Session Workshop Overview with Content

Streams	Code	Title	Organizers / Contact	Content
STREAM Environmental Information-, Decision Support-, and Software Systems	A1	**Session: Interaction design for environmental information systems**	**Daryl H. Hepting,** University of Regina, Canada **Steven Frysinger,** James Madison University, USA **Markus Wrobel,** Potsdam Institute for Climate Impact Research (PIK), Germany	Environmental Informatics (or enviromatics) is a maturing subject with interdisciplinary roots. The application of information and communication technology (ICT) to the environment is emerging as one of great importance as the health of our planet gains priority on research agendas. Modelling is an important aspect of enviromatics, but it is not the only one. Ultimately, environmental information must be put into peoples' hands so that they can make decisions. How best to involve stakeholders, so that they can access the information they need and put it to use in a satisfying manner, remains a topic of inquiry. Underlying the larger benefits of enviromatics as a tool for policy decisions, is the architecture that enables those decision making processes. To maximize the value of the enviromatics infrastructure, interaction design must be an integral part of the architectural plan. How do we best employ metaphor in educating users and influencing their mental models? What are the ethical concerns involved and how can they be addressed? Appropriate design helps the user to improve the quality of the information that is produced, presented, and used. Contributions are sought that deal with human factors in enviromatics. We seek to put work on interaction design and human computer interaction into the specific context of enviromatics, with the goal of understanding how to draw on and apply existing knowledge to enviromatics so that efforts are focused on refinement and adaptation instead of reinvention. Topics include, but are not limited to: - Usability analyses - Decision psychology - Task analyses (including, for example, decision support) - Validation of ICT tools - Human-computer interface design - Human performance evaluation. This session is linked with workshop A4 "Defining interaction design for environmental information systems".
STREAM Environmental Information-, Decision Support-, and Software Systems	A2	**Session: Striking the balance: advancing multi-objective decision support for a changing world**	**Andrea Castelletti,** Politecnico di Milano, Milano, Italy **Francesca Pianosi,** Politecnico di Milano, Milano, Italy **Patrick Reed,** The Pennsylvania State University, University Park, USA **Dragan Savic,** School of Engineering, Computing and Mathematics University of Exeter, UK **Alexander Lotov,** Dorodnicyn Computing Centre of Russian Academy of Sciences, Moscow, Russia	The multi-objective nature of environmental modelling and planning problems has long been recognized to arise from the combined effects of increasing pressures on natural resources and diverse stakeholder perspectives. The discovery and negotiated exploitation of critical tradeoffs for environmental systems must embrace the growing spectrum of social groups playing an active role in decision-making processes. Multi-objective optimization (MOO) has been extensively used to support decision-making under conflicting objectives at all decision levels, from monitoring to model calibration, from planning to real-time operation, with application in a wide range of fields including agro-forestry systems, land use planning, water systems, air pollution, transport systems, etc. Despite the wide spectrum of theoretical and application advances, there is the need to advance the capabilities and use MOO given the dramatic innovations in computational and information services over the last decade. This session is aimed at bringing together researchers and practitioners involved in developing and applying MOO, to discuss and compare experiences in facing novel challenges including: - Problems involving a large number of objectives (many-objective problems) - Reduction of computational complexity and novel software solutions - Improved multi-objective algorithms - New metrics for the evaluation of Pareto-front quality - Advanced visualization/decision support techniques.
STREAM Environmental Information-, Decision Support-, and Software Systems	A3	**Session: Intelligent Environmental Decision Support Systems (IEDSS): from single methods to an automatic semantic interoperability of artificial intelligence/mathematical/statistical methods (S-IEDSS-2012)**	**Miquel Sànchez-Marrè,** KEMLG, Universitat Politècnica de Catalunya-BarcelonaTech, Catalonia **Karina Gibert,** KEMLG, Universitat Politècnica de Catalunya-BarcelonaTech, Catalonia **Joaquim Comas,** University of Girona, Catalonia **Ignasi Rodríguez-Roda,** Catalan Institute for Water Research (ICRA) and University of Girona, Catalona **Manel Poch,** Catalan Institute for Water Research (ICRA), Girona, Catalonia **Ulises Cortés,** KEMLG, Universitat Politècnica de Catalunya-BarcelonaTech, Catalonia **Rick Sojda,** NRMSC, Montana State University, USA **Jean Philippe Steyer,** LBE - INRA, France **Peter Struss,** Technical University of Munich, Germany **Mihaela Oprea,** University Petroleum-Gas from Ploiesti, Romania **Franz Wotawa,** Graz University of Technology, Austria **René Bañares-Alcántara,** Oxford University, England, UK	The session will establish a discussion platform for Artificial Intelligence (AI) and environmental researchers involved in the development of techniques, frameworks, software platforms or applications in the Intelligent Environmental Decision Support Systems (IEDSS) area. Single AI techniques such as rule-based reasoning, fuzzy models, case-based reasoning, qualitative reasoning, artificial neural networks, genetic algorithms and programming, model-based reasoning, Bayesian networks, and multi-agent systems provide a solid basis for construction of reliable and real applications, but there is the general agreement among researchers that a semantic interoperability of AI techniques is the main open challenge in this field. Thus, this is the proposed main issue for the session. IEDSS are present in the environmental management process at different levels such as hazard identification, risk assessment, risk evaluation and intervention decision-making, but there is neither a well defined methodology or framework for the development of IEDSSs nor for model integration nor for model recommendation techniques nor for benchmarking and validation of IEDSSs. Outstanding applications and case studies of IEDSSs with important contributions are also welcome. Other open issues can be addressed, such as the spatial reasoning, temporal reasoning, and uncertainty modelling and management in IEDSSs. These are the open challenges to be addressed by the session papers, and special emphasis will be given to Environment's sake issues. Session participants may come from all environmental science and AI or statistical modelling fields. Topics: - Semantic interoperability of AI/statistical/mathematical models in IEDSSs - Methodologies and frameworks for the development of IEDSSs - Integration of AI and statistical/mathematical models in IEDSSs - Model recommendation in IEDSSs - Benchmarking and validation of IEDSSs - Relevant applications and case studies of IEDSSs - Other open issues in IEDSSs: spatial reasoning, temporal reasoning, uncertainty modelling and management. This session is linked with workshop (D12).

Streams	Code	Title	Organizers / Contact	Content
STREAM Environmental Information-, Decision Support-, and Software Systems	A4	**Workshop: Defining interaction design for environmental information systems**	**Daryl Hepting,** University of Regina, Canada **Steven Frysinger,** James Madison University, USA **Markus Wrobel,** Potsdam Institute for Climate Impact Research (PIK), Germany	The aim of this workshop is to foster exchange of experiences on appropriate interaction design for environmental informatics (or enviromatics). The application of information and communication technology (ICT) to the environment grows in importance as the health of our planet gains priority on research agendas. Ultimately, environmental information must be put into people's hands so that they can make decisions. The potential benefits of enviromatics as a tool for policy decisions and education will not be fully realized if people cannot meaningfully access the necessary information. How best to involve stakeholders, so that they can transform data into the information they need and put it to use in a satisfying manner, remains a topic of inquiry around which this workshop is focused. Interaction design must be an integral part of the architectural plan for enviromatics systems. How do we best employ metaphor in educating users and influencing their mental models? What are the ethical concerns involved and how can they be addressed? How can the hurdles to usability evaluation of enviromatics systems be overcome? Contributions are sought that explore how interaction design and human computer interaction can be put into the specific context of environmental modelling and software. When is it appropriate to draw on and apply existing knowledge to environmental informatics, and when must new approaches be developed for environmental information systems? As the field of enviromatics matures, it is important to move beyond generic statements about user-friendly interfaces to specific methods and approaches to ensure that the intended users are satisfied with their experience with software and that they can accomplish what is needed. Topics include, but are not limited to: - Usability analyses - Decision psychology - Task analyses (including, for example, decision support) - Validation of ICT tools - Human-computer interface design - Human performance evaluation. This workshop is linked with session A1 "Interaction design for environmental information systems".
STREAM Environmental Information-, Decision Support-, and Software Systems	A5	**Session: System Identification and Control Theory applications for Environmental Systems Management**	**Andrea Castelletti,** Dipartimento di Elettronica e Informazione, Politecnico di Milano, Italy **Marialuisa Volta,** Dipartimento di Ingegnieriadell'Informazione, Università di Brescia, Italy **Andrea E. Rizzoli,** IDSIA, Manno, Switzerland	The session provides the forum for presenting and discussing new methodological and applicative developments in Systems Identification and Control Theory for environmental modelling and decision-making. The aim is to review the state-of-the-art of systems and control approaches, to discuss novel and improved techniques and to look at feasible developments to the future. Environmental systems considered include, but are not limited to, air pollution (at the global, regional and local scale) and climate change, land (forests, biomasses, etc.) and water resource systems (surface and ground waters, marine and coastal waters). Approaches include system identification, non-linear modelling and control techniques as well as artificial intelligence, data mining and machine learning methods. Particularly welcome are contributions on real time control, distributed control, and large scale system control.
STREAM Environmental Information-, Decision Support-, and Software Systems	A6	**Session: Innovative approaches and components in Environmental Modelling and Software**	**David Swayne,** University of Guelph, Canada **Holly C. Hartmann,** University of Arizona, Tucson, USA	Environmental modelling and software research projects frequently uncover surprising applications of informatics which are not always anticipated in advance. These innovative approaches are often buried in the details of the concepts and implementations. Innovations in informatics have to be demonstrated in practice to be understood and appreciated. For instance, the difficulties encountered in the implementation of probabilistic networks were largely solved in the 1980s, and yet their deployment in environmental applications is still evolving thirty years hence. Innovation also has difficulty keeping up with the huge speedups in computing power. Papers to be considered should present interesting implications for environmental informatics research and application.

