Documentation regarding the level of the chair – Geo-Information Science and Remote Sensing

Name Chair

Laboratory of Geo-Information Science and Remote Sensing (GIRS), composed out of two chairs¹:
- Geo-Information Science with emphasis on Geographical Information Systems
- Geo-Information Science with emphasis on Remote Sensing

Description Chair

The Laboratory of Geo-Information Science and Remote Sensing of Wageningen University have joined forces with the Geo-Information group of Alterra Green World Research in the Centre for Geo-Information (CGI). The two chairs within the centre collaborate with related institutes and use their network of expert advisers to provide university-level education and research on geo-information science, with a view to supporting policy development and the design and management of rural areas.

Research in geo-information science covers a wide range of subjects. The following main themes have been selected to delineate the centre's identity:
- providing geo-information for rural areas: making knowledge and information available to underpin policy decisions on natural resources;
- monitoring rural areas: developing GIS-based and RS-based methods for monitoring rural areas, at national as well as global levels;
- quantitative retrieval of geobiophysical and -chemical variables from spatially distributed data at scales from local to global for environmental management;
- scenario studies: integrating GIS and RS knowledge in process models for planning and scenario studies;
- visualisation and communication of geo-information: using multimedia technology in developing and underpinning policies for the rural areas.

¹ During the evaluation period, the chair positions were filled in as follows:
GIS: Jan 1999 – Nov 2002 0.5 fte; Dec 2002 – Dec 2003 1.0 fte
Position in organisation (Science Group, Graduate Schools)

**Wageningen University and Research Centre (WUR):** Wageningen University has been integrated with the Agricultural Research Department (DLO), the Institutes for Applied Research in Agriculture, the International Agricultural Centre (IAC), the International Institute for Land Reclamation and Improvement (ILRI) and the International Soil Reference and Information Centre (ISRIC), with the objective of establishing Wageningen University and Research Centre (Wageningen UR).

**Wageningen University (WU)** was founded in 1918 and is part of WUR. In recent decades, it has evolved into one of the world's leading education and research centres in the plant, animal, environmental, agrotechnological, food and social sciences.

**The Department of Environmental Sciences (DES)** is one of five Departments of Wageningen University. DES covers and co-ordinates the activities of twenty chairs and their accompanying research groups that are the foundation of the scientific education and research activities at university level. The DES chairs and their research groups focus on a broad range of environmental issues, focussing on 'green' (vegetated) and 'blue' (aquatic and atmospheric) spaces.

**The Laboratory of Geo-Information Science and Remote Sensing (GIRS)** is one of five chair groups in DES. Together with the Geo-information department of Alterra it forms the Centre for Geo-Information (CGI). GIRS is participating in the C.T. de Wit Graduate School for Production Ecology and Resource Conservation (PE&RC). Nevertheless, GIRS supervises also several PhD students that are affiliated with other research schools (e.g., Mansholt, Ceres) and other universities (e.g., Univ. of Zurich, Univ. Utrecht). GIRS takes care of introductory teaching in geo-information science for large groups of students. In addition, GIRS offers an MSc in Geo-Information Science. This education is offered to both Dutch and foreign students. The teaching language is English.

GIRS is also part of the Wageningen Environmental Sciences Group (which is composed of the Department of Environmental Sciences, Alterra Green World Research Institute, ILRI and ISRIC).

**Name Chairholder**

**Laboratory of Geo-Information Science and Remote Sensing**

- **Prof. A.K. Bregt** Geo-Information Science with emphasis on Geographical Information Systems (full chair)
- **Prof. M.E. Schaepman** Geo-Information Science with emphasis on Remote Sensing (full chair)
- **Prof. M. Molenaar** Theory of GIS and Remote Sensing (additional chair)
Leadership

The chairholders of GIRS strive towards a participating management style which emphasises the individual and enhances his self-responsibility, finally resulting in well motivated staff. The basic principle in this leadership model is to involve all the responsible scientists actively in a common goal. This goal is defined in “2) Description Chair” of this document. We use direct face-to-face communication among all scientists to communicate this message. The common goal is then treated in thematic groups for further study. These smaller thematic groups are commonly made up of all sorts of scientists with a particular expertise or interest in the issue at hand (c.f., Chapter 7). Scientists who are especially vocal concerning a given issue might be included in the study group for that issue. Responsible senior scientists plan regular meetings and control the progress of the thematic groups using iterative feedback. Innovation and improvement is achieved by participation in national and international programmes, support of training courses for all staff members, and active coaching to perform to the best of individual capabilities.

Strategy and policy

All of the GIRS research strives to be academically rigorous and practically relevant. Fundamentally, we are committed to undertake and disseminate research that makes a real contribution to our academic disciplines with focus on GIS and remote sensing and enhances quality of life. Our extended research portfolio, innovative programmes, international appeal and strong external links, all within a participating and supportive environment, combine to offer a rich and rewarding research experience. We encourage a spirit of creative enquiry and co-operation that allows students and staff to pursue their ideas with rigour and integrity together in a high quality learning experience. We aim to provide a research environment which develops both practical and intellectual abilities and aptitudes.

GIRS has a strong record in applied and strategic research with particular strengths in areas such as the provision of geo-information for rural areas, monitoring of these, quantitative remote sensing, integrated scenario studies, and visualisation and communication of geo-information. It has been successful in winning grants from a variety of prestigious sources such as the EC (e.g., ReSeDA, EPN, etc.), ESA (e.g., SPECTRA, APEX, MERIS, CHRIS/PROBA, etc.), national authorities (e.g., KNAW, SRON, NWO, etc.), and setting up an own research direction: In 2000 GIRS has taken the initiative to formulate a nation-wide programme on innovation and research in the domain of GI-science and GI-practice (Bsik – ‘Space for Geo-information’). Finally, a consortium of 120 organisations was formed consisting of GI-companies, GI-users, GI-producers and GI-research organisations. In 2003 the programme was awarded 20 Mio. Euro by the national government. The contributing organisations will also support this programme with 20 Mio. Euro, which results in a total budget of 40 Mio. Euro.

For the upcoming 6 years, the programme will fund fundamental and applied research. The overall research of GIRS, being one of the founding fathers, will highly benefit from this programme in the coming years.

