia NET05

Featuring the industry's most accurate sub-millimeter EDM with 0.5mm precision to reflective sheet target up to 200m. Angular accuracy of 0.5", angle resolution of 0.1" (0.02mgon) and environmental rating of IP64 make this an ideal instrument for the highest accuracy LPS projects.

	Topcon IS-201	Sokkia NET05
Angle accuracy in seconds (mgon)	1 (0.3)	0.5 (0.15)
Distance accuracy with prism in mm ± (. mm + . ppm × D) m.s.e.	2 + 2	0.8 + 1
Distance accuracy Reflectorless at 100 m in ± . mm m.s.e.	5	1 + 1
Distance range reflectorless (18% reflective Kodak grey) in m	2000	100 (Kodak white)
Auto tracking yes/ no	Y	1
Auto tracking accuracy at 100 m in ± mm	2	1"
Color Screen yes/no	Y	Y
Graphic screen yes/no	Y	Y
Internal battery life under normal use in hrs	4.5	3
Weight of instrument including battery and tribrach in kg	6.5	7.6
Camera included in instrument if yes coaxial and megapixel	Y Coaxial 3	N
Number of i/o ports and short description	7: RS-232C, USB type A, USB type mini B, CF Card, Bluetooth, SS Radio and RC-3	5: Serial, CF card, USB-A, USB-B, optional Bluetooth



## FARO Introduces the Focus3D



According to the announcement, Focus3D is a high-performance 3D laser scanner for detailed measurement and documentation with intuitive touch screen control that makes it as easy to operate as a digital camera. It is four times lighter and five times smaller than its predecessor and is the smallest and lightest laser scanner ever built.

Focus3D uses laser technology to produce very detailed three-dimensional images of complex environments and geometries in a few minutes. The resulting image is an assembly of millions of 3D measurement points in color which provides an exact digital reproduction of existing conditions.

Faro reports that Focus3D is suitable for documentation of large environments, quality control of components and reverse engineering. Thanks to its millimeter-accuracy and its 976.000 measurement points/second, the Focus3D offers the most efficient and precise method for measurement and 3D documentation of building construction, excavation volumes, façade and structural deformations, crime scenes, accident sites, product geometry, factories, process plants and more.

Lastly, Faro stated that it is entirely self-contained, meaning no additional devices, cables or laptop are needed. With its dimensions of 24x20x10 cm and a weight of 5kg, the Focus3D is so compact and mobile that users can always take it with them, wherever they go.

SOURCE: [http://www.faro.com/content.aspx?ct=uk&content=pro&item=5&int\\_cid=rd.iqvolution.com](http://www.faro.com/content.aspx?ct=uk&content=pro&item=5&int_cid=rd.iqvolution.com) (September 10, 2010)

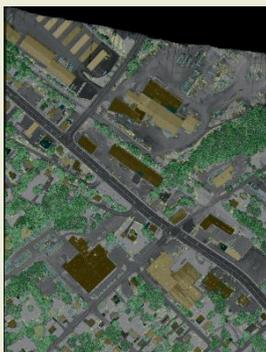
## Leica Announces Airborne LIDAR technology

Leica Geosystems announces the successful flight testing of its new Point Density Multiplier technology for airborne LIDAR. This scanning system allows the use of a single laser and scanning mechanism to provide over double the data collection productivity of previous systems. The new technology will be incorporated into Leica Geosystems' ALS series airborne LIDAR Systems.

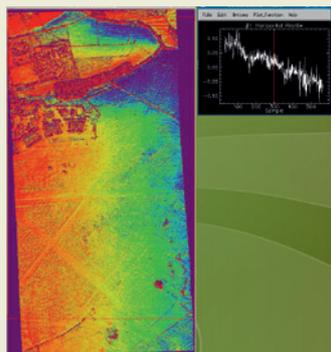
The market constantly demands higher productivity from airborne sensing systems to reduce the equipment and labor costs associated with data collection. Dual laser scanner designs were rejected due to data consistency risks. In fact, the new technology has a higher pulse rate than two current-generation systems operating in tandem.

With a measurement rate of 500 kHz, new Leica Geosystems Airborne LIDAR technology gives industry-leading data acquisition productivity.

SOURCE: [http://www.pobonline.com/Articles/Industry\\_News/BNP\\_GUID\\_9-5-2006\\_A\\_1000000000000915357](http://www.pobonline.com/Articles/Industry_News/BNP_GUID_9-5-2006_A_1000000000000915357) (October 10, 2010)



LIDAR "photo"



LIDAR technology Analysis

## Leica Reveals Viva TS15 Robotic Imaging Total Station

Leica Geosystems announces its new robotic Imaging Total Station, the Leica Viva TS15. This total station provides advanced imaging functionality combined with dynamic tracking capabilities for one-person surveying. Leica Viva TS15 features the easy-to-use Leica SmartWorx Viva onboard software.



