

## GOFC-GOLD STRATEGY REVISITED

### 3<sup>RD</sup> SCIENCE AND TECHNICAL BOARD MEETING FOCUSES ON GOFC-GOLD CONTRIBUTION FOR GEOSS & UNFCCC IMPLEMENTATION

The GOFC-GOLD Scientific and Technical Board (STB) is comprised of scientists and technical experts both from within and outside of the panel. With overall guidance from the Global Terrestrial Observing System (GTOS), the STB regularly reviews the progress, problems and the plan of activities for the forthcoming period. The STB also communicates with the IGOS Partnership to ensure that GOFC-GOLD is responsive to the

needs of CEOS members and other IGOS Partners. The second STB meeting was held in 2001 at ESA in Frascati, Italy. The results have been summarized in GOFC-GOLD report number 12. In cooperation with the Chinese Ministry of Science and Technology, the STB held its third meeting from 19-22 April 2005 at Beijing. Participants included: external board members, panel executive and Implementation Team (IT) chairs; regional rep-

#### Newsletter content:

STB meeting	1
GEOSS & GOFC-GOLD	3
JERS-1 SAR data for Asia	4
VCF validation workshop	5
SIBERIA II results	6
Upcoming events	7

representatives from the six regional networks; East Asia regional representatives; symposium participants and resource personnel (Fig. 1).



Figure 1: Participants of the 3<sup>rd</sup> Science and Technical Board meeting of GOFC-GOLD held in April 2005 in Beijing/China. Key issues were GOFC-GOLD contributions to GEOSS and UNFCCC implementation, as well as, the establishment of an East-Asia regional network.

In addition to annual business affairs, the third meeting included two special events: a 5-year review and revision of the GOF-C-GOLD Strategy document (1999), and initiation of a new GOF-C-GOLD regional network for East Asia. Most importantly, in its 3<sup>rd</sup> STB meeting, GOF-C-GOLD has taken on the challenges posed by recent developments with respect to the Group on Earth Observation (GEO) and the related developments towards a Global Earth Observation System of Systems (GEOSS), and the specific actions in UNFCCC implementation by the Global Climate Observing System (GCOS) calling for GOF-C-GOLD. The overall strategy manifested in the revised strategic document highlights and aligns related actions along the GEOSS and UNFCCC requirements, and thus emphasize the operational role of GOF-C-GOLD in their implementation.

#### **GEOSS and GOF-C-GOLD**

Of the many highlights of the meeting, particular attention was focused on how GOF-C-GOLD could effectively contribute to the recently formalized Group on Earth Observations (GEO). In this regard, Dr. Toshio Koike, of the GEO Implementation Planning Task Team was invited to the meeting to present the current status of the Global Earth Observation System of Systems (GEOSS) 10-year implementation plan. He explained the ongoing activities and the need for GOF-C-GOLD to contribute to current developments coordinated by the GEO secretariat. For more information please see the GEOSS article in this newsletter.

#### **UNFCCC and GOF-C-GOLD**

The implementation of the UNFCCC is outlined in the implementation plan of the Global

Climate Observing system (GCOS IP). This plan was developed in 2004 and recently endorsed by 3<sup>rd</sup> GEO Earth Observation summit. The plan emphasizes the need for operational observations for thirteen Essential Climatic Variables (ECV) in the terrestrial domain. Land cover and fire disturbance are among them. Specific tasks urge GOF-C-GOLD and its partners for specific actions needed to improve these observations in the land domain. As an urgent action, GOF-C-GOLD contributes to reporting mechanisms to the Conference of the Parties 11<sup>th</sup> session on progress in implementing the GCOS IP.

#### **East-Asia network**

Within the frame of the STB meeting, GOF-C-GOLD extended its regional network activities. A one day workshop was dedicated to the initial establishment of an East-Asia regional network. China will play a key role in the implementation of the network, partnering with mem-

bers from different countries including Japan, Korea, India, Mongolia and others. The next East Asia workshop is planned for in late 2005 or 2006 to further develop this regional network.

#### **Land cover team**

The GOF-C-GOLD land cover theme aims at providing an international forum for identifying and developing consistent land cover data and information to support global change science and applications. During the STB meeting the activities of the Land Cover Implementation Team were prioritized in response to the needs of GEOSS and the GCOS IP (see box).

#### **Documentation**

Currently, the agenda and list of participants are available online (see box). The revised strategic document and a comprehensive meeting report will be available soon on the GOF-C-GOLD website.

### **Priorities of the land cover team defined at the 3<sup>rd</sup> STB meeting:**

- Encourage consistency, continuity, adequacy, and accessibility of coarse and fine resolution satellite and in situ land cover observations,
- Evolve international standards and specifications for the production of land-cover characterization maps and their accuracy assessment. The implementation is ensured through a joint international harmonization and validation framework as outlined in the GCOS implementation plan,
- Cooperation and engagement in ongoing international mapping initiatives (e.g. GLOBCOVER),
- Further engagement in capacity building through regional partnerships and networks and links to the Global Land Cover Network (GLCN),
- Implementation of land cover harmonization and interoperability case studies to make best use of existing resources.

### **STB meeting agenda:**

<http://www.fao.org/gtos/gofc-gold/docs/meetings-2005/3rd-STB-Mtg-program-v6.pdf>

# GOF-C-GOLD AND THE GLOBAL EARTH OBSERVATION SYSTEM OF SYSTEMS (GEOSS)

The World Summit on Sustainable Development in Johannesburg in 2002 emphasized that Earth observations need to be improved. This led to the establishment of an ad hoc Group on Earth Observations (GEO). After three earth observations summits, international agreement on a 10-year implementation plan for a Global Earth Observation System of Systems (GEOSS) was reached by GEO member countries in Brussels in February 2005. The GEO secretariat was recently established at the WMO in Geneva and since then has asked members of the international EO community to get involved in implementing GEOSS with focus on nine areas of societal benefit (see box).

## GEOSS will deliver benefits to society in the following areas:

1. Reducing loss of life and property from natural and human-induced **disasters**.
2. Understanding environmental factors affecting human **health** and well-being.
3. Improving management of **energy** resources.
4. Understanding, assessing, predicting, mitigating, and adapting to **climate** variability and change.
5. Improving **water**-resource management through better understanding of the water cycle.
6. Improving **weather** information, forecasting, and warning.
7. Improving the management and protection of terrestrial, coastal, and marine **ecosystems**.
8. Supporting sustainable **agriculture** and combating desertification.
9. Understanding, monitoring, and conserving **biodiversity**.



## The role of GOF-C-GOLD

Under the guidance of GTOS, GOF-C-GOLD will have a role in the GEOSS implementation, recognizing that:

- GOF-C-GOLD provides an operational framework for land observations within GTOS.
- The land domain is least advanced compare to other fields of observation (ocean, atmosphere). In contrary, land cover products are required by all nine areas of societal benefits (see box).
- The GEOSS reference plan especially mentions GOF-C-GOLD and its detailed observation plans and network for land cover, global fire mapping products, cultivated area, and forest area.
- GOF-C-GOLD provides a communication and cooperation platform between data producers, data users, and the science community to cooperatively improve observation, data products definition, assimilation, and dissemination.
- Implementation builds upon and enhances established partnerships and observing systems, and stable funding and staffing are essential for a comprehensive GEOSS implementation.
- GOF-C-GOLD has been involved in the development and evaluation of internationally agreed standards for harmonization, standardized land mapping and validation,
- Potential of international capacity building (linkage to GOF-C-GOLD).

## GEOSS 2 year targets

As an initial step, GOF-C-GOLD responded by submitting eighteen

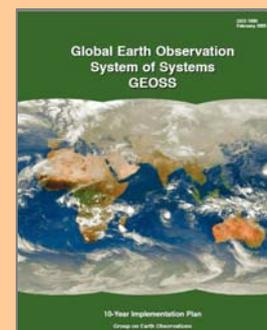
work packets for GEOSS tasks for the period from 2005-2007. The tasks focus on five areas societal benefit: Disasters, Climate, Weather, Ecosystems, Agriculture, and additionally for Capacity Building.

## Partners

GOF-C-GOLD carries out its tasks, including those in the GEOSS work packets, in association with several partner organizations. Among others, these include GTOS, Committee on Earth Observation Satellites (CEOS, land subgroup on calibration and validation), Global Land Cover Network (GLCN), Food and Agricultural Organization (FAO) and the space agencies.

## For more information:

<http://earthobservations.org/>



## Demonstration project

To support the development of GEOSS, GOF-C-GOLD is planning a demonstration project, which will promote the various facets of GEOSS in the area of international forest cover and forest cover change assessment.

