

# LAND COVER AND CHANGE

Newsletter of the GOFC-GOLD Land Cover Project Office

**JANUARY 2008**

**NUMBER 16**

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### GOFC-GOLD INPUT TO UNFCCC CLIMATE CHANGE CONFERENCE IN BALI

At Bali, the GOFC-GOLD working group on Earth observation for reducing emissions from deforestation presented the first draft of the REDD implementation sourcebook at the UNFCCC Climate Change Conference in Bali. In conjunction with GTOS and ESA, GOFC-GOLD presented progress on observing Essential Climate Variables in the terrestrial domain including the first version of the GLOBCOVER map that will be released to the public in February 2008.

### GOFC-GOLD/NERIN REGIONAL NETWORK MEETING

In September, GOFC-GOLD in cooperation with NEESPI held a Regional Network Meeting. It assessed requirements for dryland observations in Northern Eurasia. A summary on discussions and outcomes is presented on pages 6-7.

### 2<sup>ND</sup> GLOBCOVER USER MEETING IN MARCH

The GlobCover Team announced the 2<sup>nd</sup> User Consultation Meeting to be held at FAO in Rome, on **10 March 2008** (see calendar).

## PROGRESS OF THE GOFC-GOLD LAND COVER TEAM

### SUMMARY OF THE RECENT MEETING IN BOSTON

From 24-26 October 2007, the members of the GOFC-GOLD Land Cover Implementation Team (LC-IT) came together at Boston University for the this years meeting. The objective was to report on the status and progress of the various activities and to discuss their further development. The meeting followed the most recent meeting, in March 2006, in Jena (see Newsletter 10). Since then, the team has made considerable progress following the action plan toward operational forest and land cover observations.

Highlights of the agenda have been: the joint global land cover validation, GOFC-GOLD contribution to GEO, progress in REDD, the Mid-decadal and Decadal global Landsat datasets (Fig. 1), the involvement in producing in global land cover datasets, status of LCCS, the UNFCCC standards for essential climate variable's, development of IGOL and Boreal monitoring activities. The presentations and the workshop report are available on the webpage: [www.gofc-gold.uni-jena.de/sites/boston07.php](http://www.gofc-gold.uni-jena.de/sites/boston07.php).



*Fig. 1: Dr. Thomas Loveland (Michigan University) presented the status of the Mid-Decadal and Decadal Global Landsat datasets during the GOFC-GOLD Land Cover Implementation Team Meeting at Boston University*

The development of the **Group on Earth Observations (GEO)** benefits from several GOFC-GOLD activities. GOFC-GOLD is taking lead or contributes to a number of GEO tasks. A main activity is the engagement in the area of "Global Land Cover" that was approved and presented as GEO Early Achievement at the GEO Plenary Meeting in November (detailed report follows in the next newsletter). Recent efforts in this area include the IGOL initiative, the GLOBCOVER project, the NASA & USGS Mid-decadal and decadal global land cover datasets and the GEO global land cover dataset. Progress for each activity was presented and the objective and work plan for this task was reviewed and updated.

