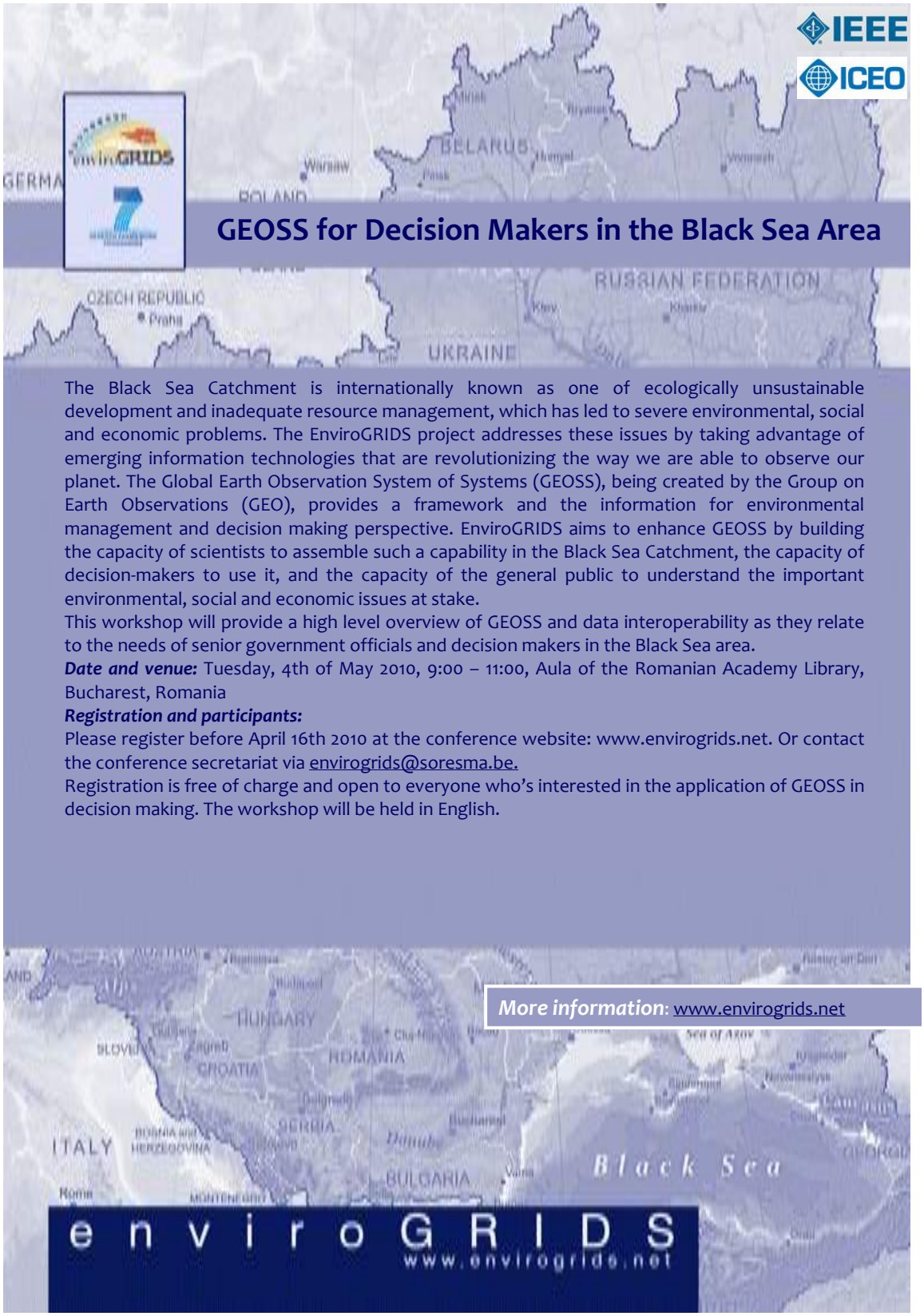
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GEOSS for Decision Makers in the Black Sea Area
The Black Sea Catchment is internationally known as one of ecologically unsustainable development and inadequate resource management, which has led to severe environmental, social and economic problems. The EnviroGRIDS project addresses these issues by taking advantage of emerging information technologies that are revolutionizing the way we are able to observe our planet. The Global Earth Observation System of Systems (GEOSS), being created by the Group on Earth Observations (GEO), provides a framework and the information for environmental management and decision making perspective. EnviroGRIDS aims to enhance GEOSS by building the capacity of scientists to assemble such a capability in the Black Sea Catchment, the capacity of decision-makers to use it, and the capacity of the general public to understand the important environmental, social and economic issues at stake.
This workshop will provide a high level overview of GEOSS and data interoperability as they relate to the needs of senior government officials and decision makers in the Black Sea area.
Date and venue: Tuesday, 4th of May 2010, 9:00 – 11:00, Aula of the Romanian Academy Library, Bucharest, Romania
Registration and participants:
Please register before April 16th 2010 at the conference website: www.envirogrids.net. Or contact the conference secretariat via envirogrids@soresma.be.
Registration is free of charge and open to everyone who's interested in the application of GEOSS in decision making. The workshop will be held in English.
More information: www.envirogrids.net
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Background - GEOSS