Streams	Code	Title	Organizers / Contact	Content
STREAM **Human Health and Environ-mental Risks**	B1	**Session:** **Modelling social and environmental determinants of human and ecosystem health**	**Stefan Reis,** Centre for Ecology & Hydrology (CEH), Bush Estate, Penicuik, UK **Susanne Steinle** Centre for Ecology & Hydrology (CEH), Bush Estate, Penicuik, UK and College of Life and Environmental Sciences, University of Exeter, UK	Quantifying impacts of anthropogenic activities on human and ecosystem health is a key building block in the process of identifying viable mitigation options, in particular to provide a robust evidence base from which (policy) decisions can be derived. Modelling and simulation tools to support this quantification range from rather simple concepts to complex, process-driven models, as well as vary substantially in their coverage of spatial and temporal scales and impact areas. The conceptual frameworks for assessing such impacts are typically integrated across a full-chain approach, to ensure that - as far as possible - synergies and tradeoffs, which would relate to actions taken as a result of the impact assessment process, are fully accounted for. The DPSIR (Driver-Pressure-State-Impact-Response) framework adopted by the European Environment Agency is one widely accepted causal framework. But while the methodology for integrated impact assessment and tools for quantification are well established, the key challenges today can be seen in a lack of integration and interaction across different scientific and policy communities. In the case of both human and ecosystem health, drivers and pressures often arise from the same activities, and policy actions to - for instance - reduce air pollutant emissions positively affect environmental states which are not directly related to human health (e.g. ecosystem services or biodiversity). On the other hand, viable actions to reduce acidification and eutrophication of natural and semi-natural ecosystems may have negative effects on short-term radiative forcing. Last, but not least, social context often modifies susceptibility of receptors to adverse health effects and determines their interaction with the environment. For this session, we would like to invite contributions from modellers working at discipline interfaces, both covering conceptual approaches and practical experience. Furthermore, the integration of processes and data across different spatial, temporal and topical scales would be relevant topics for this session.
STREAM **Human Health and Environ-mental Risks**	B2	**Session:** **Methodological developments in the assessment of radiation risks**	**Kristina Voigt,** Dr. **/ Hagen Scherb,** Helmholtz Zentrum München, German Research Centrer for Environment and Health, Germany	The risks of ionizing radiation have been studied at the latest following the explosions of the atomic bombs on Hiroshima and Nagasaki in 1945. Experiences after those bombings yielded some evidence of genetic effects. The second large fields of research were the consequences of the atmospheric atomic bomb tests, essentially terminated in 1963 which injected huge amounts of radioactive materials into the biosphere. Then, many major hazardous incidents respectively accidents of running nuclear facilities, such as, e.g. TÅkai-mura/Japan (1999), Sewersk, Russia (1993), Wladiwostok, Russia (1985), Three Miles Island, USA (1979), Sellafield/GB (1973) and many more. The Chernobyl catastrophe has also led to considerable genetic effects of ionizing radiation resulting from fallout dispersed over large parts of Europe in spring and summer 1986. In early 2011 the worst case scenario of Fukushima, Japan occurred. This catastrophe urgently requires support by methodological evaluation. In a recently performed study it could be demonstrated that even under normal running conditions nuclear facilities in Germany and Switzerland showed some shifts in the sex odds hence genetic effects. Environmental health effects which are found and studied so far are among others: cancers, leukemia, stillbirths, Down syndrome and other birth defects, as well as shifts in human sex odds. Mathematical statistical methods must be sound and understandable in order to explain the danger of ionizing radiation and draw conclusions and consequences out of the data. So, in this session we will focus on the methodological aspects of the evaluation of environmental and human health effects of ionizing radiation. Topics: Data processing, data evaluation methods, software, DSS, environmetrics and environmental informatics with respect to ionizing radiation.
STREAM **Human Health and Environ-mental Risks**	B3	**Session:** **Current trends in software developments for environmental pollution modelling**	**Stefan Reis,** Centre for Ecology & Hydrology (CEH), Bush Estate, Penicuik, UK **Kristina Voigt,** Dr., Helmholtz Zentrum München, German Research Centrer for Environment and Health, Germany	Topics of the session: Environmental models, environmental software, DSS, environmetrics, environmental informatics with respect to environmental pollution, environmental pollution modelling. Models and software are major tools for the description, simulation, evaluation, estimation as well as future prevention and control of pollution. Pollution is the introduction of contaminants like e.g. pesticides, heavy metals, air pollutants, greenhouse gases, nano-particles, oil etc. into a natural environment causing instability, disorder, harm or discomfort to the ecosystem (i.e. physical systems) or living organisms. The focus of this session is on transmission, fate and effects of contaminants in air, water and soil. Models and software for the following types of pollution are presented: Air pollution: the release of chemicals and particulates into the atmosphere. Common gaseous pollutants include carbon monoxide, sulfur dioxide, chlorofluorocarbons (CFCs) and nitrogen oxides produced by fossil fuel combustion and other activities. Secondary pollutants such as tropospheric ozone or aerosols are created as primary pollutants react and mix in the atmosphere. Water pollution by the discharge of wastewater from commercial and industrial waste (intentionally or through accidental spills) into surface waters; discharges of untreated domestic sewage, and chemical contaminants (organic and inorganic chemicals), from treated sewage; release of waste and contaminants into surface runoff flowing to surface waters (including urban runoff and agricultural runoff, which may contain chemical fertilizers and pesticides); waste disposal and leaching into groundwater; eutrophication and littering. Soil pollution occurs when chemicals are released by spill or leakage. Among the most significant soil contaminants are hydrocarbons, heavy metals, MTBE, herbicides, pesticides and chlorinated hydrocarbons. New model and software developments or the adaptation and combination of existing environmental models will be presented. The characteristics of the countries, regions and environmental regulations will also be taken into account and discussed.

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Streams	Code	Title	Organizers / Contact	Content
STREAM Climate Mitigation and Adaptation Strategies	C1	Session: Climate change and agriculture – modelling impacts, exploring adaptation options, identifying conflicts	**Annelie Holzkämper,** Agroscope Research Station Reckenholz-Tänikon ART, Air Pollution and Climate Group, Zurich, Switzerland **Robert Finger,** 2Agri-food and Agri-environmental Economics Group, ETH Zürich, Switzerland **Jürg Fuhrer,** Agroscope Research Station Reckenholz-Tänikon ART, Air Pollution and Climate Group, Zurich, Switzerland	What are the impacts of climate change on agriculture? How can farmers adapt their management? Could management adaptations induce conflicts with other landscape functions? Agriculture utilizes a large proportion of the planet's land surface and provides, besides food and fibre production, many other important functions and services such as soil conservation, nutrient cycling, biodiversity, carbon sequestration, or recreation. Climate change is likely to affect these functions in different ways. Yield potentials could increase with increasing temperatures, but may be limited by water availability especially during the summer months. Farmers will have to adapt their land use and management to cope with climate change under variable economic development and political constraints. Such adaptation measures could create synergies, but could also induce new conflicts with environmental objectives and thus need to be evaluated carefully. For example, conservation tillage combined with direct sowing could reduce the risk of erosion while at the same time being a profitable adaptation to drought through improved soil water retention. Conversely, expanding irrigation could induce conflicts with other water users and with environmental targets such as surface water quality and aquatic biodiversity as the dilution of pollutants is reduced with declining water levels due to water extraction, and oxygen solubility declines with increasing temperatures. Additional pressure on water quality could result from increased runoff of nutrients, sediments and pesticides from agricultural fields. This session focuses on modelling approaches to assess impacts of climate change on agroecosystems and their functions and to explore implications of adaptation measures. Topics: - Assessment of climate change impacts on agroecosystems and related uncertainties - Exploration of strategies to adapt agriculture to climate change - Investigation of trade-offs and synergies related to adaptation measures in land management.
STREAM Climate Mitigation and Adaptation Strategies	C2	Session: Modelling the effectiveness and efficiency of REDD+	**Daniel Müller / Zhanli Sun,** Leibniz Institute of Agricultural Development in Central and Eastern Europe (IAMO), Halle (Saale), Germany	Projects aimed at reducing emission from deforestation and forest degradation or the enhancement of forest carbon stocks (REDD+) are promising and cost-effective pathways to mitigate greenhouse gas emissions in developing countries. REDD+ activities provide incentive payments that aim to reduce the pressure on forest resources and related carbon stocks. But to date it is unclear how REDD+ mechanisms can best deliver beneficial outcomes with regard to understanding and monitoring the impact on climate effectiveness, cost efficiency, equity and co-benefits. Knowledge of the decision-making processes that lead to changes in land use is prerequisite to understand the likely impacts of REDD+ payments on the drivers of forest carbon emissions and to provide reasonable estimates of future emission levels. Modelling approaches can generate a better understanding of land-use decision making and provide crucial insights into the setting of historic and future baselines, the monitoring of leakage, the verification of additionality, and the assessment of likely co-benefits of REDD+. We welcome interdisciplinary contributions from a variety of modelling disciplines including, but not limited to, agent-based Modelling, machine learning approaches, statistical analysis, and participatory simulations. All applications are supposed to target existing or prospective REDD+ schemes and to investigate forest and land use transitions with integrated human-environment data. We expect participants to include assessments of past developments and the likely future trajectories in light of the incentive payments. The session will thus bring together a number of state-of-the-art applications from diverse geographic settings that help better understanding the likely impacts of REDD+ payments on the drivers of forest carbon emissions and to provide reasonable estimates of future emission levels.
STREAM Climate Mitigation and Adaptation Strategies	C3	Session: Data sets and model components for an integrative assessment of climate strategies	**Georgii A. Alexandrov,** Institute of Atmospheric Physics (Russian Academy of Sciences), Moscow, Russia	Many countries (and even multinational corporations) have adopted strategies to combat climate change. The strategies are normally categorized into the strategies for mitigation of climate change and the strategies for adaptation to climate change. The mitigation strategies are to reduce carbon dioxide emissions and to ehance carbon sinks. The adaptation strategies are to protect agriculture, forestry, biodiversity, water resources, and transportation infrastructure from the risks associated with climate change. The purpose of this session is to review data sets and model components that could be used in an integrative assement of either mitigation or adaptation strategies. The purpose of this session is to review data sets and model components that could be used in an integrative assement of either mitigation or adaptation strategies.