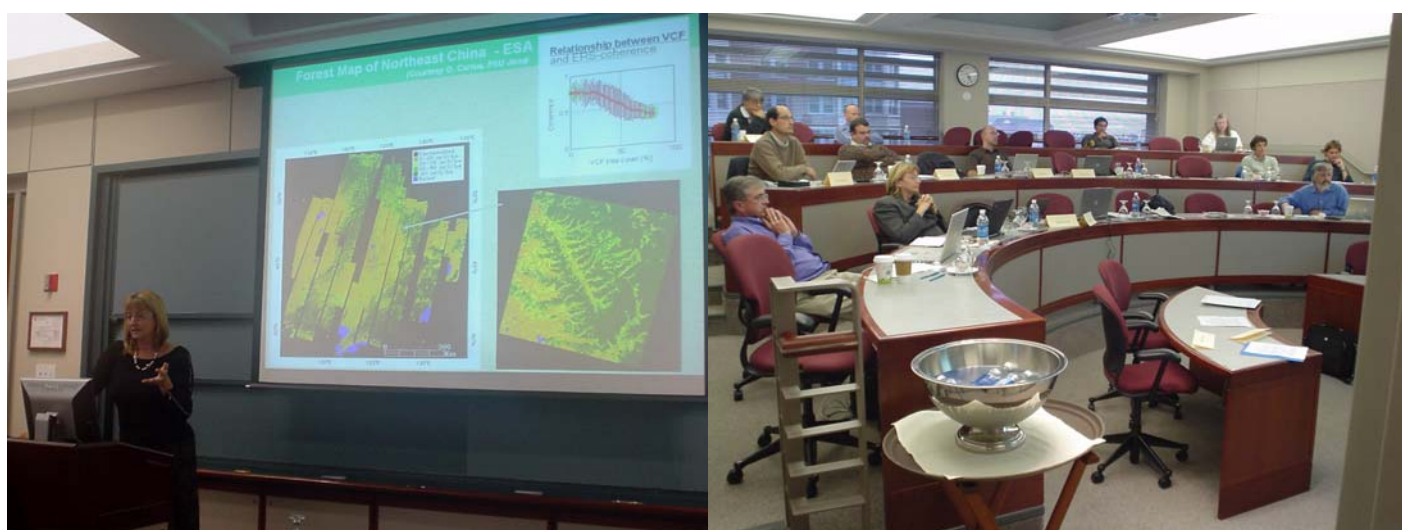
GOFC-GOLD plays a key role in the development of **IGOL**, the Land Theme of IGOS. The IGOL report has been completed this year. It addresses strategies for integrated land observations. The report was successfully presented at the IGOS Meeting. Currently, IGOL is in transition into GEO and the LC-IT discussed the transition plan. There was agreement that a mechanism is needed that maintains the coordinating character of IGOL and ensures its implementation in future.

The GCOS implementation plan specifies **Essential Climate Variables (ECV's)**. The UNFCCC SBSTA has requested GTOS to prepare standards for reporting on the essential climate variables including land cover. The standard drafts and observing progress were presented by GTOS and GOFC-GOLD to the UNCCC at COP13 in Bali. The LC-IT has contributed to the first draft of the land cover ECV (available on: <http://www.fao.org/gtos/ECV-T09.html>). During the meeting the GTOS mandate and this current land cover version was discussed and a further revision of the current draft will be performed by the land cover team.

The LC-IT has contributed to the implementation of GCOS with the UNFCCC for evolving standards in land cover characterization and validation. As input for ongoing UNFCCC policy discussions, the LC-IT working group on "Monitoring deforestation for reducing emissions from deforestation" has prepared a first version sourcebook on **REDD** implementation that summarizes outcomes and lessons learned from several ongoing case studies and national experiences.

Another main activity of the LC-IT is its engagement toward a **joint validation of available global land cover products** leading to the development of a "best available" land cover product. Team members have prepared a proposal that includes a comparative assessment of existing global land cover datasets and their synergy. This proposal was developed in close cooperation with the CEOS (Committee on Earth Observation) Working Group on Calibration and Validation and comprises a detailed work plan to develop the validation database, refine LCCS and analyze the accuracy of the various maps. During the meeting the proposal was presented and further steps discussed.

The **Land Cover Classification System (LCCS)** is currently in the process to become an international standard and GOFC/GOLD has been asked to provide comment and feedback in this context. The existing version of the software has some limitations and the LC-IT members discussed further steps in order to develop a new version that considers the needs of the global land cover mapping community.