The Global Earth Observation System of Systems (GEOSS) is envisioned to cover all aspects of Earth observations and by this will introduce a new capability for monitoring environmental processes. GEOSS is a complex "system of systems," including sensors, communication systems, spatio-temporal data infrastructures and other components essential for understanding the Earth and its impact on a host of important societal benefits. In addition, GEOSS includes models and data fusion processes to create information from the observation data that is essential for decision making

The GEOSS 10-year Implementation Plan states that GEOSS will provide the overall conceptual and organizational framework for integrated global Earth observations to meet user needs. GEOSS will be a system of systems consisting of existing and future Earth observation systems, supplementing but not supplanting their own mandates and governance arrangements. It will provide the institutional mechanisms for ensuring the necessary level of coordination, for strengthening and supplementing existing Earth observation systems, and for reinforcing and supporting component systems in carrying out their mandates.

The emphasis of GEOSS is on societal benefits, initially in nine key areas. Sound management of the Earth system, in both its natural and human aspects, requires information that is timely, of known quality, long-term, and global. Interpretation and use of Earth observations requires information on drivers and consequences of change, including geo-referenced socio-economic data and indicators. The nine areas addressed in the GEOSS Implementation Plan are: Disasters; Health; Energy; Climate; Water; Weather; Ecosystems; Agriculture; Biodiversity.

Although all of the above societal benefit areas (SBAs) of the Implementation Plan are important for GEOSS, this workshop will focus specifically on water and its impacts on the environment and population in the Black Sea Basin.

The GEO Work Plan

The GEO 2009-2011 work plan takes the GEOSS 10-year Implementation Plan through its midway point, and has an increasing focus on putting the components of GEOSS into place. This phase of the plan will enable connections to be realized between diverse observing, processing, data-assimilation, modeling and information-dissemination systems. The work plan will also addresses the role of users and Communities of Practice within GEO. The work plan includes EnviroGRIDS in one of its ecology tasks (EC-09-02-c). For more information see the work plan on the GEO website at http://www.earthobservations.org/index.html

Sponsorship

The organizations and agencies listed below are acknowledged for providing financial, organizational and/or logistical co-sponsorship of this GEOSS workshop:

- EnviroGRIDS Framework Project
- IEEE Committee on Earth Observations (ICEO)
- Institute of Geography, Romanian Academy, Romania
- GEO

Workshop Agenda- May 4, 2010

Location: Aula of the Romanian Academy Library, 125 Calea Victoriei, sector 1, RO 010071, Bucharest, Romania

Time	Topic	Speaker
Opening		
8:30	Registration and Coffee	
9:00	Welcome and opening	Anthony Lehmann, EnviroGRIDS, Dan Bălteanu Romanian Host (IGAR).
9:05	The EnviroGRIDS project in the context of GEOSS	Anthony Lehmann, EnviroGRIDS
9:30	Improved understanding of Earth Observation data	Ion Nedelcu, Romanian Space Agency
10:00	GEOSS and information resources	Jay Pearlman, IEEE
10:30	Hydrology information from regional to global perspective	Douglas Cripe, GEO Secretariat
11:00	Open Discussion	All
11:30	Lunch	

GEOSS for Decision Makers Presenters (from left to right, Anthony Lehmann, Dan Bălteanu, Douglas Cripe, Jay Pearlman)

Dan Bălteanu is a senior researcher. He is director of the National Institute of Geography and professor and Chair of Geomorphology and Soil Science, University of Bucharest. His research-work has focused on the geo-morphological aspects related to landslides, gully processes, and small catchments. The impact of climate change on natural hazards-triggered technological hazards (NATECH) has been among his major preoccupations over the past ten years.

