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# INTAMAP

## *Interoperability and Automated Mapping*

<http://www.intamap.org/>

SIXTH FRAMEWORK PROGRAMME  
PRIORITY IST-2005-2.5.12  
ICT for Environmental Risk Management

**2<sup>nd</sup> Year (September 2007-August 2008)**

**Management Report**

**Appendix: plan for using and disseminating knowledge**

<b>Title of Deliverable</b>	INTAMAP 2nd Year Management Report
<b>Related Workpackage and Tasks</b>	WP7, Task 7.4
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## Appendix 1 – Plan for using and disseminating the knowledge1

**1 Section 1 - Exploitable knowledge and its Use**

**At this stage of the project, no directly exploitable knowledge has been generated. The activities of the only SME in INTAMAP, partner Keynetix (KYX), is expected to result in client development that is exploitable.**

<b>Exploitable Knowledge</b> (description)	<b>Exploitable product(s) or measure(s)</b>	<b>Sector(s) of application</b>	<b>Timetable for commercial use</b>	<b>Patents or other IPR protection</b>	<b>Owner &amp; Other Partner(s) involved</b>
<i>1. Commercial client development</i>	<i>Commercial web client software</i>	<i>1. Environmental management 2. Disaster management</i>	<i>2009</i>		<i>Partic. KYX (owner)</i>

Partner KYX is developing a client in combination with, and on top of, an upload server (using .Net, and the mapguide software); this upload server will be client to the INTAMAP interpolation service. It will have the following features:

- The upload server will be a central store at a web site, nothing will be stored local, but with sufficient user and data protection;
- Will be project oriented, where a project may include access to certain maps and data bases with observations, dealing with security
- Will interface to the web processing service (interpolation service)
- The client can be used to view the resulting outputs, and store it on the server
- Overlays, resulting in specific views, even pictures can be saved and shared with other users
- The client can be used as a tool to share information with other people
- The client will have the possibility to work with parameter choices, preferences related to application fields (e.g. radiation, rainfall, air quality).

The client will be ready at the end of the project, summer/fall 2009. Extensive details on its development and current functionality are found in the “Periodic activity report”, under Workpackage 1.

<sup>1</sup> **Knowledge:** means the results, including information, whether or not they can be protected, arising from the *project* governed by this *contract*, as well as copyrights or rights pertaining to such results following applications for, or the issue of patents, designs, plant varieties, supplementary protection certificates or similar forms of protection (Article II.1.14 of the contract)

## 2 Section 2 – Dissemination of knowledge

**Overview table**

Planned /actual Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
	<i>Conferences</i>	<i>Researchers; users</i>	<b>All</b>		<i>All</i>
	<i>Publications</i>	<i>Researchers</i>	<b>All</b>		<i>All</i>
	<i>Project Web Site</i>	<i>Research, policy, users</i>	<b>All</b>		<i>UU, Ast</i>
	<i>Posters</i>				<i>All</i>
	<i>Open Source Software</i>	<i>Research; industry</i>	<b>All</b>		<i>All</i>

Below follows a list of all activities.

### *INTAMAP advisory committee*

During year 2, the INTAMAP project has started forming an advisory committee, with members both from research institutes and academia. The goal of the user committee was to get end users and experts involved in the forming of the INTAMAP project, and form a user potential for the products under development. The invitation letter sent to each of the advisory committee members has been presented to the EC and INTAMAP review committee before it was sent. The letter copied in the APPENDIX of this report.

The following table gives the list of experts approached, the field they work in, and whether they accepted the invitation or not.

Name	Institute	Field of expertise	Response
Haigh, Tim	EEA, EU	Air Quality	Decline
Denby, Bruce	NILU, NO	Air Quality	Accept
Sauter, Ferd	RIVM, NL	Air Quality	Decline
De Smet, Peter	MNP, NL; EEA/ETC	Air Quality	Accept
Builtjes, Peter	TNO, NL	Air Quality	Decline
Van den Hout, Dick	TNO, NL	Air Quality	Decline
Sluiter, Raymond	KNMI	Meteorology	Accept
Twenhofel, Chris	RIVM	Radioecology	Accept
Lawrence, B.N.	Atmospheric data centre, UK	Meteorology	Decline
Pierce, Clive	Metoffice, UK	Meteorology	Decline
Latinen, Juhari	STUK, FI	Radiation	Decline
Chandler, Roger	KeySystems.com, UK	Geotechnical engineering	Decline

Oliver, Margaret	Reading University	Soil science	Accept
Mueller, Werner	Linz University	Network optimization	Accept
Mustonen, Raimo	STUK, FI	Radiation	Decline (but see below)
Paul Nathanail	Land Quality Management Ltd	Geotechnical Engineering	Accept

In cases where multiple persons from one institution were asked, this was done on advice of the first person approached. Dr. Mustonen from STUK has agreed that INTAMAP does develop very interesting technology, but has declined because of lack of time. He acknowledges that in the context of the DETECT proposal (as of Nov 2008 under negotiation with EURATOM) STUK will get in touch with the technology and services developed in the context of INTAMAP (see next section).