Streams	Code	Title	Organizers / Contact	Content
STREAM Model Develop-ment, Analysis and Applica-tion: Methodo-logical Aspects	D1.1	**Session: Uncertainty Analysis (Environmental Model Application)**	**James C. Ascough II**, USDA-ARS-NPA, Agricultural Systems Research Unit, Fort Collins, Colorado, USA **Holger Maier,** School of Civil, Environmental and Mining Engineering, The University of Adelaide, Australia **Olaf David**, Depts. of Civil and Environmental Engineering and Computer Science, Colorado State University, Fort Collins, Colorado USA **Peter Krause,** Department of Geography, Friedrich-Schiller-Universität Jena, Germany	The purpose of this session is to provide a forum for presentations focusing on communicating state-of-the-art information on advances in uncertainty analysis methodologies for integrated environmental models. Suitable uncertainty analysis (UA) topics for this session include, but are not limited to: • Evaluation of uncertainty in model outputs with respect to decision making or risk management objectives; • Uncertainty propagation in complex, environmental models with large parameter sets or high computational requirements; • Assessing and quantifying information requirements (e.g., theories, data, models) to reduce predictive uncertainty in environmental models; • Scale effects in UA of integrated environmental models; and • Methods for identifying and managing structural uncertainty and bias in integrated environmental models.
STREAM Model Develop-ment, Analysis and Applica-tion: Methodo-logical Aspects	D1.2	**Session: Uncertainty Analysis (General Frameworks, Data, and Decision Support)**	**James C. Ascough II**, USDA-ARS-NPA, Agricultural Systems Research Unit, Fort Collins, Colorado, USA **Jack Carlson**, Colorado State University, USA **Holger Maier,** School of Civil, Environmental and Mining Engineering, The University of Adelaide, Australia **Olaf David**, Depts. of Civil and Environmental Engineering and Computer Science, Colorado State University, Fort Collins, Colorado USA **Peter Krause,** Department of Geography, Friedrich-Schiller-Universität Jena, Germany	The purpose of this session is to provide a forum for presentations focusing on communicating state-of-the-art information on advances in uncertainty analysis methodologies for general frameworks, data, and decision support. Suitable uncertainty analysis (UA) topics for this session include, but are not limited to: • Evaluation of uncertainty with respect to decision making or risk management objectives; • Incorporation of uncertainty in decision support methods, such as multi-criteria decision analysis; • Development and evaluation of UA methods that appropriately consider subjective and qualitative factors; • Assessing and quantifying information requirements (e.g., theories, data) to reduce predictive uncertainty; and • Assessment of uncertainty in socio-economic models.
STREAM Model Develop-ment, Analysis and Applica-tion: Methodo-logical Aspects	D1.3	**Session: Sensitivity Analysis**	**James C. Ascough II**, USDA-ARS-NPA, Agricultural Systems Research Unit, Fort Collins, Colorado, USA **Holger Maier,** School of Civil, Environmental and Mining Engineering, The University of Adelaide, Australia **Olaf David**, Depts. of Civil and Environmental Engineering and Computer Science, Colorado State University, Fort Collins, Colorado USA **Peter Krause,** Department of Geography, Friedrich-Schiller-Universität Jena, Germany	The purpose of this session is to provide a forum for presentations focusing on communicating state-of-the-art information on advances in sensitivity analysis methodologies for integrated environmental models. Suitable sensitivity analysis (SA) topics for this session include, but are not limited to: • Practical strategies for local/global SA given models with large parameter sets or high computational requirements; • The use of SA to gain insights into key sources of uncertainty in order to prioritize additional data collection or research efforts; • Key criteria in selecting SA methods for different modelling structures and problems; • SA in the context of probabilistic risk assessment (PRA); and • Limitations and promising new advances/directions for SA methodologies in environmental models.

Streams	Code	Title	Organizers / Contact	Content
STREAM **Model Develop-ment, Analysis and Applica-tion: Methodo-logical Aspects**	D2	**Session: Distributed environmental modelling**	**Ari Jolma,** Professor, Aalto University, Espoo, Finland **Kostas Karatzas,** Aristotle University, Thessaloniki, Greece **Karl Aberer,** EPLF, Lausanne, Switzerland **Mike Sips,** GFZ German Research Centre for Geosciences, Potsdam, Germany **Phillip C. Dibner,** OGC Interoperability Institute, Wayland, USA	Modelling is a process that involves articulation of the goals, understanding the domain reality, selection of methods and tools, integration, and eventually testing of the model and interpretation of the results. A lot of modelling work is moving into the Internet in the sense that baseline data, real-time measurements, and computational resources are becoming available over the Internet, collaboration is carried out by email and increasingly by interactive websites, and many tools are being exposed to users on the Internet. Service-orientation is becoming the leading paradigm for developing information systems and infrastructures. Models, many steps of the modelling process, and the modelling process itself can be implemented as or aided by services provided by software on the Internet. These services can be targeted to programs or to humans and they can be based on almost any computational method. New generic web browser based technologies including free libraries for many kind of data make highly interactive and visual tools relatively easy to implement and publish. There are many general distributed systems issues that need to be considered from the point of view of environmental modelling: search, trust, linking of services, semantic interoperability, and so on. For this session we seek case studies, descriptions of novel service concepts, theoretical considerations, and other contributions, which demonstrate or give new insights into how modelers can be better interact with each other, use and create services in the Internet, and help decision makers.
STREAM **Model Develop-ment, Analysis and Applica-tion: Methodo-logical Aspects**	D3.1	**Session: Advances in Software Engineering for IEM: "Methods and Approaches"**	**Olaf David,** Colorado State University, Fort Collins, Colorado USA **James C. Ascough II,** USDA-ARS-NPA, Agricultural Systems Research Unit, Fort Collins, Colorado, USA **Peter Krause / Sven Kralisch,** Friedrich-Schiller-Universität Jena, Germany	The purpose of this session is to provide a forum for presentation and discussing approaches, methods, techniques, platforms, and general advances in software engineering beneficial for integrated environmental modelling. Therefore, this session is specifically dedicated to software methods and approaches for integrated modelling. Session topics include (but are not limited to): design patterns, environmental modelling framework design approaches, design and use of domain specific languages (DSLs), workflow engines, model testing, model/framework integration and coupling approaches, advanced methods for integrated models such as parallelization techniques, services integration methods or cloud computing.
STREAM **Model Develop-ment, Analysis and Applica-tion: Methodo-logical Aspects**	D3.2	**Session: Advances in Software Engineering for IEM: "Applications and Use cases"**	**Olaf David,** Colorado State University, Fort Collins, Colorado USA **James C. Ascough II,** USDA-ARS-NPA, Agricultural Systems Research Unit, Fort Collins, Colorado, USA **Peter Krause / Sven Kralisch,** Friedrich-Schiller-Universität Jena, Germany	The purpose of this session is to provide a forum for presentation and discussing approaches, methods, techniques, platforms, and general advances in software engineering beneficial for integrated environmental modelling. Therefore, this session is specifically dedicated to software methods and approaches for integrated modelling. Session topics include (but are not limited to): design patterns, environmental modelling framework design approaches, design and use of domain specific languages (DSLs), workflow engines, model testing, model/framework integration and coupling approaches, advanced methods for integrated models such as parallelization techniques, services integration methods or cloud computing.
STREAM **Model Develop-ment, Analysis and Applica-tion: Methodo-logical Aspects**	D4	**Session: Characterising environmental modelling paradigms (Bayesian networks, system dynamics, agent based models, coupled complex models and expert systems)**	**Tony Jakeman** (contact person), Australian National University (ANU), Canberra, Australia **Olivier Barreteau,** Cemagref, UR Irrigation, Montpellier, France **Mark Borsuk,** Thayer School of Engineering, Dartmouth College, New Hampshire, USA **Andrea Rizzoli,** IDSIA, Manno, Switzerland **Sondoss El Sawah,** Australian National University (ANU), Canberra, Australia **Carlo Giupponi,** University of Venice Ca' Foscari, Euro-Mediterranean Centre for Climate Change (CMCC) and Fondazione Eni Enrico Mattei (FEEM), Italy **Rebecca Kelly,** Australian National University (ANU), Canberra, Australia **Barbara Robson,** CSIRO, Australia **Alexey Voinov,** University of Twente (ITC), Enschede, The Netherlands	A range of model types now exists for such purposes as scientific understanding, prediction, communication, social learning, and environmental decision making. Each type has strengths and weaknesses in any given situation which we classify, at the very least, according to purpose, breadth and depth of issues being addressed, level of spatial and temporal detail required, type of input data available and outputs required (eg quantitative versus qualitative), capacity to address uncertainty and assess model credibility, and capacity for effective communication and social learning. In many cases models are chosen without good reason, and often model choice is determined simply by the existing skills of the modeller involved. This becomes especially limiting in a participatory modelling effort, where stakeholders in many cases do not have sufficient knowledge and understanding to make an informed selection and may be easily persuaded by modelling results. The aim of this linked session and workshop (D7) is to characterise and compare the various paradigms using the above 'metrics' so that better guidance is available for future model selection. Other metrics for classification can also be considered. The Session's presentations and accompanying full papers would describe one or more modelling approaches and be structured according to the metrics above. The organisers also welcome prior application of modelling paradigms to a set of common case studies they are setting up for the purposes of comparative analysis. The session will begin with the presentation of a position paper currently in preparation and initially drafted by Rebecca Kelly and Tony Jakeman but being updated by the organisers. This conference PP will be published in the proceedings and revised after the conference for publication in EMS as a journal PP.

Streams	Code	Title	Organizers / Contact	Content
STREAM **Model Develop-ment, Analysis and Applica-tion: Methodo-logical Aspects**	D6.1 -D6.5	**Session:** **Geographic Information Systems and geoprocessing workflows for environmental modelling** **D6.1: GIS Based Workflows** **D6.2: GIS Hydro-Climate Analysis** **D6.3: GIS Web Services & Systems** **D6.4: GIS Land-Surface Analysis** **D6.5: GIS Spatial Temporal Analysis**	**Daniel P. Ames,** Idaho State University, Idaho Falls, USA **Nigel W.T. Quinn,** Lawrence Berkeley National Laboratory, ESD, Berkeley, USA **Robert Argent,** University of Melbourne, Australia **Susan Cuddy,** CSIRO, Australia **Raul Zurita-Milla,** Wageningen University, The Netherlands	In September 2000, the 4th International Conference on Integrating GIS and Environmental Modelling (GIS-EM4) was held in Banff, Canada with more than 250 presentations. In the ensuing 12 years no major "GIS for Environmental Modelling" meeting has been held in spite of: Significant advances in both GIS software and hardware computational capabilities Advent of a veritable tidal wave of accessible geospatial data sets The introduction of an entirely new breed of GIS software (characterized by Google Earth and Google Maps) and the accompanying rise of the so-called "neogeographer" The establishment of major geospatial data sharing standards through OGC and related bodies (e.g. WFS, KML) and The introduction of a several highly functional free and open source GIS software tools and libraries (e.g. as sponsored by OSGeo). This session of iEMSs 2012 recognizes all of these advances as well as the natural role of iEMSs in encouraging, promoting, and facilitating continued advancements in the application of GIS software and tools to environmental Modelling. While any novel and interesting studies in the arena of GIS for environmental modelling will be considered for presentation in this session, we are particularly interested in the development and application of geoprocessing workflows, use of free and open source GIS, web-based GIS applications, tightly coupled GIS-based environmental models, GIS-based environmental decision support systems, geospatial data services, geoprocessing semantics, GIS integration technologies, and related topics.
STREAM **Model Develop-ment, Analysis and Applica-tion: Methodo-logical Aspects**	D7	**Session:** **Third session on data mining as a tool for environmental scientists (S-DMTES-2012)**	**Karina Gibert,** KEMLG, Universitat Politècnica de Catalunya-BarcelonaTech, Catalonia **Miquel Sànchez-Marrè,** KEMLG, Universitat Politècnica de Catalunya-BarcelonaTech, Catalonia **Joaquín Izquierdo,** Universitat Politechnica de Valencia, Valencia, Spain **Ignasi Rodríguez-Roda,** Catalan Institute for Water Research (ICRA) and University of Girona, Catalonia **Geoff Holmes,** The University of Waikato, New Zealand **Serena Chen,** Australian National University (ANU), Canberra, Australia **Antonio Ciampi,** McGill University, Canada **Ioannis Athanasiadis,** University of Thrace, Xanthi, Greece	This session is strongly linked with W-DMTES-2012, fourth iEMSs DMTES workshop (D12), and aims to approach and to promote the interaction between the environmental sciences community to the data mining community and related fields, such as artificial Intelligence, Statistics or other fields to discuss the contribution of data mining techniques to knowledge discovery in environmental sciences, as well as to make data mining techniques more accessible to environmental modellers and to give data miners and developers a better idea of the needs and desires of the environmental community. The workshop will introduce interested parties to a range of data mining techniques and a selection of software packages. We also invite submissions of papers and presentations of interesting applications of data mining to environmental problems. New or improved techniques or methods are welcome, as well as innovative applications. Particularly welcome in this edition, contributions related with applications where it was not easy to find the right data mining technique for getting good results. For this particular contributions, please include details on unsuccessful models and the possible reasons for bad performance in the particular application addressed.

