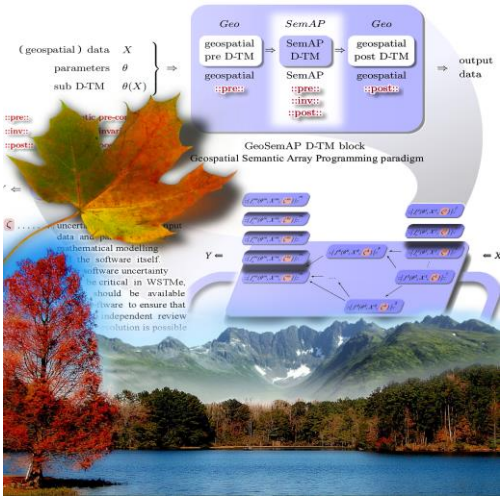
Call for Papers – Geospatial Semantic Array Programming

2014 Quarterly Theme Issue 2
March 22, 2014 – June 21, 2014

Earthzine, an IEEE-sponsored online scientific journal, is soliciting articles of 800-3,000 words for its second quarter theme of 2014 on **Geospatial Semantic Array Programming** (GeoSemAP). We seek contributions from all regions of the globe, addressing environmental transdisciplinary research in which a concise integration of array-based semantics and array programming, geospatial tools and a modular composition of data-transformation models are exploited for geospatial problems within the paradigm of Semantic Array Programming.



Pictorial representation of modular Data-Transformation Modelling (D-TM) with Geospatial Semantic Array Programming. Image Credit: Daniele de Rigo.

This theme specifically focuses on wide-scale transdisciplinary modelling for environment (WSTMe) as a scientific challenge with an increasingly important role in allowing strategic policy-making to be effectively discussed and programmed with the support of robust science.

Specific topics of interest and review criteria include:

- WSTMe combining the use of Semantic Array Programming and Free and Open Source Software for Geospatial (FOSS4G) under the GeoSemAP paradigm
- WSTMe problems ranging from the catchment scale up to the regional/continental/global scale
- The relationship – array of feedbacks, disturbances, impacts – between different environmental sectors for natural resources (forests, water, soil, etc.)
- Climate and land-use scenarios defined in terms of large geospatial arrays
- Integrated environmental modelling and multi-criteria environmental policy support: ecosystem services, risk assessment (e.g. of natural hazards and landscape disturbances) and the bio-economy
- Local-scale GeoSemAP modelling (e.g. wildfires, landslides, floods, plant-pest outbreaks) set in a wider context (using regional/global datasets and scalable approaches so as for multiple local applications to be more easily generated in a wider spatial extent)
- Case studies or modelling architecture
- The chain of D-TMs and its flow of initial/derived geo-data (semantically-enhanced with the SemAP concise representation of array-based semantic constraints)

- The modular use of free software and preferably also of open data (e.g. by documenting how free alternatives may replace proprietary tools and data)
- Data interoperability is recommended (by using standard/portable data formats, e.g. 1,2,3,4, …)
- Preferably open geospatial standard (compliance with OGC standards and – if meaningful – regional standards, such as the European INSPIRE Directive)

Natural resources such as forests, water and soil, along with climate, land-use and a plethora of anthropogenic changes, are subject to a network of interactions whose large scale effects may be significant. Systemic disturbances of landscape, such as wildfires, storms and plant pest outbreaks (possibly exacerbated by climate change and shifting ecological niches) are typical and worrying examples. Their impacts range from altered carbon cycle, soil erosion and landslide susceptibility to perturbed habitat connectivity, runoff, floods and seasonal allocation of water resources. Non-obvious modelling aspects of a given spatio-temporal scale for a given discipline may potentially reverberate, bringing systematic biases in other scales and disciplines (systems of systems).

This challenging level of complexity requires integrated modelling practices to be scalable in coping with arrays of often nonlinear and uncertain WSTMe relationships. Earth observation and computational science are intrinsically linked. They are expected to deal with such a modular array of transdisciplinary aspects while ensuring that they are concise and preserve semantics. This is desirable in order to better communicate key messages and issues between different scientific communities and policy-makers. Transparency – also due to the open science approach, including free scientific software and open data – is a goal to strive for as it supports society in clearly understanding and controlling the implications of the technical apparatus on collective environmental decision-making.

The characteristic WSTMe heterogeneity of available geospatial information, complexity of systems and multiple sources of uncertainty (including those related to scientific software) may affect the robustness, transparency and comprehensibility of hypotheses and results. A gap exists between mathematical modelling and its crucial software implementations, which are often difficult to access and understand. A similar difficulty also may apply for obtaining and understanding essential data. Concise array-based approaches (with array programming tools) have proved helpful in mitigating the complexity of WSTMe.

Semantics may be seen as another key aspect, dealing with both computational modelling (Semantic Array Programming, SemAP) and with the overall dependability of geo-information processing based on transparent geospatial tools. A new approach for WSTMe has recently emerged by introducing a lightweight integration of SemAP and geospatial tools. WSTMe problems are addressed with chains of data-transformation models (D-TM), each expressed as a semantically-enhanced module with concise array-based notation. This is called Geospatial Semantic Array Programming (GeoSemAP), and promises intermediate data and information layers to be more easily described in their multifaceted semantics so as to increase the fault-tolerance, transparency and reproducibility of WSTMe. This might also help to better communicate part of the policy-relevant knowledge, often difficult to transfer from technical WSTMe to the science-policy interface.

Important dates: Queries to the editors may be sent at any time. Submission of original articles and other content will be accepted until **June 1, 2014**. Submissions must be in English. Submit inquiries and articles to Managing Editor Jeff Kart at jkart@earthzine.org.

Publication: All accepted contributions will undergo review by at least two subject-matter experts, be published online from March 22, 2014 to June 21, 2014, at Earthzine.org, and be freely and persistently accessible to the public. Earthzine does not charge authors for publishing.

Submission of correlated works to FSSAPR and EDDTMR: All accepted contributions are offered the possibility to support their content by submitting complementary manuscripts to the forthcoming (spring 2014) open-access journals *Free Software and Semantic Array Programming Research* (FSSAPR) or *Environmental Data and Data Transformation Models Review* (EDDTMR). Original contributions expanding the technical aspects (focusing respectively on software and data) of the topics discussed in the Earthzine theme may be submitted to the forthcoming journals to undergo independent peer review. FSSAPR and EDDTMR do not charge authors for publishing.

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EC, JRC (IES): European Commission, Joint Research Centre, Institute for Environment and Sustainability.

POLIMI, DEIB: Politecnico di Milano, Dipartimento di Elettronica, Informazione e Bioingegneria

OSGeo: Open Source Geospatial Foundation

EMS: Environmental Modelling and Software (Elsevier)

iEMSs: International Environmental Modelling and Software Society

TUG: TeX Users Group (includes the CTAN: Comprehensive TeX Archive Network)

The views expressed are purely those of the guest co-editors and may not be regarded as stating an official position of mentioned organisations.