SEAMLESS DIGITAL CADAstral MAP AND GEODETIC INFRASTRUCTURE IN TURKIYE

Sedat BAKICI
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SHORT HISTORY of GDLRC

MINISTRY OF ROYAL REGISTRY ORGANISATION

ESTABLISHMENT OF PRIVATE PROPERTY AND LAND REGISTRY

LAW ON DEFINING AND MANAGING OF ASSESTS AND REAL PROPERTIES (1st CADASTRE LAW)

RE-STRUCTURE

GENERAL DIRECTORATE OF LAND REGISTRY AND CADASTRE

RE-ORGANISATION OF GDLRC
FIRST CADASTRAL MAP IN TURKIYE-1913
DUTIES & AUTHORIZATION

- Register, update and service of land registry
- Cadastre of homeland
- Photogrammetric map production and geodetic activities
- Land information system
- Cooperation with international organisations on related areas
- Licenced Survey and Cadastral Engineering Offices
- Real estate brokerage activities
- Coordination with other public institutions and organizations
MAIN AREAS OF ACTIVITY of GDLRC

- GEO-INFORMATICS
- CADASTRE
- LAND REGISTRY
GEOINFORMATICS SERVICES

- GNSS RTK Network (TUSAGA-Aktif / CORS-Tr)
- Photogrammetric mapping & Orthophoto production.
CORS-Tr Stations-146

Distance between stations 80-100 Km.’s
CORS-Tr Stations

Erzurum-Meteoroloji

Iğdır-TKGM

Kabinet

Viranşehir-Meteor.
CORS-Tr Control Center Ankara – GDLRC
Network RTK Working Principle

2005.0 Epok
User Web Service

http://www.tusaga-aktif.gov.tr
User Web Service

http://www.tusaga-aktif.gov.tr
CORS-Tr Usage Map – 2016

13,412,424 points ...
CORS-Tr Operating/Users

Total # Users: 8,968

<table>
<thead>
<tr>
<th>Category</th>
<th>GNSS</th>
<th>GDLRC</th>
<th>PRIVATE COMP.</th>
<th>PUBLIC INST.</th>
<th>LICENSED SURVEYORS</th>
<th>MUNICIPALITIES</th>
<th>UNIVERSITIES</th>
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<tbody>
<tr>
<td></td>
<td>660</td>
<td>5733</td>
<td>1061</td>
<td>423</td>
<td>985</td>
<td>106</td>
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</table>

Daily total number of users (mean): 2400
Simultaneous maximum number of users: 840
## CORS-Tr Accuracy Checks

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>Nr of POINTS</th>
<th>RMS (m.)</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>EAST</td>
</tr>
<tr>
<td>2009</td>
<td>808</td>
<td>0.039</td>
</tr>
<tr>
<td>2014-1</td>
<td>723</td>
<td>0.045</td>
</tr>
<tr>
<td>2015-1</td>
<td>743</td>
<td>0.033</td>
</tr>
<tr>
<td>2015-2</td>
<td>701</td>
<td>0.029</td>
</tr>
<tr>
<td>2016-1</td>
<td>725</td>
<td>0.032</td>
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<tr>
<td>2016-2</td>
<td>697</td>
<td>0.029</td>
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</table>

2 times QC Checks every year ...
# CORS-Tr Operating / Prices

<table>
<thead>
<tr>
<th>SERVICE TYPE</th>
<th>DATA TYPE</th>
<th>Price (VAT INC.)</th>
<th>EXPLANATION</th>
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<tbody>
<tr>
<td>FIRST SUBSCRIPTION</td>
<td>-</td>
<td>50 USD</td>
<td>Once</td>
</tr>
<tr>
<td>RTK Services</td>
<td>Network-RTK</td>
<td>35 USD</td>
<td>Monthly</td>
</tr>
<tr>
<td></td>
<td>Network-DGPS</td>
<td>250 USD</td>
<td>Annual</td>
</tr>
<tr>
<td>RINEX Data</td>
<td>RINEX 1 s</td>
<td>0.17 USD</td>
<td>Station/Hour</td>
</tr>
<tr>
<td></td>
<td>RINEX 30 s</td>
<td>FREE</td>
<td>Station/Day</td>
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</tbody>
</table>
CORS-Tr Operating/User support

444 GNSS
444 4677
2016
14,919 CALLS
CORS-Tr and GIS Integration
On-line Orthometric Height Value
PHOTOGRAMMETRIC MAP&ORTHOPHOTO PRODUCTION

In order to complete first cadastre, 1/5000 scaled base map production has been carried out at 480,000 Km² area after 1955 by photogrammetric method ...