Streams	Code	Title	Organizers / Contact	Content
STREAM Model Develop-ment, Analysis and Applica-tion: Methodo-logical Aspects	D8	**Workshop: Comparison of and guidelines for environmental modelling paradigms**	**Tony Jakeman** (contact person), Australian National University (ANU), Canberra, Australia **Olivier Barreteau,** Cemagref, UR Irrigation, Montpellier, France **Mark Borsuk,** Thayer School of Engineering, Dartmouth College, New Hampshire, USA **Andrea Rizzoli,** IDSIA, Manno, Switzerland **Alexey Voinov,** University of Twente (ITC), Enschede, The Netherlands	This workshop follows on from its associated session. Please see that session (D4) description. The Workshop will be structured by the organisers to address already identified key issues as well as ones that emerge from the associated session itself, with the aim of preparing an excellent EMS PP. The organisers also welcome prior application of modelling paradigms to a set of common case studies they are setting up for the purposes of comparative analysis.
STREAM Model Develop-ment, Analysis and Applica-tion: Methodo-logical Aspects	D9	**Workshop: The Community for Integrated Environmental Modelling (CIEM): Current status and future directions**	**Gerry Laniak,** US EPA Ecosystems Research Division, National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, Georgia **Gene Whelan**	At the 2010 iEMSs conference a workshop entitled "Web Portal for the Community for Integrated Environmental Modelling" was presented. The goals of the workshop were to introduce the CIEM web-portal (iemHUB.org) to the wider modelling community, obtain feedback and comments, and encourage its use as a key resource for sharing knowledge and technologies related to IEM. Since the Ottawa conference both the CIEM and the web-portal have progressed in important ways, including the convening of an international summit for integrated environmental modelling and advancements to the appearance and functionality of the web portal. As a community of communities the CIEM shares interests, goals, and activities with many other communities of practice (e.g., iEMSs, CSDMS, CUASHI, ISCMEM), each of which has a focus on a topic of particular relevance to IEM. Several important interactions with these communities have taken place. The goals of this workshop are to: - Review the latest developments of the CIEM, other closely related communities, and the iemHUB web portal - Discuss and compile specific goals and activities to further increase the awareness and value of CIEM and - Discuss how CIEM and other related communities can further coordinate and collaborate to strengthen the overall value and use of IEM. Related to these goals the following key questions will be discussed: - How can the CIEM better facilitate the exchange of IEM science and technology across the international community? - What formal/informal relationships between CIEM and other communities should be pursued (e.g., discipline specific communities)? - How can the iemHUB web-portal better serve the needs of the community? - What social and technical issues related to IEM should CIEM address and what outcomes would be desired?

Streams	Code	Title	Organizers / Contact	Content
STREAM **Model Develop-ment, Analysis and Applica-tion: Methodo-logical Aspects**	D10	**Workshop:** **Complex problems, simple answers, difficult solutions**	**Alexey Voinov** (contact person), University of Twente (ITC), Enschede, The Netherlands **Ralf Seppelt,** Helmholtz Centre for environmental Research - UFZ and Marin-Luther University Halle-Wittenberg, Germany	Scientist, society and politicians become aware, that although our understanding of environmental processes is increasing, yet our ability of taking the right decisions is still limited. For example, we already know much about the climate change and how it can impact our livelyhoods, we already see what are the possible conflicts due to limited resources such as food, energy and land, we already realize how loss of biodiversity and ecosystem functioning can be detrimental to our life-support systems - however, in all these cases we still cannot develop appropriate decisions to avoid or adapt to these changes. There are many examples when knowledge and understanding does not necessarily produce adequate reaction in form of policies or management strategies. We see that increasing complexity of models used for coping with the complexity of the systems we analyze, may not necessarily produce the kind of understanding that is appropriate for action. We may hypothesize that this is because we are treating complexity with complexity, while the real power of modelling is simplification and the ability to abstract to higher level of analysis, where the solutions may be easier to identify and communicate. According to Einstein "problems cannot be solved at the same level of awareness that created them". By moving from one level of complexity to another, it may be easier to find solutions. For example, we already know what has to be done to solve the problem of climate change. What we do not know is how to make this happen. In this workshop we would like to focus on multi-hierarchical modelling, and look at systems that are studied in different levels of complexity to see how we can inform one hierarchical level with findings from another, and how we can move from one level of complexity to another. What are the key success stories of model applications that have been influential for sustainable resource use of communities? What have been the major caveats? How the model complexity was justified? How model complexity can be changed? How to move from one complexity level to another? We are at the crossroads, good ideas welcome.
STREAM **Model Develop-ment, Analysis and Applica-tion: Methodo-logical Aspects**	D11	**Session: Ecological modelling and networks**	**Brian Fath,** Ph.D.; Professor, Towson University and International Institute for Applied Systems Analysis, USA **Caner Kazanci,** University of Georgia **Ursula Scharler,** University of KwaZulu-Natal	Ecosystems are complex adaptive systems. In order to effectively understand and manage these systems it is important to utilize models and analyses that can capture their holistic nature. This session will present papers dealing with use of process-based ecological models and networks, with specific attention given to various methodologies. Specifically, network methodologies which can be used to investigate the indirect relations, both quantitatively and qualitatively, between components of a complex system will be discussed and applied. Model applications to terrestrial, aquatic, and integrated socio-ecological systems will be considered. Topics include, but not limited to: - Food web dynamics - Biogeochemical cycles and models - Agent based ecological and socio-ecological models - Resilience or collapse of ecological networks - Ecological community relations (i.e., mutualism, predation, competition, etc.) Keywords: Ecological Modelling, Ecological Network Analysis, Socio-ecological systems, resilience.
STREAM **Model Develop-ment, Analysis and Applica-tion: Methodo-logical Aspects**	D12	**Workshop:** **First joint workshop on data mining and intelligent decision support systems for environmental scientists (IV W-DMTES-2012 and IEDSS-2012)**	**Karina Gibert,** KEMLG, Universitat Politècnica de Catalunya-BarcelonaTech, Catalonia **Joaquín Izquierdo**, Universitat Politechnica de Valencia, Valencia, Spain **Miquel Sànchez-Marrè,** KEMLG, Universitat Politècnica de Catalunya-BarcelonaTech, Catalonia **Ignasi Rodríguez-Roda**, Catalan Institute for Water Research (ICRA) and University of Girona, Catalona **Rick Sojda**, NRMSC, US Dept. of the Interior - Geological Survey/Ecology Dept., Montana State University, USA **Geoff Holmes**, The University of Waikato, New Zealand **Antonio Ciampi**, McGill University, Canada **Ioannis Athanasiadis**, University of Thrace, Xanthi, Greece **Joaquim Comas**, University of Girona, Catalonia	Fourth workshop on data mining as a tool for environmental scientists (D-DMTES-2012) and second workshop on intelligent environmental decision support systems for environmental scientists (IEDSS-2012). This workshop (W-DMTES-2012) aims to provide a global perspective of the complete and complex process of transforming raw data into really useful decisional knowledge in environmental domains. Data mining processes transforms the data into relevant information, and permits to induce decision knowledge from it, even taking into account the doctrinae corpus in the target domain, when available. Intelligent decision support systems can use this knowledge to provide rational support to the complex decision making process in front of high levels of uncertainty, multifactors influences and, eventually, different experts opinions. The combination of both disciplines provides highly powerful tools in better knowledge of environmental systems as well as better control and management. This joint workshop is in close connection with session A3 (S-DMTES-2012) and session D7 (S-IEDSS-2012), and pretends to promote the interaction among the Environmental Sciences, the Data Mining and the Intelligent Decision Support Systems communities and related fields, to discuss the joint contribution of data mining techniques and intelligent decision support systems to knowledge discovery in environmental sciences, as well as to make both data mining techniques and Intelligent Decision Support Systems more accessible to environmental modellers and to give data miners and knowledge engineers a better idea of the needs and desires of the environmental community. Authors are invited to submit ABSTRACTS to this workshop, in which a short number of 5 minutes presentations will be chosen in order to deliver maximum time to global discussion. Participants in S-DMTES-2012 and/or session S-IEDSS-2012 are specially invited to take active participation in this workshop.

Streams	Code	Title	Organizers / Contact	Content
STREAM Participat-ory Modelling and Stake-holder Involve-ment	E1	**Session: The role of models in governing transition processes towards sustainable resource management**	**Claudia Pahl-Wostl / Johannes Halbe** (contact person)**,** Institute of Environmental Systems Research (USF), Osnabrück, Germany **Jan Sendzimir,** International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria **Dominik Reusser** (contact person)**,** Potsdam Institute for Climate Impact Research (PIK), Potsdam, Germany	Over the past decades, the vision of a sustainable resource management emerged in the scientific community and the public at large. The design properties characterising "sustainable" resource management systems are still debated and the delineation of pathways towards sustainability and the implementation of associated measures are challenged by uncertainty as well as structural barriers and conflicts among affected stakeholders. The influence of environmental authorities to steer the management of resources in a sustainable direction is especially limited when multiple actors have an effect on the resource base. This session will address the role of models in the governance of transition processes towards sustainable resource management. Can model based understanding of past transitions support practical decision-making? Are model-based diagnoses of current resource management problems helpful to identify barriers and drivers of change, and to deal with conflicting interests and world-views? Can explorative models help to define management strategies and pathways towards sustainability?
STREAM Participat-ory Modelling and Stake-holder Involve-ment	E2	**Session: Understanding human-environment interactions through modelling and stakeholder participation: integrating models and stakeholders**	**Pieter Valkering** (contact person) **/ Heleen Vreugdenhil,** International Centre for Integrated assessment and Sustainable development (ICIS), Maastricht University, The Netherlands **Drs. Marjolijn Haasnoot,** Deltares - Delft Hydraulics, The Netherlands **Francois Bousquet,** cirad, France **Jörg Krywkow** (contact person) **/ Geeske Scholz,** University of Osnabrück, Germany **Alexey Voinov,** University of Twente (ITC), Enschede, The Netherlands	Understanding human-environment interactions is vital for developing more robust, flexible, and pro-active environmental policy. To this end, there is much interest in integrated modelling, assuming that linking models, modules, and components produces more functionality and better understanding of human-environment processes. At the same time participatory model development involving stakeholders has become a quasi standard approach in environmental modelling. Participatory modelling may be considered as an approach to integrate the knowledge of stakeholders with expert knowledge. Whereas computer modelling provides formalism, and the inclusion of the (prevailingly quantitative) scientific 'facts'; stakeholder participation introduces (often qualitative) lay-knowledge and subjective stakeholder perspectives on the issues of concern. Notably, stakeholder participation is supportive to understand possible human response to environmental, societal, economic and technical development. In this session, we share experiences in approaches that combine modelling efforts such as ABM or system dynamics models, etc. with stakeholder participation to examine human-environment interactions including serious or policy gaming, scenario development (like the 'storyline and simulation' approach), participatory or companion modelling, and group model building. We discuss problems and challenges associated with combining various forms of knowledge (personal experience, group preferences, expert opinion, science-based knowledge, etc.). We welcome papers about diverse case studies pertaining to various application domains, geographical regions and scales. Particular questions to be addressed are: How can software tools in general and model integration tools in particular (including various levels of complexity and user-friendliness ranging from icon-based system dynamics tools to detailed GCMs) be coupled to assist stakeholder participation and knowledge integration? - How to design and plan interactions among stakeholders and models? How to integrate stakeholder knowledge of various levels of complexity and detail, ranging from lay person's opinions to informed expert opinion (for example through individual stakeholder consultation, stakeholder workshops, or through the Internet)? - How to validate the observed human-environment dynamics, for example, through a cross comparison with historical cases stakeholder consultation, or a triangulation of methods - and what are quality criteria for the knowledge produced? - How to promote produced knowledge in the policy arena? How can this knowledge contribute to societal learning (for example through the participation of decision makers or the public at large, or other knowledge dissemination activities)? - How to package and present insights in a way that they are useful and informative to participants and decision makers? - What type of policy relevant insights emerge from these studies into the nature of human-environment interaction? This session is linked with workshop E3.