# JERS-1 SAR DATA FOR ASIA

## RELEASE & ACCESS FOR A FULL MOSAIC FOR INSULAR SE-ASIA

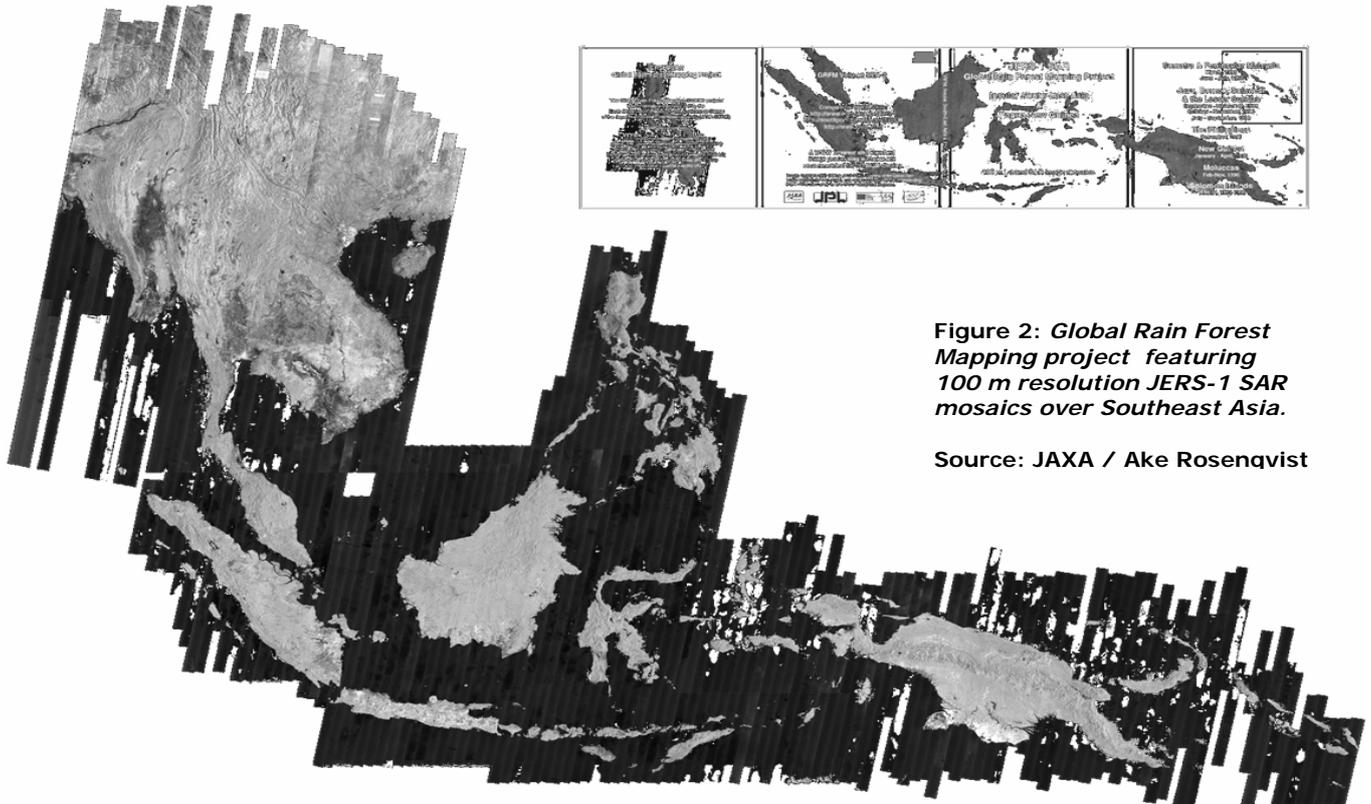


Figure 2: *Global Rain Forest Mapping project featuring 100 m resolution JERS-1 SAR mosaics over Southeast Asia.*

Source: JAXA / Ake Rosenqvist

The Global Rain Forest and Boreal Forest Mapping (GRFM/GBFM) project is a joint international undertaking led by the Japan Aerospace Exploration Agency, JAXA (formerly NASDA), in collaboration with NASA JPL, the E.U. Joint Research Center, the Alaska Satellite Facility, the Swedish National Space Board and RESTEC (Japan). The project is set out to generate spatially and temporally contiguous 100 m resolution JERS-1 SAR L-band SAR mosaics over the entire tropical and boreal zones of the