Traditional robotic operation is significantly improved with imaging features through Image Assisted Surveying and Documentation. Image Assisted Surveying and Documentation Thanks to live streaming of the total station view on the robotic controller, remote points can be easily measured with the new tap, turn & measure functionality without returning to the total station. With the new Image Capture functionality users can take high-resolution images of the surveying scene or even capture any screen shown on the display at the push of a button. The exact photo documentation of site conditions helps to further optimize productivity and to minimize paper field-notes and avoid costly re-visits.

The Leica Viva TS15 models offer angle measurements of 1", 2", 3", and 5" with quadruple axis compensation. In prism mode a distance of 3.500m is achieved with an accuracy of 1mm+1.5ppm on a single prism in standard measuring mode. On all surfaces users can measure up to 1.000 m and more with an accuracy of 2mm + 2ppm.

SOURCE: [http://www.leica-geosystems.com/en/Leica-Viva-TS15\\_86198.htm](http://www.leica-geosystems.com/en/Leica-Viva-TS15_86198.htm) (September 13, 2010)

## Topocad for survey, mapping, design and GIS **Topocad**

Topocad is a true object orientated CAD system especially made for survey, calculation, mapping and design. It is an independent survey and design program that needs no other programs, yet it works seamlessly with other programs (from Excel to SQL databases). The design of roads, survey calculations, surface designs on which other designs such as profiles can be made are integrated and need no plug-ins. 2D and 1D adjustments become part of the drawing. The net adjustment will actually look at data and find the nets which are adjustable. It has a possibility to read and write raw data to the following file formats; Topocad, AutoCAD drawing format, AutoCAD exchange format, MicroStation design file-2D, Leica file format, Trimble file format, GeoDOS coordinate format, GeoDOS roadline format, GEO/Point coordinate file, Marit coordinate file, Point/GEO roadline, Point/GEO road profile, DRD roadline format, DRD road profile, Topocad roadline, Drd coordinate file, DRD sections, Topocad polygon point, Sokkia SDR format, Geosecma coordinate files and Generic import/ export.

A list of the Topocad modules: Topocad Base, Topocad GIS, Topocad Design, Topocad Field, Topocad database connector for ArcGIS.

The actual version (October 10, 2010) of TopoCad software is R12.31.

SOURCE: [http://www.geomatika-smolcak.hr/proizvod\\_detalj.asp?sif=129](http://www.geomatika-smolcak.hr/proizvod_detalj.asp?sif=129) (October 15, 2010)

# Andrea Crnković and Ante Barišić

## RECTOR'S AWARD STUDY SUMMARY

### Academic year 2008./2009.

Our colleagues Andrea Crnković and Ante Barišić earned an University Rectors Award for a study called: *Optimal satellite orbit for satellite supported services on the territory of the Republic of Croatia*, mentor doc. dr. sc. Željko Hećimović.

Their study elaborates of the problems of the modeling optimal satellite orbits considering the territory of Republic of Croatia and their application in designed satellite supported services. In the first, theoretical part of the study introduction of the satellite orbits and Sun Synchronized orbit is explained. Because of specific requirements for space, time, spectral and radiometric resolution of satellite acquisitions for each satellite supported service, this problem is continuously processed. Overview of the satellite orbit data format, remote sensing, the most known satellite missions and used software's is given. Analyze of the shape and geographical position of the Republic of Croatia gave parameters for optimal satellite orbit modeling. Period of the satellite revolutions around the Earth is one of the fundamental parameter of the temporal resolution of satellite acquisition. Spatial attention is taken to optimization of this orbit parameter. Optimal satellite orbit (e.g. figure 1) for the territory of Croatia is modeled making variations of the Kepler orbit elements. On the basis of modeled satellite orbit parameters meteorological, fire and bio-vegetation satellite's supported services for the territory of Croatia are designed. Meteorological satellite service (figure 2) is using two satellites. One meteorological satellite is periodically scanning atmospheric parameters and clouds over the territory of the Republic of Croatia in the big spatial resolution, and the other satellite is geostationary satellites that continuously monitor atmosphere over the Croatia in the lower resolution.

Fire protection service has the purpose to evaluate the threat of fire, detect fire in early stage, and provide firefighting support and judging fire damages. Because of the relatively low satellite temporal resolution, the satellite is very suitable for providing estimates of the dangers of fire and estimation of the damages. But, satellite can give optimal firefighting support when it is used in coordination with information from unmanned vehicle (figure 3 and 4). It should fill the time holes between satellite acquisitions. Third, a bio-vegetation service consists of a satellite with optimal orbit over the territory of Croatia. This service will monitor the dynamic of the bio-vegetation changes in the local habitats, in the daily time resolution. It should be basis for the development of a huge range of scientific research and economical applications.

**Figure 1.** Orbite of the satellite for the period of 2,7 hour

**Figure 2.** CROMET service

**Figure 3.** CROFIRE service

**Figure 4.** CROFIRE service above the Croatia