GIRS supports a networking-based research culture with a number of world-class research centres (ESA/ESTEC (NL), ESA/ESRIN (It), INRA (F), Univ. Zurich (CH), CCRS (Ca), Univ. Colorado (USA), GFZ (Ger), DLR (Ger), VITO (Be), JRC (It), JPL (USA), Univ. Muenster (Ger), Univ. Melbourne (Aus),...
NERC (UK), Univ. Tehran (Iran)) and opportunities for graduates to undertake research programmes leading to the degree of PhD. Multidisciplinarity and interdisciplinarity remains a priority of GIRS with the particular focus on innovative approaches of research in new areas linked to service and professional needs. This is also expressed in research topics tackled within PE & RC with chair colleagues active in nature conservation (F. Berendse, H. Prins, and A. Skidmore), soil inventory and land evaluation (T. Veldkamp), forestry (F. Mohren), and landscape planning and architecture (K. Kerkstra).

Following the appointment of a new chair in remote sensing (Prof. Dr. M.E. Schaepman, October 2003), a new research strategy in remote sensing will focus on quantitative methods with significant importance being placed on physical modelling and radiative transfer approaches using imaging spectroscopy. This will be achieved with the formation of international networks and collaborative interaction based on new and innovative interdisciplinary approaches.

Processes in research, internal and external collaboration
Research processes within GIRS are grouped and organized in thematic working groups. These groups are composed of GIRS (University) members as well as Alterra members of the Centre for Geo-Information. The groups are divided in two areas of interest, the specialist groups (oriented at basic and applied research in the geo-information domain) and the application groups (focusing on the particular application field whilst using geo-information sources). Thematically they are subdivided into the following categories (approximate participants listed in brackets):

Specialist groups:
- Spatial Data Infrastructure (20)
- Remote Sensing (17)
- Visualization and Communication (8)
- Quality of Geo-Information (7)

Application groups:
- Geo-Information for Spatial Planning (8)
- Geo-Information for Water and Climate (8)
- Geo-Information for Ecosystems and Landscape (12)
- Geo-Information for Soil and Land Cover (9)

Monthly meetings of each group strengthen the co-operation within the centre and support joint activities. Individuals will contribute with their knowledge in form of short presentations to the group, covering topics of personal interest, as well as external collaboration issues. Strategic agreements on research goals (representation at conferences, peer reviewed journal planning, publication strategy, detailed thematic focus, etc.) are performed within these groups and reviewed by the board of CGI.

Participants of thematic working groups are covering all levels of scientific education, ranging from PhD students to professors. Close supervision and feedback control allow maintaining highest quality standards.

GIRS members maintain active research links and external collaboration with various academic and research institutions, research networks, the government and the private sector. Several external, durable collaborations exist in the form of a spatial data quality network within the National Institute
for Geo-sciences (TNO), the Dutch Topographic Service, and the Geo-information Department of the Ministry of Transport, Public Works and Water Management. A network on spatial data infrastructure is established with the RIVM, JRC, Univ. Munster, Univ. Leuven, and the Univ. Melbourne. In land use modelling, a network between RIVM, Free Univ. Amsterdam, the Spatial Planning Bureau, and Univ. Utrecht is implemented. Finally, activities in spatial data visualisation and mobile GIS are implemented between Free Univ. Amsterdam, Univ. Nijmegen, TU-Delft, and the Euroleague Univ. GIRS also maintains close links to ISRIC (World Soil Information), which is loosely affiliated to the group. Other networks are established for collaboration in the frame of MERIS (The MeriLand team: ITC, Utrecht Univ., and Wageningen Univ.; as well as Univ. Arizona and Univ. Zurich for vicarious calibration). In the framework of airborne imaging spectroscopy, DLR, Univ. Zurich, VITO, and GIRS are collaborating, and finally for SPECTRA, the Mission Advisory Group (CCRS, York Univ., JRC, INRA, KNMI, Univ. Munich, Univ. Amsterdam, Univ. Strasbourg, MPI, and GIRS) has close links amongst each partner.

Academic reputation
In the year 2000, GIRS has been evaluated for the period 1995-1999 within the discipline of geographical sciences by an international committee. The final assessment of the research quality of the GIRS group was judged as follows (on a scale from 1 – 5):

- Quality 4.5
- Productivity 4.0
- Relevance 4.5
- Viability 5.0

Academic activities of Prof. A.K. Bregt, Prof. Dr. M.E. Schaepman, Prof. Dr. M. Molenaar, Dr. J.G.P.W. Clevers, Dr. G.F. Epema, Dr. R. van Lammeren and Dr. S. De Bruin are described in the individual staff profiles in the appendix.

External validation
The past years of GIRS activity were coined from a steadily growth of the geo-information market. Initially, this market was driven by separate evolving strategies in separate segments. Collaborative environments, such as the WWW integrated demands of various users and eventually turned into a large and heterogeneous network of geospatial information. Geo-information science has become a multidisciplinary and collaborative scientific environment. This trend is reflected in the activities of GIRS – in particular its specialisation on spatial data infrastructure and spatial data quality, as well as quantitative remote sensing.

For the ministry of economic affairs in the Netherlands, GIRS has made an assessment of the overall geomatics situation in the Netherlands (respecting factors such as employment, annual turnover, etc.). This report has resulted in an active support programme of the ministry for the GI-sector in the Netherlands.

The formulation of the Bsik- ‘Space of Geo-information’ knowledge programme - where GIRS maintains a leading role - has resulted in an increase of 40 Mio. Euro in funding for the GI-sector. Besides this financial benefit, a large network of co-operating GI-organisations is established, which
will have a strong impact on the cohesion of GI-research and GI-practice the coming years in the Netherlands. The backbone of these joint activities will be the innovation of geo-information infrastructure in the Netherlands. An independent economic research organisation estimated that every Euro invested in spatial data infrastructure will yield ten Euros of revenues in the near future. These revenues originate from new GI-applications and services and result in more efficient national geo-data management. GIRS – with it’s participation in Bsik - is strategically excellent prepared to contribute to the growing demands of the GI-market in form of scientific advancement.