Digital Orthophoto production has been started after 2007 for cadastral renovation and update works for the purposes of decision-support, quality control and establishing legal basis ..
Orthophoto Map – Usage at Cadastre
Orthophoto Map – Usage at Cadastre
Orthophoto Map – Usage at Cadastre
Orthophoto Map Production Process

1. Project Planning
2. Geodetic Works
3. Aerial Image Acquisition
4. Image Processing
5. Aerial Triangulation and Adjustment
6. Data Collection
7. Orthophoto Production
8. Web Service

HALİ HAZİR HARİTA
SAYİSAL YÜZEY MODELİ
YAKIN KIZILÖTESİ GÖRÜNTÜSÜ (NIR)
RENKLİ HAVA GÖRÜNTÜSÜ (RGB)
Aerial Image Acquisition

Aerial photography services for aerial image acquisition are provided by 2 aircrafts equipped with digital aerial camera in GDLRC.
Orthophoto Map Production Situation
15-30-50 cm GSD
Orthophoto Maps - Web Services (WMS)

http://harita.tkgm.gov.tr

Ortho image – Delivery

1.75 USD / Km²
ORTHOPHOTO PRODUCTION FROM B/W AERIAL ARCHIVE PHOTOGRAPHS

Scanning of aerial photographs taken for the production of 1/5,000 scale ST maps in the 480,000 Km2 area available in the GDLRC archive and the production of B/W Orthophoto using the obtained digital images. It was completed in 2015.
CADASTRE SERVICES

- First Cadastre is completed
- Cadastre Renovation works in progress
- Forest Cadastre in progress
- Military security zones are measured
- Licenced Cadastre Offices (195)
INITIAL CADASTRE

<table>
<thead>
<tr>
<th>TOTAL UNITS</th>
<th>COMPLETED BEFORE 2003</th>
<th>2003-2015</th>
<th>IN PROGRESS</th>
<th>PROBLEMATIC</th>
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<tbody>
<tr>
<td>52,049</td>
<td>38,796</td>
<td>12,781</td>
<td>107</td>
<td>365</td>
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</table>

- ARIP PROJECT

[Graph showing the distribution of completed units over the years from 2003 to 2016.]
CADASTRAL RENOVATION

TKMP PROJECT
In 4671 units, **4,808,032** parcels

REVOLVING FUND RESOURCES
In 1190 units **1,229,543** parcels

TOTAL
In 5861 units **6,037,575** parcels

AF PROJECT
**4.6 Millions** parcels
Land Registry and Cadastre Information System-TAKBİS

TAKBİS IS ONE OF THE BASIC E-GOVERNMENT PROJECT AIMING TO TRANSFORM SERVICES OF GDLRC IN TO A UNIQUE DATABASE
TAKBİS (Land Registry and Cadastre Information System)
Since 06 October 2010, e-Government application of GDLRC has been published and TAKBİS data has been served to citizens via e-Government gateway. (www.turkiye.gov.tr)
Users Of TAKBIS

MERNİS
Central demographic information system
E-parcel Inquiry
LAND REGISTRY SERVICES

• Legal bases from Turkish Constitution and Civil Code
• Land Registry is under state guaranty without any excuse
• 8.3 Millions transactions at 2106
E-Appointment and KIOSKS
https://randevu.tkgm.gov.tr

Notice With SMS
E-removal of Mortgage

Ziraat Bankası, İş Bankası, Akbank
E-Payment of Fees
Exchange Bank Application
Land Registry Transactions Outside the Jurisdiction Area and Abroad

• Doing Land Registry Transaction from every LR office
• Doing Land Registry Transaction in Turkish Embassy in Berlin-Germany

...
REVOLVING FUND

• Active since 1992
• Cost recovery ...
• Main purpose is;
To collect fee from the land registry and cadastre services, to make expenditures for the services in line with the annual demands and needs of the Institution.
NEAR FUTURE PLANS

- 3D City Models
- 3D Cadastre
- Improve TAKBIS
Let’s meet in Istanbul

6-11 May 2018, Istanbul, Turkiye
www.fig.net/fig2018
Thank you ...

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