Streams	Code	Title	Organizers / Contact	Content
STREAM Participat-ory Modelling and Stake-holder Involve-ment	E3	**Workshop: Understanding human-environment interactions through modelling and stakeholder participation: integrating models and stakeholders**	**Pieter Valkering** (contact person)**/ Heleen Vreugdenhil,** International Centre for Integrated assessment and Sustainable development, (ICIS), Maastricht University, The Netherlands **Drs. Marjolijn Haasnoot,** Deltares - Delft Hydraulics, The Netherlands **Francois Bousquet**, cirad, France **Jörg Krywkow** (contact person) **/ Geeske Scholz**, University of Osnabrück, Germany **Alexey Voinov**, University of Twente (ITC), Enschede, The Netherlands	Understanding human-environment interactions is vital for developing more robust, flexible, and pro-active environmental policy. To this end, there is much interest in integrated modelling, assuming that linking models, modules, and components produces more functionality and better understanding of human-environment processes. At the same time participatory model development involving stakeholders has become a quasi standard approach in environmental modelling. Participatory modelling may be considered as an approach to integrate the knowledge of stakeholders with expert knowledge. Whereas computer modelling provides formalism, and the inclusion of the (prevailingly quantitative) scientific 'facts'; stakeholder participation introduces (often qualitative) lay-knowledge and subjective stakeholder perspectives on the issues of concern. Notably, stakeholder participation is supportive to understand possible human response to environmental, societal, economic and technical development. In this workshop, we share experiences in approaches that combine modelling efforts such as ABM or system dynamics models, etc. with stakeholder participation to examine human-environment interactions including serious or policy gaming, scenario development (like the 'storyline and simulation' approach), participatory or companion modelling, and group model building. We discuss problems and challenges associated with combining various forms of knowledge (personal experience, group preferences, expert opinion, science-based knowledge, etc.). We welcome papers about diverse case studies pertaining to various application domains, geographical regions and scales. Particular questions to be addressed are: - How can software tools in general and model integration tools in particular (including various levels of complexity and user-friendliness ranging from icon-based system dynamics tools to detailed GCMs) be coupled to assist stakeholder participation and knowledge integration? - How to design and plan interactions among stakeholders and models? How to integrate stakeholder knowledge of various levels of complexity and detail, ranging from lay person's opinions to informed expert opinion (for example through individual stakeholder consultation, stakeholder workshops, or through the Internet)? - How to validate the observed human-environment dynamics, for example, through a cross comparison with historical cases stakeholder consultation, or a triangulation of methods - and what are quality criteria for the knowledge produced? - How to promote produced knowledge in the policy arena? How can this knowledge contribute to societal learning (for example through the participation of decision makers or the public at large, or other knowledge dissemination activities)? - How to package and present insights in a way that they are useful and informative to participants and decision makers? - What type of policy relevant insights emerge from these studies into the nature of human-environment interaction? This workshop is linked with session E2.
STREAM Participat-ory Modelling and Stake-holder Involve-ment	E4	**Workshop: Community mapping and empowerment: A hands-on workshop/tutorial with actual village data and simplified villageQGIS software**	**Nagesh Kolagani,** Indian Institue of Technology Madras (ITT Madras), India	The goal of the workshop is to give participants an understanding of what the map requirements of village communities are for carrying out participatory watershed management and how to meet these requirements. Participants will be given actual sample data of various village features (spatial GPS data and non-spatial attribute data). Using our open source simplified 'villageQGIS' software, they will prepare maps and then try to generate various views that might interest a village audience to visualize and participate better.

Streams	Code	Title	Organizers / Contact	Content
STREAM Resource Manage-ment and Sustain-ability	F1	**Session: Land-use and land-cover modelling: dealing with complexity**	**Daniel Rutledge / Alexander Herzig / Fraser Morgan,** Manaaki Whenua Landcare Research NZ Ltd **Brendan Williams,** University College Dublin **Guy Engelen, Jean-Luc de Kok,** Vlaamse Instituut voor Technologishe Onderzoek (VITO)	Land-use/land-cover modelling is increasingly playing a key role in helping to explore complex environmental issues in an integrated and holistic manner and address sustainable development on a finite planet. In particular land-use/land-cover change modelling by definition adds a spatial dimension to such explorations, thereby helping frame important issues of distributional social justice such as the spatially heterogenous impacts of climate change. However land-use/land-cover models suffer from a number of limitations that limit their versatility and scope. The limitations relate to the continuing tendancy to characterise land use and land cover as one would on a paper map, i.e. as a set of simple categories displayed in a non-spatially overlapping manner wheres in reality land-use and land-cover are much more rich and complex. Characterising and Modelling land use and land cover in such a simple manner limits the types of questions one can ask and by extension limits the possible approaches to addressing persistently wicked problems such as those presented by sustainable development. The challenges lying ahead for policy, planning, and resource management across scales demand better approaches to characterising and modelling land use and land cover (e.g., multiple uses, functionality, ecosystem services, etc.) that overcome those limitations while at the same time becoming more useful and accessible to policy makers, planners and resource managers. This session seeks to bring together researchers with interests in land-use/ land-cover modelling to present emerging ideas, methods and techniques for advancing land-use/land-cover change modelling to overcome current limitations and better deal with the complexity found in the real world. We are open to any papers dealing broadly with the concept of complexity in land-use and land-cover modelling but especially desire papers that address one of the following four themes: 1) Ideas and methods for better characterising land-use/land cover 2) Techniques and algorithms to facilitate more complex modelling of land-use/land cover change 3) Approaches and solutions for making complex modelling of land-use/land-cover more tractable and accessible 4) Addressing/quantifying uncertainty in the face of increasing complexity. The session will be accompanied by a workshop "Advancing land-use and land-cover modelling: enhancing complexity" (F6) in which participants will discuss the benefits, drawbacks and challenges in more complex approaches to land-use/land-cover modelling.
STREAM Resource Manage-ment and Sustain-ability	F2	**Session: Sustainability assessment: quantitative indicators, models and techniques**	**Marina G. Erechtchoukova / Peter A. Khaiter,** York University, Toronto, Canada	Topic: quantitative methods for sustainability appraisal Sustaining the environment via maintaining its functions in order to provide economic growth and social needs becomes vitally important. Social sustainability is aimed at attaining social goals, including maximum consumption. Such simplified representation of societal development demonstrates that environmental, economic and social aspects of sustainability are interrelated and must be considered all together in decision and policy making. Sustainable development can be achieved through management activities which are based on sustainable decisions. To evaluate decision's sustainability, it is necessary to evaluate and analyze values of current and future welfare outcomes. The latter makes application of models and mathematical tools unavoidable and explains the necessity to use quantitative indicators of sustainability. Currently used sustainability indicators describe multidimensional aspects of sustainable development. However, these indicators are measured using incompatible units and their evaluation requires data of different scales with various levels of aggregation, collected based on objective observations and measurements, as well as surveys and interviews reflecting subjective opinions of individuals. The session invites papers describing development and/or applications of quantitative methods for sustainability assessment, evaluation of current and future welfare, data requirements and uncertainty estimates of the results. The works related to evaluation of uncertainty in aggregate sustainability indices are of a particular interest.
STREAM Resource Manage-ment and Sustain-ability	F3.1	**Session: Simulating environmental change – quality, quantity and validation: Examples focusing on terrestial systems**	**Joerg Priess / Christian Schweitzer,** Helmholtz-Centre for Environmental Research – UFZ, Leipzig, Germany	„Managing Resources of a Limited Planet" requires the adaptation to changing biophysical environments as one of the key aspects. Many studies have already demonstrated that we changed large fractions of the terrestrial surface. While the processes associated with these transformations are mostly well known, it is still a major challenge to simulate them quantitatively – a prerequisite to adequately assess environmental as well as related socio-economic impacts of ongoing or future human activities and/or climate change. We emphasise the need for accurate representations of environmental change in studies of socio-environmental systems, as its dynamics may take effect over e.g. one order of magnitude (concentrations, rates) and require different actions or adaptation measures in the human domain. In this session we invite papers explicitly addressing environmental changes (such as GHG-emissions, erosion, soil properties, water fluxes and quality, etc.) related to different types of land-use activities or naturally occurring processes. We especially encourage submissions of regional scale studies, but also welcome studies from larger (e.g. continental) or smaller scales (e.g. small catchments). Validating environmental changes for larger regions or longer periods is an ongoing challenge – hence, we highly welcome presentations picking up this problem.
STREAM Resource Manage-ment and Sustain-ability	F3.2	**Session: Simulating environmental change – quality, quantity and validation: Examples focusing on hydrological aspects: Examples focusing on hydrological aspects**	**Joerg Priess / Christian Schweitzer,** Helmholtz-Centre for Environmental Research – UFZ, Leipzig, Germany	„Managing Resources of a Limited Planet" requires the adaptation to changing biophysical environments as one of the key aspects. Many studies have already demonstrated that we changed large fractions of the terrestrial surface. While the processes associated with these transformations are mostly well known, it is still a major challenge to simulate them quantitatively – a prerequisite to adequately assess environmental as well as related socio-economic impacts of ongoing or future human activities and/or climate change. We emphasise the need for accurate representations of environmental change in studies of socio-environmental systems, as its dynamics may take effect over e.g. one order of magnitude (concentrations, rates) and require different actions or adaptation measures in the human domain. In this session we invite papers explicitly addressing environmental changes (such as GHG-emissions, erosion, soil properties, water fluxes and quality, etc.) related to different types of land-use activities or naturally occurring processes. We especially encourage submissions of regional scale studies, but also welcome studies from larger (e.g. continental) or smaller scales (e.g. small catchments). Validating environmental changes for larger regions or longer periods is an ongoing challenge – hence, we highly welcome presentations picking up this problem.