Several large projects of GIRS have shaped the geo-information future nationally (as mentioned above), and internationally. In the international context, the contribution of GIRS to the implementation of the ESA Earth Explorer Core Mission named SPECTRA is mentioned. The SPECTRA mission addresses issues such as the identification and quantification of the key underlying processes that govern the terrestrial CO$_2$ balance by providing detailed observations to help understanding the terrestrial component of the carbon cycle. GIRS members contribute to the definition of this mission as well as to its simulator and validator, the Swiss/Belgium ESA PRODEX APEX airborne imaging spectrometer.

Researchers and other personnel

Table 1: GRS Staff Involvement

<table>
<thead>
<tr>
<th>Research input at programme level (Full Time Equivalents)</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenured staff</td>
<td>1.4</td>
<td>1.4</td>
<td>1.6</td>
<td>1.7</td>
<td>2.0</td>
</tr>
<tr>
<td>Non-tenured staff</td>
<td>0.0</td>
<td>0.6</td>
<td>0.4</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>AIO/OIOs</td>
<td>1.7</td>
<td>0.6</td>
<td>1.0</td>
<td>2.1</td>
<td>2.1</td>
</tr>
<tr>
<td>Other PhD students¹</td>
<td>3.4</td>
<td>3.1</td>
<td>1.8</td>
<td>3.0</td>
<td>2.7</td>
</tr>
<tr>
<td>Total research staff</td>
<td>6.5</td>
<td>5.7</td>
<td>4.8</td>
<td>6.8</td>
<td>6.8</td>
</tr>
</tbody>
</table>

¹ Research time of external and sandwich PhD students is counted only as far as spent in Wageningen
## Table 2: Research Staff at Programme Level

<table>
<thead>
<tr>
<th>Name and present title</th>
<th>Period of appointment</th>
<th>Fte</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Full professors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prof.dr.ir. A.K. Bregt</td>
<td>From 1/6/1998 till 1/12/2002</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>From 1/12/2002 till present</td>
<td>1.0</td>
</tr>
<tr>
<td>Prof.dr. S.M. de Jong</td>
<td>From 1/9/1998 till 1/10/2002</td>
<td>0.5</td>
</tr>
<tr>
<td>Prof.dr. M.E. Schaepman</td>
<td>From 1/9/2003 till present</td>
<td>0.5</td>
</tr>
<tr>
<td>Prof.dr. M. Molenaar</td>
<td>&lt; 1999 till present</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Associate professors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr.ir. J.G.P.W. Clevers</td>
<td>&lt; 1999 till present</td>
<td>1.0</td>
</tr>
<tr>
<td>Dr.ir. R.J.A. van Lammeren</td>
<td>&lt; 1999 till present</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Assistant professor</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. G.F. Epema</td>
<td>&lt; 1999 till present</td>
<td>1.0</td>
</tr>
<tr>
<td>Dr.ir. S. de Bruin</td>
<td>From 1/10/2001 till present</td>
<td>1.0</td>
</tr>
<tr>
<td>Ir. J.W.H.C. Crompvoets</td>
<td>&lt; 1999 till present</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Other tenured staff</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr.ir. S. de Bruin</td>
<td>From 1/1/2000 till 1/10/2001</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Non-tenured staff</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ir. O.W. Vonder</td>
<td>&lt; 1999 till 1/8/2000</td>
<td>1.0</td>
</tr>
<tr>
<td>Ir. E.W.H. Keizer</td>
<td>&lt; 1999 till 1/3/1999</td>
<td>1.0</td>
</tr>
<tr>
<td>Mw.ir. H.A. Deurloo</td>
<td>&lt; 1999 till 1/8/2000</td>
<td>0.6</td>
</tr>
<tr>
<td>Ir. I. Kemeling</td>
<td>From 1/8/2002 till 1/10/2002</td>
<td>1.0</td>
</tr>
<tr>
<td>Mw.drs. E.A. Addink</td>
<td>From 1/9/1999 till 1/1/2001</td>
<td>0.8</td>
</tr>
<tr>
<td>Dr. G. Hunter</td>
<td>From 15/6/2001 till 15/12/2001</td>
<td>1.0</td>
</tr>
<tr>
<td>Mw.drs E.A. Addink</td>
<td>&lt; 1999 till 1/9/1999</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>PhD students</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ir. S. de Bruin</td>
<td>&lt; 1999 till 1/1/2000</td>
<td>1.0</td>
</tr>
<tr>
<td>Mw.ir. M. Obbink</td>
<td>&lt; 1999 till 1/1/2004</td>
<td>0.6</td>
</tr>
<tr>
<td>L.M.T. de Carvhalho MSc</td>
<td>&lt; 1999 till 1/12/2001</td>
<td>*2</td>
</tr>
<tr>
<td>Mw. I. Bielsa MSc</td>
<td>&lt; 1999 till 1/9/2002</td>
<td>*2</td>
</tr>
<tr>
<td>Drs. E. Koster</td>
<td>From 1/1/2000 till 1/19/2001</td>
<td>1.0</td>
</tr>
<tr>
<td>Ir. P.A.J. van Oort</td>
<td>From 1/9/2001 till present</td>
<td>1.0</td>
</tr>
<tr>
<td>Ir. M. Bader</td>
<td>From 1/5/2002 till present</td>
<td>1.0</td>
</tr>
<tr>
<td>F. Weimar Acerbi MSc</td>
<td>From 1/3/2002 till present</td>
<td>*2</td>
</tr>
<tr>
<td>P. Okoth MSc</td>
<td>&lt; 1999 till 1/12/1999</td>
<td>*1</td>
</tr>
<tr>
<td>T. Nguyen Hieu</td>
<td>From 1/7/2001 till present</td>
<td>*1</td>
</tr>
<tr>
<td>Z. Malenovsky MSc</td>
<td>From 1/2/2002 till present</td>
<td>*2</td>
</tr>
<tr>
<td>Y. Zeng MSc</td>
<td>From 1/11/2003 till present</td>
<td>*1</td>
</tr>
<tr>
<td>Ir. J. van Etten</td>
<td>From 1/3/2002 till present</td>
<td>0.5</td>
</tr>
<tr>
<td>I.I.Z. Bacic MSc</td>
<td>From 1/11/1999 till 1/11/2003</td>
<td>*2</td>
</tr>
<tr>
<td>J. Palma MSc</td>
<td>From 1/6/2003 till present</td>
<td>*2</td>
</tr>
<tr>
<td>X. Li MSc</td>
<td>&lt; 1999 till 1/1/2000</td>
<td>*1</td>
</tr>
<tr>
<td>F.Y. Kidane MSc</td>
<td>&lt; 1999 till 1/9/2002</td>
<td>*1</td>
</tr>
<tr>
<td>Z. Lamine MSc</td>
<td>From 15/11/1999 till 1/11/2003</td>
<td>*1</td>
</tr>
</tbody>
</table>

Note: Fte's with respect to their total appointment, of which tenured staff has approximately 45% available for research.