Dan Bălteanu opened the session by welcoming the workshop attendees. He introduced the Romanian Academy which provides advice for policy makers in area such as environmental issues. The Institute of Geography of the Romanian Academy is very much involved in environmental issues. They have been working on a Framework Project (FP6) on Climate with the Marx Planks institute. Other projects include projects with France, UK, and NATO, and now the EnviroGRIDS framework project.

Dr. Anthony Lehmann is the EnviroGRIDS project initiator and coordinator. He holds a Masters Degree and a PhD in Aquatic Biology from the University of Geneva, and a Postgraduate Master in Statistics from the University of Neuchâtel. He specialized during his career in combining GIS analyses with statistical models. At the University of Geneva, he is in charge of the enviroSPACE laboratory exploring Spatial Predictions and Analyses in Complex Environments. He works also with the United Nations Environment Programme (UNEP) Global Resource Information Database (GRID) under a special agreement between the University of Geneva and UNEP. At GRID, Dr. Lehmann is responsible for organizing research activities by leading the “environmental monitoring and modeling” unit. With the EnviroGRIDS project, his personal objective is to motivate all the partners to give their best in order to create a great observation system for the Black Sea Catchment.

Anthony Lehmann was the next speaker. He introduced the goals of the EnviroGRIDS project as exploring the past, present and future of the Black Sea catchment, especially for hydrology. The EnviroGRIDS team is a strong and motivated consortium with 27 Partners in the Black Sea catchment and western Europe. As we know from the IPCC report, climate change is becoming a reality and is due to human activities. All regions of the world are facing important changes. Predictions at the European level suggest temperature increases of up to 6 degrees and rain fall pattern changes. As a result, land cover is also changing. Dr. Lehmann referenced the UNEP atlas which addresses land cover changes. We can observe/predict land cover changes (EURALIS).. Almost all scientific evidence confirms that our only choices now are how we are going to try to slow down these changes (mitigation) and how we are going to try to adapt to them (adaptation). Impact of climate change includes many aspects: water, health and others. By working collectively, institutions can share available data and methods, saving time and money, while keeping their own specific objectives. One of the main aims of the enviroGRIDS project is to explore how changes in climate will impact the quantity and quality of water reaching the Black Sea. He gave the example of the Lake Balaton (Hungary) where the SWAT model (Soil and Water Assessment Tool) was used in a previous project. SWAT models every part of a hydrological balance across the full landscape under study. Four weather stations were used to provide time series of weather and hydrological information. Varying climate or land cover and looking at the impact showed a possible decrease of water in the lake of up to 20%. Another aspect of the EnviroGRIDS project is the use of GRID technology to store and process large amounts of data. He gave the example of the work at the CERN super computer center where 160 thousand computers are employed across the word. The third part is spatial data Infrastructure (SDI) and its use in the context of GEOSS. GEOSS is taking advantage of new internet technology to look at many sources of information accessed via a portal.. Bringing together these capabilities, the challenge is to fill the gap between science and decision making. To meet this challenge, tasks in the project include the preparation of scenarios regarding climate land cover and other changes, running the SWAT models and assessing the sustainability of water resources in the Black Sea catchment. The team takes advantage of remote sensing to address societal benefit areas, and capacity building. They need to convince regional data holders to make their data available. This would allow the Black Sea Commission and the Danube Commission to take advantage of emerging data. The goal is to make information available through Web service (data or/and meta-data available through a variety of mechanisms). In conclusion, Anthony Lehman thanked all the partners of enviroGRIDS consortium who are contributing to this project.

Ion Nedelcu from the Romanian Space Agency (ROSA) focused on the improved understanding of Earth observation data. Many initiatives are justified by the development of Earth observation technology. These activities are global and need to be well coordinated. Key words include interoperability, coordination, and common models. There is an increase in availability of Earth Observation (EO) data, as shown by the list of data sets that are starting to be made available in the GEOSS framework. Romania