Earth. To date, mosaics over Alaska, Canada, Central America, the Amazon basin, Central Africa, Madagascar and mainland Southeast Asia have been completed. JERS-1 SAR mosaics covering Siberia, Europe and Australia are scheduled for release during the late autumn of 2005. The latest release (April 2005) within the GRFM/GBFM project is a JERS-1 SAR multi-temporal mosaic from the mid 1990's covering the insular part of South-East Asia, including Indonesia, Malaysia, Singapore, Brunei, East Timor, the

Philippines, Papua New Guinea and the Solomon Islands (Figure 2). The JERS-1 SAR data used were processed with JAXA's Sigma-SAR "strip mode" processor, in which the full 75 km wide satellite swaths were processed as continuous data sets, sometimes as long as 3000 km. All data passes were initially processed to full spatial resolution (18 meters, 4 looks) to maintain radiometric quality, and in the subsequent mosaicking step, resampled by block-averaging to 100 m pixel spacing. The mosaics were generated strip by strip from east to west, using image matching and correlation in the overlap zones between adjacent passes to maintain geometric accuracy.

*Dr. Ake Rosenqvist, JAXA  
GRFM/GBFM Project Scientist  
GOFC-GOLD land cover team member*

### JERS Data access:

The GRFM/GBFM data sets are provided free of charge for research and educational purposes. 500 m and 2 km resolution versions of all mosaics generated are available for viewing on-line at: <http://www.eorc.jaxa.jp/JERS-1/GFMP/index.html>.

The full 100 m resolution versions of the mosaics are available on CD-ROM. These can be by sending an email to the ALOS/JERS-1 secretariat at JAXA's Earth Observation Research and Applications Center (email: [aproject@eorc.jaxa.jp](mailto:aproject@eorc.jaxa.jp)) with information about your name, address and desired CD-ROM, together with a short description of what you intend to use the data for.

# VALIDATION OF VEGETATION CONTINUOUS FIELDS PRODUCTS

## A JOINT CEOS-WGCV AND GOFC-GOLD WORKSHOP IN OCTOBER

Several vegetation continuous field (VCF) products are available for the user community and represent an important source of global land cover characteristics data (Figure 3). So far, there is only limited information about the accuracy of these products. As continuation of the joint activities of the CEOS group for calibration and validation (WGCV) and GOFC-GOLD to evolve standards for land characterization and validation of map products, and foster their implementation towards operational terrestrial observations, a workshop will be held to discuss in develop concepts for validating VCF datasets.

The overall objective of this meeting is to present and discuss approaches to validating sub-pixel vegetation cover estimates (VCF) for use both as one-time map layers and as multi-temporal change products. The goal is develop consensus from the science community, producers and users of VCF products on the most suitable approaches for their validation and how such concepts

### Key issues to be discussed during the workshop:

- Concepts and developments in VCF mapping
- VCF validation requirements and approaches
- Scaling of VCF information (in situ – global)
- Link between VCF and other approaches in land cover mapping and validation
- Users of VCF products; their role and requirements for validation
- Concepts for implementing an operational validation framework