*1: sandwich PhD student not employed by WU

*2: external PhD student not employed by WU
Resources, funding and facilities
As being part of the Wageningen University and Research Centre, the group has full access to technical facilities of WUR. In particular the information and communication technology (ICT) group is providing services with respect to data- and telecommunication, servers (data storage, WWW, and e-mail), application development for special needs, and a helpdesk. The group has approx. 90 PC’s in the Intel Pentium class (running MS Windows) available for staff, PhD’s, MSc’s, and educational purposes. Due to special data needs in geo-information science, agreements with the ICT group on special servers and computers have been arranged.

GIRS is operating jointly with CGI-Alterra the GeoDesk. GeoDesk is a helpdesk to offer organized access to spatial data from the Netherlands and international. This service is used by users within WUR, as well as on a national level.

Access to publications is granted through the Wageningen Desktop Library, offering a wide range of services ranging from access to walk-in library up to electronic search capabilities of relevant literature. The online access to relevant journals in the field of GIRS is excellent; the availability of printed books in the GI domain is considered to be fair to good.

There is also access to a variety of expert software for GIS and Remote Sensing. The group has a number of licenses for the following major programs:

- ESRI ArcInfo and related products
- Intergraph products (through accreditation as official Intergraph research laboratory)
- Leica Erdas Imagine
- IDL/ENVI
- IDRISI
- Oracle Spatial
- TerraDesk / Virtools game engine

A dedicated instrument pool is operated by the group and compiled in the following table. The pool mainly consists of a field spectrometer and various GPS.

Table 3: GRS Equipment

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Purchase</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrating Sphere for Leaf Optical Properties (LOP) measurement</td>
<td>2004</td>
<td>To be acquired</td>
</tr>
<tr>
<td>LAI / Gap fraction measurement – Hemispherical Camera (Nikon), Can-Eye software (INRA), Linux computer (WU)</td>
<td>2004</td>
<td>Excellent</td>
</tr>
<tr>
<td>ASD FieldSpec FR Pro portable field Spectroradiometer with various FOV and contact probe, lab measurement equipment</td>
<td>2003</td>
<td>Excellent</td>
</tr>
<tr>
<td>Loox GPS (Siemens) and handheld devices</td>
<td>2002/03</td>
<td>Excellent</td>
</tr>
<tr>
<td>Trimble RTK-GPS-equipment (4700 + 4800) dual-freq.</td>
<td>2001</td>
<td>Excellent</td>
</tr>
<tr>
<td>Garmin eTrex Summit handheld GPS</td>
<td>2001</td>
<td>Good</td>
</tr>
<tr>
<td>Trimble RTK-GPS-equipment (3 x 4000) single-freq.</td>
<td>1994</td>
<td>Fair/good</td>
</tr>
<tr>
<td>Cropscan MSR87</td>
<td>1990</td>
<td>Fair</td>
</tr>
<tr>
<td>Several classical triangulation/measurement instruments</td>
<td>Pre 1990</td>
<td>Historical value</td>
</tr>
</tbody>
</table>
Table 4: Funding Level

<table>
<thead>
<tr>
<th>Funding</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>5 year average</th>
</tr>
</thead>
<tbody>
<tr>
<td>WU funded</td>
<td>2.2</td>
<td>2.0</td>
<td>2.0</td>
<td>2.9</td>
<td>2.9</td>
<td>2.4</td>
</tr>
<tr>
<td>NWO funded</td>
<td>0.3</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Contract funded</td>
<td>4.0</td>
<td>3.2</td>
<td>2.3</td>
<td>3.4</td>
<td>3.4</td>
<td>3.3</td>
</tr>
<tr>
<td>Total</td>
<td>6.5</td>
<td>5.7</td>
<td>4.8</td>
<td>6.8</td>
<td>6.8</td>
<td>6.1</td>
</tr>
</tbody>
</table>

Fte research time of external PhD students is counted only as far as spent in Wageningen

Overview of the results

Table 5: Key Publications


In the same way as the results of the Institute as a whole are presented, the programme results are presented in a comprehensive list. A complete list of all publications (both inside as well as outside PE&RC) of the chair ordered per year and per graduate school is presented in the Annex.

Table 6: Programme results: outcome numbers

<table>
<thead>
<tr>
<th>1. PhD theses</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. in refereed journals</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>12</td>
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<tr>
<td>b. in other journals</td>
<td>-</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>c. book chapters</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>d. monographs and edited books</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>e. proceedings (full papers only)</td>
<td>10</td>
<td>24</td>
<td>15</td>
<td>28</td>
<td>14</td>
<td>91</td>
</tr>
<tr>
<td>f. scientific reports</td>
<td>11</td>
<td>12</td>
<td>8</td>
<td>5</td>
<td>16</td>
<td>52</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>38</strong></td>
<td><strong>52</strong></td>
<td><strong>41</strong></td>
<td><strong>42</strong></td>
<td><strong>52</strong></td>
<td><strong>225</strong></td>
</tr>
</tbody>
</table>

<table>
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<th>2. Academic publications</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Professional publications and products (incl. IP)</td>
<td>32</td>
<td>14</td>
<td>12</td>
<td>9</td>
<td>9</td>
<td>76</td>
</tr>
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<td>4. Publications for the general public (optional)</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

Explanation: see Table 3.
Analysis, perspectives and expectations for the research programme

SWOT – Analysis - Chair Group Laboratory of Geo-Information Science and Remote Sensing (GIRS)

Analysis
The most important strong (S) and weak (W) points, as well as opportunities (O) and threats (T) of the chair group in research (for chair group as a whole) are indicated below. The various items are listed in order of decreasing importance.

