

AGRICULTURAL ACADEMY

REMOTE SENSING APPLICATION CENTER - ReSAC

GMES USER'S PERSPECTIVE IN LAND MANAGEMENT FOR BULGARIA AND SEE REGION

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Sofia, Bulgaria

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Introduction

- Important sources for Bulgaria are products of the agriculture and forests.
- In the last years the renewable energy sources based on agricultural production made agriculture multifunctional and that is in the context of the Common Agricultural Policy of European Union.
- Monitoring the land surface for agricultural and forest needs is one of the pilot activities we expect from the GMES.

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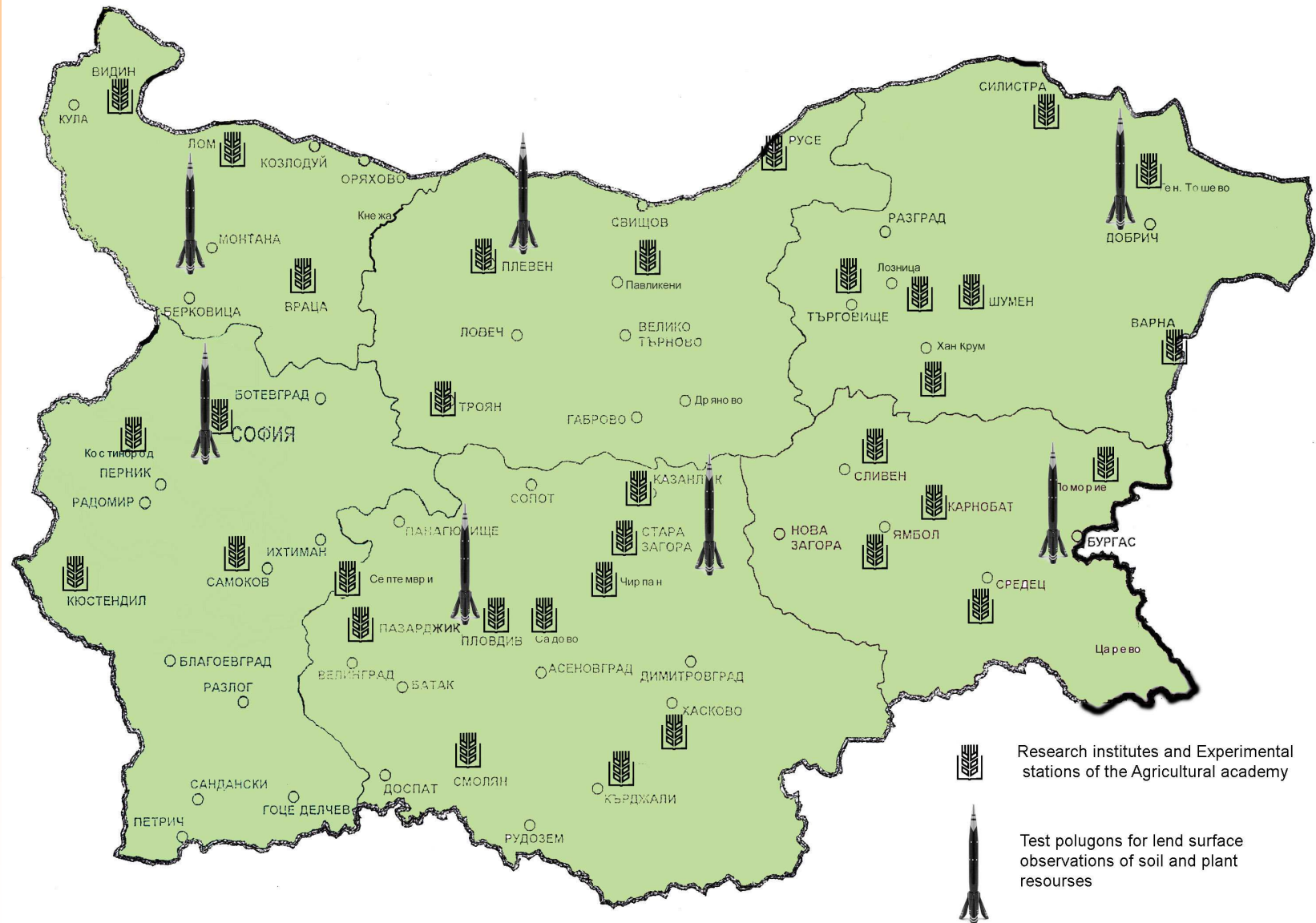
SWOT ANALYSIS OF BULGARIAN CAPACITY IN REMOTE SENSING

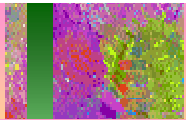
STRENGTHS

- **Good experience in the land surface monitoring (agriculture and forests) including soil, crop and forest observations based on experts of the Agricultural academy, Bulgarian academy of sciences and agricultural universities.**
- **The Agricultural academy includes 28 research institutes and 20 experimental stations geographically situated in all Bulgaria (shown in the next slide).**
- **There is an Institute of Soil Science 'Nikola Poushkarov' in the system of the Agricultural academy, which has activities in remote sensing of agricultural lands more than 30 years, participating in national and in international projects (SHIPKA and PRIRODA Projects with Russia, MARS-MERA Project with JRC). There are experts in agronomy, phyto pathology, agrophysics and agroecology in the institutes and stations of the Agricultural academy which can realize pilot activities of the European GMES initiative including developing products and services based on satellite data and airborne lab data for sustainable land management in Bulgaria and in Balkan region.**
- **ReSAC – Private research and development organization for remote sensing data activities and the main provider of satellite images in Bulgaria**
- **Good collaborative works between Remote Sensing Application Center (ReSAC), and the Agricultural academy as user.**
- **Good collaborative works and common research projects between the Space Research Institute and Institute of Solar-Terrestrial Interactions of the BAS and the research institutes of the Agricultural academy.**

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- **National network of test areas for remote sensing and land surface observations of soil and plant resources status.**
- **Good experience in developing and application of remote sensing equipment (passive radiometry; radars and lidars; spectrometry and IR thermometry) synchronous and quazzy synchronous land surface agronomy observations and agrophysical measurements by electronic devices and systems (soil moisture and temperature; soil salinity, compaction and solidity) on pilot fields of the test areas.**
- **Cultivated agricultural land covers 48% of the total territory of the country**
- **Institutes of the Agricultural academy have:**
 - **mobile laboratories for agrophysical measurements and agrochemical analysis for research expeditions on the fields;**
 - **microcomputer agrometeorological systems for long term evaluation of main energy elements of the soil-plant-surface air layer system on the fields.**



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Remote Sensing Application Center (RESAC) - functions



Welcome to
Remote Sensing Application Center (ReSAC)

Observer Member of
EARSCE
European Association of Remote Sensing Companies

RESEARCH KNOW-HOW INNOVATION CONSULTANCY

The Remote Sensing Applications Center (ReSAC) Bulgaria was established with the support of the Food and Agriculture Organisation (FAO) of the UN in 1998. ReSAC activities were included in a BASA program at national level.

Main tasks of **ReSAC** are to develop Remote Sensing and GIS applications to agricultural and environmental management, land cover/land use, soil and forest inventory, water resources, environmental hazards, urban planning, infrastructure, participation in regional and international projects and cooperation.

ReSAC maintains a qualified specialists covering a wide range of RS/GIS applications, who benefited between 1998-2005 a training organised by FAO/UN in Poland, Romania; GTOS/FAO in Hungary, Czech Republic; training sessions in ESA/ESRIN, JRC Italy, Germany and on job training in Bulgaria, organized by JRC, FAO, AED SICAD experts.

Since 2005 **ReSAC** is part of the **Agency for Sustainable Development and Eurointegration**.

The Agency for Sustainable Development and Eurointegration is a non-governmental organization. It is a legal entity. Governmental, municipal and public support will be accumulated to foster the sustainable development on local level in line with the goals of AGENDA 21.

Services
ReSAC offers services in the area of earth observation applications, GIS, orthophoto mapping as well as consultancy for projects and tasks within this scope.

ReSAC is a distributor for Bulgaria of almost all of the available European satellite data providers - offering satellite images ranging from 0.6 to 1000m spatial resolution.

ReSAC offers satellite image processing services which include the whole range of techniques used to prepare the image ready to use for the end user.

ReSAC offers different photogrammetric services such as photogrammetric mapping from aerial photography, ground control survey, photogrammetric processing and production of orthophotomaps, digital terrain models, etc.

ReSAC offers GIS services which cover activities from entry and capture of data, conversion of formats, scanning, digitizing up to specific GIS database creation, analyses and modelling.