The budget for INTAMAP did not foresee in funding an advisory committee, so setting up a single meeting for the full committee, covering all expenses, is not feasible. Instead, smaller meetings are organized more locally. The first of them will be on Feb 4, on the 6-monthly INTAMAP meeting in Wageningen, where Dr. C. Twenhofel, Dr P. de Smet and Dr R. Sluiter have agreed to participate the first day of the meeting, when the project will present its ambitions and progress. They will write a report with advice at the end of the day. A meeting with Dr. B. Denby is foreseen in February during the annual meeting of the HEIMTSA project. A meeting with prof. Mueller is foreseen in Muenster, early December. KYX and AST are in discussions with users from the geotechnical community, with meetings planned in the next 2 months.

### *INTAMAP outreach to external users*

Apart from the formation of the advisory committee, INTAMAP has actively reached out to parties that are, or should be, interested in the technology and application of an automated interpolation service. The following institutes/users can be mentioned.

**KNMI** the Dutch meteorological institute is highly interested in automated interpolation algorithms for the interpolation of temperature and rainfall; they are also highly interested in the web service technology that INTAMAP uses and develops. In the context of the **Atmospheric data access for the geospatial user community** project, INTAMAP will hold an invited presentation on Dec 4 (<http://adaguc.knmi.nl/>)

**EEA, UBA** despite the rejection of EEA to advice the INTAMAP project, INTAMAP will try to get access to near-real-time air quality data to set up an SOS itself using these data. EEA has not reacted on this proposal; if this will not work out, INTAMAP will start working with German air quality data available from the Umwelt Bundesamt (UBA).

**RIVM** the radiological laboratory of RIVM is highly interested in the INTAMAP technology, and has participated and reacted on INTAMAP activities, on invitation, at the second INTAMAP meeting in Utrecht. Contact has remained since, roughly on a three-monthly basis.

**DETECT** is an EU FP7 project proposal that aims at the optimization (and partly design) of gamma dose rates monitoring networks for European countries. The proposal is currently under negotiation. UOM is partner in the project, and the project will actually use the outcomes of INTAMAP as technology for monitoring network optimization.

**EC, JRC, MARS** is the agriculture unit of the JRC where a lot of meteorological data need to be interpolated for crop modelling (AGRI4CAST) or for estimating food security (FOODSEC). INTAMAP is currently tested with AGRI4CAST to assess the advantages and drawbacks of using INTAMAP instead of their own interpolation algorithms of daily rainfall measurements over Europe.

### *INTAMAP and OGC*

During the first half of Year 2, several contacts have grown between people from OGC and INTAMAP. OGC has taken an active attitude towards EU projects in general, to avoid that projects “dump” their standards-proposals with OGC without having resources to work on comments, or continue work. The attitude seems early involvement, and INTAMAP has replied to this by actively participating in the OGC TC meeting in Potsdam, June 1-5, 2008, where M. Williams (AST) and E. Pebesma (UU) have presented UncertML in a session on the SWE architecture, and in a session from the Data Quality Working Group (DQWG). Although UncertML is still in full development, we consider this early involvement a definitely positive development. OGC in turn has responded very positively, amongst others by including UncertML in the OWS-6 testbed. The SWE and geoprocessing groups at UOM will take part in OWS-6, and will start experimenting with UncertML.

### *INTAMAP on the WWW*

With only a few tens of links to INTAMAP found during the early days of the project, one will find today (1 September 2008) more than 1 500 links to INTAMAP work, links pointing to scientific publications as well as to the web site. A few IT online journals published information about INTAMAP, allowing us to largely extend our audience to software developers, see e.g.

<http://xml.coverpages.org/newsletter/news2008-07-22.html>

Similar is the growth of the visibility of UncertML that did not exist in Google’s vocabulary at the start of the project. We have today almost 200 links to this topic.

### *INTAMAP on GI Days 2008*

As a presentation vehicle for his new working group at the institute for geoinformatics at University of Muenster, Prof. E. Pebesma has been general chair at the GI Days conference 2008, held in Muenster. The conference theme was “geospatial processing”, and the conference had a special session on “**Geostatistical Applications and Real-Time Geostatistics**”, in which three full papers from the INTAMAP consortium have been presented. In addition one keynote came from the INTAMAP consortium (D. Cornford: *Uncertainty: the key to interoperable geospatial processing?*), and another one from the OGC (M. Klopfer). Finally, three posters were submitted by the INTAMAP consortium. The heavy representation could

be justified by combining the event with the mid-term review of INTAMAP in Muenster.