### Web resources:

Agenda: <http://landval.gsfc.nasa.gov/pdf/VCF-workshop.pdf>

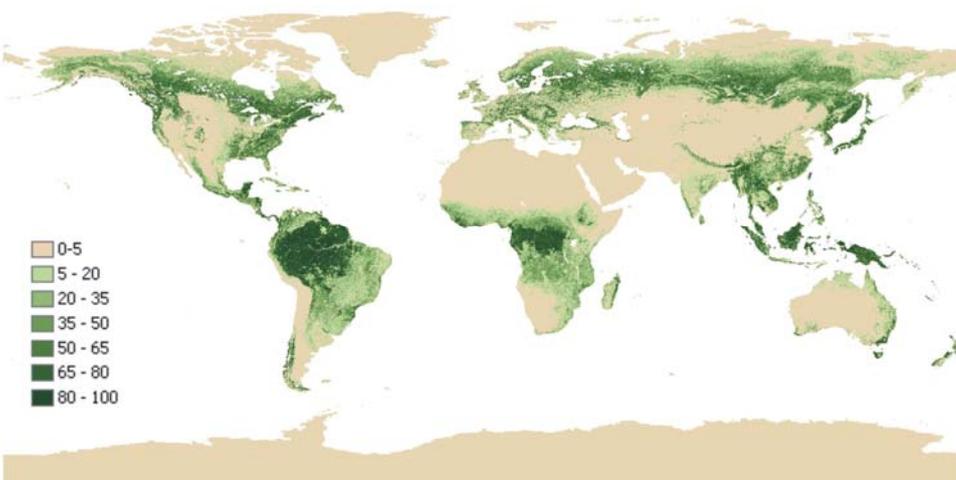
CEOS WGCV: <http://lpvs.gsfc.nasa.gov/>

PECORA 16: <http://www.asprs.org/Pecora16/overview.html>

could be put into operational practice. Researchers directly involved in VCF mapping and validation science in this area are invited to present their findings and to discuss the development of improved methods. Users of VCF maps are urged to participate as well to discuss how errors in the map layers impact their science applications. The meeting is to be held October 27 and 28, 2005 at the Geographic Information Science Center of Excellence in Wecota Hall 100 on the campus of South Dakota State University.

SDSU is located in Brookings, South Dakota, 50 miles north of Sioux Falls on Interstate 29. This workshop is being held the week of the USGS PECORA meeting in Sioux Falls from October 23 to 27 in order to create some travel efficiencies for those interested in attending both events.

The main organizer of the workshop is Dr. Matt Hansen from SDSU. Among presentations of current status of VCF products, the workshop includes several breakout group discussions to codify best practices for validating single date and time-series change maps, and developments towards an implementation framework for operational validation of land cover information.

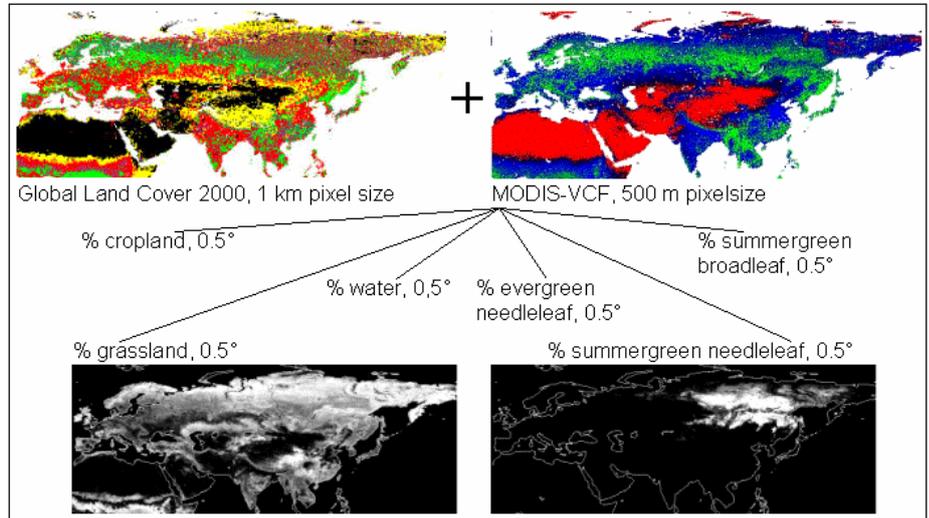


**Figure 3: Vegetation continuous field product of global percent tree cover derived from MODIS (source: GLCF - <http://glcf.umiacs.umd.edu>)**

# SATELLITE-DERIVED LAND COVER FOR GLOBAL BIOSPHERE MODELLING

## RESULTS FROM THE EUROPEAN SIBERIA-II PROJECT

The overall goal of the SIBERIA-II project was to develop multi-sensor Earth Observation (EO) concepts for greenhouse gas accounting of Northern Eurasia. As part of the project, global land cover products were integrated with Dynamic Global Vegetation Models (DGVMs) to simulate on a global scales vegetation dynamics as well as carbon and water fluxes subject to variations in climate and atmospheric CO<sub>2</sub> content. DGVMs predict, from first principles, the vertical projection of leaf area for each vegetation type. This parameter controls carbon and water fluxes through the canopy but can also derived from optical satellite data. Two EO datasets have been of major importance for this modeling exercise: the Vegetation Continuous Fields product from MODIS (Hansen et al., 2003) and the Global Land Cover



**Figure 4: Derivation of fractional land cover types considered in the Lund-Potsdam-Jena Dynamic Global Vegetation Model (examples for grassland and larches) by combining the two different types of information provided by the Global Land Cover 2000 project (Bartholome and Belward, 2005) and the Vegetation Continuous Fields map (Hansen et al., 2003).**

2000 (GLC2000) map (Bartholome and Belward, 2005) of the Joint Research Centre of the European Commission. Land cover estimates were scaled to 0.5° pixel size, in which climate and soils data are available globally. The integration of satellite-derived land cover information results in the required maps of leaf cover for vegetation types (Figure 4) considered in the Lund-Potsdam-Jena (LPJ) DGVM (Sitch et al., 2003). LPJ simulates growth, resource competition, mortality, self thinning and disturbances. As a novel concept, the modeled vegetation distribution (i.e. leaf coverage of each vegetation type) is spatially constrained by the remotely sensed land cover measurements. This

leads to a significant improvement of vegetation density (Figure 5) and the distribution of the dominant type, thus results in several improvements of the predicted pools and fluxes of carbon and water.