has many problems to face that EO can help solve. ROSA participates in global and European initiatives and research activities and has become an important actor in the region by signing a European State Cooperating agreement with ESA; negotiations have been started for full membership. Actions taken include: more Research and Development resources, participation in European and global initiatives, dissemination of information on EO data use and benefits. Ion Nedelcu noted that EO needs satellite data but also in-situ data and capacity building. He also highlighted interoperability aspects of data sharing. Romanian involvement in societal benefit areas of GEO focusing in areas where EO data is used to support decision process. He gave examples of ROMA's involvement in many societal benefit areas: flood risk management (international charter for disaster); land monitoring; biodiversity; weather and climate change (high performance infrastructure including EO receiving capabilities, radar network, and computing and modeling system); and lastly the AIR-AWARE project (with focus on air quality and health).. He then highlighted other areas where EO was used such as thematic maps and national coverage datasets. Mr. Nedelcu gave several examples: forest management / forest vegetation map, water management (Ocean national and European projects); seismic activity monitoring. ROMA is also involved in Capacity building, with many activities including training sessions, and image processing SW for educational use developed by ESA Eduspace. Capacity building events include workshop and summer schools such as the one conducted in Sinaia (in September 09). In conclusion, ROMA is involved in many successful actions in different fields. There is a significant volume of data and tools available to users. It is very important to keep connected with users at national, regional and global level. Ion Nedelcu's recommendation is to establish simple and practical goals to be achieved in small things.

Dr. Jay Pearlman was Chief Engineer of NCOC&EM at Boeing and a Boeing Technical Fellow. He was responsible for advanced development of information systems. Previously he was Northrup Grumman deputy program manager of Hyperion on the NASA EO-1 satellite program. He has a Ph.D. from the University of Washington and a B.S. from the California Institute of Technology. Jay is a Fellow of the IEEE. Dr. Pearlman is past-Chair of the IEEE Committee on Earth Observation and Co-Chair of the GEO Architecture and Data Committee, which is the organization building the GEOSS information infrastructure. Jay is a member of the the Committee of Earth Studies of the US National Research Council and the US National Academy's Ocean Studies Board. Dr. Pearlman has more than 75 publications and 25 international patents.

Jay Pearlman from IEEE addressed GEOSS and information resources. He focused on the system, its future direction, impact, and advantages. As illustrated by the GEOSS imperative, over 30% of the world's economy is directly tied to the environment (examples crop for drop, others). GEO is responding to many challenges in support of users, scientists or decision makers. Earth information is needed to inform decisions including both data and services. Optimization at local, regional and global levels are required. Dr. Pearlman then focused on hydrology and water resources, with the example of the lake Balaton catchment modeling. The SWAT model takes into

consideration land cover, use of land, soil types, water flow, and in-situ measurement, resulting in predicted water quantity and quality. Understanding hydrology and river basin rests on many diverse considerations from physical to socio-economic issues. He provided the following quote from UN secretary-general Ban Ki-moon: “Water is essential to survival. Unlike oil, there are no substitutes. But today, fresh water resources are stretched thin. Population growth will make the problem worse. So will climate change. As the global economy grows, so will its thirst.” While water is a global issue, it must be addressed at regional scales. Thus there is a need to address hydrology, and water handling in the Black Sea catchment. Any single problem requires many data sets and one data set supports many issues.

Jay Pearlman provided a brief history of GEO, starting in 2005. GEO involves prediction open data access and capacity building. There are three primary aims to answer societal needs for information: coordinate and sustain observation systems (need for time sequences); provide easier and more open access to data; and foster use of science application and capacity building. He referred to a recent article in the economist regarding the closure of airspace due to volcanic ash which was „made without sufficient information“; this showed the challenges and impacts of decision making in a real situation rather than via use of theoretical models.

GEO is looking for the ability to answer key societal issues through information. There are nine societal benefit areas (SBAs) and the complexity of interaction between SBAs needs to be addressed as well. GEOSS is a virtual system with central access to distributed resources. These include the components and services registry, standards and interoperability registry, common best practices, and requirement registry). He emphasized the standards and interoperability as a major contribution of GEOSS (what GEOSS is “doing for us”). Data sharing principles encompass full and open exchange of data with minimum time delay and cost. In conclusion, GEOSS is striving to impact societal issues, making access to Earth information resources easier and interoperable, filling information gaps and striving for continuity in data and information. GEOSS is people and technology working together.

Douglas Cripe is a member of the Group on Earth Observations (GEO) Secretariat. He is currently on secondment to the Secretariat from the Netherlands, overseeing the Water Societal benefit Area (SBA) as well as supporting the GEO Science and Technology Committee. He also works with the Institute of Environmental Sciences at the University of Geneva, serving as the coordinator for the climate module of the Environmental Diplomacy course, offered jointly with UNEP and the Graduate Institute of Geneva.

He received his PhD in Physical Geography (Climatology emphasis) from Kent State University, and his Master of Science degree in Atmospheric Science from Colorado State University.