### *Disseminating knowledge, reported specifically for each work package*

#### 2.1.1 WP1

An extensive dialogue is well underway with the Open Geospatial Consortium with UncertML being proposed as an international standard with clear governance. This is important to facilitate the widespread adoption of UncertML and will ensure the work reaches the widest and most relevant audience. We are also in discussion with a range of other end users, including KNMI in Holland, BADC in the UK and NOAA in the US, as to how our work can best be used in their contexts. UncertML now has a strong web presence (<http://www.uncertml.org/>) and is easily found using Google for example.

The client developed by KYX is becoming increasingly mature and KYX are exploring how this can be exploited in the future.

The software developed within INTAMAP is available on sourceforge: <https://intamap.svn.sourceforge.net/svnroot/intamap/>. This is still developing, but will be one widely used route through which others can access the software developments from INTAMAP.

#### 2.1.2 WP2

There is strong interest among various scientific groups for the non-parametric anisotropy identification method. In particular, the University of North Carolina in USA (Prof. Marc Serre, Dept. of Environmental Sciences and Engineering) and the Université Catholique de Louvain (Prof. Patrick Bogaert, Unité d'Environnement et de Géomatique) have expressed a clear interest in using the method in their studies of spatial analysis. Since it is anticipated that the method will be useful to the scientific community who are active in spatial analysis, the main modules of the Matlab code used in the paper by Chorti and Hristopulos (IEEE Transactions in Signal Processing, 2008) have been made available for download on the internet at the link: <http://www.mred.tuc.gr/home/hristopoulos/dionisi.htm#Anisotropy.Code>

#### 2.1.3 WP3

So far the actions relating to the dissemination of knowledge developed within WP3 include two journal papers [1], [5], three conference proceedings papers [2], [4], [6] and another paper that will appear in a Springer Volume [3] by the end of this year. All these papers address to a wider community, including specialists working in such diverse areas as biosciences, earth sciences, statistics and computer sciences, geoinformatics and GIS.

#### 2.1.4 WP4

The ‘Plan for using and disseminating the knowledge’ as presented in the Description of Work is unchanged. Deliverable 4.2 produces two journal articles.

#### 2.1.5 WP5

BfS plans to do both, to transfer the knowledge gained from INTAMAP to other radiation related interpolation processes within our organization and to use and disseminate the knowledge to other partners and projects.

To achieve this, BfS presented the INTAMAP project at the GEOSS sensor web workshop, Geneva, (May 15-16, 2008), at the international conference on radioecology and environmental radioactivity in Bergen (June 15-20, 2008) and on the 53rd Annual Meeting of the Health Physics Society in Pittsburgh (July 13-17, 2008). The response to both presentations was very positive and interest was shown in the European GDR networks, the data harmonization procedures and in the automatic mapping procedures.

In addition BfS wants to use optimized interpolation methods developed within the project for predictions of in-house Radon concentrations. Besides smoking, in-house Radon is second most important risk factor for lung cancer in Germany. Prediction of concentrations or threshold exceedance probabilities is difficult since the Radon concentration is determined by various parameters. Prediction results will be used to effectively and efficiently plan future measurement campaigns.

#### 2.1.6 WP6

In addition to the regular contributions to conferences and peer reviewed publications, DG JRC focused on promoting INTAMAP for the mapping of non-radiological data as this was considered a priority by the reviewers.

JRC presented the INTAMAP prototype (RAISIN) at the GEOSS sensor web workshop, Geneva, (May 15-16, 2008). Within the European Commission, INTAMAP was presented to a number of units of the JRC, among which the unit of Renewable Energies and the Agriculture Unit. The last was chosen to initiate some formal collaboration, in particular with the AGRI4CAST group (<http://mars.jrc.it/mars/About-us/AGRI4CAST>). The large visibility of the activities of this group given the many end-users of agricultural forecasts should provide an excellent opportunity for INTAMAP to get direct feedback from end-users.

A number of high visibility meetings are foreseen for 2009 in which INTAMAP could be presented directly to potential end-users. Among these meeting, we will cite the 33rd International Symposium on Remote Sensing of Environment (ISRSE). The overall theme of the symposium is the use of Earth Observation systems and airborne techniques for understanding and managing the Earth environment and natural resources.

Last but not least, WP6 is coordinating the organization of StatGIS 09 “GeoInformatics for Environmental Surveillance” (17-19 June 2009, Milos Island, Greece). This international conference will close the INTAMAP project and be used to present the work done through scientific papers but also through workshops dedicated to demonstrations and applications. The conference announcement is already available at

<http://milos.conferences.gr/statgis2009>

We believe the prestigious background of the keynote speakers as well as of the members of the international scientific committee will allow us to reach a very large audience. The call for papers can be found in annex of this document.