**Fig. 2: Impressions of the LC-IT Meeting, left: Christiane Schmullius presenting boreal activities, right: participants at the meeting (pictures: M. Herold)**

Tab. 1: Summary of LC-IT activities and related documents

JOINT GLOBAL LAND COVER VALIDATION AND EVOLVING A "BEST AVAILABLE" MAP
<p>The LC-IT has contributed to a proposal including comparative assessment and synergy of existing global land cover datasets. Funding is sought from NASA and specific activities are anticipated to start in 2008.</p>
GEO LAND COVER TASK
<ul style="list-style-type: none"> <li>Report was given on GEO activities of the LC-IT with focus on DA-07-02 (Global land cover), related activities of this task achieved considerable progress (GEO Early Achievement)</li> <li>During the discussion the individual tasks, objectives and work plan have been reviewed</li> </ul> <p><b>Documents:</b>  The G OFC-GOLD LC-IT contributed to recently published GEO book "The Full Picture", available at: <a href="http://www.earthobservations.org">http://www.earthobservations.org</a>  Scientific paper:  HEROLD, M., WOODCOCK, C. E., LOVELAND, T. R., TOWNSHEND, J., BRADY, M., STEENSMANS C., SCHMULLIUS, C. (2007): Land Cover Observations as part of a Global Earth Observation System of System (GEOSS): a report after 2 years of GEO implementation, IEEE Sensors Journal (submitted)</p>
REDUCING EMISSIONS FROM DEFORESTATION
<ul style="list-style-type: none"> <li>Report was given on progress of the related working group</li> <li>First draft of technical sourcebook has been presented at COP-13. LC-IT agreed to review.</li> </ul> <p><b>Documents:</b>  First version of the sourcebook: <a href="http://www.gofc-gold.uni-jena.de/redd">http://www.gofc-gold.uni-jena.de/redd</a>  Report of Bolivia Workshop:  <a href="http://nofc.cfs.nrcan.gc.ca/gofc-gold/Report%20Series/GOLD_29.pdf">http://nofc.cfs.nrcan.gc.ca/gofc-gold/Report%20Series/GOLD_29.pdf</a>  Special Issue Environmental Research Letters:  <a href="http://www.iop.org/EJ/abstract/1748-9326/2/4/045021">http://www.iop.org/EJ/abstract/1748-9326/2/4/045021</a></p>
MID-DECADAL AND DECADAL GLOBAL LANDSAT DATASETS, INCL. CEOS VIRTUAL CONSTELLATIONS
<ul style="list-style-type: none"> <li>Mid-decadal: Progress was reported with the Landsat Global Geocover Standard (LGGS) data available for users at the end of 2008</li> <li>Decadal: Landsat-type observation data for preparing a global mosaic available at no cost for 2010</li> </ul> <p><b>Further Information:</b>  Landsat Data Gap Studies: <a href="http://calval.cr.usgs.gov/LDGST.php">http://calval.cr.usgs.gov/LDGST.php</a>  MDGLS: <a href="http://mdgls.umd.edu/">http://mdgls.umd.edu/</a>  Scientific paper:  WULDER, M, WHITE, J. C., GOWARD, S. N., MASEK J. G., IRONS, J. R., HEROLD, M., COHEN, W. B., LOVELAND, T. R., WOODCOCK, C. E. (2007): Landsat continuity: Issues and opportunities for land cover monitoring. Remote Sensing of Environment (in press)</p>
GLOBAL LAND COVER DATASET DEVELOPMENTS
<p>Reports were given on GLOBCOVER and the MODIS 500 m land cover datasets, both datasets will be available in the near future.</p> <p><b>Further Information:</b>  GLOBCOVER: <a href="http://ionia1.esrin.esa.int/">http://ionia1.esrin.esa.int/</a>, <a href="http://dup.esrin.esa.it/projects/summaryp68.asp">http://dup.esrin.esa.it/projects/summaryp68.asp</a>  MODIS: <a href="http://modis-land.gsfc.nasa.gov/landcover.htm">http://modis-land.gsfc.nasa.gov/landcover.htm</a></p>

**UNFCCC STANDARDS FOR ESSENTIAL CLIMATE VARIABLE'S – LAND COVER & BIOMASS**

- GTOS mandate and current land cover version was discussed in plenary
- LC-IT will jointly edit current draft and provide a first updated version prior to COP13

**ECV descriptions:**

Land Cover: <http://www.fao.org/gtos/ECV-T09.html>

Biomass: <http://www.fao.org/gtos/ECV-T12.html>

**IGOL PROGRESS**

- IGOL report is finalized and successfully presented at the 14th IGOS plenary meeting and was recently approved by GEO
- It provides a detailed analysis of the current status of earth observation concerning different terrestrial fields and formulates recommendation and further actions to ensure data consistency and continuity in the future.