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STREAM Resource Manage-ment and Sustain-ability	F5	**Session: Understanding ecosystem services, multi-functional land use, trade-offs and uncertainty**	**David Miller (contact person) / Iain Brown / Keith Matthews,** The James Hutton Institute, Aberdeen, UK	Land and the ecosystems it supports underpin the provision of food, fuel, clean water and air and cultural experiences that provide for human livelihoods and well-being. The provision of these goods is supported by ecosystem functions such as climate regulation, nutrient cycling, protection from disease and natural hazards, collectively referred to as ecosystem services. These in turn create a platform on which economic activity occurs, governance regimes are built, resource use is negotiated, land management decisions are framed and lives are lived. However, Ecosystem Services are threatened, globally and locally, by high levels of consumption, ecosystem degradation, biophysical and social change, and natural disasters. Realising the potential of land to deliver more provisioning services at the same time as protecting and enhancing regulating, supporting and cultural services is recognised as a significant challenge facing public policy makers, and private sector land managers. An inter-disciplinary evidence base combining biophysical and socio-economic research is key to delivering multiple objectives from land use, including food security, energy, biodiversity, water management, soil quality, biodiversity, and responses to climate change (mitigation and adaptation). The focus of this session will be directed towards identifying the scientific understanding of the likely significance of pressures for change in relation to different land use sectors, and the potential implications of uncertainty on transition pathways. Papers will be encouraged which consider issues of: 1) implications of uncertainty in modelling (e.g. spatial, social) on transition pathways of land use change and trade-offs between ecosystem services; 2) understanding interactions between multi-functional land uses, and certainty in modelling of land's potential for supporting different ecosystem services; 3) the communication of statistical and geographical distributions of impacts, and the perception and communication of risks to ecosystem services of pressures for change. Output: journal papers drawn from the conference session and on topics elicited from the session and associated workshop. In particular, a refereed paper on the position statement around the topic of ecosystem services, trade-offs and uncertainty. The Environmental Modelling journal, and Journal of Land Use Science will be approached with a proposal for submissions. This session is linked with the workshop "Understanding ecosystem services, multi-functional land use, trade-offs and uncertainty for policy support and land management" (F7).
STREAM Resource Manage-ment and Sustain-ability	F6	**Workshop: Advancing land-use and land-cover modelling: enhancing complexity**	**Daniel Rutledge / Alexander Herzig / Fraser Morgan,** Manaaki Whenua Landcare Research, New Zealand **Brendan Williams,** University College Dublin; Ireland **Guy Engelen / Jean-Luc de Kok,** Vlaamse Instituut voor Technologishe Onderzoek (VITO), Belgium	This workshop follows-on from the session "Land-use and land-cover modelling: Dealing with Complexity" (F1). Its purpose is to provide a forum to discuss and debate the challenge and merits of more complex approaches to land-use/land-cover modelling that were presented in the companion session. We will organise the workshop into five sections: one section for each of the four themes discussed in the session (1. ideas and methods for more complex characterisation, 2. techniques and approaches for facilitating more complex modelling, 3. approaches and solutions for increasing tractability and accessibility, 4. addressing complexity) and a final synthesis session. We may also modify the themes on the day based on the outcomes of the session and desires of the participants. For each section we seek a willing participant who will agree to summarise the relevant papers presented at the start of the section and then lead a round-table discussion of the authors of the relevant papers. In discussing those themes, we will consider a range of critical questions that cut across them. While the full range of questions will emerge during the session, some key *a priori* questions include: 1) When are more complex approaches warranted? How much complexity is "enough"? 2) Do we have the data needed? If not, how can we start to collect/collate it? 3) Will more complex approaches improve our shared knowledge and understanding or lead to more fragmentation and lack of comparability/synthesis? 4) How do we communicate more complex approaches to policy makers, planners, resource managers, communities, etc. without overwhelming them? During the synthesis section participants will discuss options for disseminating the findings of the combined session and workshop, ranging from the production of a single synthesis paper in a relevant journal to a collected body of work such a section in a journal or perhaps a book.
STREAM Resource Manage-ment and Sustain-ability	F7	**Workshop: Understanding ecosystem services, multi-functional land use, trade-offs and uncertainty for policy support and land management**	**David Miller (contact person) / Iain Brown / Keith Matthews,** The James Hutton Institute, Aberdeen, UK	Stakeholders in land use and the ecosystem services it supports are increasingly obliged to consider the implications of pressures for change on the management of our natural resources. Policy-makers in many countries have a public responsibility to take account of environmental, social and cultural demands whilst seeking to deliver food, fuel, fibre and well-being from limited natural resources. However, there are gaps in the scientific evidence base for sustainable use and management of all land and the ecosystem services and functions it supports, and in stakeholder understanding of the implications of uncertainty when in receipt of models of potential impacts. Such gaps include perceptions of risks and appreciation of uncertainty, and the factors (e.g. trust, costs/benefits, control) that influence those perceptions; impacts of different pathways of change on ecosystem services, and account being taken of dependencies of one set of ecosystem service(s) on another when planning changes in land use. The Workshop will develop scientific themes identified in the linked conference session on 'Understanding ecosystem services, multi-functional land use, trade-offs and uncertainty' (F5). In particular, it will focus on the implications for strategic planning of public policy, and the potential effects on land managers and those responsible for the protection and enhancement of ecosystem services. A position paper will be developed, authorship of which will be invited from those expressing an interest in the combined session and workshop. This paper will provide the basis for participant discussion on the key weaknesses in the support given to policy-makers, public sector agencies, and private land managers on the understanding of the pressures of change on ecosystem services, and the implications of uncertainty in model outputs when seeking to future-proof decisions on planning land uses. The workshop will be run to try and elicit generic lessons relevant to land-use sector (e.g. agriculture, forestry, renewable energy, biodiversity, recreation), or different target audiences (e.g. national or regional strategy, local authority planner, land manager). Participants will be encouraged to prepare for the workshop with some background on either sector or audience type. For the benefit of public bodies, a set of science briefs will be developed. These will comprise 1 or 2 page summaries of key issues associated with land-use sectors and ecosystem services, and target audience. It is proposed that these will be made available by the conference WWW and by participants in the workshop and associated conference session.

Streams	Code	Title	Organizers / Contact	Content
STREAM Know-ledge, Data and Semantic Process-ing for Environ-mental Research	G1.1	**Session: Analysis of remote sensing data for environmental models (with special emphasis on "Remote sensing")**	**Isabelle Herlin** (contact person), INRIA, Paris **Roberto San Jose**, UPM, Madrid, Spain **Steffen Unger**, Fraunhofer FIRST, Berlin, Germany **Dan Zachary**, CRTE, Esch-sur-Alzette, France	Data of different scales and sources play a big role for building and running mesoscale environmental models. They serve as input data to model runs, build the basis for the models themselves and for their validation. Thus methods for deriving the necessary parameters, input values and validation characteristics are of increasing interest to enhance the quality of simulation results. This session addresses methods and tools from informatics to process and analyze these data with respect to their use in mesoscale environmental models. Particular topics are: - Remote sensing techniques, - Uncertainty analysis of data, - Aggregation of data of scales smaller than mesoscale to perform high quality and sustainable parametrization of processes modeled, in particular for surface characteristics, - Analysis of data from a global scale as drivers and boundary conditions for mesoscale models, - Statistical methods for data analysis, - GIS based methods, - Emission models, - Coupling of models of different scales to mesoscale models to enhance performance of models, - Tools and methods to automate resulting workflows of data gathering, analysis, model run, analysis of results, model based management and graphical representation.
STREAM Know-ledge, Data and Semantic Process-ing for Environ-mental Research	G1.2	**Session: Integration of heterogeneous data and environmental models (with special emphasis on "Integration of data and models")**	**Isabelle Herlin**, INRIA, Paris **Roberto San Jose**, UPM, Madrid, Spain **Steffen Unger** (contact person), Fraunhofer FIRST, Berlin, Germany **Dan Zachary**, CRTE, Esch-sur-Alzette, France	Data of different scales and sources play a big role for building and running mesoscale environmental models. They serve as input data to model runs, build the basis for the models themselves and for their validation. Thus methods for deriving the necessary parameters, input values and validation characteristics are of increasing interest to enhance the quality of simulation results. This session addresses methods and tools from informatics to process and analyze these data with respect to their use in mesoscale environmental models. Particular topics are: - Remote sensing techniques, - Uncertainty analysis of data, - Aggregation of data of scales smaller than mesoscale to perform high quality and sustainable parametrization of processes modeled, in particular for surface characteristics, - Analysis of data from a global scale as drivers and boundary conditions for mesoscale models, - Statistical methods for data analysis, - GIS based methods, - Emission models, - Coupling of models of different scales to mesoscale models to enhance performance of models, - Tools and methods to automate resulting workflows of data gathering, analysis, model run, analysis of results, model based management and graphical representation.
STREAM Know-ledge, Data and Semantic Process-ing for Environ-mental Research	G3	**Session: Semantics and the environment**	**Ioannis Athanasiadis** (lead), University of Thrace, Xanthi, Greece **Sasa B. Nesic**, University of Lugano, Switzerland **Ferdinando Villa**, University of Vermont, Burlington, USA **Andrea Emilio Rizzoli**, IDSIA, Manno, Switzerland (contact person)	The "Semantics and the environment" session aims to collect contributions addressing the various challenges and expected developments posed by the application of Semantic Technologies to the Environmental sector. Among such issues we list: the use of semantics to facilitate search and discovery of environmental resources; the linked open data approach to support interlinking of environmental data on the internet; the role of semantics in integrated modelling efforts. Because of the diversity of possible application areas, we expect sub-sessions to be spun off of this general theme.
STREAM Know-ledge, Data and Semantic Process-ing for Environ-mental Research	G4	**Workshop: Machine Learning for Environmental Data: Concepts, Applications, and Software**	**Mikhail Kanevski**, Professor, University of Lausanne, Switzerland	There is a growing demand for new analytical and processing environmental observation and monitor, analyse and to model spatio-temporal data streams. These tools can be provided by Machine Learning (ML), which is a general and powerful field for processing and nonlinear robust modelling of complex high dimensional data. The workshop will present the basic concepts underlying a wide range of conventional ML algorithms and provide the cutting-edge data analysis, modelling and visualisation tools: - artificial neural networks: multilayer perceptrons, radial basis function networks, general regression and probabilistic neural networks - self-organizing Kohonen maps - support vector machines and other kernel-based methods. Real case studies from environmental a variety of problems, like pollution, climate, natural hazards, renewable resources and other fields of applications will be outlined focusing on the software tools used. The workshop will be useful both for the beginners and advanced researchers and users. Workshop deliverables are: tutorial slides, detailed "how-to-do-it" case studies, software tools, sample datasets.
STREAM Know-ledge, Data and Semantic Process-ing for Environ-mental Research	G5	**Workshop: The future of semantic technologies in environmental research**	**Andrea Emilio Rizzoli**, IDSIA, Manno, Switzerland **Gerald Schimak**, Forschungszentrum Seibersdorf /IT, Austria **Tomás Pariente-Lobo Sasa Nesic**, University of Lugano, Switzerland	The "Semantics and the environment" workshop wants to develop a discussion on how environmental research will be impacted by semantic technologies in the near future. What are the challenges, where are the major obstacles, and what are the expected outcomes? The output of the workshop should be a research agenda for the next four years, identifying the most promising application areas of semantics for environmental sciences. The workshop participants are welcomed to bring their own case studies to be discussed and analysed during the workshop short presentations.