### ***Conferences & Workshops:***

On several conferences more than one INTAMAP presentation has been held or has been submitted. Acknowledging and explaining the INTAMAP project is here a standard activity, and it further enlarges the visibility of the project. The conferences and workshops where INTAMAP material was presented during Month 1-24 are indicated hereafter.

- *geoENV VI – Geostatistics for Environmental Applications*. November 2006, Rhodes, Greece.
  - Pebesma, E.J., Dubois, G. and D. Cornford (2008). The challenge of real-time automatic mapping for environmental monitoring network management.
- *ICMS, Smoothing-Based and Gaussian-Process-Based Methods for Non-Parametric Regression in Environmental Problems*. March 2007, Edinburgh, UK
  - Cornford, D. (2007) Data assimilation, Bayesian inference and Gaussian processes: opportunities and challenges.
- *EGU 2007*, April 2007, Vienna, Austria, *Natural Hazards session*.
  - Skøien, J.O., Pebesma, E., Blöschl, G. (2007). Geostatistics for automatic estimation of environmental variables - simple solutions.
- *ISESS 2007 – International Symposium on Environmental Software Systems*, May 2007, Prague, Czech Republic
  - Williams, M., Cornford, D., Ingram, B., Bastin, L., Beaumont, T., Pebesma, E. and G. Dubois (2007). Supporting interoperable interpolation: the INTAMAP approach.
- *5<sup>th</sup> International Symposium on Spatial Data Quality*, June 2007, ITC, Enschede, The Netherlands
  - Jiang, Z., S. De Bruin, G.B.M. Heuvelink and C.J.W. Twenhöfel (2007), Optimization of mobile radioactivity monitoring networks.

- 32nd Spring Lecture Series, University of Arkansas, Spatial and Spatio-Temporal Statistics, Fayetteville, April 12-14, 2007
  - Spöck, G., Noninformative priors with special application to spatial statistics, talk.
  
- *StatGIS 2007*, September 2007, Klagenfurt, Austria.
  - Baume, O., J.O. Skoien, G.B.M. Heuvelink, E.J. Pebesma (2007) Geostatistical approach to data harmonization – application to radioactivity exposure data. Environment and Ecological Statistics.
  - Chorti A. and D. T. Hristopulos (2007) Automatic Detection of Spatial Anisotropy in Environmental Data Sets.
  - Skoien, J.O., O. Baume, E.J. Pebesma, G.B.M. Heuvelink (2007) Identifying and removing heterogeneities between monitoring networks.
  - Spöck, G (2007) Bayesian trans-Gaussian Kriging and the Uncertainty of Variogram Estimates.
  
- *INTERCAL 2007* Schauinsland, *External dose rate measurements at the Schauinsland intercalibration site*, November 2007, Freiburg, Germany.
  - J. O. Skøien (2007) The INTAMAP project - first results.
  
- *EGU 2008*, April 2008, General Assembly, Vienna, Austria.
  - D. T. Hristopulos, A.Chorti, G. Spiliopoulos and E. Petrakis (2007) Systematic detection of anisotropy in spatial data obtained from environmental monitoring networks. Geophysical Research Abstracts, EGU2008-A-03671.
  - Skøien, J.O.; Pebesma, E. J (2008) Real-time mapping in emergency situations – some preliminary results.
  - Williams, M; Cornford, D; Bastin, L; Ingram, B. (2008) Web Processing Service based interoperable, automated, interpolation.
  - Williams, M; Cornford, D; Bastin, L; Ingram, B. (2008) UncertML - XML language for exchanging uncertainty. poster.
  - Skøien, J. O., L. Gottschalk, E. Leblois, E. J. Pebesma (2008) Interpolation with irregular support - examining a simplification.
  
- GISRUK2008*, Manchester, UK 2-4 April.
  - Williams, M., Cornford, D., Bastin, L. and Ingram, B. R., 2008. UncertML: an XML schema for exchanging uncertainty.
  
- *International Conference on Radioecology and Environment Radioactivity*, 2008 Bergen Norway .
  - Stöhlker, U., M. Bleher, T. Szegvary, F. Conen (2008) Inter-calibration of gamma dose rate detectors on the European scale.

- *GEOSS SensorWeb Workshop*, 15-16 May 2008, Geneva, Switzerland
  - J. de Jesus (2008) INTAMAP. INTeroperability and Automated MAPping.
  - U. Stohlker(2008) The German gamma dose rate network.
  