**Documents:**

Information on IGOL: <http://www.fao.org/gtos/igol/>

IGOL report draft available at: <http://www.ioc-goos.org/IGOS-P-14>

Transition report:

[http://www.gofc-gold.uni-jena.de/documents/boston/The\\_Future\\_of\\_IGOL%20with%20table.doc](http://www.gofc-gold.uni-jena.de/documents/boston/The_Future_of_IGOL%20with%20table.doc)

**LAND COVER CLASSIFICATION SYSTEM (LCCS) AND RECENT DEVELOPMENTS**

LC-IT to interact with GTOS/GLCN on the use of LCCS concept (as part of GEO task DA-07-02):

- Develop a formal mechanism for LCCS feedback and improvements
- Foster LCCS documentation and implementation activities

Define a set of LCCS classifiers recommended for land cover maps contributing to global mapping requirements

**SUPPORT OF FAO'S FRA2010**

During the discussion the role of GOFC-GOLD within FRA2010 was discussed:

- Direct help for implementation - validation
- Guidance to the process:
  - Land cover should be primary observation variable, then use 1975 MSS analysis problematic
  - Interaction with the FRA team

Documents: GOFC-GOLD Newsletter 12

**BOREAL FOREST MONITORING ACTIVITIES**

A number of ongoing regional activities have been presented and progressing well.

**Further Information:**

SIB-ESS-C website: <http://www.sibessc.uni-jena.de/>

Terra-Norte website: <http://terranorte.iki.rssi.ru/>

**SUPPORT OF NEW LAND OBSERVING SENSORS**

Landsat 8, GMES Earthwatch missions and ESA-BIOMASS were discussed

**Further Information:**

ESA BIOMASS mission: <http://www.cesbio.ups-tlse.fr/us/indexbiomass.html>

NASA Desdyni: <http://desdyni.jpl.nasa.gov/>

**REGIONAL NETWORK ACTIVITIES**

Detailed planning for the global land cover validation effort has started as overarching activity involving all regional networks.

## GOFc-GOLD WORKING GROUP PRESENTS A DRAFT SOURCEBOOK FOR REDD IMPLEMENTATION

### TECHNICAL GUIDELINE WAS PRESENTED AT UNFCCC CLIMATE CHANGE CONFERENCE

The GOFc-GOLD Working Group (WG) for reducing carbon emissions from deforestation has been working since 2005 on the issue of "Reducing emissions from Deforestation and Degradation" (REDD). In April 2007, the 2<sup>nd</sup> P workshop of the working group was held in Bolivia (Newsletter 14). During this workshop the discussions underlined the importance of guidance for developing countries on available methods for REDD implementation and UNFCCC reporting. As a result the WG initiated the development of a technical sourcebook to support REDD implementation activities.

In December, the first draft of the sourcebook has been finalized. It provides a consensus perspective from the global community of earth observation and carbon experts on methodological issues relating to quantifying the green house gas impacts of implementing activities to reduce emissions from deforestation and degradation in developing countries (REDD). Based on the current status of negotiations and UNFCCC approved methodologies, the book gives additional explanation, clarification, and methodologies. It emphasizes the role of satellite

remote sensing as an important tool for monitoring changes in forest cover, and provides clarification on the IPCC Guidelines for reporting changes in carbon stocks at the national level.

#### Presentations during the UNFCCC Side Event on REDD-Preparedness:

1. Background and Scope of the Sourcebook (*Martin Herold, Friedrich Schiller University, Jena, Germany*)
2. Monitoring deforestation (*Ruth DeFries, University of Maryland, USA*)
3. Monitoring forest degradation (*Carlos Souza, IMAZON, Brazil*)
4. Changes in Carbon Stocks (*Sandra Brown, Winrock International, USA*)
5. Reporting (*Giacomo Grassi, JRC, Italy*)
6. Review process and discussions (*Frederic Achard, EC Joint Research Center, Ispra, Italy*)
7. Responses and comments by *Carlos Manuel Rodriguez (Conservation International & former Costa Rica environment minister) and Ken Andrasko (Worldbank, Forest Carbon Partnership)*

During the recently held UNFCCC Climate Change Conference in Bali, from 3-14 December, the sourcebook was presented at two side events: the UNFCCC side event (jointly organized by Winrock International, TNC, GOFc-GOLD, see fig. 3) and at the parallel CIFOR Forest Day. The sourcebook is available for download on the GOFc-GOLD web site (see box). It is an open document and the scientific community is invited to provide comments.