Strengths:
• Integration of Remote Sensing and Geo-Information Systems
• Internal thematic groups with dedicated specialisation
• Strong link between Geo-Information science and GI practise
• Large number of MSc students
• Existing national network

Weaknesses:
• Number of peer reviewed journals
• International visibility (memberships, organisations, scientific, representation)
• Limited availability of research and geo-computing capacity
• Lack of diversity of research methods used to achieve scientific goals
• No dedicated expertise in radar remote sensing

Opportunities:
• National programmes (e.g., Bsik – Space for Geo-Information)
• Internal research cooperation (within WUR)
• European programmes (e.g., EU, ESA (GMES, APEX, SPECTRA, MERIS, etc.))
• GIS and RS are still an expanding research field
• Redefinition of a remote sensing research strategy

Threats:
• Reduced research core funding
• Fragmentation of research activities
• National / International financial competitiveness

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2 See Chapter 7 on 'Processes in Research' for details of groups.
3 This includes also the number of MSc thesis topics that can be offered.
4 Indicating both, not sufficient number of published papers overall, and that there is still a lack of GIS journals listed in the ISI Web of Science.
5 Specific focus on dedicated research methods such as validation procedures, spatial modelling, and quantitative methods.
6 This is due to having 5 teaching periods per year instead of the classical semester or trimester approach.
7 Referring to high internal overhead requirements.
SWOT-table

In table 8 a selection of the most important opportunities and threats, strengths and weaknesses are listed. Per combination a value is assigned on a scale of 0 - 4 (0 = not relevant; 4 = very important).

Table 7: Results SWOT-analysis GRS

<table>
<thead>
<tr>
<th></th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
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<td></td>
<td>National programmes</td>
<td>Internal cooperation</td>
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<td>Strength</td>
<td>Integration of Remote Sensing and Geo-Information Systems</td>
<td>4</td>
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<td></td>
<td>Internal thematic groups with dedicated specialisation</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Strong link between Geo-Information science and GI practise</td>
<td>4</td>
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<td></td>
<td>Large number of MSc students</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Strong national network</td>
<td>4</td>
</tr>
<tr>
<td>Weaknesses</td>
<td>Number of peer reviewed journals</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>International visibility</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Limited availability of research and computing capacity</td>
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<tr>
<td></td>
<td>Lack of diversity of research methods</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>No dedicated expertise in radar remote sensing</td>
<td>1</td>
</tr>
</tbody>
</table>

Analysis: main points of attention (changes / adjustments)

The most important points of attention on the basis of the SWOT analysis are discussed in the following section.

A general overview of the SWOT-table reveals that the opportunities receive in the average a high ranking (positive-positive coupling), thus indicating the awareness of GIRS of the potential in the scientific environment of geo-information science. Nevertheless, the threats are dominated by the administrative and organisational framework of the University, rather than real scientific methods or visions.

In more detail, the comments to the individual points of attention are:
New remote sensing research strategy
Due to the frequent changes with the remote sensing chair position and the fragmentation of remote sensing education on the WUR campus, no continuous and sustainable remote sensing strategy could be implemented so far. It is recommended to coordinate all these efforts at GIRS, with the proposal to locate fundamental remote sensing education at the centre, and applied remote sensing with the final end-users on campus.

International visibility
The group’s international visibility is being seen as an opportunity to join European programmes; nevertheless, there should be more dedicated activities and time available to be present at international events and programmes.

Limited availability of research and geo-computing capacity
Geo-Information science has become an increasingly important factor for computing resources needs. The infrastructure requirements by geo-information science is typically non-standard, large (in terms of storage requirements), and fast. A modern computing centre equipped with cluster based computing will strongly support quantitative remote sensing approaches, simulation based visualisation, as well as management of spatial data infrastructure. Due to the teaching load, free research capacity (to acquire new projects) is very limited as well.

Reduced research core funding
There is a significant trend to be observed that the reduction of available research funding is hampering the scientific output and visibility of the group. The input/output based financing model including rewarding the number of students rather than research and teaching quality is a serious threat to the motivation of the group to position itself in the future in the top geo-information science based laboratories. It is proposed that research based funding shall be reintroduced to maintain the good spirit of the motivated staff.

Fragmentation of research activities
The possibility of not being able to work a reasonably long period continuously on the same topic is hampering scientific output of the group. In particular the fragmentation of the research year into five periods is seen as a significant threat to writing peer reviewed journal contributions. In addition to the fragmented research year, the upcoming requirement to allow students to start almost in every period with their education will increase this fragmentation further. The ‘classical’ semester or trimester setup - synchronized in starting times with other European countries - with dedicated times, where no teaching takes place would help to minimize this threat.
Appendix 1: Staff Profiles

Prof.dr.ir. A.K. Bregt
Geo-Information Science and Remote Sensing

DATE OF BIRTH, QUALIFICATIONS:
24 July 1959
MSc
PhD
Professor

MEMBERSHIP OF PROFESSIONAL ORGANISATIONS:
Chairman of the Impact analysis working group for INSPIRE: the Spatial information infrastructure for Europe.
Chairman of the Dutch User Group Topographic database (TDN).
Chairman of the subcommittee on Geo-information modelling of Netherlands Commission of Geodesy (NCG) of the Dutch Royal Academy of Sciences.
Chairman of the Dutch Society for Information Technology in Food, ago–business and environment.
Chairman of the Dutch national support group for the “National Clearinghouse for Geo-information”.
Member of various EU working groups on spatial data handling (1984-2004).
Member scientific committees of international Symposia (e.g. Accuracy 2000, Spatial statistics for production ecology, EFITA).
Member of the board of EFITA (European Federation for Information technology in Agriculture, Food and Environment.
Chairman of the Knowledge proposal “Space for Geo-information” This proposal has been evaluated by an international science committee of the Dutch Academy of Sciences. It received a score of 4.8 (out of range from 1-5; 5 the highest score). The Dutch government has awarded the proposal with 20 Million euro.