- *GI-Days 2008*, 16-18 June 2008, Münster, Germany
  - De Jesus, J., Dubois G., Hiemstra, P. (2008). Web-based geostatistics using WPS.
  - Skøien, Jon O., Olivier Baume, Edzer J. Pebesma and Gerard B. M. Heuvelink(2008) Automatic detection and correction of heterogeneities between networks.
  - S.J. Melles, J. Beekhuizen, S. de Bruin, G.B.M. Heuvelink, A. van Dijk and C.J.W. Twenhöfel (2008) Optimizing monitoring networks for contaminant dispersion. Proceedings accepted.
  - Cornford, D. (2008) Uncertainty: the key to interoperable geospatial processing? Keynote
  - Williams, M., Cornford, D., Bastin, L. and Ingram B., (2008) A conceptual model for uncertainty – UncertML, Best Poster Winner
  - Ingram, B. D.Cornford, (2008) An approach to sensor fusion using geostatistics. Poster.
  
- *MODA 8*, 4th-8th June 2007, Almagro, Spain
  - Spöck, G., Spatial covariance-robust minimax prediction based on experimental design ideas, , talk.
  
- *53<sup>rd</sup> Annual Meeting of the Health Physics Society* (American conference of radiological safety), 13-17 July 2008 Pittsburgh, US
  - Stohlker, U., M. Bleher (2008) The Schauinsland Intercalibration facility. 53th Annual Meeting of the Health Physics Society.
  
- *GeoEnv 08*, 8-10 September 2008, Southampton, UK
  - Baume, O., Skøien, J.O, Heuvelink, G.B.M. , Pebesma, E.J. (2008). Bias removal in heterogeneous spatial data: simple solutions and a practical application.
  - Beekhuizen, J., Melles, S.J., de Bruin, S. Heuvelink, G.B.M. van Dijk, A. Twenhöfel, C.J.W. (2008). Dealing with uncertainty in determining the optimal locations of mobile devices.
  - Ingram, B. R., Cornford, D., and Csato, L., (2008) Robust automatic mapping algorithms in a network monitoring scenario. Paper
  - Ingram, B., Cornford, D.(2008) Parallell geostatistics for sparse and dense datasets. Paper
  - Kazianka, H. and J. Pilz (2008): Spatial interpolation using copula-based geostatistical models. Paper

- Spöck, Gunter (2008): Bayesian locally stationary trans-Gaussian kriging using generalised Voronoi tessellations. Paper
- Skøien, J.O., L. Gottschalk, E. Leblois, E. J. Pebesma (2008) Accounting for irregular support in spatial interpolation – analysing a simplified approach.
- Williams, M., Cornford, D., Bastin, L. and Ingram, B. R., 2008. Exchanging uncertainty. Interoperable geostatistics?
- 4<sup>th</sup> *International conference on Information and Communication Technologies in Bio and Earth Sciences*, 18-19 Sept. 2008. Athens, Greece
  - Pilz, J., Kazianka, H. and Spöck, G. (2008) Interoperability – Spatial Interpolation and Automated Mapping. Proc. 63-71.
- *ICCSA, GEOG-AN-MOD Workshop*, Perugia, Italy (2008)
  - Melles, S.J., Heuvelink, G.B.M., Twenhöfel, C.J.W., Stöhlker, U. (2008). Sampling optimization trade-offs for long-term monitoring of gamma dose rates.

**The following conferences will be attended by the INTAMAP consortium:**

- 1<sup>st</sup> *Workshop on Rainfall Estimates for Crop Monitoring and Food Security* 22- 24 October 2008, Barza, Italy. (Task AG0703 of GEOSS).
  - Dubois, G. and J. de Jesus. 2008. INTAMAP. Interoperability and automated mapping.
- 7<sup>th</sup> *International Semantic Web conference*, 26 October 2008 Karlsruhe, Germany
- Williams, M., Cornford, D., Bastin, L. and Ingram, B. R., 2008. Describing and Communicating Uncertainty within the Semantic Web, Uncertainty Reasoning for the Semantic Web Workshop.
- *Geostats 2008*, Santiago, Chile (not in the files)
  - Baume, O.P., J.O. Skøien, G.B.M. Heuvelink and E.J. Pebesma (2008), Data harmonization with geostatistical tools: a Bayesian extension. (Paper submitted to and to be presented).
  - Spöck, Gunter and J. Pilz (2008): Non-stationary spatial modelling using harmonic analysis. Paper submitted to and to be presented.
  - Skøien, J. O., E. J. Pebesma, G. B. M Heuvelink (2008) Unbiased block predictions and exceedance probabilities for environmental thresholds, Geostats 2008, Santiago, Chile
  - Pilz, J., Bayesian Spatial Sampling Design.
- 33<sup>rd</sup> *International Symposium on Remote Sensing of Environment (ISRSE)*. 4-8 May 2009, Stresa, Italy
  - G. Dubois, J. de Jesus, B. Doherty, D. Cornford, E. J. Pebesma (2009) Lessons learned from INTAMAP, an interoperable web service for the real-time interpolation of environmental variables. *Submitted*
- *StatGIS 09 “GeoInformatics for Environmental Surveillance”* (17-19 June 2009, Milos Island, Greece).
  - Organized by INTAMAP, all contributors will participate