#### Documentation on REDD by the GOFc-GOLD Working Group:

- Bolivia workshop report:  
<http://www.gofc-gold.uni-jena.de/sites/bolivia07.php>
- Technical sourcebook on REDD:  
<http://www.gofc-gold.uni-jena.de/redd>
- Special Issue on Monitoring REDD in open access journal:  
*Environmental Research Letters Vol. 2 (4)*  
<http://www.iop.org/EJ/abstract/1748-9326/2/4/045021>



**Fig. 3: Speakers during the joint Winrock International and GOFc-GOLD side event on "REDD Preparedness" (from l. to r.: Carlos Rodríguez Kenneth Andrasko, Frédéric Achard, Sandra Brown, photos: courtesy of IISD/Earth Negotiations Bulletin) all presentations are available at the UNFCCC web site: [http://regserver.unfccc.int/seors/reports/events\\_list.html](http://regserver.unfccc.int/seors/reports/events_list.html)**

# REQUIREMENTS FOR OBSERVATIONS OF LANDCOVER DYNAMICS IN DRYLAND REGIONS OF NORTHERN EURASIA

## GOF-C-GOLD WORKSHOP OF THE NORTHERN EURASIA REGIONAL INFORMATION NETWORK WAS HELD IN SEPTEMBER

GOF-C-GOLD offered a 1-day workshop on September 20, 2007 in Urumqi, China in conjunction with NEESPI Science Team International **Regional Meeting on Dryland Processes in Central Asia** (September 16 – 20, 2007). The workshop objective was to further develop connections among the users of remotely sensed data in dryland regions of Northern Eurasia and formulate the specific requirements for observations of land-cover dynamics in the region. Presentations and discussions were planned to address the issues of data collection, access, distribution and exchange; opportunities for extending the Northern Eurasia Regional Information Network (**NERIN**) activities into dryland regions and forming a new network, enhancing education and capacity building for improved utilization of remotely sensed

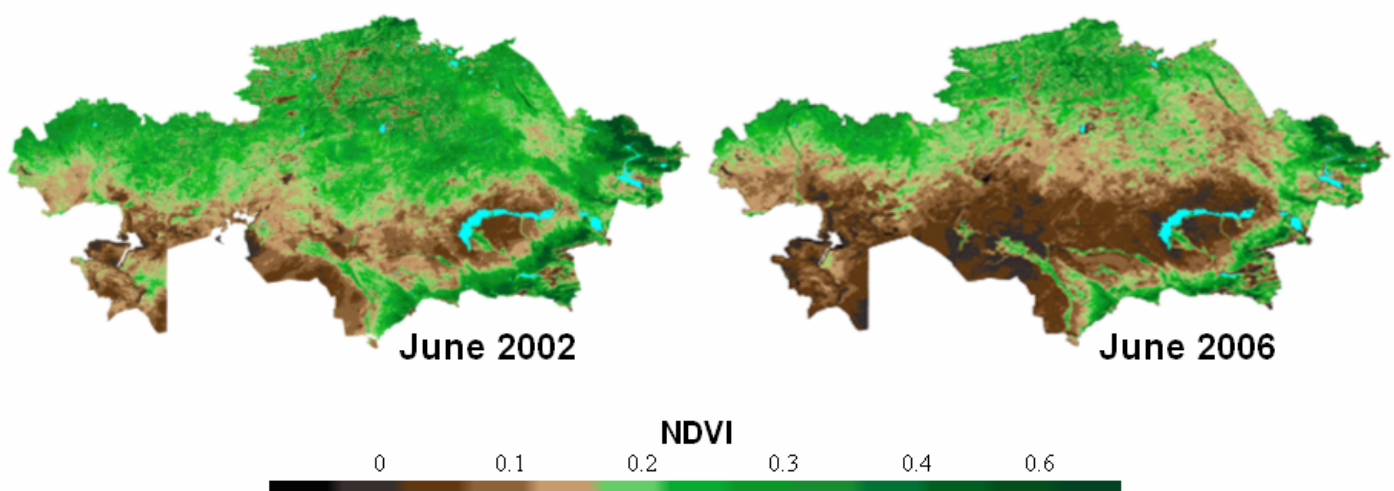
data to meet the needs of users. The workshop brought together 37 participants from China, USA, Kazakhstan, Uzbekistan, Russia, Israel, Germany, Mongolia, and Tajikistan.