ReSAC staff with its long and various experience in remote sensing and GIS is able to offer it in a

Projects
ReSAC has participated in many projects in which it has been a leading institution as well as members from **ReSAC** have been consultants and subcontractors in projects lead by other organisations.

For the 7 years starting from the establishment of **ReSAC** it has fulfilled and participated in more than 20 projects both local and international. The projects are in the area of agriculture and environmental management, land cover/land use, soil and forest inventory, water resources, environmental hazards, urban planning with the application of Remote Sensing and GIS technologies.

As also an organisation with a scientific activities some of the project results and independent researches have been presented or issued as reports or papers on [Conferences and Publications](#)

08.2006 News

The Project for the creation of Digital Orthophoto map for part of the territory of Bulgaria on the base of VHR satellite images was successfully finished. The Project was financed by the Ministry of Agriculture and Forestry. After an open international tender the project was awarded and fulfilled by a consortium with the Agency for Sustainable Development and Eurointegration - **ECOREGION** as a leader with its specialized center Remote Sensing Application Center - **ReSAC**. Partners in the consortium are the major European representatives of the companies which deliver satellite images - **EUSTI**, **EURIMAGE** и **SPOTIMAGE**. The Project is of extreme importance for the membership of Bulgaria in the EU regarding the Common Agricultural Policy and was fulfilled respecting all specifications and recommendations of the DG JRC. The processed satellite images in the frame of the project are the base for the creation of the Land Parcel Identification System, which is directly related with the provision of the agricultural subsidies from EU.

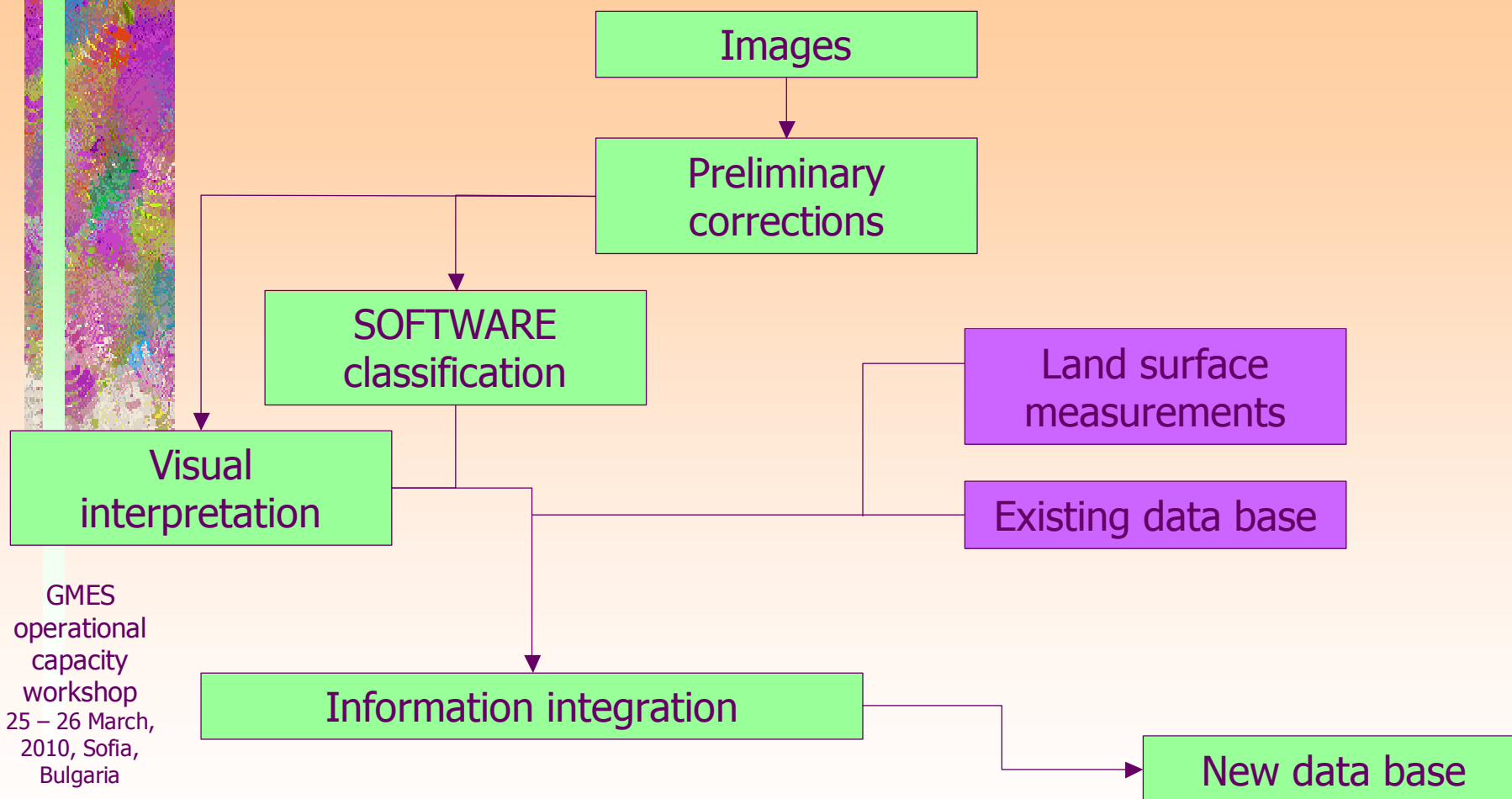
03.2006

The Ministry of Agriculture and Forestry opened an international tender for delivery and production of orthoimages on the base of archived VHR satellite data for the purposes of IACS/LPIS. The project was awarded to an international Consortium lead by the Bulgarian organization **ASDE/ReSAC** and the major European satellite providers - **European Space Imaging GmbH** (representing also **INTA Space Turk**), **Eurimage S.p.a.**, **SPOT Image**. As a local geodetic company in the Consortium was included **Dian Zlatev Ltd**.

For more information please visit the Newsletter of the European Association of the Remote Sensing Companies (EARSCE) [here](#).

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ReSAC - LAND COVER OBSERVATION BY AIRCRAFT LABORATORY AND LAND SURFACE MEASUREMENTS

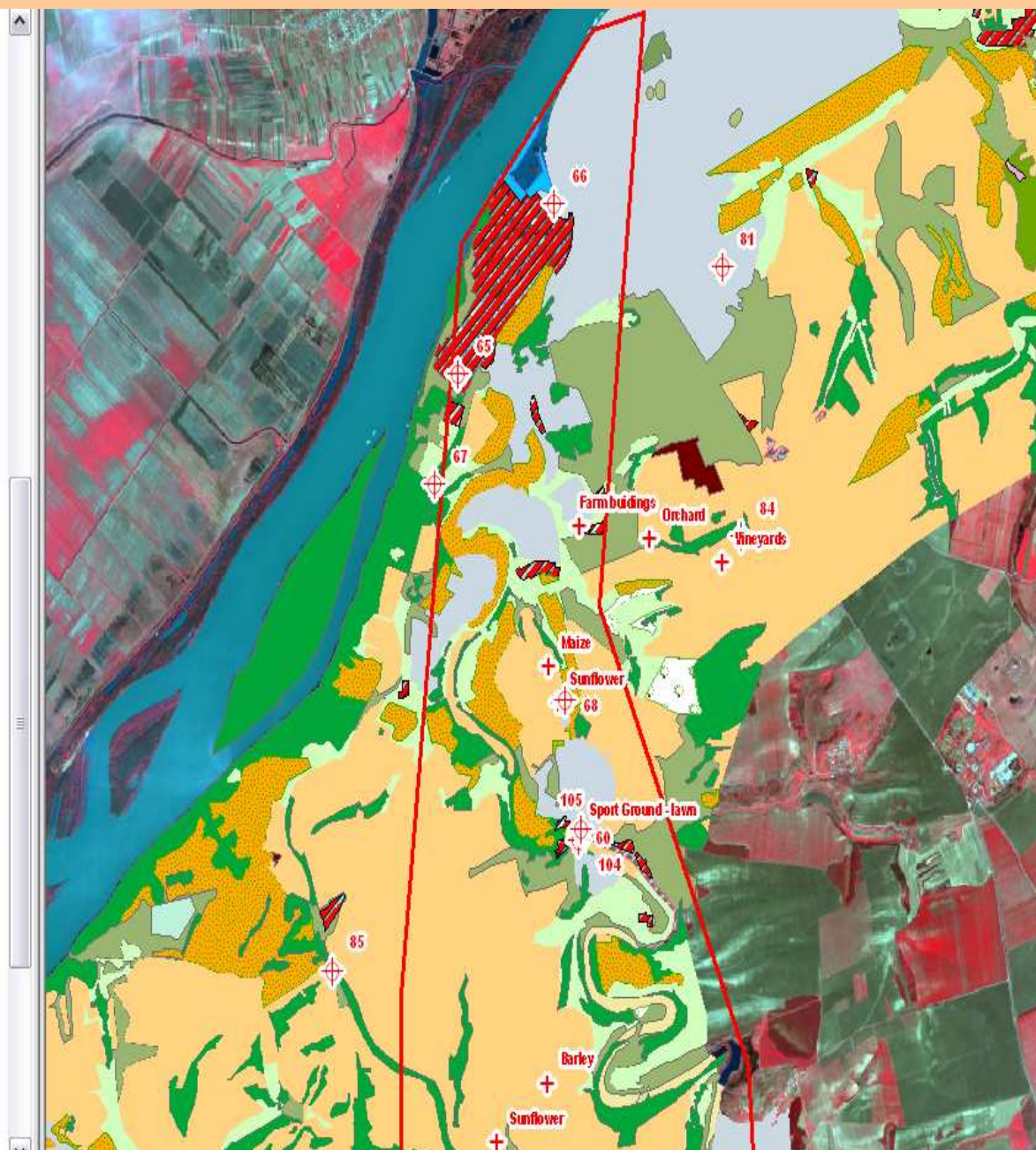


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SATELLITE IMAGES OF LAND COVER OF TEST AREA RUSSE (30.07-03.08.2007)

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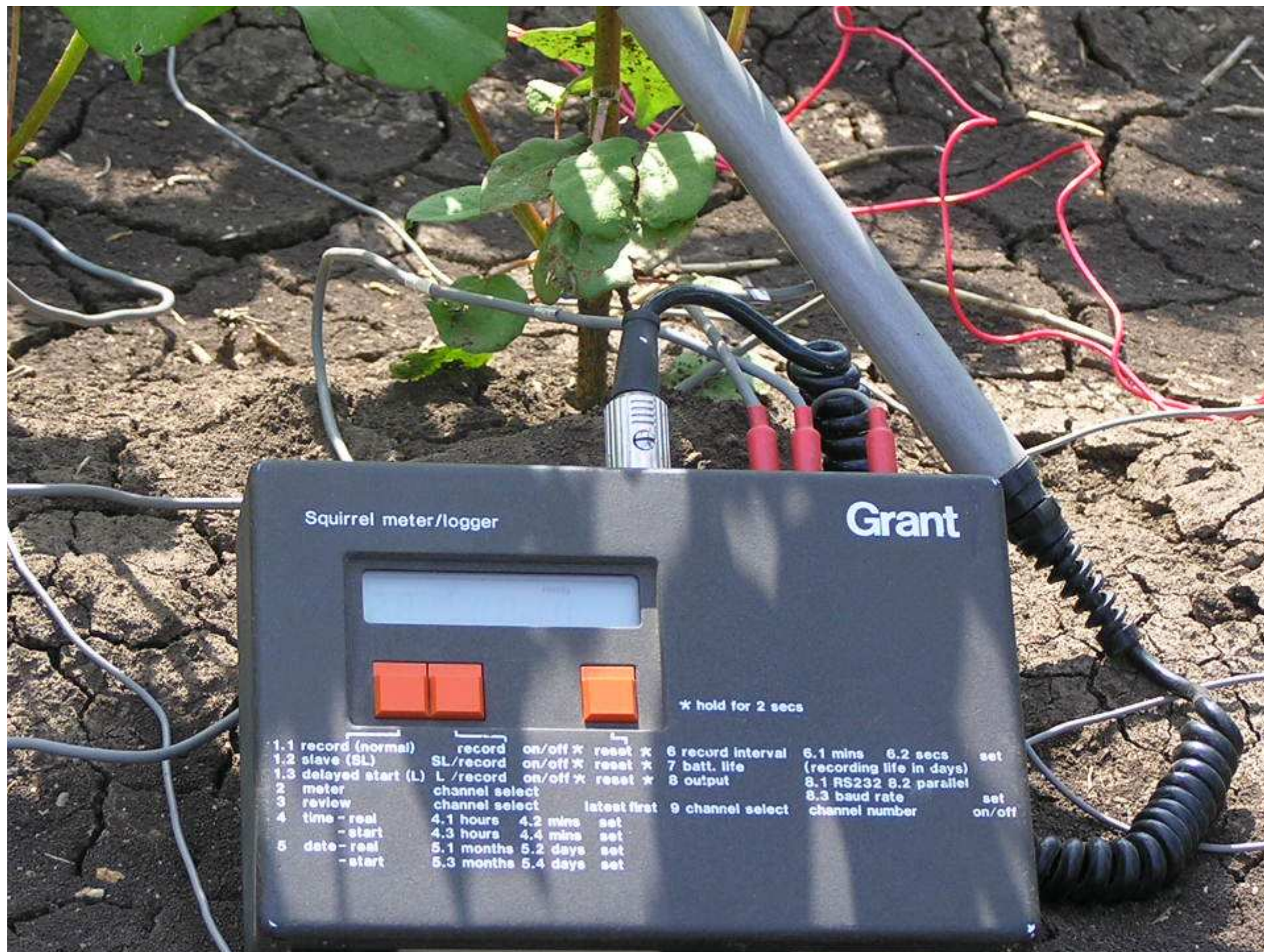
- LAND_COVER
- Населено място
 - Стопански двор
 - Смесена растителност
 - Градини
 - Наводнени територии
 - Брегова ивица
 - Овощки
 - Лозя
 - Индустриални и търговски обекти
 - Летище
 - Пристанище
 - Пътища и прилежащи площи
 - Мини
 - Вилна зона
 - Зелени площи в населени места
 - Спортни площадки
 - Влажна зона
 - Водни площи
 - Група дървета
 - Рибарници
 - Опожарени терени / стърнища
 - Наводнени гори
 - Широколистна гора
 - Парници
 - Голи скали
 - Кариери
 - Крайречна растителност
 - Запустели терени
 - Рекреационни обекти
 - Голини
 - Гари
 - Гробища
 - Иглолистна гора
 - Смесена гора
 - Тревна растителност
 - Земеделска земя
 - Сечище



Bulgarian-Holland-Russian airborne and land surface experiment in test areas **RUSSE – metadata in supporting points (30JULY – 3 August 2007)**

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105				 	Basarbovo village; down on a dike
85				 	South of Rousse - near Train Station "Dolapite"; junction



Squirrel meter/logger

Grant



* hold for 2 secs

- | | | | | | | | |
|-----------------------|----------------|----------|--------------|-------------------|--------------------------|--------------|--------|
| 1.1 record (normal) | record | on/off * | reset * | 6 record interval | 6.1 mins | 6.2 secs | set |
| 1.2 slave (SL) | SL/record | on/off * | reset * | 7 batt. life | (recording life in days) | | |
| 1.3 delayed start (L) | L /record | on/off * | reset * | 8 output | 8.1 RS232 | 8.2 parallel | |
| 2 meter | channel select | | | 9 channel select | 8.3 baud rate | | set |
| 3 review | channel select | | latest first | | channel number | | on/off |
| 4 time - real | 4.1 hours | 4.2 mins | set | | | | |
| - start | 4.3 hours | 4.4 mins | set | | | | |
| 5 date - real | 5.1 months | 5.2 days | set | | | | |
| - start | 5.3 months | 5.4 days | set | | | | |





TDR-device for expedition soil moisture measurements on the field

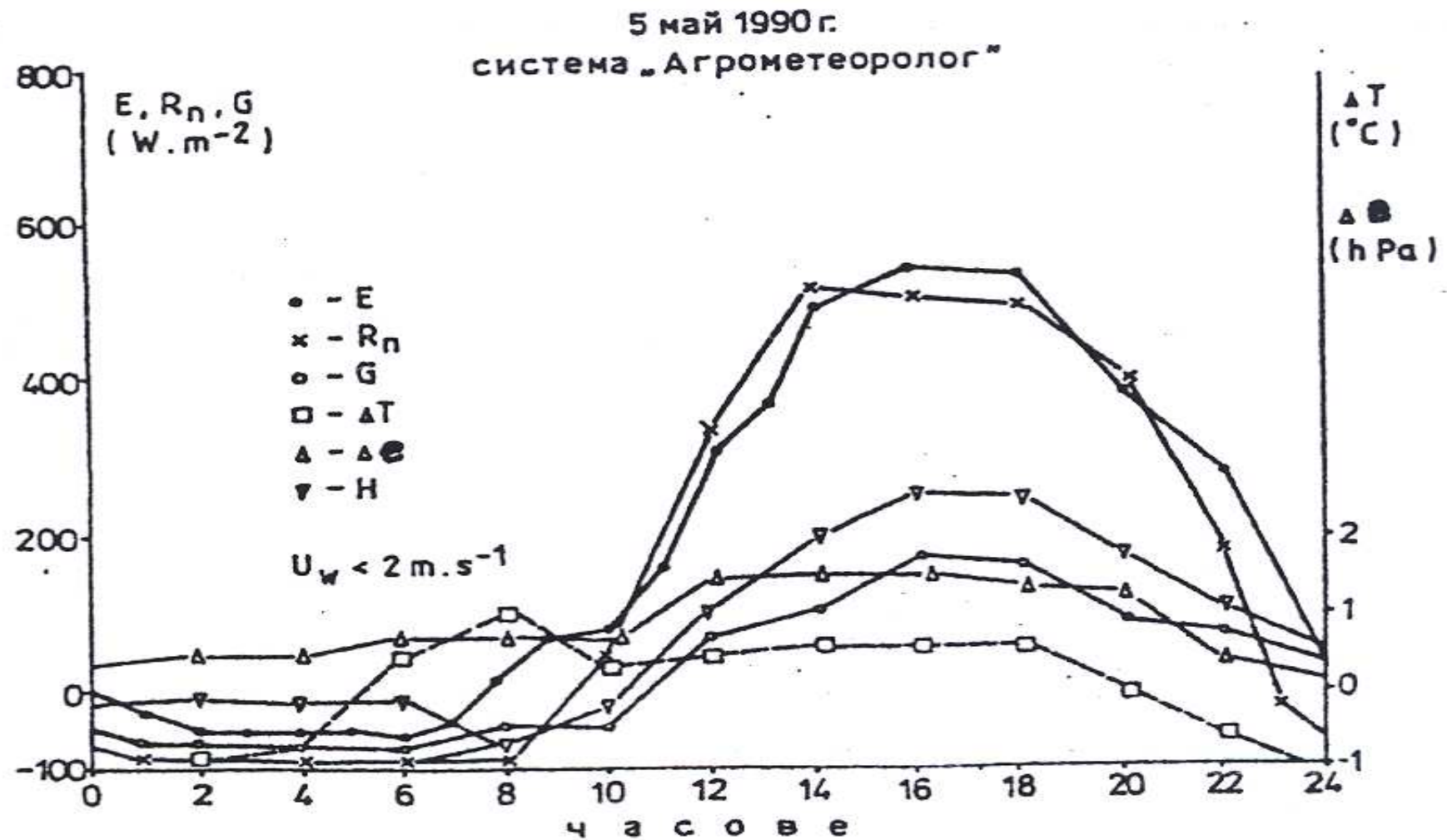


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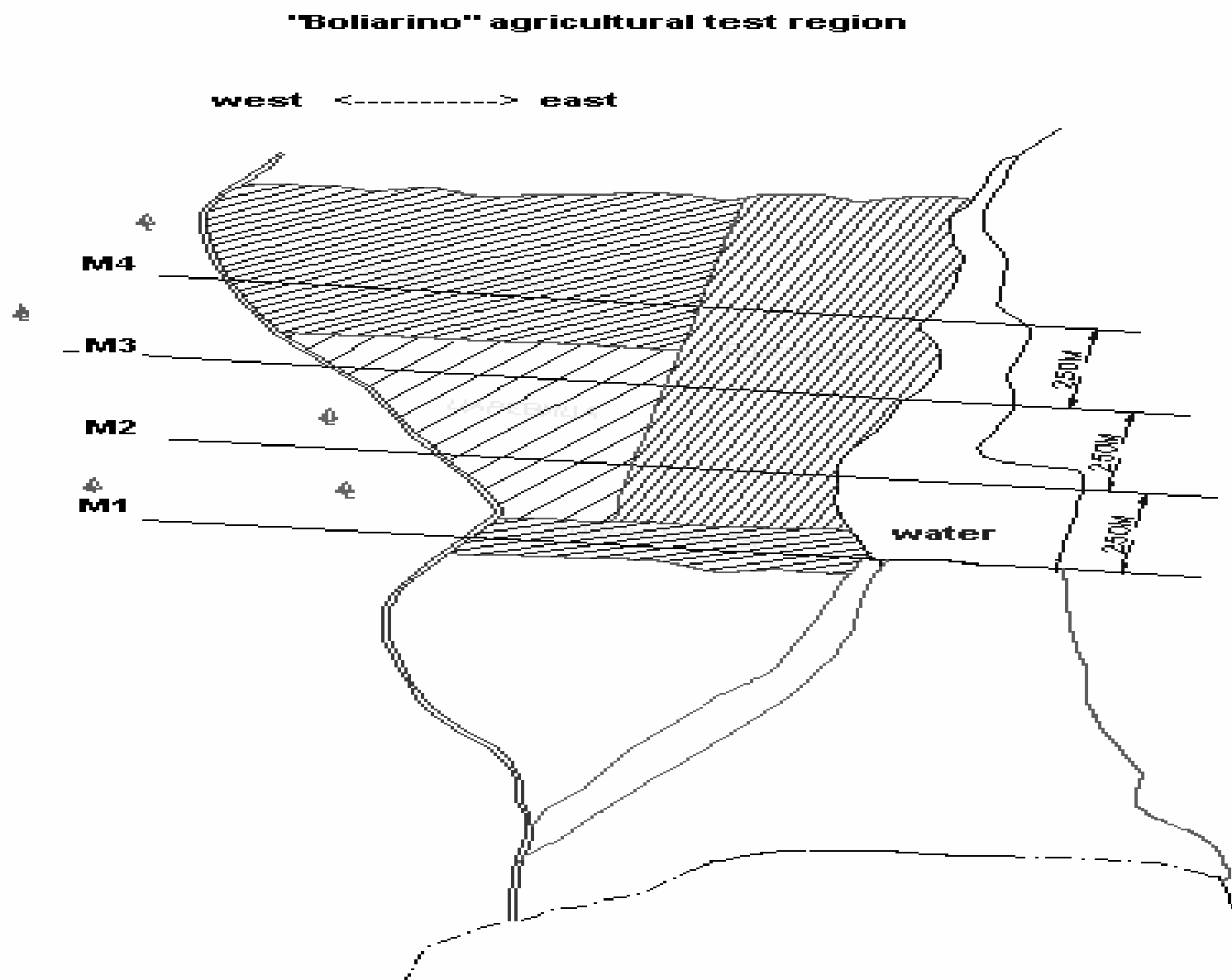


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Registration of daily energy elements of the soil-plant-air sytem on the wheat field near Plovdiv by an ARAX agrometeorological station (05.05.1990)



Draft of the agricultural crops field with aircraft lab airways of the test area PLOVDIV



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WEAKNESS

- **Near 5 mln. ha agricultural lands were cutted in more than 15 mln. land parcels after land privatisation, which can not be analized by satellite images and remote sensing data.**
- **Bulgarian experts in agriculture have no good experience in application of math models for evaluation and forecast of plant growing and yield.**
- **Bulgarian experts in agriculture did not use the service of Foreign Agricultural Service of USDA for agricultural market risk evaluation.**
- **Bulgarian experts in agriculture don't use extensive monitoring of the legitimacy of EU annually agricultural subsidy payments for land use with the help of remote sensing data and satellite images.**
- **Bulgarian experts in forests from the Institute of Forest and from the Ministry of Agriculture and Foods don't use remote sensing and images for sustainable forest management on national level.**
- **Most of the farms are small and do not have at their disposal significant financial means to support modern and precise agriculture.**

Aircraft laboratory for remote sensing of land and water resources



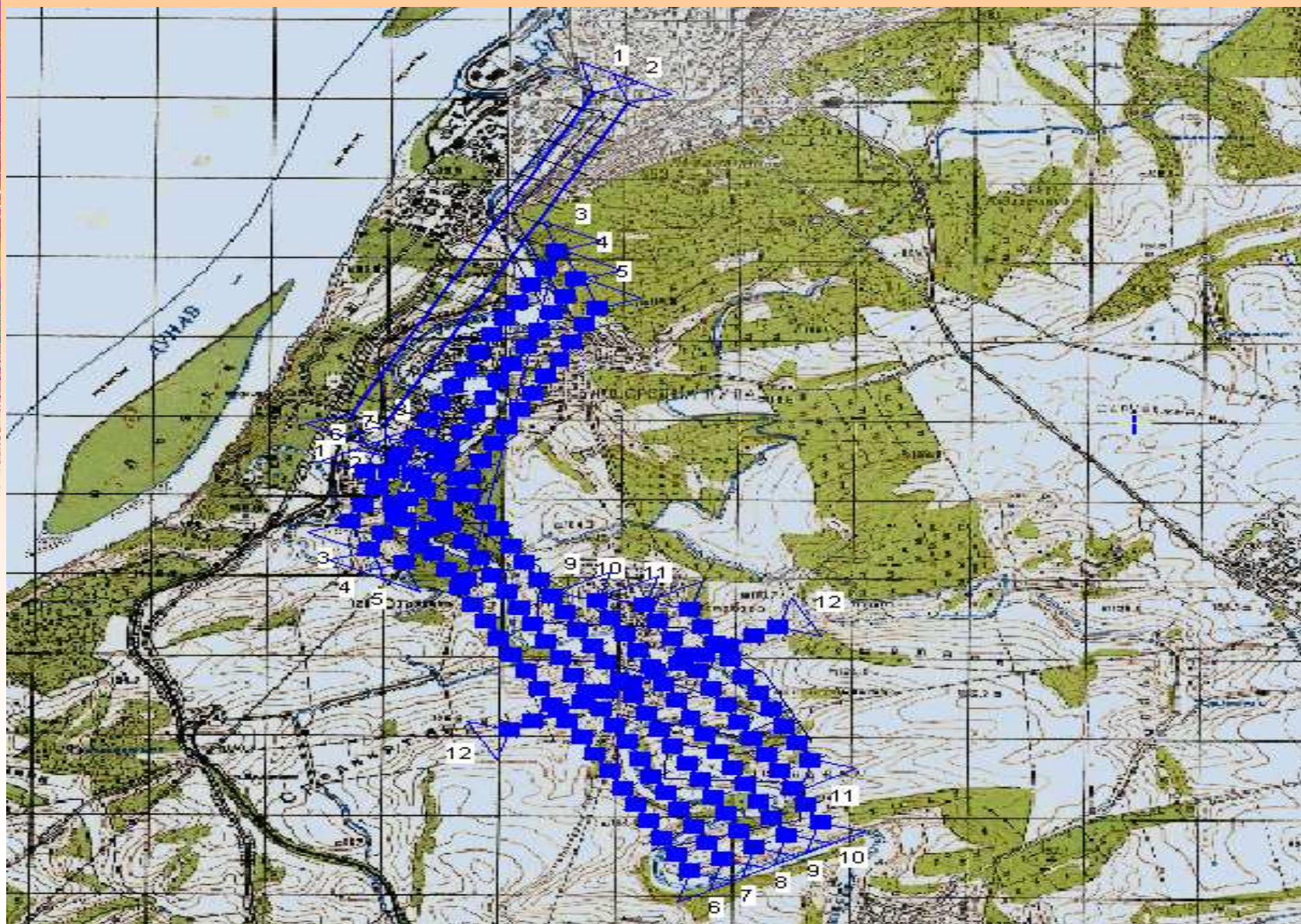
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A View of the interior of aircraft laboratory for remote sensing of land and water resources



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Trace paths of aircraft lab in the test area RUSSE



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Test agricultural lands in the RUSSE test area during the expedition on 28.07.2007

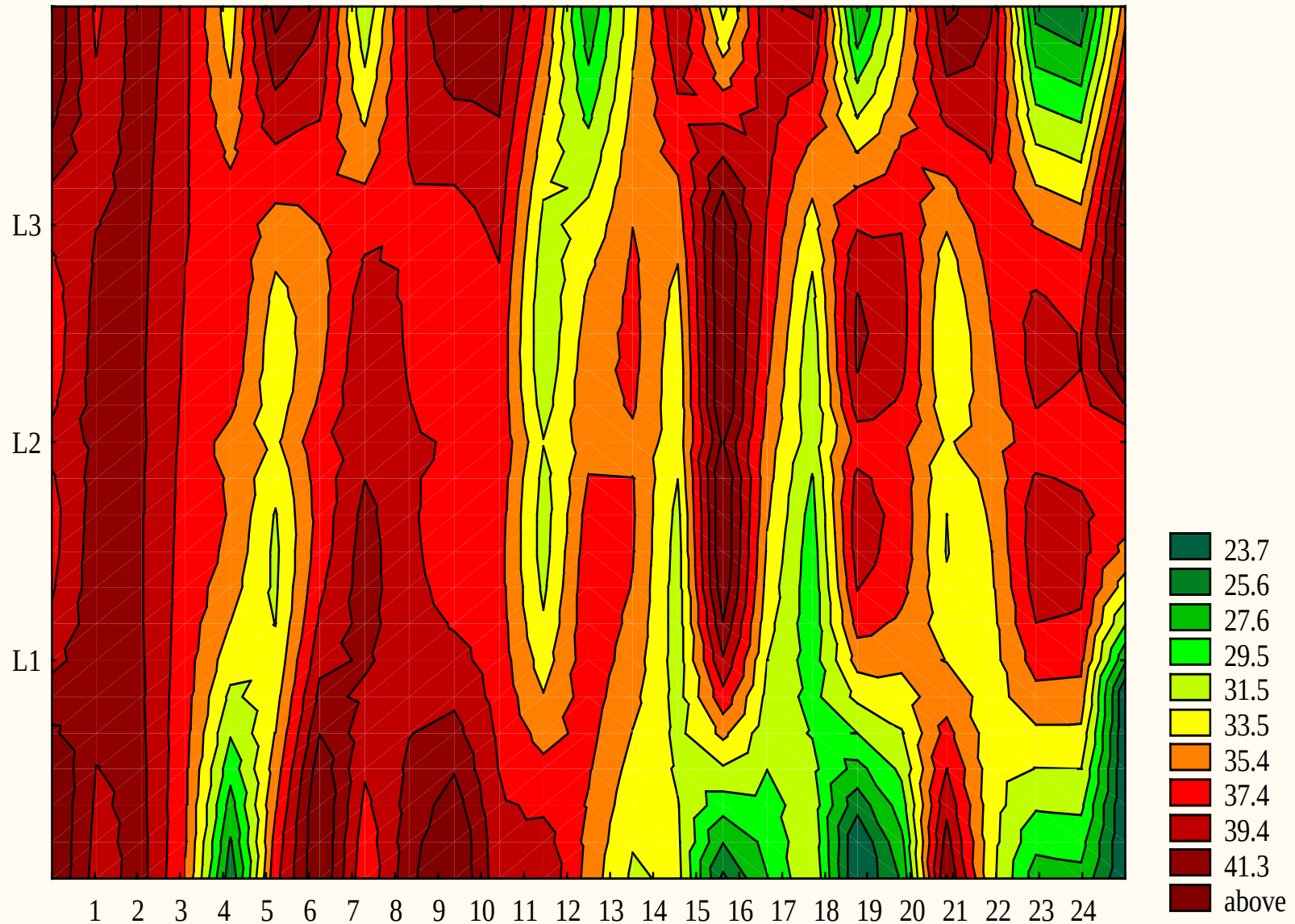


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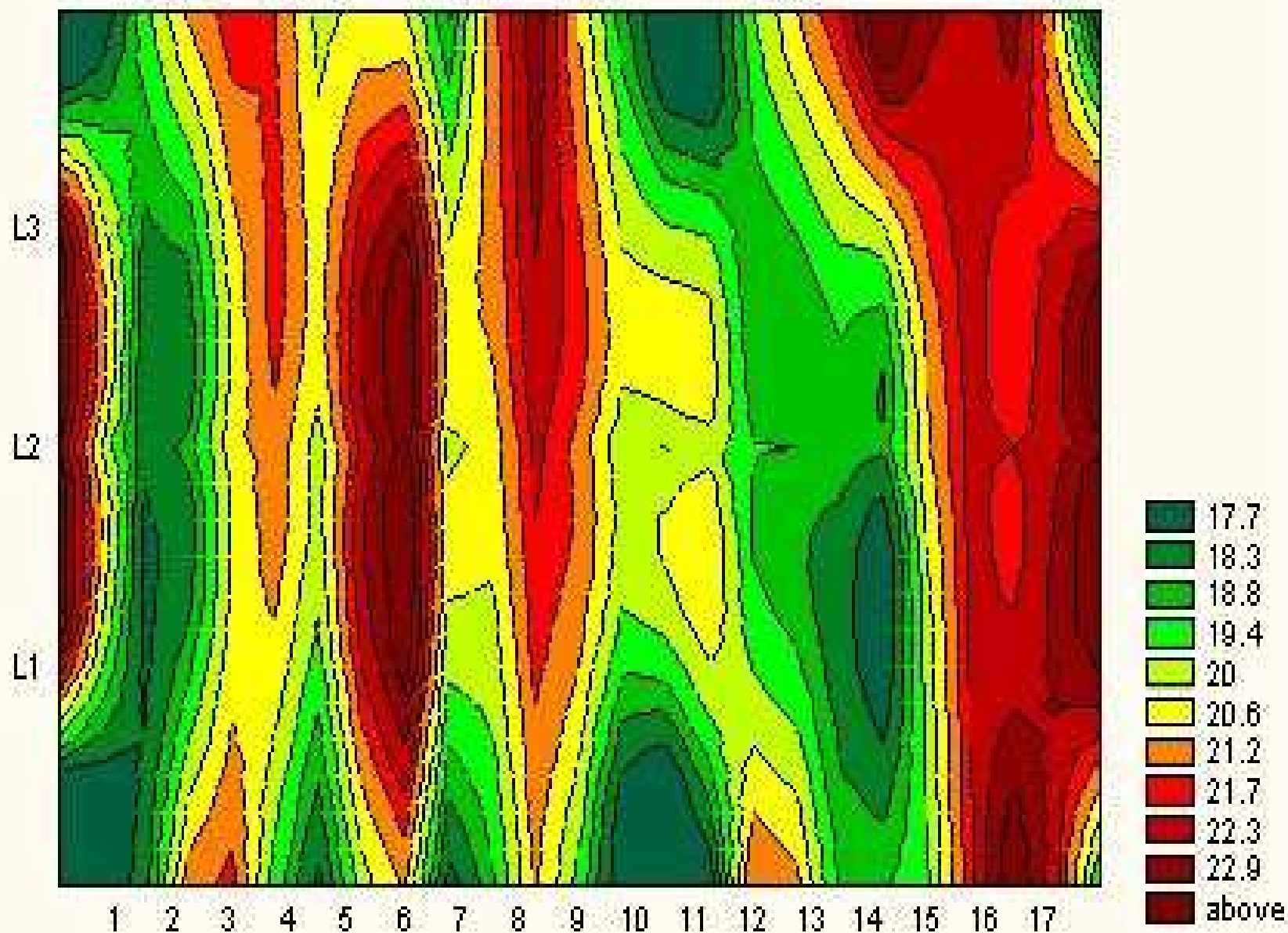
Cannopy themperature map of the maize agricultural parcel in the test area

RUSSE in 11:00 on 31.07.2007 by land surface IR measurements.

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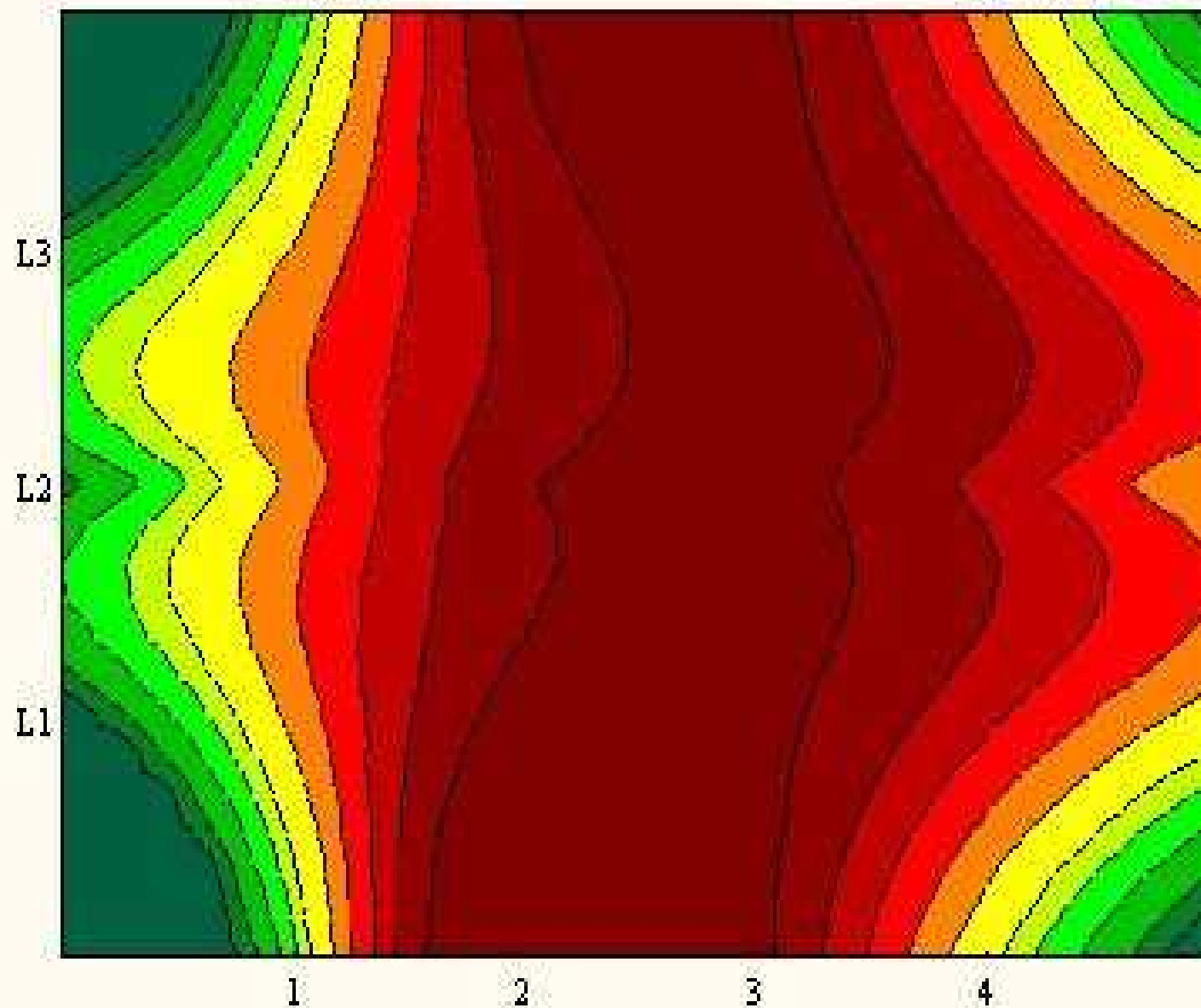


Soil surface themperature map of the irrigated maize field in the test area RUSSE in 11:00 on 31.07.2007 by land surface IR measurements.



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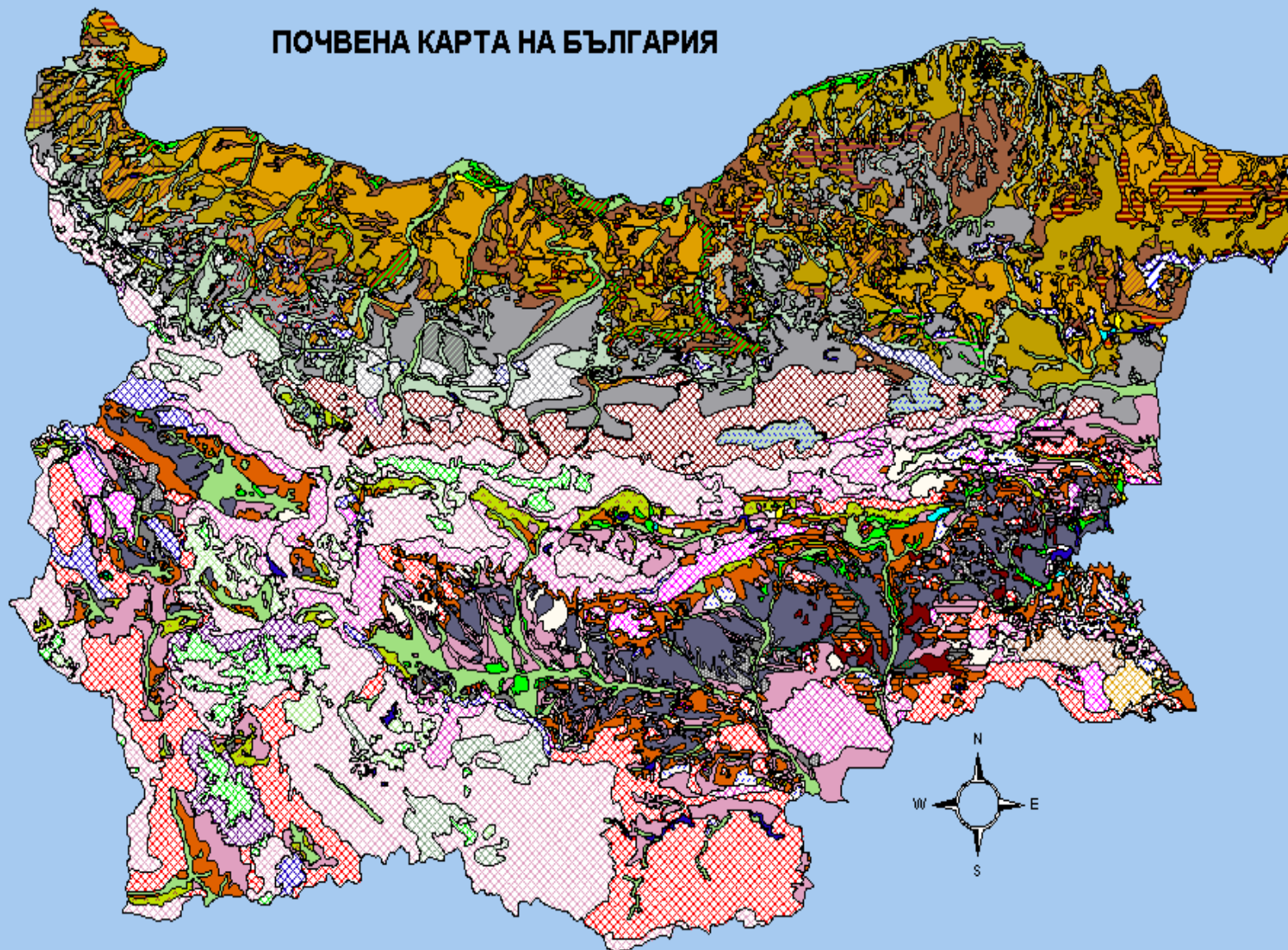
Cannopy themperature map of a non cultivated field in the Plovdiv test area in 14:00 on 20.07.2007 by IR measurements



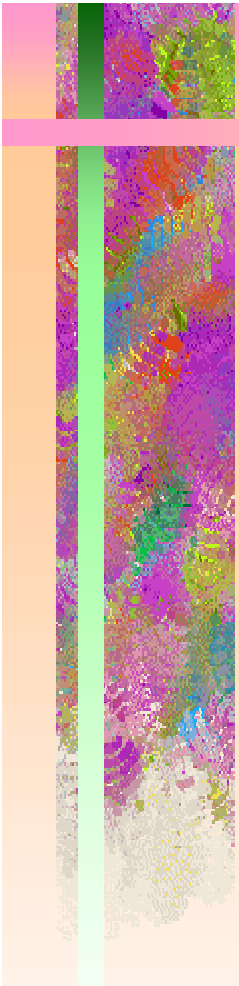
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Soil map of Bulgaria in scale 1:400 000 (Koynov et al, 1973)

ПОЧВЕНА КАРТА НА БЪЛГАРИЯ



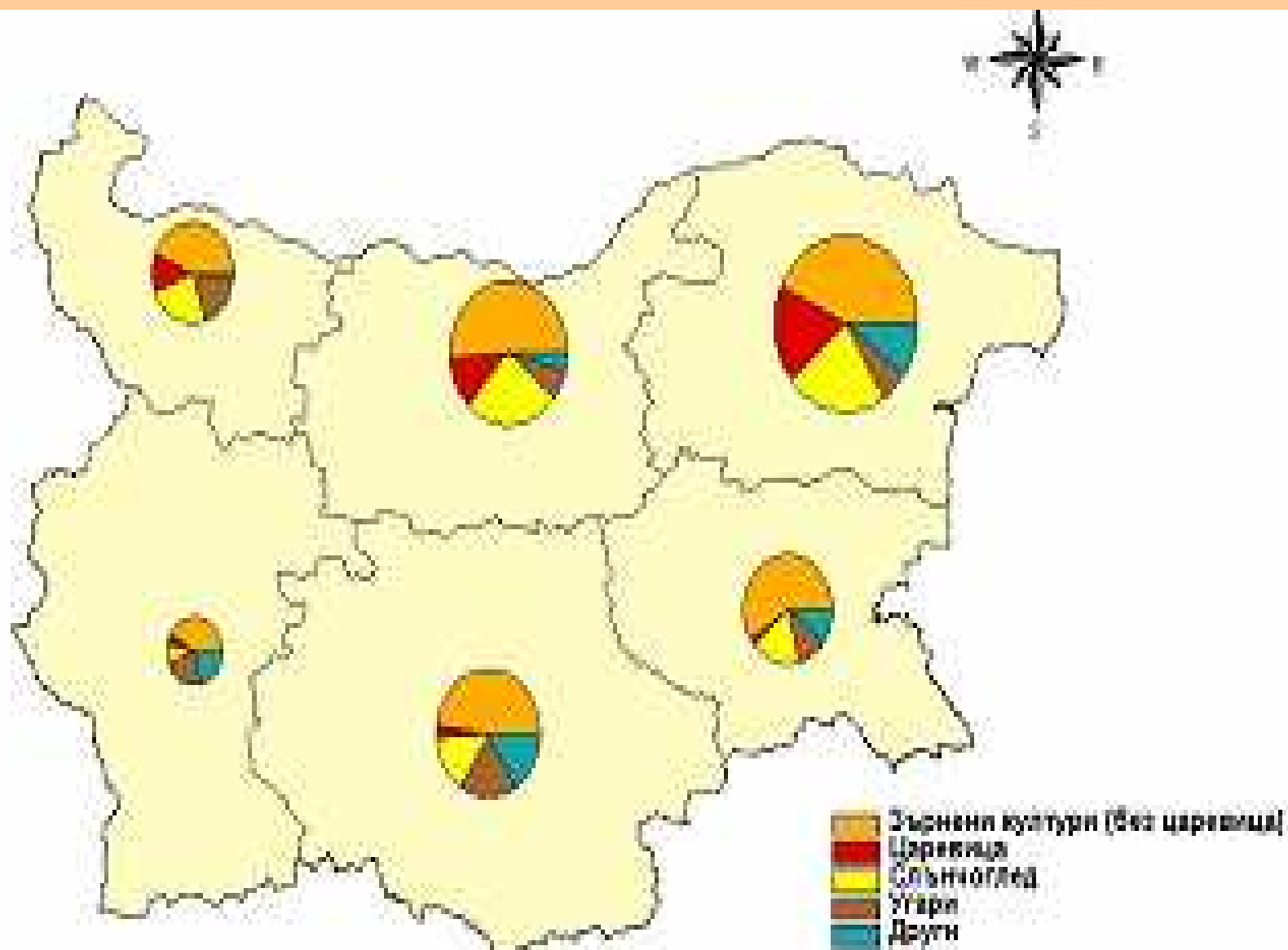
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From the geographical and ecological points of view, the territory of the country can be divided into three large soil areas:

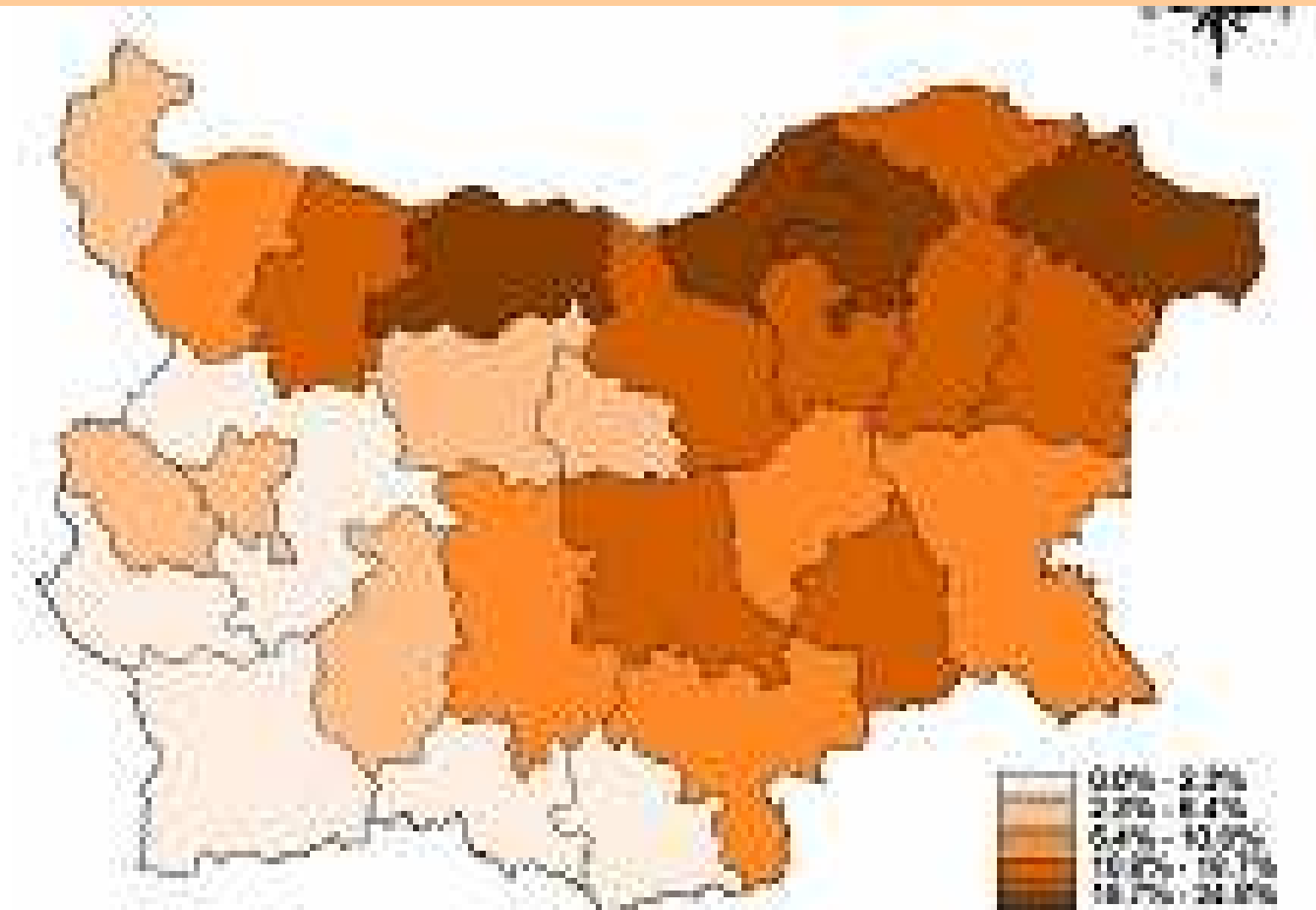
1. North Bulgaria soil area, which includes the soils distributed on the Danube plane and the Northern Balkan territories. Chernozems and Grey forest soils are widely presented there.
2. South Bulgaria soil area, which includes the soils distributed on the territory of Southern Bulgaria. Cinnamonic forest soils, Smolnitza and Pseudopodzolic soils are presented there.
3. Mountainous soil area, which includes three main soil groups. Brown forest soils, Mountainous dark soils and Mountainous meadow soils are mainly presented there.

Distribution of the main agricultural crops in the economy zones of Bulgaria



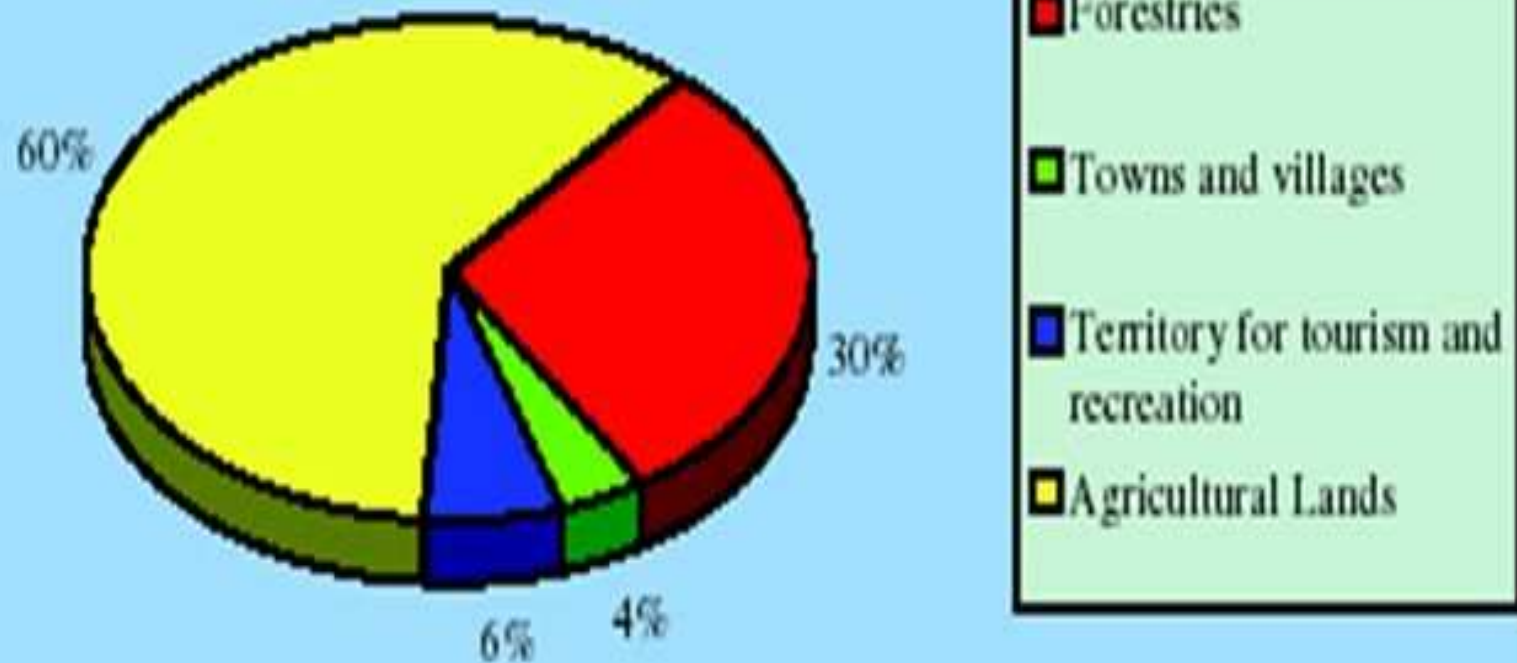
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Distribution of wheat growing in the territory of Bulgaria



Централна и източната част на територията на България са с най-висока концентрация на отглеждане на зърно, особено в северната част на територията.

Present status of land resources in Bulgaria



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Grain production of Bulgarian agriculture

Crop	Harvested area(hectares)		Output(tons)	
	2004	2005	2004	2005
Wheat	1 039 679	1 101 507	3 961 178	3 478 061
Rye	8 521	8 782	16 976	13 617
Triticale	9 521	8 782	16 976	13 617
Barley	328 924	264 519	1 180 836	657 863
Oats	43 002	30 571	101 486	50 138
Grain corn	383 217	298 713	2 123 022	1 585 701
Rice	5 669	4 501	28 116	20 163

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Source: Agrostatistics Directorate, MAFS, 2006.

An agricultural sunflower parcel of the Dobrudja Agricultural Institute in the test area DOBRICH



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Land surface observation of flooded agrikultural lands in Pazardjic district (2005)



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Non-cultivated agricultural lands near Plovdiv (2009)



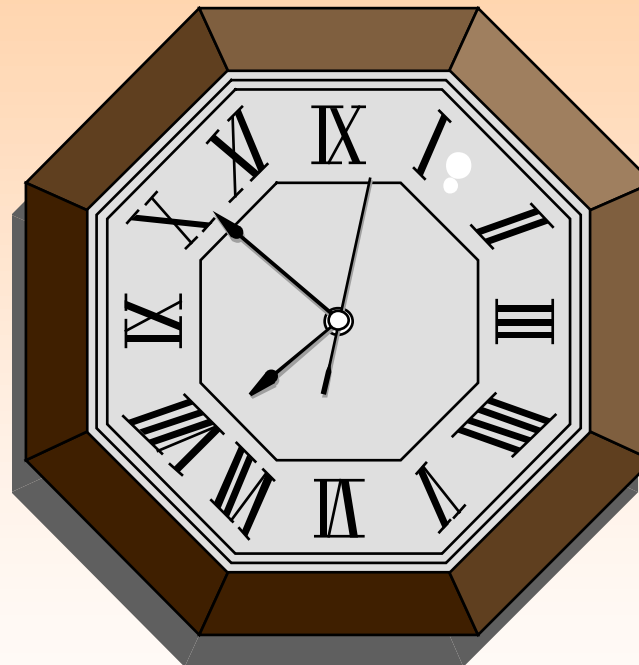
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Conclusions

- Bulgaria has good capacity in remote sensing and images application (ReSAC and Agricultural academy).
- There are national network of test areas and geographically distributed institutes and experimental stations for land surface observations of land cover .
- Analysis of the driving forces and the current state of remote sensing in Bulgaria show that we have agro ecological potential of agricultural lands to cover the indicative purposes of GMES programme in the LAND segment .

**THANK YOU
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