**Project web site:**

A web site (<http://www.intamap.org>) was installed within three months of the start of the project. The web site contains basic information about the work, the funding, the partners, deliverables, a link to the wiki, and a restricted section where (draft) deliverables could be uploaded that are only accessible to project members (e.g. because it contained information taken from reports that have not become public yet). Within the first year, a second incarnation of the web site has been launched, with much better graphics, responsive menu items, and attractive color usage. In the second year, a large amount of publishable material has been released on the web site. Some of the reports have not been published because they contain material that is still under review, or because copyrights have been transferred to (public) journals. The website has also been closer integrated with the wiki where it contains highly dynamic material, such as publication lists and lists of past and future events where INTAMAP was or will be present.

**Wiki**

It has been decided by the project to use a wiki site (<http://wiki.intamap.org/>) that is world-readable, but only editable for project members. The wiki site is the place where much of the joint (meaning: between partners) work takes place, and where relevant information of general interest (meeting reports, tutorials, discussions) is published.

**Open Source Software distribution**

Most open source software developments will be distributed freely in source code form over the internet. Some of the developments now available have been made available on the SourceForge web set, found at <http://www.sourceforge.net/projects/intamap>. Typical use up to this stage involves the public readable svn (subversion, source code version control system) file tree, which is writable for project members only.

At this stage, much of the software written is in functional form, and passes regression tests. It is foreseen that the software will be better documented, undergo more rigorous testing, and that components will be made working better together, e.g. where it comes to R code from different partners, different software components such as client and server, or server and the R back end. The open, world-readable development code base will be used as the main communication platform between project members, and at this stage has only project members with write permission. In some sense, working with a publicly readable source tree can be seen as a form of 100% open development, or continuous publication.

**Mailing list**

A mailing list ([intamap@geo.uu.nl](mailto:intamap@geo.uu.nl)) has been created for project members to be able to contact all project members at once, without fearing that someone is missed or persons that left the project are addressed. In addition to having a central, always up to-date list of mail addresses, the mailing list system archives its messages, and this allows browsing and searching mailing list archives, e.g. for project members that join the project later.

### 3 Section 3 - Publishable results

No commercially exploitable products have been delivered so far.

#### ***Publications***

As many of the partners are academic, and a considerable amount of the work addresses mathematical and statistical data analysis issues, one of the main results of the INTAMAP project will be research papers. In addition, software developments are being published in suitable papers.

The papers currently in press in the peer reviewed journal *Stochastic Environmental Research and Risk Assessment (SERRA)* published by Springer Verlag, have been published in a special issue that is fully dedicated to automatic mapping. We believe the publication of this special issue in this prestigious journal provides a great visibility to the scientific and technical issues related to real-time mapping but also to INTAMAP. The funding of DG-INFSO has been furthermore acknowledged in the Editorial of the special issue.

#### **Peer reviewed journals**

Brenning, A. and G. Dubois (2008) Towards generic real-time mapping algorithms for environmental monitoring and emergency detection. *Stochastic Environmental Research and Risk Assessment (SERRA)* 22 (5). 601-611.

Chorti, A. and D.T. Hristopulos (2008) Non-parametric Identification of anisotropic (Elliptic) Correlations in Spatially Distributed Data Sets. *IEEE Transactions on Signal Processing*.

D'Alimonte, D. and D. Cornford (2008) Outlier detection with partial information: Application to emergency mapping. *Stochastic Environmental Research and Risk Assessment (SERRA)*. 22 (5), 612-620.

Dubois, G. (2008) Editorial. Advances in automatic interpolation for real-time mapping. *Stochastic Environmental Research and Risk Assessment (SERRA)* 22 (5), 597-599.

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**Submitted Publications** (not in the file)

Heuvelink G.B.M., Z. Jiang, S. De Bruin and C.J.W. Twenhöfel (2008), Optimization of mobile radioactivity monitoring networks. *International Journal of GIS*. (not in file)

Baume, O., Skøien, J.O, Heuvelink, G.B.M. , Pebesma, E.J. (2008). A geostatistical approach to data harmonization: application to radioactivity exposure data. Submitted to *Environmental and Ecological Statistics*.

Baume, O., Skøien, J.O, Heuvelink, G.B.M. , Pebesma, E.J. (2008). Data harmonization with geostatistical tools: a Bayesian extension. submitted

Skoien, J.O., Baume, O.P, Pebesma, E.J., and G.B.M Heuvelink (2008), Identifying and removing heterogeneities between monitoring networks. *Environmetrics*, submitted



## **APPENDIX**

Dear ...