IN Volvement in scientific publications such as editorships:
Member of the Editorial board of:
Soil Use and Management and
International Journal of Applied Earth observation and geo-information.
Reviewer for GIS and related journals (e.g. IJGIS, Transactions in GIS, IJ of remote sensing)
Reviewer for Dutch, Australian and Austrian Science foundation.

FUNCTIONS:
Professor of Geo-information Science at the Wageningen University
In 2001 appointed as guest professor at the Huazhong University in Wuhan, China

ADDITIONAL INFORMATION:
Arnold Bregt (1959) has a Doctors (1992) degree from Wageningen University. The subject of his PhD thesis was “spatial data handling in soil science”. From 1983 until 1989 he was head of the Department of Applied Information Science and Statistics at the Netherlands Soil Survey Institute in Wageningen. From 1989 until 1998 he was Head of the Department of GIS, Quantitative Methods and Information Science at the Winand Staring Centre in Wageningen. In 1998 he became halftime professor in Geo-information science at the Wageningen University, followed by a fulltime position in 2002. In 2001 he was appointed as guest professor at the Huazhong University in Wuhan, China. Through his work he has been involved in international projects, consulting missions and lecturing in countries, like: China, Indonesia, Kenya, Philippines, Vietnam and Camerooon, Japan. In the period 1993-1994 he was a visiting scientist for about a year at National Institute for Agro-Environmental Sciences in Tsukuba, Japan. He wrote around 130 publications on spatial statistics in soil science, spatial data uncertainty, spatial-temporal modelling, spatial data infrastructures and the application of geo-information science in the natural resources domain. Various presentations at national and international meetings and symposia (average 7-8 per year). His current research interests are Spatial data infrastructures, Spatial data Quality and Land use modelling. The last years he was and is strongly involved in a number of projects and activities concerning the development of the Spatial data infrastructures (SDI). He was one of the initiators and project leaders of the Dutch Clearinghouse for geo-information. Within Europe he has been involved in a number of working groups related to SDI developments: “Spatial data access”, “Soil and GIS”, “Land use data” and INSPIRE. In the INSPIRE (The INfrastructure for SPatial InfoRmation in Europe) initiative of the EU-commission he was chairman of the Impact analysis working group. He was also one of the initiators of the Research programme “Space for geo-information”, which was granted a subsidy of 20 million euro in 2003.


**CAREER:**

1983-1989  Head of the Department of Applied Information Science and Statistics, the Netherlands Soil Survey Institute, Wageningen.

1989-1993  Head of the Department of Quantitative Methods, GIS and Information Science, SC-DLO, Wageningen, the Netherlands.


1996-1998  Head Division of Geo-Information, the Winand Staring Centre for Integrated Land, Soil and Water Research (SC-DLO), Wageningen, the Netherlands.


1996-1998  One of the Projectleaders of the National Clearinghouse Geo-information, RAVI, Amersfoort, the Netherlands (1 day per week).

1997-1998  Head Division of Geo-Information, the Winand Staring Centre for Integrated Land, Soil and Water Research (SC-DLO), Wageningen, the Netherlands.

1998-2002  Professor of Geo-information Science at the Wageningen University (halftime) and research leader of the DLO-GIS and Remote Sensing program (halftime).

2002-present  Professor of Geo-information Science at the Wageningen University

**NUMBER OF PHD THeses 1999-2003: 5**

- Bacic, L.L.Z. (2003). Demand-driven land evaluation- With case studies in Santa Catarina, Brazil (promotor)

**LIST OF FIVE IMPORTANT REFEREED PAPERS:**

- Ligtenberg, A.
- Bregt, A.K.
- Lammeren, R. van


- Bruin, S. de
- Bregt, A.K.
- Ven, M. Van de


- Li, X.
- Jongman, R.
- Xiao, D.
- Harms, W.B.
- Bregt, A.K.


- Hunter, G.J.
- Wachowicz, M.
- Bregt, A.K.


- Crompvoets, J.
- Rajabifard, A.
- Bregt, A.
- Williamson, I.


**LIST OF FIVE INVITED REVIEWS/PROCEEDINGS/BOOKCHAPTERS:**

- Bregt, A.K.


- Bregt, A.K.
- Zeeuw, C.J. de

Bregt, A.K.; Lammeren, R.J.A.; Ligtenberg, A.
Modelling and simulation of spatial processes.

Bregt, A.K.; Skidmore, A.K.; Nieuwenhuis, G.J.A.
Environmental modelling: issues and discussion

Bregt, A.K.; Crompvoets, J.; Scholten, H.J.; Crommert, P. van de
The Dutch National Spatial Data Infrastructure: past, present and future.

LIST OF FIVE IMPORTANT COURSES/WORKSHOPS/CONFERENCES:
Regular university course (6 ects) on Spatial Modelling
Regular university course (6 ects) on Spatial Data infrastructures
Member organising committee international symposium Accuracy 2000
Organiser of International Spatial Data Usability Workshop 2002
Member scientific board of EFITA (European Federation for Information Technology in Agriculture, Food and the Environment) conferences

LIST OF FIVE SUBSTANTIAL INTERNATIONAL COLLABORATIONS:
• University of Melbourne (Australia): Intensive collaboration on Spatial data quality research and spatial data infrastructures (SDI) (exchange of staff and students, joint research and papers)
• JRC, Ispra (Italy): Collaboration on Spatial data infrastructures
• University Munster (Germany): Collaboration on SDI, geo-informatics
• University Leuven (Belgium): GIS applications for rural areas
• Cantho University (Vietnam): GIS for land use planning

OBTAINED EXTERNAL FUNDING:
Project title (PhD): Quality of geo-information and implications for applications
Project title (PhD): Multi agent simulation for land use planning
Bsis Knowledge proposal “Space for Geo-information”. This proposal has been evaluated by an international science committee of the Dutch Academy of Sciences. It received a score of 4.8 (out of range from 1-5; 5 the highest score). The Dutch government has awarded the proposal with 20 Million euro for the period 2004-2009.
Prof.dr. M.E. Schaepman
Geo-Information Science and Remote Sensing