Douglas Cripe from the GEO Secretariat provided an insight into GEOSS and its work in the water sector. He mentioned the GEO V plenary in Bucharest in 2008 and the support of the Romanian Space Agency (ROSA). He then contrasted the Group on Earth Observation (GEO) and the Global Earth Observation System of Systems (GEOSS). In short, GEO is a group of volunteers (the people) while GEOSS represents a global, coordinated, comprehensive and sustained system of observing systems to support

decision making (the system). There is a 10 year implementation plan which addresses the building of GEOSS. Many fundamental items are supported in a voluntary, consensus based manner, such as: the Global Common Infrastructure (GCI), standards and interoperability considerations, data sharing principles, cross-cutting activities, and global data sets. Douglas Cripe then addressed the cross- cutting nature of monitoring and managing water resources. There are interactions with climate, health, agriculture, energy, and disasters.

What is happening in GEO in the water sector? The target for the water area by 2015 is "to produce comprehensive sets of data and information products to support decision making for efficient management of world's water resources". There are a number of focus areas for water tasks in the GEO work plan: WA-06-02 addresses Droughts and Floods; WA-06-07 focuses on Capacity Building; and WA-08-01 is centered on Integrated Products for water resource management and research. A number of examples of products associated with water management were provided, such as the WMO flood forecasting initiative, the drought early waning system (EWS) supported in developing countries through national and regional projects, the NOAA NIDIS Drought portal, and the North American Drought Monitor. He mentioned the progressive adoption of a standardized precipitation index across multiple activities.

In the capacity building area, the Africa Water Cycle Coordination Initiative was modeled after work being performed in Asia by Prof. Toshio Koike and his team. Twelve African countries are involved in a task team to assess water-related issues and draft an implementation plan. The timeline includes a symposium at UNECA in Addis-Ababa in September and a report at the GEO ministerial meeting in Beijing in November, 2010.

Dr. Cripe then discussed the Hydrological Applications and Run-Off Network (HARON), emphasizing the need for hydrological cycle information. There is currently a declining ability of the National Hydrological Services (NHSs) and related water agencies to provide information on the status and trends of water resources. The primary objective is to Integrate, in a phased approach, dedicated river gauging networks of existing hydrological stations into a global runoff observation network. Phase I focuses on the need for upgrading of major global run-off stations, monitoring continental freshwater fluxes into the world's oceans. Phase II would center on the integration of hydro-meteorological and related *in-situ* components with satellite observations. Phase III would address the consolidation of integrated hydrological observation network development and application of user-oriented information products. Douglas Cripe mentioned that a proposal for the HARON project has been submitted to GEO as part of the call for proposals. He concluded by citing the G8 Hokkaido Summit recommendations to accelerate efforts within GEOSS, in priority areas, inter alia, climate change and *water resources management,* by strengthening observation, prediction and data sharing, and capacity building for developing countries.

Discussion.

Anthony Lehman – what is the position of the GEO Secretariat regarding national and local nodes for GEO?

Douglas Cripe - they are looked upon favorably; he also mentioned the concept of Communities of Practice.

Workshop attendee – what is the role of the hydrological institutes?

Douglas Cripe – the goal is to include the various organizations which exist in an inclusive manner.

Workshop Attendee – explain in more detail the regional nodes participation.

Jay Pearlman – he gave the example of the North American Drought System, and also of EuroGEOSS where national nodes are brought together into a regional system.

Douglas Cripe – he gave the example of the Greek GEO office which is working on a regional node with Egypt, Turkey, and others. Another example is the GEONET project with Serbia.

Workshop Attendee – noting the INSPIRE role in Europe, what is being done about harmonization of data outside of EU countries.

Jay Pearlman – INSPIRE is a good example, but it is mandated while GEO is voluntary. The approach is to look for common standards, such as done in the regional Standards Interoperability Forum (SIF), and as part of the GEO ontology task. He gave the example of the challenges of a common measurement of sea level.

Workshop Attendees – what is the impact of business models on data sharing?

Jay Pearlman – this is an issue, in part, of how earth observation is supported. He mentioned that data policies are traditionally at the national level. Data provider's funding may be related to the number of users for example. There may also be national sensitivity regarding certain areas, such as health, coastal information, national security, etc. To converge data policies, there must be a balance between global and national level considerations.

Workshop Attendee – Is there any difference between small and large countries participating in GEO?

Douglas Cripe – No, there is no difference

Anthony Lehman closed the discussion, and thanked the Romanian Academy for hosting the meeting.

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