Streams	Code	Title	Organizers / Contact	Content
STREAM Socio-Environmental Systems	H2	**Session: Human decisions in agent-based models for natural resource use**	**Birgit Müller / Jürgen Groeneveld / Nina Schwarz,** Helmholtz-Centre for Environmental Research - UFZ, Germany	Agent-based models (ABM) allow investigating the influence of human decisions on macro-scale pattern in coupled social-ecological systems (SES). In recent studies very different starting points are used for the representation of decision making in SES models: based on theory (psychological, economic or sociological), on empirical observations or on rather ad-hoc decision making models. Consequently, quite different aspects are considered, e.g. uncertainty and attitudes towards risk, past experiences, behaviour of other agents, limited availability of information (bounded rationality, heuristic decision making) and alternative income possibilities. This listing illustrates a variety of options exists, likely influencing the outcomes of a simulation study. Thus, attention needs to be paid to the specific decision making process that is part of ABM's in SES. For this session we invite papers that 1) present ABM studies for natural resource use with emphasis on the decision part, including reasons for selection and underlying concepts/theories, 2) delineate new approaches on modelling decisions regarding natural resource use or 3) review the existing literature with regard to this topic. For the presentations of case modelling studies we ask for using, if appropriate, the a priori provided protocol to ensure a comparable and comprehensive description of the decision making model which will be available in January 2012. This session will seek to stimulate discussion around a number of challenges, including: appropriate consideration of uncertainty in the decision making process, decision making on multiple levels, decision model validation and in particular the development of a comprehensive protocol for documentation of the implementation of decisions in ABM's for natural resource use. Pending the number and coverage of papers submitted, a dedicated special issue publication in an appropriate journal is intended. This session is followed by a corresponding workshop "Human decisions in agent-based models (ABM) for natural resource use - need for protocols" (H6) which aims at synthesising results and work towards such a comprehensive protocol for documentation.
STREAM Socio-Environmental Systems	H3	**Session: Modelling responses to shocks in coupled socio-ecological systems**	**Gary Polhill,** The James Hutton Institute, Aberdeen, UK **Tatiana Filatova** (contact person), University of Twente, Enschede, The Netherlands	Coupled socio-ecological systems are complex systems, consisting of many heterogeneous interacting elements. Such systems are characterized by non-linearities and feedbacks: even a small change in one component can cause sudden abrupt change at the system level. Shocks in environmental systems include regime shift as a result of gradual ecosystem degradation, and natural hazards such as floods or droughts, chances of which increase significantly with climate change. Shocks in socio-economic systems comprise such phenomena as economic crises or social unrest. Abrupt shocks either in the ecological or socio-economic subsystem may disturb the whole structure of the coupled system altering the flow and strength of the feedbacks. At the same time complex socio-ecological systems are constantly adapting to changes and evolving over time, so the consequences of the abrupt changes either in ecological or socio-economic subsystems for the adaptive dynamics of coupled system are not immediately obvious. Models that can help exploring, studying and predicting the responses of coupled socio-ecological systems to shocks are consequently in demand. This session aims to bring together scholars using formal (i.e. mathematical or computational) models to study responses to shocks in complex socio-ecological systems. The range of questions this session focuses on includes: - Case studies of analysis of shocks to socio-ecological systems in the past; - Predictions from scenarios of shocks to contemporary socio-ecological systems; - Abstract models studying shocks to coupled social and environmental systems; - Models of adaptive individual behavior and/or structural behavioral changes in response to environmental shocks, with a special focus on changes due to changing climate; - Methodological approaches to conducting such work. The session is co-sponsored by the Global Land Project http://www.globallandproject.org/ . We plan to consolidate the best presented papers and outcomes of the discussion in a special issue of a journal (to be determined based on the scope of the submissions).
STREAM Socio-Environmental Systems	H4	**Workshop: Opportunities and challenges of modelling for resilience thinking and ecosystem stewardship**	**Maja Schlüter,** Leibniz Institute of Freshwater Ecology and Inland Fisheries - IGB, Berlin, Germany **Birgit Müller / Karin Frank,** Helmholtz Centre for Environmental Research - UFZ, Leipzig, Germany	Resilience thinking is a perspective for the analysis of the dynamics of coupled social-ecological systems (SES) in a changing world. It emphasizes the role of feedbacks between social and ecological systems across temporal and spatial scales in determining SES resilience, adaptability and transformability. Ecosystem stewardship is an approach for the application of resilience thinking to practical problems in natural resource management. Its focus on coping with uncertainty and surprise constitutes a paradigm shift in ecosystem management with consequences for evaluation and design of management strategies and institutions – as well as the analytical frameworks they are based on. Models have so far mainly been used to enhance ecological resilience by optimizing the management of multi-stable ecosystems subject to anthropogenic disturbance. Only few studies genuinely take feedbacks between social and ecological dynamics into account to address the two other aspects of resilience thinking, namely adaptability and transformability. Yet, we argue that there is a large potential of models to address those issues that have not been fully exploited yet. In this workshop we want to discuss this potential, including the opportunity to make use of a diversity of model types, to improve the link to case study research, and to use models in a larger context of theoretical and empirical research. We also want to critically reflect on the challenges associated with SES Modelling. We will provide a position paper on models for resilience thinking and ecosystem stewardship reviewing the state of the art of resilience modelling and discussing opportunities and challenges to enhance the use of models for resilience as an input to the discussion. We invite comments addressing this potential and associated challenges. We are particularly interested in contributions that use models at the science-policy interface in e.g. participatory processes to support societal processes of adaptation and transformation as well as theoretical work that enhances the scientific foundation of social-ecological resilience.

Streams	Code	Title	Organizers / Contact	Content
STREAM Socio-Environmental Systems	H5	**Workshop: On processes, patterns and interactions of urban shrinkage – how do we approach a challenging spatial development using models?**	**Dagmar Haase,** Professor, Humboldt University Berlin & Helmholtz Centre for Environmental Research – UFZ, Germany **Nina Schwarz / Annegret Haase / Dieter Rink / Sigrun Kabisch,** Helmholtz Centre for Environmental Research – UFZ, Germany	Both modellers and social scientists attempt to find better understandings of complex urban systems. Such understandings include explanations of development paths, underlying driving forces and the expected impacts of such systems. So far, research on cities or urban regions has predominantly focused on urban growth. However, new challenges have arisen since urban shrinkage entered the research agenda of the social sciences. Urban research has rarely addressed shrinkage in the form of population decline and its spatio-temporal effects, but that phenomenon has become increasingly widespread in Europe, the US and Japan. Despite enormous progress in the modelling of urban systems, a gap between social science knowledge and urban modelling still exists. Therefore, we intend to set urban shrinkage into the focus of this session and follow-up workshop. We want to discuss the challenges that urban shrinkage brings about for modelling with particular respect to the cooperation between modellers and social scientists. While the session will set the theoretical scene and gather expertise from different origins, the workshop intends to discuss key questions and to elaborate the gathered expertise further to come to a positioning paper. The workshop related to the session "On Processes, patterns and interactions of urban shrinkage – how do we approach a challenging spatial development using models?" (H2) and will be organised in breakout groups discussing different topics/questions: 1) What is the best modelling approach – SD, CA, Network, Econometrics or ABM? 2) What are challenges/specifics of urban shrinkage as a subject for modelling? 3) Governance issues: multi-ABM figuring coalition building, cooperation, exclusions, inclusions, lack of capacities etc. 4) Summary in the "plenary" and 5) Preparation of a positioning paper for ENVSOFT.
STREAM Socio-Environmental Systems	H6	**Workshop: Human decisions in agent-based models (ABM) for natural resource use – need for protocols**	**Birgit Müller / Jürgen Groeneveld,** Helmholtz-Centre for Environmental Research UFZ, Leipzig-Halle, Germany **Nina Schwarz,** Helmholtz-Centre for Environmental Research UFZ, Leipzig-Halle	The workshop will draw upon the presentations given in the corresponding session "Human decisions in agent-based models for natural resource use" (H3), which aims at getting a state-of-the art overview on: How are decisions modelled in ABM's for natural resource use? Which factors, interactions, and feedbacks are included? Which decision rules are used with which reasoning (theoretical justification, empirical observations)? We intend to discuss in the workshop how to overcome obvious weaknesses of a large part of models (such as the lack of a protocol for documentation of the decision making processes, missing reasoning on why which decision model is used and a missing link to theory, weak empirical support for the decision model used and incomplete list of model assumptions). To close this gap, it is aimed to develop a comprehensive protocol for describing decisions in ABM's for natural resource use and summarize open challenges for the future. The discussion will be launched by a position paper available in January 2012. It aims at summarizing in a structured way the necessary information that should be provided in the model description of decision making processes in ABM's for natural resource use (including aspects as uncertainty, dependence of behaviour of other agents, learning). It is inspired by the ODD-protocol for describing individual-based and agent-based models (Grimm et al. 2006), but will focus here on the decision making aspect. The workshop will be organized in two parts, consisting of a series of standpoint presentations (each five-minute long) followed by a round table discussion and aimed at modifying, integrating and improving the position paper (protocol), which will result in a collaborative paper. Potential contributors are invited to submit an extended abstract (max. 2 pages) of their planned communication (birgit.mueller@ufz.de). Selected participants will be invited to contribute as co-authors to the synthesis paper to be published in an appropriate journal.