DATE OF BIRTH, QUALIFICATIONS:
30 May 1966
1993 MSc. in Geography (dipl. Geogr.) with minors in computer science and experimental physics from University of Zurich, Switzerland
1998 PhD. Doctorate in Natural Sciences (Doctor scientiarum naturalium / Dr. sc. nat.) from the University of Zurich, Switzerland on imaging spectroscopy
2003 Prof. Full regular chair at the Laboratory of Geo-Information Science and Remote Sensing (GIRS) in Geo-Information Science with emphasis on Remote Sensing
2004 Inauguration: October 7, 2004 at Wageningen University

MEMBERSHIP OF PROFESSIONAL ORGANISATIONS:
OSA (Optical Society of America). 1994-present
ISOC (The Internet Society). 1996-present
SPIE (The International Society for Optical Engineering). 1996-present
ISPRS (International Society on Photogrammetry and Remote Sensing), Working Group VII/2. 1996-present
ISPRS (International Society on Photogrammetry and Remote Sensing), Working Group III/5. 1997-present
Co–convenor and member of the EARSeL Special Interest Group on Imaging Spectroscopy (SIG–IS). 1997-present
Naturforschende Gesellschaft des Kantons Zurich. 1998-present
Zürcher Hochschul–Verein. 1998-present
AGU (American Geophysical Union). 2001-present

INVOLVEMENT IN SCIENTIFIC PUBLICATIONS SUCH AS EDITORSHIPS:
Member of the editorial board ‘Remote Sensing and Digital Image Processing’ book series of Kluwer Academic Publisher
Guest editor for J. Applied Earth Obs.

FUNCTIONS:
Chair of the APEX Science Consultancy Group
Project Scientist for APEX, a joint Swiss/Belgian ESA PRODEX project
Member of the ESA SPECTRA Earth Explorer Core Mission Mission Advisory Group (MAG)
Member of the MERIS/ENVISAT Land Calibration/Validation Team
Member of the CHRIS/PROBA Calibration Team
Member of the EnMap imaging spectrometer (GFZ, DLR) Scientific Panel
Co-Chair/Chair of various SPIE conferences (Remote Sensing, Imaging Spectrometry)
Co-Chair of EARSeL conferences (Special Interest Group Imaging Spectroscopy)
Distinguished Reviewer for the Italian Space Agency (ASI)
External Expert for the Finnish Academy of Sciences
Expert for various EU FP5 and FP6 programmes (IST (Information Society), etc.)
Vice President of Board of Directors of Netcetera Group AG, Zurich
Member of various working groups and organisations (ISPRS Com. VII/I, OSA, SPIE, AGU, EGU/EGS, etc.)
Part time programmer at the Union Bank of Switzerland (UBS AG). Programming on DOS, Windows and UNIX platforms for IT–services and office automation. 1990-1995
Group system administrator for SUN (UNIX) and Apple (Mac OS) computers in a distributed heterogenuous network at the Dept. of Geography. 1991-1998
Responsible for the implementation, setup and operation of the UBS AG Intranet web server on SUN for the ‘Development and Operations Group’ (EDBE). Consultant and technical advisor for Intranet and Internet related installation and communication strategies. 1995-1997
Founding member of ‘Netcetera AG’ <http://netcetera.ch>. Netcetera is a software development company focusing on E–business solutions. Currently vice president of the board of directors. 1995-present
Founding member of ‘Swiss Organizer Ltd.’ Swiss Organizer is a software development and managing company focusing on personal information management (PIM). Currently member of the board of directors. 1998-present
Founding member of ‘Netcetera Group AG’ <http://netceteragroup.ch>. Currently vice president of the board of directors. 2003-present

**CAREER:**

**Education:**

1973-1979 Primary school in Zurich.
1979-1986 Gymnasium Hohe Promenade Zurich (high school), Type B (preference in latin & english).
1986 September 12th, Matriculation (‘Matura’) Type B.
1986-1987 Studies in Experimental Physics and Mathematics at the Faculty of Natural Sciences of the University of Zurich.
1987-1993 Studies in Geography at the Faculty of Natural Sciences of the University of Zurich.
1993 February, 25th, Diploma in Geography (dipl. geogr.) from the University of Zurich with minors in Computer Science and Experimental Physics.
1998 November 5th, Doctorate in Natural Sciences (Doctor scientiarum naturalium or Dr. sc. nat.) from the University of Zurich.
2003-present Prof. (Hoogleraar) Remote Sensing Wageningen University.

**Academic positions:**

1990-1991 Teaching assistant in ‘Geographic Information Systems (GIS)’, with Prof. Dr. K. Brassel.
1998-present Experiment scientist and project manager for ‘APEX – Airborne PRISM Experiment’ <http://www.apex–esa.org>, with the PRODEX office of the European Space Agency (ESA) and the Federal Office for Education and Science (BBW).
1999 Research scholar at the Optical Sciences Center, University of Arizona in Tucson, USA with Prof. Dr. M. Descour and Prof. Dr. E. Dereniak.
2001-2003 Research scientist (‘Oberassistent’) with special promotion from the Univ. of Zurich (‘Förderungsstelle’)
2003-present Chair, Professor of Geo-Information Science with emphasis on Remote Sensing, Centre for Geo-Information Science, Wageningen Universiteit and Researchcentrum, Wageningen (NL).

**NUMBER OF PHD THESES 1999-2003: 5**

LIST OF FIVE IMPORTANT REFEREED PAPERS:
Schaepman, M.E.; Dangel, S.

Schlapfer, D.; Schaepman, M.

Schaepman, M.; Itten, K.; Rast, M.

Strub, G.; Schaepman, M.E.; Knyazikhin, Y.; Itten, K.I.

Bojinski, S.; Schaepman, M.; Schlapfer, D.; Itten, K.

LIST OF FIVE INVITED REVIEWS/PROCEEDINGS/BOOKCHAPTERS:

ESA: The Land Surface Processes and Interactions Mission (LSPIM). Reports for Mission Selection, the four candidate Earth Explorer Core Missions, ESA SP–1233(2), Noordwijk (NL) (1999) 211. (book)


LIST OF FIVE IMPORTANT COURSES/WORKSHOPS/CONFERENCES:


LIST OF FIVE SUBSTANTIAL INTERNATIONAL COLLABORATIONS:
APEX: ESA/ESTEC (PRODEX) NL, RSL (Univ. of Zurich) CH, HTS (Wallisellen) CH, Netcetera AG (Zurich) CH, VITO Belgium, OIP Sensor Systems Belgium, DLR DFD Germany, Sofradir France.