I am sending you this letter because you may be interested in the issue of automatic interpolation of environmental variables. INTAMAP (<http://www.intamap.org/>) is a project funded by the European Commission under FP6 that aims at developing an interoperable web service to perform such automatic interpolation in real-time. INTAMAP seeks now an advisory committee of experts and/or potential users, and you are one of the people we approach for this.

The main objective of INTAMAP is to develop an interoperable framework for real-time automatic mapping of critical environmental variables by extending spatial statistical methods and employing open, web-based, data exchange and visualisation tools. To illustrate the potential of the framework at the European scale we will apply the framework to produce a system for automatic mapping of radiation levels reported by 29 European countries that participate in the European Radiological Data Exchange Platform ([EURDEP](#)). The ambitions of INTAMAP are however by no means limited to radiological variables, and we are actively seeking for other applications areas as well, including air quality.

In case of hazards and emergencies (e.g. pollution peaks, nuclear/radiological accidents, flash-floods), maps of environmental variables interpolated from monitoring network measurements are needed in real time with minimum or no human intervention to reflect the monitored situation. In particular when dealing with unforeseen events (*hot spots* or extreme values) environmental monitoring systems usually lack adequate automatic mapping systems. Because spatial interpolation has an associated interpolation error, an automatic mapping system must also inform decision makers about the uncertainties associated with the interpolated maps, such as by means of probabilities that a critical threshold is exceeded over a certain geographic region. Then, for example, combining these probabilities with population densities yields a system for rapid assessment of exposed population at risk.

INTAMAP also has relevance to other scenarios, such as real-time calculation of an interpolated variable from measurements obtained in the field using a mobile device, with the ability to then use the interpolated map, with the associated uncertainty, on the mobile device to plan the next sampling location. It could also be used by people requiring an easy interface to a state of the art interpolation system for data they are analyzing as part of their workflow.

The project runs from Sept 2006 to Sept 2009, and is now forming a committee of experts and potential end users that can advise the INTAMAP consortium on the relevance of the developments within the project from the user perspective. **We would like to ask you to become a member of this advisory committee.**

As a member of the INTAMAP advisory committee we ask from you, and offer to you, the following

- you will be informed about developments in the INTAMAP project on a regular basis,
- you will be invited to test the functionality developed by INTAMAP and to respond as to whether this meets your expectations,
- you will be invited to comment on the usefulness of the developed services and clients,
- you will be invited to meet with INTAMAP consortium members, either at INTAMAP meetings or at your own institute,
- the INTAMAP consortium will carefully listen to your response,
- your involvement will be acknowledged in INTAMAP reports and on the web site.

As all of the server-side development and some of the client-side development will be completely in the open source, you or your organization may also benefit from the final software products INTAMAP will deliver.

We hope that you are interested in our project, and are willing to spend some time on reviewing our developments and responding to them. If you do not have time or interest in this, please consider whether you can suggest us a colleague that could be willing to do this.

Please contact me if you have any further questions.

On behalf of the members of the INTAMAP consortium,

With best regards,

Edzer Pebesma  
Coordinator of INTAMAP  
Institute for Geoinformatics  
University of Münster  
+49 251 83 33081

*Conference announcement (1st Call):*

## StatGIS 09 "GeoInformatics for Environmental Surveillance"

Location: Milos Island, Greece. George Eliopoulos Milos Conference Centre

Conference Dates: June 17-19, 2009.

Conference Web Site: <http://milos.conferences.gr/statgis2009/>

Contact: [statgis2009@heliotopos.net](mailto:statgis2009@heliotopos.net)

Keynote Speakers:  
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We are pleased to announce the following keynote speakers for this event:

- + Noel Cressie, Ohio State University: Spatio-Temporal Random Effects Filtering
- + Hans Wackernagel, Ecole des Mines de Paris: Data assimilation for epidemiological surveillance
- + Stefano Nativi, CNR-IMAA, University of Florence: Multidisciplinary interoperability architectures, some GEOSS and GMES experiences

Conference Overview:  
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StatGIS is addressed to researchers in academia and research institutes, as well as practitioners and industry professionals who want to learn about recent developments in spatial statistics and their applications, and to share their experiences in these areas. Application fields of interest for this conference will include, but not be limited, to: spatial environmental modelling, early warning monitoring systems for the environment, geostatistics in natural hazards prediction, optimum spatial design, space-time analysis and renewable energy resources, remote sensing applications in land reclamation after mining exploitation, spatial metrics for biodiversity assessment and monitoring, etc.

The conference will provide an opportunity for researchers and industry to meet and exchange the latest in spatial statistics and geoinformatics with an emphasis on the main steps involved in environmental monitoring and surveillance. We will start with the collection of data from environmental sensors and monitoring networks and further discuss their use by the web services and systems involved in the processing of the information. The automated analysis of the data and the detection of anomalies and changes will also be covered before finally addressing the visualization and communication of the generated information for efficient decision making.

