

GEO Communities of Practice

*GEO-VII Plenary and 2010
Ministerial Summit*

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Adding Value to GEO

Communities of Practice (CoPs) play a critical role in implementing GEO's mission, connecting GEO to the broader scientific and user communities, and leveraging the synergies and potential that exist when groups and individuals collaborate toward a common goal.

Existing CoPs

Air Quality
Biodiversity
Carbon
Coastal Zone
Energy
Forests
Geohazards
Global Agricultural Monitoring
Health and Environment
Integrated Global Water Cycle
Observations

Emerging CoPs

Atmospheric Chemistry
Cryosphere
International Phenology Network

What is a GEO Community of Practice?

- ▶ A GEO Community of Practice is a self-organized group of people who commit to working together as part of GEO to foster application of Earth observations for societal benefit in their shared field of interest and expertise.
- ▶ GEO CoPs form when a critical mass of interest and commitment coalesces. GEO's User Interface Committee formally recognizes and supports GEO's CoPs.
- ▶ Work of GEO CoPs is funded by voluntary contributions from host organizations and by the in-kind contributions of their members.

How do CoPs benefit GEO?

As self-organized groups, each GEO CoP charts its own path in coordination with GEO's mission, Committees, Tasks, and objectives. In general, CoPs:

- ▶ Develop a shared vision for the most important work they can do to promote application of Earth observations for societal benefit, and then work to achieve that vision.
- ▶ Define which Earth observation data and products are most important within their area of shared interest and how they can be applied to address issues and tasks identified by GEO.
- ▶ Lead or contribute to GEO Tasks/Subtasks within their field of expertise.
- ▶ Seek members and partners within GEO and from external organizations and communities.
- ▶ Raise awareness of the importance of Earth observations as a critical tool for societal benefit.
- ▶ Actively connect colleagues with GEO through networking and outreach (e.g., participation in workshops/conferences/task forces).
- ▶ Engage end users through workshops, networking, and interactive websites in identifying issues and potential solutions for achieving societal benefit through application of Earth observations.

What are the GEO CoPs?

As of September 2010, GEO has 10 active CoPs (Air Quality, Biodiversity, Carbon, Coastal Zone, Energy, Forests, Geohazards, Global Agricultural Monitoring, Health and Environment, and Integrated Global Water Cycle Observations) and several emerging CoPs. Some CoPs have recently formed; others have been active for several years.

The CoPs are described on the following pages. For more information, see the CoP page of GEO's website at <http://www.earthobservations.org/cop.shtml>.

Air Quality

for more info contact...

The **Air Quality CoP** connects providers of Earth observations to users who apply them for societal benefit. Key activities over the past three years include:

- ▶ Networking with members and other communities via workshops, wiki, and teleconferences.
- ▶ Contributions to the Global Earth Observation System of Systems (GEOSS) Common Infrastructure, including an air quality community catalog and standard-based metadata for finding and understanding data.
- ▶ Coordination of a GEO Decision Support Concept Proposal.

The Air Quality CoP seeks to enable the development of a functioning Air Quality System of Systems by 2015. Anticipated activities in support of GEOSS include:

- ▶ Gathering user requirements for air quality management, science, and education.
- ▶ Enabling data access and re-use through web services.
- ▶ Supporting the use of standards for sharing data and metadata.
- ▶ Fostering and sharing tools and methods as best practices.