SPECTRA: ESA/ESTEC (Earth Explorer Core Mission) the Netherlands, (incl. MAG members from INRA (F), KNMI (NL), Max Planck (Ger), Univ. Munich (Ger), Univ. Louis Pasteur (F), York Univ. (Can), Univ. Valencia (Sp), WUR (NL), JRC (It).

MERIS: Cal/Val. ESA/ESTEC (NL); ESA/ESRIN (It) the Netherlands. (Land calibration activities with Univ. Arizona (USA), INRA (F), DLR (Ger), and RSL (CH))

Simulator for SPECTRA: ESA/ESTEC the Netherlands. jointly with ACRI (F), ONERA (F), Netcetera
(CH), Alterra (NL), MPI (GER), Univ. of Valencia (Sp).


**OBTAINED EXTERNAL FUNDING:**
Swiss National Science Foundation (SNSF):

European Space Agency (ESA):
- Phase B Study: 'APEX – Airborne PRISM Experiment', PI: Prof. Dr. K. I. Itten, Col: M. Schaepman. Scientific partner: VITO (B), and industrial partners: Alcatel Space Switzerland (CH), Schweizerische Flugzeugwerke (CH), and Delft Sensor Systems—OIP (B), 1998 – 2000
- Calibration and validation phase of MERIS on ENVISAT: 'MERIS Cal/Val', PI: Dr. M. Schaepman, Col's: Prof. K. Thome (RSG, Univ. of Arizona), A. Müller (DLR), accepted, 1999
- Quality assessment of CHRIS on PROBA: Joint USA (NASA JPL, Univ. of Arizona) and European (RSL, DLR) calibration proposal. PI: Dr. M. Schaepman, Col's: Prof. K. Thome (RSG, Univ. of Arizona), A. Müller (DLR), D. Schläpfer (RSL), 2000 – 2002.
- Phase C/D Study: ‘APEX – Airborne PRISM Experiment’, PI: Prof. Dr. K. I. Itten, Col: Dr. M. Schaepman, 2001 – 2004
- Scientific Analysis of the ESA Airborne Multi–Annual Imaging Spectrometer Campaign DAISEX: PI: Prof. Dr. J. Moreno, Univ. of Valencia, 2001 – 2003
- Validation of ENVISAT MERIS Geophysical Algorithms based on Vicarious Calibration Experiments (funded by CH BBW IntEx), PI: Dr. M. Schaepman, Col’s: Prof. Dr. K. Thome (Univ. of Arizona), A. Müller (DLR), 2001 – 2002
- SPECTRA Radiometric Performance Requirements, PI: Dr. M. Schaepman, Col: Dr. D. Schläpfer, 2002
- SPECTRA Mission End-To-End Simulator, PI: Dr. M. Schaepman, Col: Dr. S. Dangel, jointly with ACRI, ONERA (F), Netcetera (CH), Alterra (NL), MPI (GER), Univ. of Valencia, 2003 – 2005.

The European Commission:

Airborne Imaging Spectrometer Campaigns (all funded through operating agencies or EU FP5 projects)
AVIRISwiss’91: NASA JPL’s AVIRIS vegetation and inland water quality measurement in Switzerland, PI: Prof. Dr. K. I. Itten, Col: M. Schaepman.
ROSISwiss’94: DLR ROSIS inland water quality measurement in Switzerland, PI: Prof. Dr. K.I. Itten, Col: M. Schaepman.
DAISwiss’96: DLR DAIS 7915 vicarious calibration in Switzerland, PI: M. Schaepman.
DAISwiss’97/MultiSwiss’97: Multi sensor campaign, fusion of SAR and hyperspectral imaging, PI’s: M. Schaepman, Dr. E. Meier.
ProSmart’98: IntSpec HyMap vicarious calibration, vegetation and inland water quality measurement in Switzerland, PI: M. Schaepman.
DAISEX’99: DLR DAIS 7915 and IntSpec HyMap in Barrax (Spain), provision of spectro–directional ground measurements, overall campaign responsible Dr. E. Attema (ESA/ESTEC), PI: Dr. M. Schaepman.
Hysens 2002: DLR DAIS 7915, HyMap and ROSIS in Switzerland
MERIS Cal/Val 2002: ENVISAT MERIS land vicarious calibration campaign, jointly with Prof. Dr. K. Thome (RSG, UoA).

**Other Projects:**
- Calibration study ‘Laboratory Calibration of the GER3700 Spectroradiometer’ for GER Corp.
(Millbrook, NY, USA), PI: M. Schaepman, 1997–1998
• University of Tehran Scientific Remote Sensing Excursion to the University of Tehran (IR). Organizer and excursion lead jointly with Prof. Dr. K.I. Itten and Dr. A. Darvishsefat.
• ADNR Technology Services Sagl. (CH), Basic research in hydrocarbon research using acoustic spectroscopy. PI: Dr. M. Schaepman, 2001.

OTHER:
• Founding member of Netcetera AG (Zurich, Switzerland). Spin-off company created by four previous PhD students of the Dept. Of Geography (Univ. Zurich, Switzerland). Awarded fastest growing entrepreneurship for spin-off’s in 1998 in Switzerland.

Several publications in forensic pathology using remote sensing techniques:
Dr.ir. J.G.P.W. Clevers

Geo-Information Science and Remote Sensing

DATE OF BIRTH, QUALIFICATIONS:
5 July 1957
1981 MSc
1986 PhD
1994 Associate Professor Remote Sensing

MEMBERSHIP OF PROFESSIONAL ORGANISATIONS:
Netherlands Society for Earth Observation and Geo-informatics (NSEOG)
International Society for Photogrammetry and Remote Sensing (ISPRS)
European Association of Remote Sensing Laboratories (EARSeL)
Koninklijke Landbouwkundige Vereniging (KLV)
Secretary Working Group Remote Sensing for Agricultural and Environmental Applications (WRSLN)
Member of the Scientific Committee ISPRS-2000, July 2000, Amsterdam, The Netherlands
Member of the Scientific Committee of the PE-Conference “Spatial Statistics for Production Ecology”, April 1999, