Remote sensing methods in land cover – land use, fire, and agriculture in Russia

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Main programs and projects

- **Land cover mapping:**
  - Land cover map of Russia based on MODIS (IKI Project)

- **Fire monitoring:**
  - Federal program of forest fire monitoring

- **Agricultural monitoring:**
  - Agricultural lands monitoring system (Ministry of Agriculture of RF)
THE LAND COVER OF NORTHERN EURASIA FOR THE YEAR 2000
Comparison with GLC2000: Tyumen Region

MODIS derived map

GLC2000
Results

A new automatic method and chain for land cover mapping at continental/global level has been developed:

new opportunities:

**Repeatability** (annual land cover mapping)

**Geographical extendibility** (without any stratification)

**Thematic enrichment** based on available training data sources (including hierarchical legend scheme)

Mapping with **consecutive increase of spatial resolution** using available satellite data and previously derived land cover products

(process of macroscopic mapping errors elimination and formal validation is ongoing)
In concerns of increase of operation efficiency of air forest protection service "AVIALESOOKHRANA" since 1995 is developed the information system of remote monitoring of forest fires.

The main purpose of the system is the supply with forest fire information of Federal Forest Agency of Ministry of Natural Resources and air divisions for acceptance of the operating decisions on suppressions of forest fires as on the protected as non-protected forest lands.
Satellite monitoring system of forest fires: products

Satellite information products:

- Daily products derived from AVHRR-NOAA and MODIS(TERRA/AQUA) database:
  - cloudiness maps and composite images;
  - hotspot detections;
  - pseudo-color images
- Accumulated burned areas based on MODIS hotspot database during current fire season.
- Burnt areas derived from SPOT-VEGETATION data of previous years
- Fire satellite monitoring reports:
  - Summary of active large forest fires (format: HTML)
  - List of populated places nearest to active fires (format: HTML)
  - Cards of active large forest fires (format: RTF)
  - Cards of fires endangering populated places (format: RTF)
### Burned area mapping: main tasks and status of development

<table>
<thead>
<tr>
<th>Task</th>
<th>Status</th>
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<tr>
<td>Brief estimation and mapping burned areas using hotspot products</td>
<td>Implemented in the System based on AVHRR-</td>
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<td>NOAA and MODIS – TERRA&amp;AQUA hotspots data</td>
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<td>(1 km)</td>
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<td>Annually burned area mapping after fire season using decade optical</td>
<td>Implemented in the System based on SPOT-</td>
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<td>VGT (1 km) and MODIS – TERRA&amp;AQUA hotspots</td>
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<td>data (1 km)</td>
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<td>Operational burned area mapping using daily optical and hotspots</td>
<td>Under developing based on MODIS-TERRA&amp;AQUA</td>
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<td>optical (250 and 500 m) and hotspots data</td>
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<tr>
<td>Burn severity assessment and scar mapping and Carbon CO₂ emission</td>
<td>Under investigation and development methods</td>
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<td>and approach prototype</td>
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Agricultural Monitoring with EO data in Russia

Development of the national agricultural monitoring system with use of EO data has been initiated by Russian Ministry of Agriculture in year 2003

Main agricultural monitoring system developing institutions:

- Main Computational Center, Russian Ministry of Agriculture
- Space Research Institute, Russian Academy of Sciences
Main thematic focuses of agricultural monitoring development

- Arable lands area and dynamic assessment
- Crop / land-use types mapping
- Crop yield forecast and assessment
- Assessment of climate change impact on agriculture
Forthcoming Challenges

- To extend arable lands map for entire Northern Eurasia region
- To develop automated and regionally adaptive algorithms for crop classification and to extend them to main crop types
- To develop operational mode for crop types mapping on entire Russia level
- To develop new monitoring options (e.g. yield forecast and assessment, crops failure detection and etc.)
- To develop operational land-use change monitoring (e.g. land abandonment, aforestation, newly-ploughed virgin lands and etc.)
- To combine moderate and high-resolution satellite data to improve crop area estimated accuracy