Gary Foley

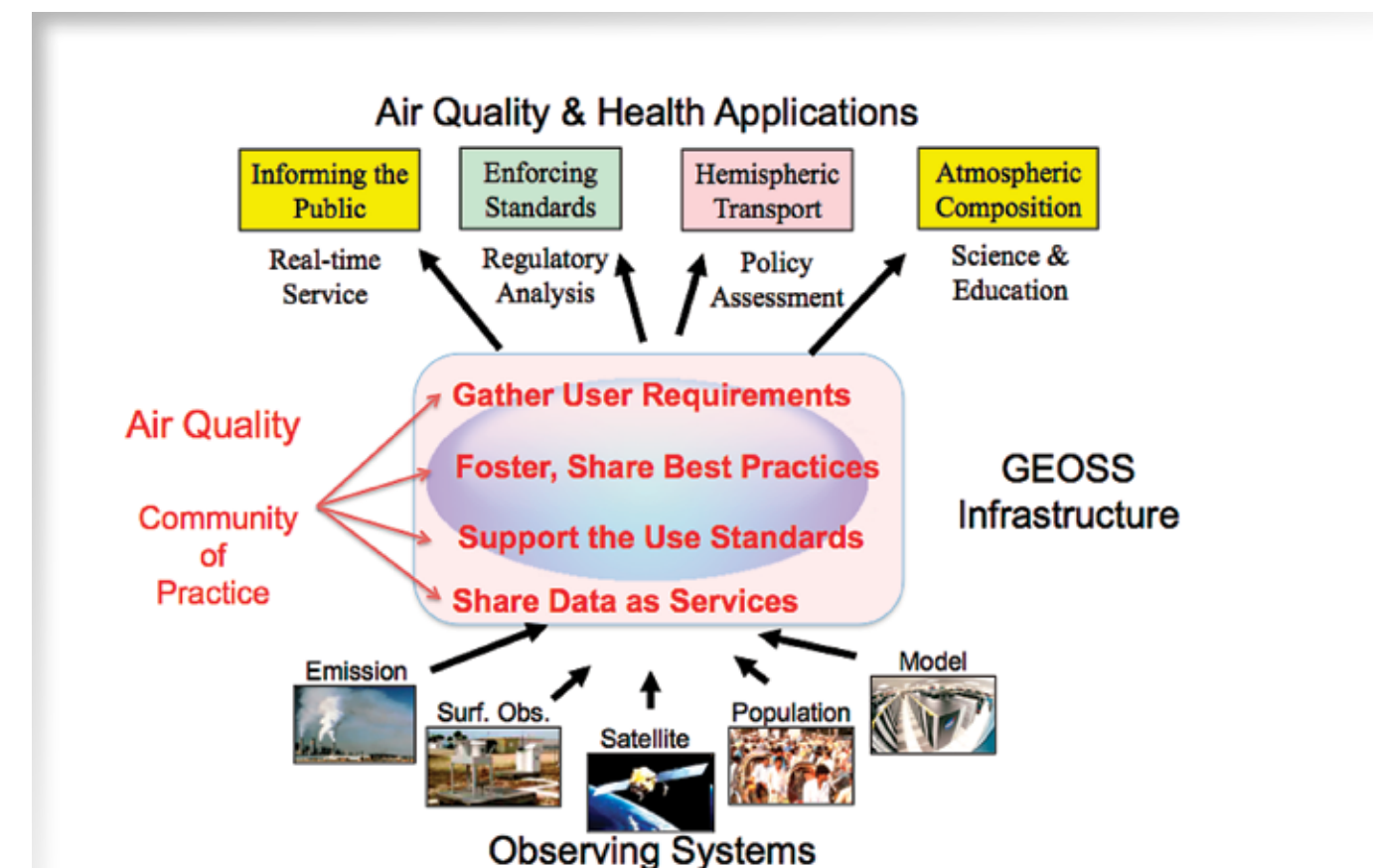
U.S. Environmental Protection Agency

foley.gary@epa.gov

Rudolf Husar

Washington University in St. Louis, United States

rhusar@wustl.edu



The Air Quality CoP conducts many activities to foster the availability of Earth observations and their application to managing air quality and informing the public.



GEO's Biodiversity CoP supports protection of biological diversity in the world's ecosystems by improving the quality, quantity, and availability of biodiversity information and analysis.

The **GEO Biodiversity Observation Network – GEO BON** – is the biodiversity arm of GEOSS. Some 100 governmental and non-governmental organizations are collaborating through GEO BON to make their biodiversity data, information, and forecasts more readily accessible to policymakers, managers, experts, and other users.

By bringing together the diverse, stand-alone observation instruments and systems now tracking trends in the world's genetic resources, species, and ecosystems, GEO BON is working to create a global platform for integrating biodiversity data with data on climate and other key variables. Work includes ascertaining the data requirements of user groups; reviewing and prioritizing research; facilitating interoperability among observation systems and databases; generating regularly updated assessments of global biodiversity trends; designing decision-support systems that integrate monitoring with ecological modelling and forecasting; and making data and reports available to users via GEOSS.

GEO BON has been recognized by the Parties to the Convention on Biological Diversity as well as by GEO's member governments.

More information on GEO BON is available at <http://www.earthobservations.org/geobon.shtml>.

Gary Geller

U.S. National Aeronautics and Space Administration (NASA)
gary.n.geller@jpl.nasa.gov

Rob Jongman

Wageningen University and Research Centre, Netherlands
rob.jongman@wur.nl

Anne Larigauderie

DIVERSITAS
anne@diversitas-international.org

Bob Scholes

Council for Scientific and Industrial Research, South Africa
bscholes@csir.co.za

Woody Turner

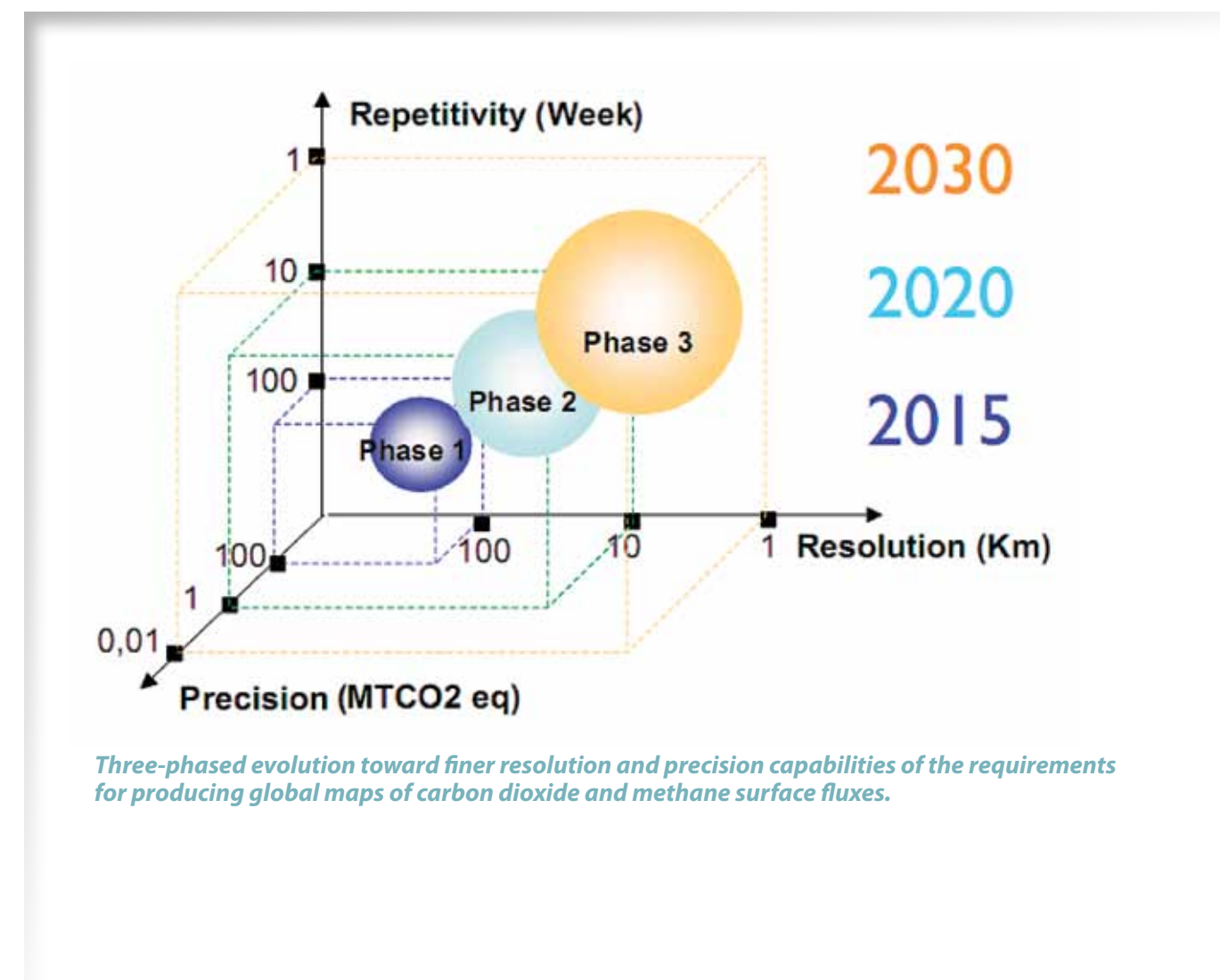
NASA, United States
woody.turner@nasa.gov

The **Carbon CoP** works to improve understanding of the global carbon cycle; monitor and assess the effectiveness of carbon sequestration and emission reduction activities on global atmospheric carbon dioxide levels; and build and improve the infrastructure and interoperability of the carbon observing system. The CoP envisions a three-phased seamless deployment of an operational global monitoring system for carbon over the next 15 years or so (see figure below).

The CoP manages work under three GEO Subtasks. This work focuses on integrating carbon observations from all platforms, reservoirs, and time and space scales; establishing and integrating data from forest carbon tracking sites worldwide; and supporting the validation and use of space-based greenhouse gas observations.

The CoP's 2010 Carbon Strategy Report sets forth a series of actions to disseminate information on the status and availability of carbon observations. The CoP has been reaching out to colleagues and potentially interested parties via presentations, workshops, and distribution of outreach materials at professional meetings in the carbon field. The CoP would like to establish a carbon office housed at an international organization to provide support (e.g., for coordination and outreach) to the hundreds of scientists and dozens of projects connected with the Carbon CoP.

Antonio Bombelli
University of Tuscia, Italy
bombelli@unitus.it



GEO's Coastal Zone CoP (CZCP) brings together scientists and other experts to support integrated coastal zone management (ICZM) decisions through utilization of Earth observations and derived products. The CZCP focuses on research and practical applications related to ICZM. Its work includes:

- ▶ Engaging coastal users and data providers in specifying priority needs and requirements for observations and products to support ICZM.
- ▶ Identifying opportunities for linkage, collaboration, and support.
- ▶ Holding workshops, including proof-of-concept pilot workshops to address needs and enable data integration.
- ▶ Developing and strengthening networks that contribute to or benefit from GEOSS.