Streams	Code	Title	Organizers / Contact	Content
STREAM **Issues in Water Re-sources Manage-ment**	I1	**Session:** **Environmental fluid mechanics – theoretical, numerical and experimental approaches**	**Carlo Gualtieri,** University of Napoli Federico II, Italy **D.T. Mihailovic,** University of Novi Sad, Serbia **N. Mole,** University of Sheffield, UK **P.A. López Jiménez,** Universidad Politécnica de Valencia, Spain **B. Blocken**, Eindhoven University of Technology, The Netherlands	Environmental Fluid Mechanics (EFM) is the scientific study of transport, dispersion and transformation processes in natural fluid flows on our planet Earth, from the microscale to the planetary scale. Stratification and turbulence are two essential ingredients of EFM. Stratification occurs when the density of the fluid varies spatially, as in a sea breeze where masses of warm and cold air lie next to each other or in an estuary where fresh river water flows over saline seawater. Turbulence is the term used to characterize the complex, seemingly random motions that continually result from instabilities in fluid flows. Turbulence is ubiquitous in natural fluid flows because of the large scales that these flows typically occupy. The processes studied by EFM greatly affect the quality of natural ecosystems. For this session papers reporting observational, experimental, numerical and theoretical investigations would be welcome. So the Session will be organized in two parts: theoretical and numerical aspects (Part 1) and applicative, software and experimental issues (Part 2). This session could tentatively cover the following topics: - Diffusion, turbulent dispersion and mixing of environmental contaminants in natural and engineered water systems and in the atmosphere, - Processes at the environmental interfaces in soil, atmosphere and natural waters, - Turbulent flows, - Nonlinear processes in environmental fluid mechanics, - Two-phase and multiphase flows - Stratified flows, - Transport of water and chemicals in the soil, - Water quality processes in surface and sub-surface systems.
STREAM **Issues in Water Re-sources Manage-ment**	I2.1	**Session:** **Water management and planning - Models for unique institutional, economic, and geographic contexts**	**Julien Harou,** University College London, UK **Andrea Castelletti,** Institute for Water and Environmental Engineering (IIAMA) and Politecnico di Milano, Italy **Manuel Pulido Velázquez,** Universitat Politècnica de València, Spain **Ejaz Qureshi,** CSIRO, Commonwealth Scientific and Industrial Research Organisation, Australia	Water scarcity is forcing a re-evaluation of water resource planning and management strategies in many regions. New strategies for developing and managing water resource systems at regional and national scales are required given population growth, economic development, growing environmental concern and the nonstationarity of future hydrology and the hydrologic extremes. Regional water management and planning issues almost invariably require some customization of existing software tools, models and planning frameworks. In this session we look at a range of water management tools that have been customized for particular contexts. We focus on unique institutional, economic and political contexts, in addition to geographic or hydrological considerations. Hydro-economic models, trans-national resource modelling, planning under multiple sources of uncertainty including institutional uncertainty, integrated models that consider human or institutional agents, adapting to climate, land use and other changes will be covered in addition to a range of other topics. Presenters will be asked to emphasize what features of their tools, models and frameworks made them ideal to study a particular context. Are they flexible and adaptable, could such tools be ported and applied in a different context? Generally this session will seek to advance the tools, software and methods of advanced regional water resource planning and management.
STREAM **Issues in Water Re-sources Manage-ment**	I2.2	**Session:** **Water management and planning - Tools and methods for making decisions with uncertainty and complexity**	**Julien Harou,** University College London, UK **Andrea Castelletti,** Institute for Water and Environmental Engineering (IIAMA) and Politecnico di Milano, Italy **Manuel Pulido Velázquez,** Universitat Politècnica de València, Spain **Ejaz Qureshi,** CSIRO, Commonwealth Scientific and Industrial Research Organisation, Australia	Water scarcity is forcing a re-evaluation of water resource planning and management strategies in many regions. New strategies for developing and managing water resource systems at regional and national scales are required given population growth, economic development, growing environmental concern and the nonstationarity of future hydrology and the hydrologic extremes. Regional water management and planning issues almost invariably require some customization of existing software tools, models and planning frameworks. In this session we look at a range of water management tools that have been customized for particular contexts. We focus on unique institutional, economic and political contexts, in addition to geographic or hydrological considerations. Hydro-economic models, trans-national resource modelling, planning under multiple sources of uncertainty including institutional uncertainty, integrated models that consider human or institutional agents, adapting to climate, land use and other changes will be covered in addition to a range of other topics. Presenters will be asked to emphasize what features of their tools, models and frameworks made them ideal to study a particular context. Are they flexible and adaptable, could such tools be ported and applied in a different context? Generally this session will seek to advance the tools, software and methods of advanced regional water resource planning and management.

Streams	Code	Title	Organizers / Contact	Content
STREAM Issues in Water Re-sources Manage-ment	I3	**Session: Application of scenarios to support national and international environmental policies to govern freshwater resources**	**Ilona Bärlund,** Helmholtz Centre for Environmental Research – UFZ, Magdeburg, Germany **Katri Rankinen,** Finnish Environment Institute, Helsinki, Finland	Mathematical modelling is currently being used in order to simulate the effect of changing environmental and socio-economic conditions on hydrology, sediment and nutrient transport and water quality. The ability of models to abstract natural and human behaviour driven processes and to look into a possible future make them useful tools for scenario applications. The aim of most scenario studies so far has been to study impacts of one driving force e.g. either of climate or land-use or socio-economic change. As these driving forces however are interconnected, scenario studies need to include all these factors jointly in order to support policy development and application. Hence this session is primarily seeking for papers that present examples of joint use of scenarios in national or international studies to estimate future development of water resources and their quality. Further, interesting features include the analysis of successful downscaling of global scenarios to regional studies and how the scale of catchment modelling affects the use of scenarios as input information. Also examples of cooperation between end users and modellers in supporting policy applications are welcome.
STREAM Issues in Water Re-sources Manage-ment	I4	**Session: Bridging the gap - monitoring and modelling strategies for improving process knowledge and environmental management**	**Martin Volk,** Dr., UFZ- Helmholtz Centre for Environmental Research, Leipzig, Germany **Ann van Griensven,** 2 UNESCO-IHE, Delft, The Netherlands	Models are used since decades for simulating the impact of land and water management on hydrology, sediment and nutrient transport and water quality. However, they are still mostly used by scientific institutions, and not "directly" in environmental management. In addition, finding the appropriate monitoring strategy to capture hydrological and nutrient dynamics and to support the modelling procedure is still a challenge. On the other hand, new measurement techniques, remote sensing methods and models have been developed during the last years that are promising to improve this situation. Hence, this session is seeking for papers that present 1) innovative monitoring strategies that support both process investigation and model performance (and vice versa), and 2) model systems based on appropriate monitoring strategies and used in environmental management. Both studies from experiments and experimental sites linked to relevant authorities as well as more pragmatic approaches are welcome.
STREAM Issues in Water Re-sources Manage-ment	I5	**Session: Use of models for integrated management of urban water systems**	**Lluís Corominas,** ICRA, Spain **Peter Vanrolleghem,** Uni Laval, Québec **Joaquin Comas,** Uni of Girona, Spain **Scientific committee Benedetti, Lorenzo.** Waterways srl, Italy **Butler, David.** Uni of Exeter, UK **Comas, Joaquim.** Uni of Girona, Spain **Corominas, Lluís.** ICRA, Spain **Jeppsson, Ulf.** Lund Uni, Sweden **Mannina, Giorgio.** Uni di Palermo, Italy **Martin, Cristina.** Uni Laval, Québec **Muschalla, Dirk.** ITWH GmbH, Germany **Nopens, Ingmar.** Ghent Uni, Belgium **Porro, Jose.** Malcolm Pirnie, US **Rieckermann, Jörg.** EAWAG, Switzerland **Rodriguez-Roda, Ignasi.** ICRA, Spain **Schuetze, Manfred.** IFAK, Germany **Vanrolleghem, Peter.** Uni Laval, Québec	The aim of this session consists in the creation of a discussion platform for researchers involved in the development and application of modelling for the integrated management of urban water systems (UWS). More specifically, the session would present the last trends in system-wide modelling (mechanistic, data-driven, etc) and the techniques used to calibrate and validate these models (Bayesian, multiobjective optimization, etc). On the other hand, this session will highlight the importance of models in integrated management to successfully implement the Water Framework Directive (WFD), to achieve good ecological and chemical status of receiving water bodies. The WFD also highlights sustainability as an important driving force to manage UWS, whereas in the US Triple-Bottom-Line (TBL) assessments are increasingly part of decision-making in water systems. Therefore, this session also is open to presentations about new models (green house gas emission models, e.g. N2O and CH4 generated in sewer systems, wastewater treatment plans and rivers), new paradigms (e.g. ecosystem-based management) and methodologies (e.g. Life Cycle Assessment) required to address sustainability. The translation of environmental protection objectives into different types of legislative structures and norm systems (statistical effluent limit definitions) is also attracting attention. Thus, this session will favour contributions aiming at improving the use of currently available models to solve environmental problems.

Streams	Code	Title	Organizers / Contact	Content
STREAM Young Academics	J1	**Workshop: Elsevier author workshop: getting published, getting cited in international ecological scientific journals**	**Sandra Broerse;** ELSEVIER, Amsterdam, The Netherlands **Brian Fath,** Towson University and International Institute for Applied Systems Analysis, USA **Tony Jakeman;** Australian National University (ANU), Canberra, Australia	In this workshop, we provide an overview of the Elsevier publishing system including author services and latest trends in publishing (e.g., article based publishing, graphical abstracts, etc.). Furthermore, we - as editors - review some of the major features of publishing including choosing a journal, writing and revision tips, language, technical details, ethical issues and getting accepted. This advice is targeted toward young researchers to help them navigate the world of publishing and get quality articles that impact the field.
STREAM Young Academics	J2	**Workshop: Use of models for integrated management of urban water systems**	**Martin Volk,** UFZ- Helmholtz Centre for Environmental Research, Leipzig, Germany **Sven Lautenbach;** UFZ-Helmholtz Centre for Environmental Research, Leipzig, Germany	Publishing papers in high ranked journals is gaining more and more importance in scientific society and is seen as one quality measure in science. Hence, it is important that students learn in an early stage how to successfully prepare papers and publish their work in scientific journals. In the workshop, we - as reviewers - will provide tips and recommendations on how to structure a manuscript and how to write it well. We will point out the 10 biggest authors' mistakes that result in rejections of the submitted papers and answer related questions. We invite also other experienced reviewers to report on their experiences. The workshop is addressing primarily PhD students and young scientists.
STREAM Young Academics	J3	**Student and young researcher workshop / meeting of young academics**	**Anna Cord,** Department Computational Landscape Ecology, Helmholtz Centre for Environmental Research GmbH - UFZ Permoserstraße 15, 04318 Leipzig, Germany **Francesco M. Falcieri**, PhD, CNR - ISMAR, Arsenale-Tesa 104, Castello 2737/F, 30122, Venezia, Italy **Markus Stocker**, University of Eastern Finland, Kuopio Campus, Department of Environmental Science, Research Group of Environmental Informatics P.O. Box 1627, FI-70211 Kuopio, Finland	The aim of the workshop is to: - Inform you about the purpose of the iEMSs network - Update the list of topics already included in our website - Discuss your ideas how the network should be improved (regarding topics, using Facebook or Twitter) If you need more information you can contact us at iemss.network (at) gmail.com.