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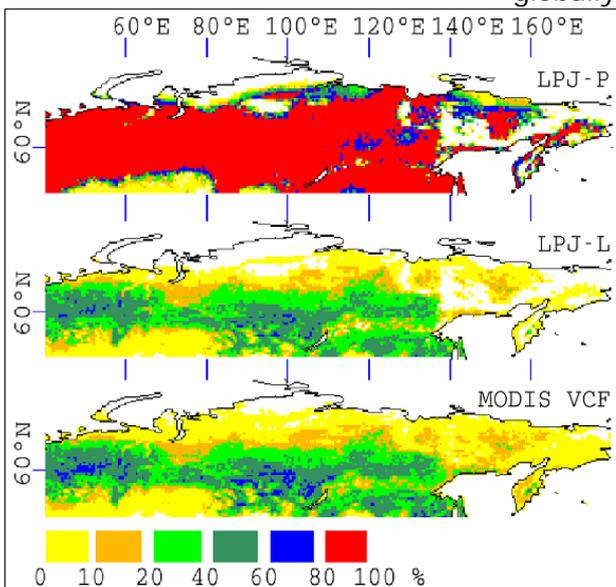
More information:  
<http://www.siberia2.uni-jena.de>  
<http://www.pik-potsdam.de/lpj>

**References:**

Bartholome E & Belward A (2005) GLC2000: A new approach to global land cover mapping from Earth. *International Journal of Remote Sensing*, 26(9), 1959-1977.

Hansen M, et al. (2003) Global percent tree cover at a spatial resolution of 500 meters: First results of the MODIS Vegetation Continuous Fields algorithm. *Earth Interactions*, 7(10), 1-15.

Sitch S, et al. (2003) Evaluation of ecosystem dynamics, plant geography and terrestrial carbon cycling in the LPJ dynamic global vegetation model. *Global Change Biology*, 9, 161-185



**Figure 5: Foliage Cover of Northern Eurasia in 2001. Results of both the original Lund-Potsdam-Jena Dynamic Global Vegetation Model (LPJ-P) and the model coupled with the remotely sensed land cover (LPJ-L) in comparison to the MODIS VCF data.**

## UPCOMING LAND COVER EVENTS

### EVENTS / CONFERENCES / WORKSHOPS

#### September 2005

#### International Workshop on European Union Expansion: Land Use Change and Environmental Effects in Rural Areas

**Venue :** Université de Luxembourg

**Date:** 5 -7 September

**Info/Contact:** Laurence A. Lewis ([llewis@clarku.edu](mailto:llewis@clarku.edu))

<http://www.clarku.edu/offices/Leir/europeanunionconf.htm>

#### October 2005

#### LUCC - 6th Open Meeting of the Human Dimensions of Global Environmental Change Research Community

**Venue:** University of Bonn, Germany

**Date:** 9-13 October

**Info:** <http://openmeeting.homelinux.org/>

#### October 2005

#### PECORA 16 "Global Priorities in Land Remote Sensing"

**Venue:** Sioux Falls, South Dakota,

**Date:** 23-27 October

**Info:** <http://www.asprs.org/Pecora16/>

#### October 2005

#### CEOS WGCV and GOFC-GOLD Global Vegetation Continuous Fields Validation Workshop

**Venue:** Brookings, South Dakota, USA

**Date:** 27/28 October

**Info:** <http://landval.gsfc.nasa.gov/pdf/VCF-workshop.pdf>

#### THE ESA GOFC GOLD LAND COVER PROJECT OFFICE NEWSLETTER:

The Newsletter is distributed free of charge to all members listed in the ESA Land Cover Project Office database. To update your information, to subscribe or to be removed from our database, please contact us or visit the newsletter website:

<http://www.gofc-gold.uni-jena.de/sites/letter.html>

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

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