A main CZCP activity in recent years has been organizing a series of regional workshops worldwide to bring end users and experts together in an effort to initiate regional CoPs. The series started in 2008 with a workshop in Athens, Greece, focusing on ICZM in the Mediterranean, and continued in 2010 with a workshop in Cotonou, Benin, focusing on climate change impacts on coastal zones in West Africa. For 2011, the CZCP is planning a workshop in Puerto Rico that will address Earth observations in support of sustainable tourism in small island states.

In June 2010, the CZCP met to develop a work plan for the next three years. As part of the work plan, the CZCP will encourage new membership and will start a quarterly, web-based newsletter. The CZCP also will be organizing a global assessment of the state of coastal zones, in coordination with other organizations.

More information on the CZCP CoP is available at <http://www.czcp.org>.

Paul DiGiacomo

U.S. National Oceanic and Atmospheric Administration
paul.digiacomo@noaa.gov

Hans-Peter Plag

University of Nevada-Reno, United States
hpplag@unr.edu



Coastal zones—the most densely populated and productive zones on the globe—also are home to sensitive ecosystems. The many conflicting interests pose a huge challenge to integrated coastal zone management (ICZM). Earth observations are crucial for understanding the different processes that impact coastal zones, and for detecting trends and developments that require an ICZM response. The CZCP connects end users to GEO to help ensure that Earth observations made available through GEOSS meet the needs of ICZM.

The **Energy CoP** works to promote application of Earth observations to improve management of energy resources. Active in GEO for many years, the Energy CoP has engaged stakeholders via professional societies, conferences, publications, and other communications, and has educated end users about the utility of global products from satellite observations.

The CoP's involvement in various energy management applications has yielded significant results in national and international energy programs through the transfer of science results to improve decision-making, for example in support of renewable energy and energy-efficient technology optimization. An early key achievement was delivery of an Energy Strategic Plan to the GEO Ministerial in 2007. The CoP also has established long-term partnerships to develop and disseminate specifically tailored data sets. The Energy CoP currently has two active components funded by the European Commission as a dedicated GEOSS contribution:

- ▶ **Monitoring Atmospheric Composition and Climate**, which includes a radiation activity to prepare existing solar irradiance services Solemi and SoDa as a Global Monitoring for Environment and Security (GMES) service component.
- ▶ **EnerGEO**, which seeks to develop a strategy for a global assessment of the current and future impact of the exploitation of energy resources on the environment and ecosystems and to demonstrate this strategy for a variety of energy resources worldwide.

The Energy CoP also is contributing to the third phase of the GEOSS Architecture Implementation Pilot project (AIP-3) by developing a scenario and an associated web-based tool to provide information on the environmental impact of the production, transportation, and use of energy, with a present focus on the carbon footprint of photovoltaic systems.

More information on the Energy CoP is available at <http://www.geoss-ecp.org>.

Ellsworth LeDrew

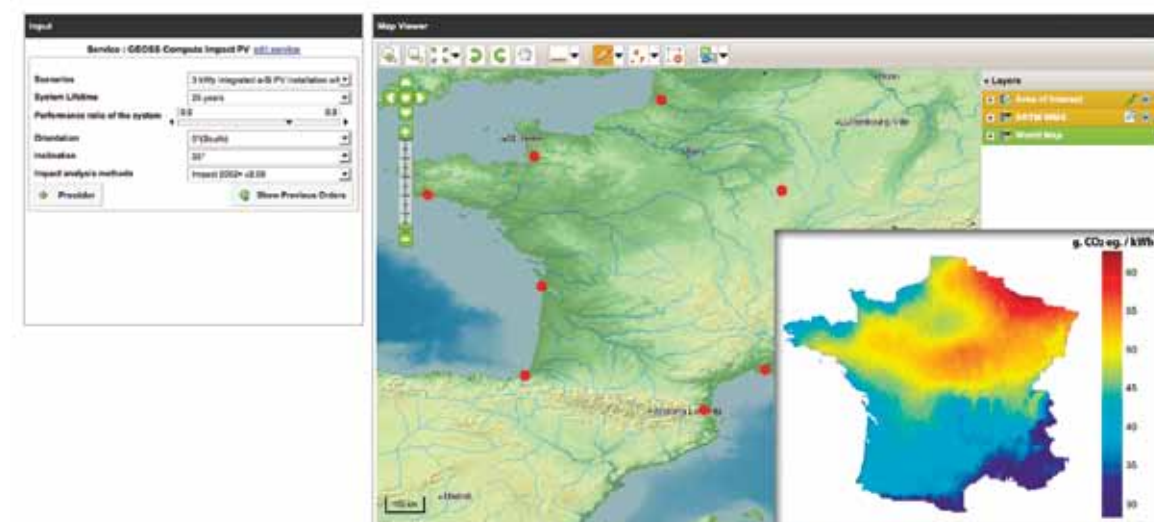
University of Waterloo, Canada
ells@uwaterloo.ca