The presentations and discussions at the workshop addressed both fire and land cover themes and highlighted many pressing needs for improved monitoring of land cover and change processes, including pasture degradation and desertification, dust storms, shifts in grain production and irrigation, concerns about people's health and food supply, and the impact of climate change.

The workshop identified important specifics and challenges of the remote sensing of land in arid regions. These regional specifics include:

1. **Dramatic inter-annual variation** in peak vegetation cover depending on moisture conditions (fig. 4). Major implications include inconsistencies between land-cover products based on imagery collected in dry and in wet years and difficulty in separating intra-annual variation from directional land-cover change. Very short vegetative period of ephemeral vegetation (1-2 months, sometimes less) is an additional source of uncertainty and greater frequency of observations is required to address it. These are the likely reasons behind the significant disagreement among available land-cover products in dryland regions (e.g. See and Fritz, 2006, presentations at the workshop).

### Kazakhstan vegetation state

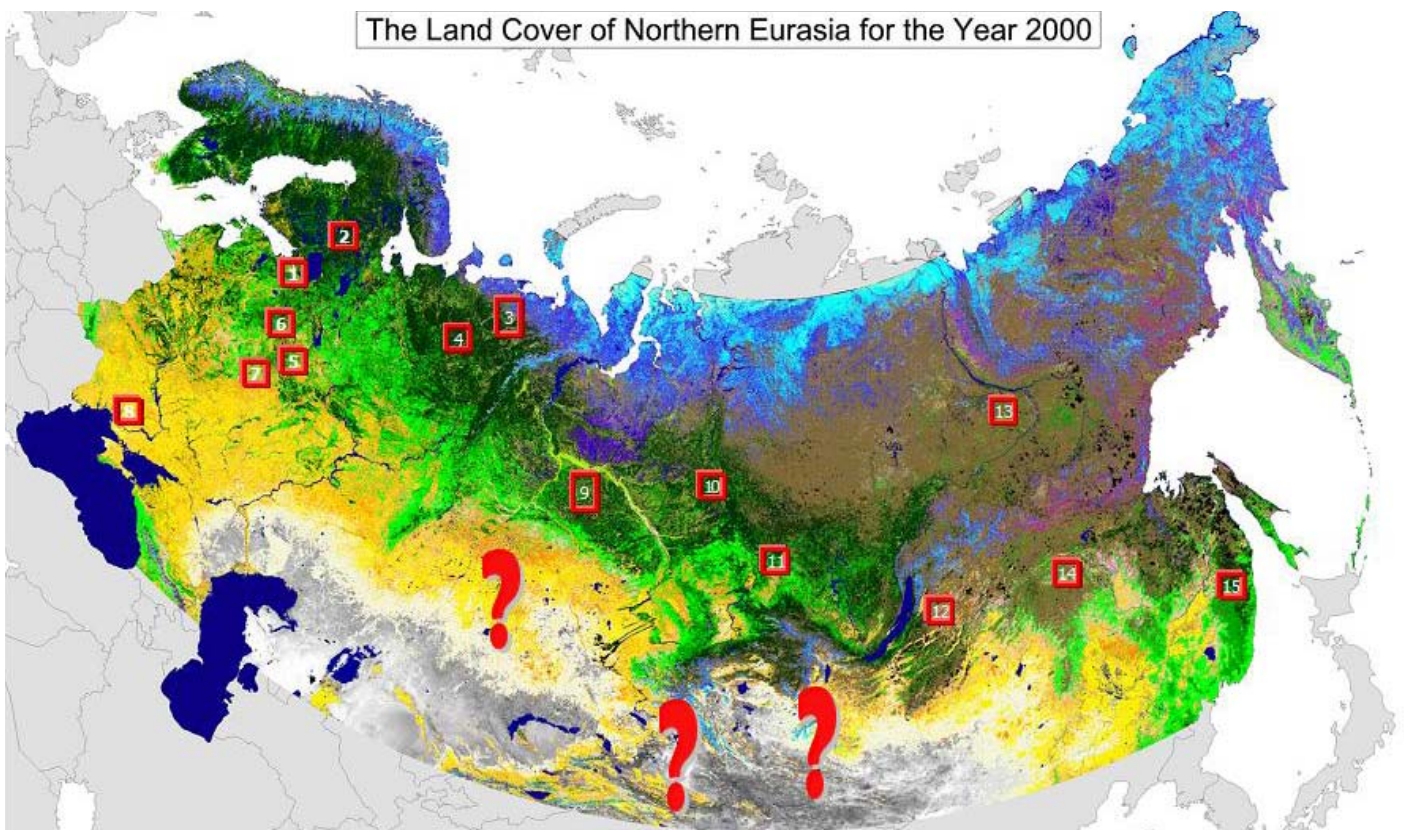


**Fig. 4: Inter-annual variation in land cover of Kazakhstan (NDVI for the first decade of June [vegetation maximum] based on NOAA/AVHRR 1 km resolution). In 2002 precipitation was above average, in 2006 - below average, source: SPIVAK et al. (2007)**

2. **Open canopy woody vegetation** covers large areas, plays an important role in local environment and economy (as firewood) but is poorly represented on vegetation maps. Increased tree cover in parts of the region is expected from forest plantations established in the last two decades, but growing pressure from wood harvest threatens tree-dominated vegetation.