The international character of the conference will be an opportunity to focus on GMES (Global Monitoring for Environment and Security) and GEOSS (Global Earth Observation System of Systems) related issues, in particular on the need for cost-effective sustainable services. StatGIS 2009 will therefore focus on generic solutions, re-usable software solutions, in particular Open Source technology, and interoperability of systems. Cross-border issues that affect the homogeneity of geographic information (INSPIRE) and of global environmental monitoring networks as well as the interoperability of the systems will also be covered.

Those used to the tradition of StatGIS being an important meeting to learn about the latest developments in geostatistics and spatial statistics will not be disappointed by the challenges that will be discussed in Milos. Statistical issues that will be covered range from the analysis of data provided by heterogeneous networks, the automatic detection of anomalies for early warning, to the real-time interpolation of data collected by mobile devices or the fast processing of environmental data for reducing computing times. The monitoring of environmental risks using spatial statistics and geoinformatics covers a large number of applications. These cover issues as different as environmental radioactivity, global change, biodiversity, pests, floods, droughts, fires or earthquakes but also health risks associated with the spreading of viruses or any health threats.

Key papers will be published in a special issue of Computers & Geosciences.

#### Conference Topics

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- Topic A. Monitoring networks and Sensor Webs
- Topic B. Service Oriented Architectures for Environmental Monitoring
- Topic C. Statistics and spatial metrics for Environmental Monitoring
- Topic D. Open Source tools for Environmental Web Services
- Topic E. Applications and Case Studies
- Topic F. Visualisation and Decision-Making
- Topic G. Socio-economical benefits of Service Oriented Architectures for Environmental Monitoring

Workshop: “Lessons learned from INTAMAP, an interoperable framework for real-time automatic mapping of critical environmental variables”

#### Important dates and deadlines

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- Friday 16 January 2009 - Abstract submission. Information will follow
- Friday 6 February 2009 – Notification of abstract acceptance
- Friday 13 March 2009 – Submission of full papers
- Friday 17 April 2009 – End of reviewing
- Friday 1 May 2009 – Submission of camera ready copies of corrected papers
- 17-19 June 2009: Conference in Milos, Greece

## Conference Fees:

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Early registration until April 25th

Students: 150 Euros

Regular: 300 Euros

Late registration

Students: 200 Euros

Regular: 350 Euros

## Organizing Committee

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Cornford, Dan (Aston University, UK)

Dubois, Gregoire (JRC, European Commission)

Hristopoulos, Dionisis (Technical University of Crete, Greece)

Pebesma, Edzer (University of Münster, Germany)

Pilz, Juergen (University of Klagenfurt, Austria)

## Scientific Committee

-----

Allard, Denis (INRA, France)

Atkinson, Peter (University of Southampton, UK)

Bogaert, Patrick (Université Catholique de Louvain, Belgium)

Brenning, Alexander (University of Waterloo, Canada)

Brus, Dick (Wageningen University and Research Centre, The Netherlands)

Christakos, George (San Diego State University, USA)

Cornford, Dan (Aston University, UK)

Diggle, Peter (Lancaster University and Johns Hopkins University School of  
Public Health, UK and US)

Dubois, Gregoire (JRC, European Commission)

Fortin, Marie-Josée (University of Toronto, Canada)

Ghosh, Sujit K. (North Carolina State University, USA)

Goodchild, Michael F. (University of California Santa Barbara, USA)

Goovaerts Pierre (BioMedware, USA)

Griffith, Daniel A. (University of Texas at Dallas, USA)

Havlik, Denis (Austrian Research Centres GmbH - ARC, Austria) Heuvelink, Gerard  
(Wageningen University, The Netherlands)

Hristopoulos, Dionisis (Technical University of Crete, Greece)

Kyriakidis, Phaedon (University of California Santa Barbara, USA)

Lark, Murray (Rothamsted Research, UK)

Myers, Wayne (The Pennsylvania State University, USA)

Neteler, Markus (Fondazione Mach - Centre for Alpine Ecology, Italy)

Nativi, Stefano (CNR-IMAA, University of Firenze, Italy)

Papritz, Andreas (ETH Zurich, Switzerland) Patil, Ganapati P. (The Pennsylvania State University, USA)  
Pebesma, Edzer (University of Münster, Germany)  
Pilz, Jürgen (University of Klagenfurt, Austria)  
Saura, Santiago (Polytechnic University of Madrid, Spain)  
Schaepman, Michael (Wageningen University, The Netherlands)  
Schoupe, Michel (DG INFSO, European Commission)  
Stein, Alfred (ITC, The Netherlands)  
Stöhlker, Ulrich (BFS, Germany)  
Switzer, Paul (Stanford University, USA)  
van den Boogaart, Gerald (TU Bergakademie Freiberg, Germany)  
Wackernagel, Hans (Ecole des Mines de Paris, France)