Thierry Ranchin

Centre for Energy and Processes, MINES ParisTech, France
thierry.ranchin@mines-paristech.fr

Marion Schroedter-Homscheidt

German Aerospace Center
marion.schroedter-homscheidt@dlr.de



GEO AIP-3 Energy Scenario Web-based Tool



GEO's **Forest CoP** focuses on:

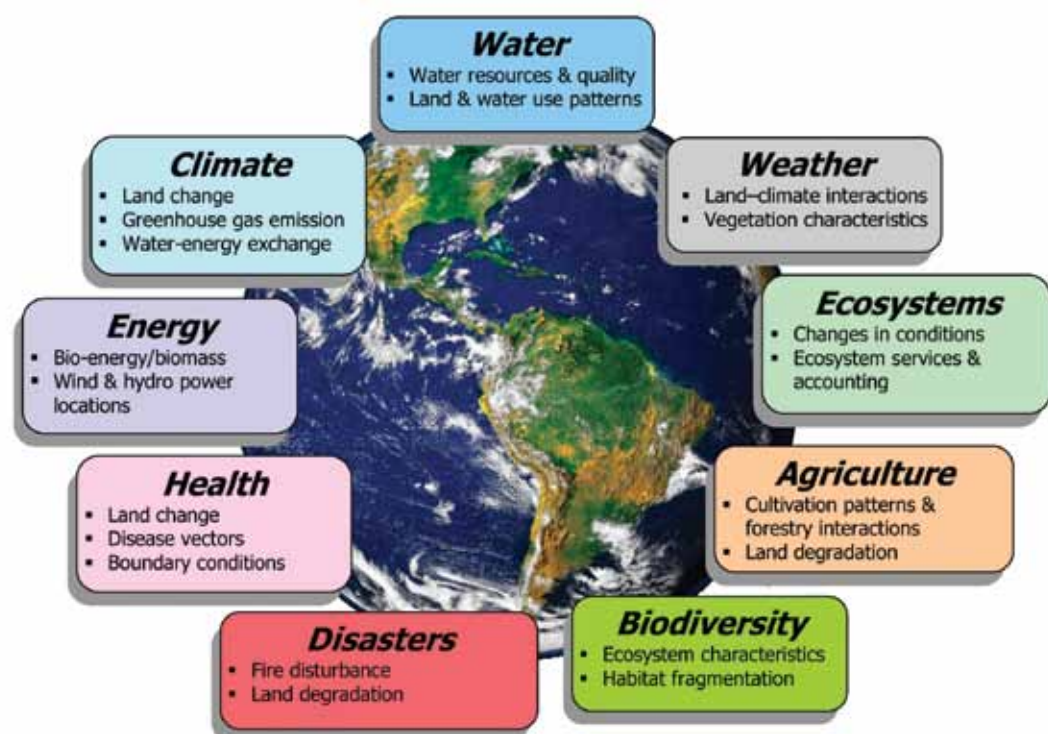
- ▶ Actively fostering communication and coordination among the teams involved in GEO's eight forest-related Tasks, which are enhancing observations and systems for forest mapping and monitoring of features such as cover, cover change, biomass and carbon, biodiversity, and fire disturbances.
- ▶ Encouraging registration of forest data, Earth observations, systems, and users in GEOSS.
- ▶ Advising GEO on matters relating to forest observations and related societal benefits and supporting the forest observation community with information about activities and plans in the GEO process.

CoP members have been connecting with the forest user community around the globe by actively participating in many workshops and meetings. Members have expressed interest in:

- ▶ Proceeding with the design of a global forest observations initiative, an ambitious activity to which all eight GEO forest Tasks would contribute.

- ▶ Fostering better connection between remote sensing and ground-based observations.
- ▶ Collaborating with the Global Agriculture Monitoring CoP to fully address the Agriculture societal benefit area.

Michael Brady
Natural Resources Canada
MBrady@NRCan.gc.ca



Earth observations contribute to monitoring and understanding important forest and land processes in all nine GEO societal benefit areas.

Formed out of the former Integrated Global Observing Strategy (IGOS) Geohazards Theme Team, the **Geohazards CoP** (GHCP) has been working in a number of areas to promote use of Earth observations for geohazards risk assessment, hazard mitigation and adaptation, vulnerability reduction, and disaster preparedness. One early success has been the Supersites initiative, in which space agencies, the Committee on Earth Observation Satellites (CEOS), and others have been making data sets for a select number of hazard sites available to research communities around the world.