3. Fire plays a major role in land-cover dynamics. While vegetation regenerates quickly after fire making the mapping of **burnt area** difficult, the successional changes in species composition unfold for many years following fire. Tracking these changes with remote sensing methods is critical for understanding the impact of fire on land cover.
4. **Fire risk** is poorly correlated with the dryness of weather conditions and depends primarily on the amount of biomass present on site. This argues for including land cover information into the algorithm development for fire-risk assessments.

The workshop participants expressed interest in developing regionally consistent and LCCS-compatible map for the dry land areas of Northern Eurasia as a pilot project. Workshop recommendations stress the need for training through a series of workshops focused on application of the LCCS and the use of remote sensing methods.

**NERIN - Northern Eurasia Regional Information Network**



**Fig. 5: Location of validation sites supported by NELDA (Northern Eurasia Land Dynamics Analysis) Project. Additional sites in arid regions are needed to improve observations of land cover and its change (Land cover map by S. Bartalev)**

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**Reference:**

SPIVAK L.F., VITKOVSKAYA I.S. & M. Z. BATYRBAYEVA (2007): The analysis of long-term time and spatial variations of vegetation productivity using of remote sensing data. IGARSS'2007, Spain

**Further details on the NERIN:**

<http://www.fao.org/gtos/gofc-gold/net-NERIN.html>

## UPCOMING LAND COVER EVENTS

### EVENTS / CONFERENCES / WORKSHOPS

#### February – March

##### **EARSeL Joint Workshop Remote Sensing "New Challenges of High Resolution"**

**Venue:** Bochum, Germany

**Date:** 5-7 March

**Info:** <http://www.sig-urs-2008.de/>

##### **2nd GLOBCOVER User Consultation Meeting**

**Venue:** FAO, Rome/Italy

**Date:** 10 March

**Info:** <http://ionia1.esrin.esa.int/>

Persons or institutions interested in participating please contact [due@esa.int](mailto:due@esa.int) until February, 15.

##### **MODIS Conference: International EOS/NPP Direct Readout Meeting 2008**

**Venue:** Bangkok, Thailand

**Date:** 31 March - 4 April

**Info:** <http://dbmeeting.gsfc.nasa.gov/>

#### April

##### **Group on Earth Observation (GEO) User Interface Meeting**

**Venue:** Toronto, Canada

**Date:** April, date to be confirmed

**Info:** [www.earthobservations.org](http://www.earthobservations.org)

##### **European Geosciences Union (EGU) General Assembly 2008**

**Venue:** Vienna, Austria

**Date:** 13-18 April

**Info:** <http://meetings.copernicus.org/egu2008/>

#### May

##### **9<sup>th</sup> Conference of the Parties (COP) of the UN Convention on Biological Diversity**

**Venue:** Bonn, Germany

**Date:** 19-30 May

**Info:** <http://www.cbd.int/cop9/>

##### **G OFC-GOLD Scientific and Technical Board meeting**

**Venue:** Helsinki, Finland

**Date:** 29-30 May

**Info:** <http://www.fao.org/gtos/gofc-gold/index.html>

##### **High-latitude land cover mapping workshop**

**Venue:** to be announced

**Date:** May-June 2008

**Info:** Olga Krankina (Email: [olga.krankina@oregonstate.edu](mailto:olga.krankina@oregonstate.edu))

#### June

##### **NEESPI Science Team Meeting**

**Venue:** Helsinki, Finland

**Date:** 2-4 June

**Info:** <http://neespi.org/>



**Workshop on fire early warning systems****Venue:** Edmonton, Canada**Date:** June 2008, date to be confirmed**Info:** Michael Brady (Email: [MBrady@NRCan.gc.ca](mailto:MBrady@NRCan.gc.ca))**UNFCCC 28th Session of the Subsidiary Body for Scientific and Technical Advice****Venue:** Bonn, Germany**Date:** June, date to be confirmed**Info:** <http://unfccc.int/>**July****XXI ISPRS Congress****Venue:** Beijing, China**Date:** 3-11 July**Info:** <http://www.isprs2008-beijing.org/>**IEEE International Geoscience & Remote Sensing Symposium – IGARSS 2008****Venue:** Boston, USA**Date:** 6-11 July**Info:** <http://www.igarss08.org/>**September****Australian & SE Asia MODIS validation workshop at the 14th Australian Remote Sensing & Photogrammetry Conference****Venue:** Darwin, Australia**Date:** 29 September-3 October**Info:** <http://14arspc.com/>**October****10<sup>th</sup> Conference of the Parties (COP10) of the Ramsar Convention****Venue:** Changwon, Republic of Korea**Date:** 28 October - 9 November**Info:** [http://www.ramsar.org/index\\_cop10\\_e.htm](http://www.ramsar.org/index_cop10_e.htm)**November****Southeast Asia Regional Research and Information Network (SEARRIN) – Land Cover Land Use Change Meeting****Venue:** Thailand**Date:** 17-21 November**Info:** <http://www.eoc.ukm.my/searrin/>**December****14<sup>th</sup> Conference of the Parties (COP) of the UN Framework Convention on Climate Change****Venue:** Poznan, Poland**Date:** 1-12 December**Info:** <http://unfccc.int>**To be defined****Group on Earth Observation 5th Plenary****Venue:** Beijing, China**Date:** November**Info:** [www.earthobservations.org](http://www.earthobservations.org)

**Joint GMES/GEO global land cover task workshop****Venue:** to be defined**Date:** to be defined**Info:** <http://www.gmes.info/> & [www.earthobservations.org](http://www.earthobservations.org)**Newsletter archives of related projects**GLOBCOVER Newsletter: <http://dup.esrin.esa.it/projects/summary68.asp>GLCN Newsletter (Global Land Cover Network): <http://www.glcn.org/news/>**The ESA GOFC GOLD Land Cover Project Office  
Newsletter:**

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If you have any suggestions or recommendations for future contributions to this newsletter please feel free to contact us.

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