In January 2010, the Geohazards CoP drafted a Road Map that affirms its commitment to working towards putting in place, by 2020, the building blocks for a comprehensive geohazards monitoring system in support of all phases of the risk management cycle (mitigation and preparedness, early warning, response, and recovery), and as a basis for increased resilience and disaster reduction. The GHCP will work to achieve this target by developing a few carefully selected core sites on different continents to demonstrate how all the building blocks of a value chain, from observations to end users, can be linked and applied to the phases of the risk management cycle relevant to the region. These core sites will be developed as regional centers of excellence and will support scientific studies, technological developments, and policy and decision-making in the region. They also will provide the basis to develop more general tools and training useful to other regions.

More information on the GHCP is available at <http://www.geohazcop.org>.

Stuart Marsh
British Geological Survey,
United Kingdom
shm@bgs.ac.uk

Hans-Peter Plag
University of Nevada-Reno,
United States
hpplag@unr.edu



Geohazards, including earthquakes, tsunamis, volcanic eruptions, landslides, and ground instabilities, pose a major threat to society. Despite many efforts to reduce risks and damages, these hazards increasingly result in disasters with large damage to property and loss of life, partly because a growing global population is sprawling into hazardous areas. Earth observations are crucial for mapping and characterizing hazards as a basis for planning settlements and infrastructure, raising awareness and fostering preparedness, and supporting early warning and response when hazards and disasters occur. The GHCP works to make Earth observations available to support all stages in the risk management cycle.

Established at a 2007 workshop jointly convened by GEO and the Integrated Global Observations for Land (IGOL), the **Global Agricultural Monitoring CoP** has close to 300 members representing a wide range of national and international agencies and organizations concerned with agricultural monitoring. Its members work to promote use of Earth observations for:

- Global monitoring of agricultural production to facilitate reduced risk and increased productivity at a range of scales.
- Timely and accurate national (and where possible sub-national) agricultural statistical reporting.
- Accurate forecasting of shortfalls in crop production and food supply.
- Effective early warning of famine to aid timely international response.
- Global mapping, monitoring, and modeling of changes in agricultural land use, type, and distribution.



Participants at the GEO Agriculture Monitoring Planning Workshop, hosted by the Institute of Remote Sensing Applications, Chinese Academy of Sciences, February 2009 in Beijing.

Recognizing the importance of improving the ability to monitor agricultural systems and of expanding international cooperation, the CoP organized a set of well-attended international GEO agricultural monitoring workshops. At these workshops, participants reviewed the current state of the art, developed a common vision for a comprehensive global agricultural monitoring system and its functionality, identified the observational requirements for the system, and initiated near-term tasks to lay the foundation for the system's development. The CoP's work over the next five years will focus on the following initiatives:

- Joint Experiments on Crop Assessment and Monitoring (JECAM) to facilitate the inter-comparison of monitoring and modeling methods, product accuracy assessments, data fusion, and product integration for agricultural monitoring.
- A centralized Multi-source Production, Acreage and Yield (PAY) database providing crop statistics from different reporting agencies on a common platform.
- Coordinated Data Initiatives for Global Agricultural Monitoring (CDIGAM) to establish coordinated, timely acquisition and improved accessibility of satellite data, and to evolve a free and open data policy to support agricultural monitoring.
- Global Agricultural Monitoring System of Systems (GLAMSS) Thematic Workshop Series to improve communication among the CoP on priority topics, develop best practices and standards, and encourage international cooperation and coordination.

- An initiative on Agricultural Land Use and Climate Change.

More information on the Global Agricultural Monitoring CoP is available at http://www.earthobservations.org/cop_ag_gams.shtml.

Wu Bingfang

Chinese Academy of Sciences
wubf@irsa.ac.cn

Chris Justice

University of Maryland-
College Park, United States
justice@hermes.geog.
umd.edu

Olivier Leo

European Commission
Joint Research Centre
olivier.leo@jrc.ec.europa.eu

Jai Singh Parihar

Indian Space Research
Organization
Agmon_sec@ymail.com

The newly formed **Health and Environment CoP**, whose members include national and international organizations, seeks to address the user perspective on issues involving environment and health, with an emphasis on using environmental observations to improve health decision-making at the international, regional, country, and district levels. The CoP held three workshops in 2009 and 2010 to convene GEO members and others interested in contributing, and has been exploring possibilities for partnering with user communities and other support mechanisms.

Areas of interest include information architecture for the environment, ecosystems, climate, and health; oceans, water quality, and health; vector-borne disease; and disasters and health. The CoP supports several ongoing projects in GEO's Work Plan involving:

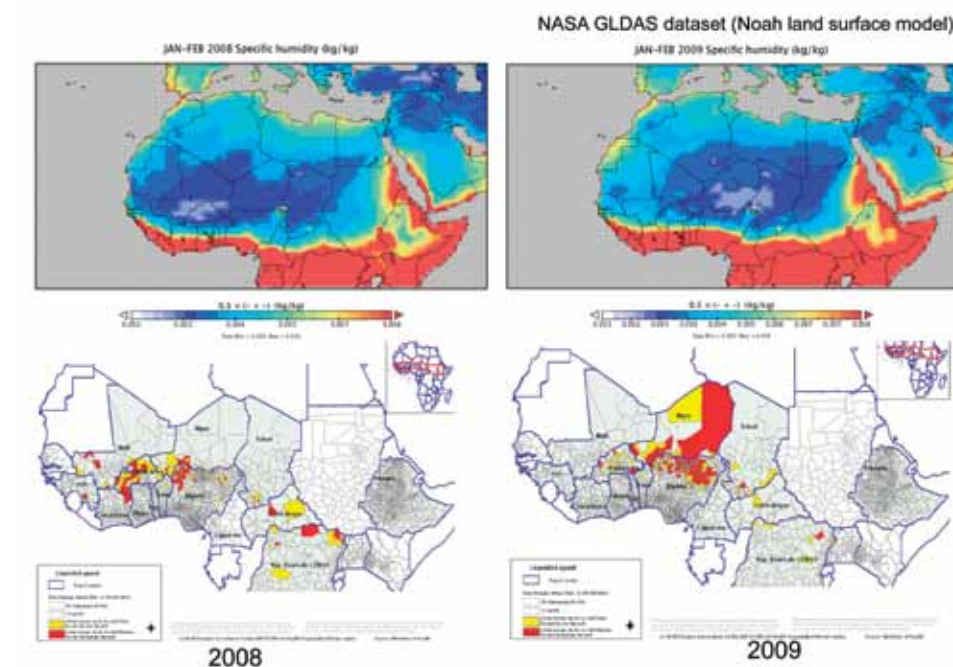
- Health information systems integrating Earth observation remote-sensing imagery as a contributor to the World Health Organization's OpenHealth information system.
- Health monitoring and prediction systems for aerosol impacts on health and the environment, air quality observations and forecasting, global monitoring of persistent organic pollutants, and monitoring of atmospheric mercury.
- End-to-end projects for health aimed at implementing a meningitis decision-support tool and a globally coordinated malaria warning system, and at describing the linkage between ecosystems, biodiversity, and health in order to integrate these components into decision-support tools.

Members also have expressed interest in several new CoP efforts, including the *Vibrio* disease-causing bacteria that inhabit coastal waters; the link between biodiversity/landscape change and infectious diseases; and the influence of weather/climate and airborne sand and dust on northern African meningitis.

Joaquim-Zim Da Silva
World Health Organization
Regional Office for Africa
dasilva@zw.afro.who.int

Ramesh Dhiman
National Institute of
Malaria Research, India
dhimanrc@icmr.org.in

Murielle Lafaye
French Space Agency
murielle.lafaye@cnes.fr



Data from the NASA Global Land Data Assimilation System for western and central Africa and from research show that low humidity (e.g., dry and dusty regions) in January-February, marked by dark blue areas in maps at top for 2008 (left) and 2009 (right), is associated with meningitis outbreaks (red and yellow areas in maps below) during the first 39 weeks of 2008 and 2009, respectively. The Health and Environment CoP strives to expand application of this type of Earth observation data to support research, forecasting, planning, and policies to protect public health from diseases associated with environmental conditions.

... for more info contact

Integrated Global Water Cycle Observations

The **Integrated Global Water Cycle Observations CoP** (IGWCO CoP) provides the developmental component for the Water Tasks in GEO's Work Plan. The CoP is supported by regional and specialized groups such as the Asian Water Cycle and the Water Quality Working Group, which provide expertise in demonstration, deployment, and dissemination of new water cycle technologies and approaches.



Participants in the GEO Water Cycle Capacity-Building Workshop held December 2009 at CONIDA (Agencia Espacial del Peru) in Lima, Peru.

The CoP has actively contributed to each of the 14 Water Tasks in GEO's Work Plan. Work includes activities related to developing integrated data products for soil moisture, runoff, ground water, precipitation, water cycle data integration, water quality assessment, and monitoring; pilot projects for water discovery; and capacity-building activities and initiatives related to the monitoring and prediction of extreme events such as droughts. Specific projects include:

- ▶ The Asian water cycle initiative, which uses data integration and analysis systems to support users throughout Asia. A key target is to ensure interoperability within the timeframe of GEOSS.
- ▶ An African Water Cycle Coordination Initiative following the model of the Asian Water Cycle, but adapted for the state of infrastructure development and different modes of watershed management.
- ▶ A U.S.-Canada partnership that is testing GEO tools in shared areas along the border.

- ▶ Significant work on drought in North America directed at improved drought monitoring and the development of approaches that could be applied globally.
- ▶ Testing the concept of web-based product evaluation, including some experimental products to support drought management decisions.
- ▶ Projects to support capacity building throughout the Americas, including a 2009 workshop in South America.

The CoP held seven meetings and workshops in 2009 and 2010, including three regional workshops to identify priority issues for Africa, Asia, and Latin and Caribbean America. Future CoP activities include encouraging more regional and specialized workshops (e.g., a workshop on evapotranspiration); revising the website to engage more interested people in the CoP; and producing more experimental integrated data products.

Richard Lawford

University of Maryland,
Baltimore, United States

lawford@umbc.edu

Wolfgang Grabs

World Meteorological
Organization

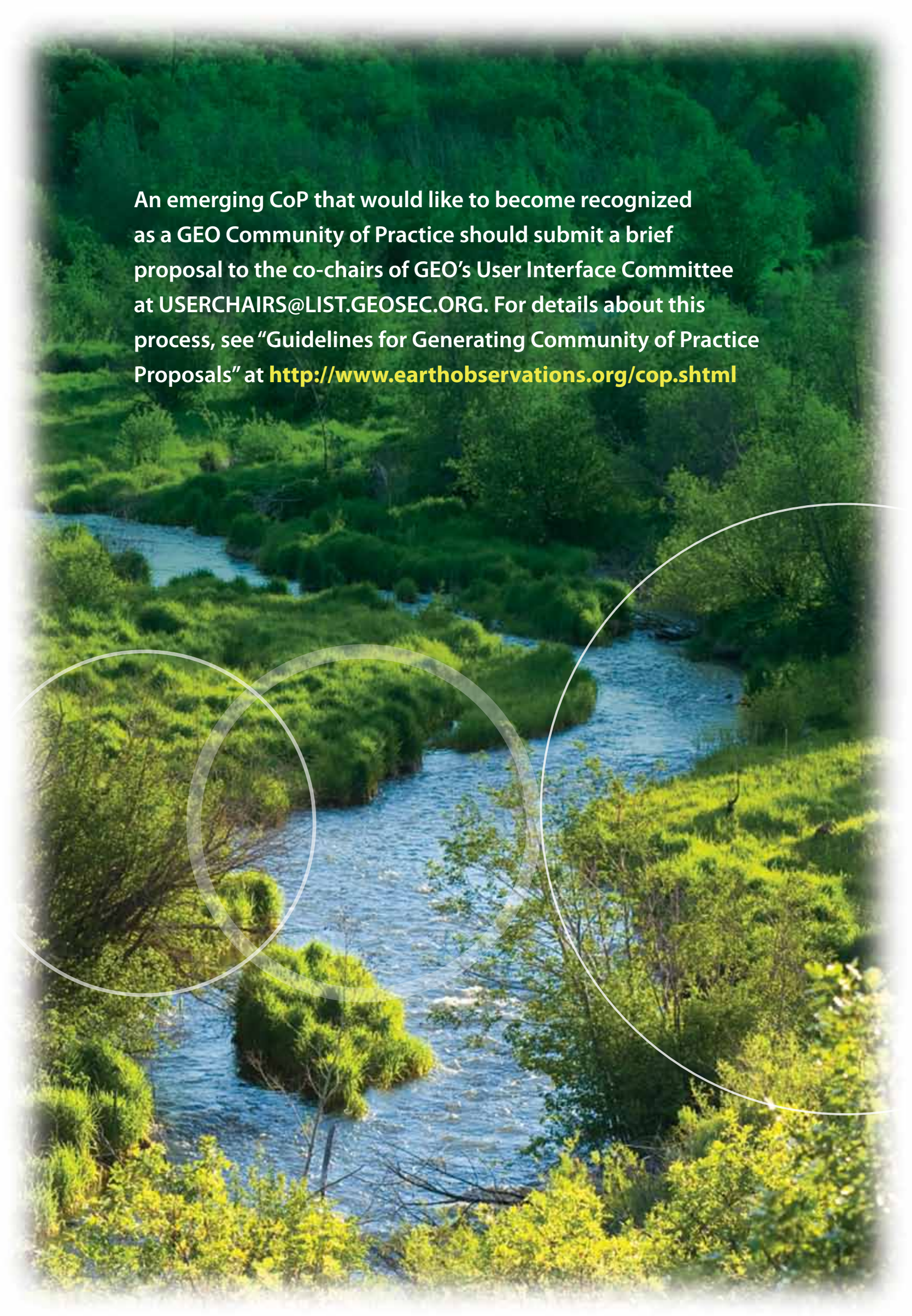
wgrabs@wmo.int

Toshio Koike

University of Tokyo, Japan

tkoike@hydra.t.u-tokyo.ac.jp

An emerging CoP that would like to become recognized as a GEO Community of Practice should submit a brief proposal to the co-chairs of GEO's User Interface Committee at USERCHAIRS@LIST.GEOSEC.ORG. For details about this process, see "Guidelines for Generating Community of Practice Proposals" at <http://www.earthobservations.org/cop.shtml>





For more information please contact:

GEO Secretariat

7 bis, avenue de la Paix

Case postale 2300

CH-1211 Geneva 2

Switzerland

E-mail: secretariat@geosec.org

Telephone: +41 22 730 8505

www.earthobservations.org

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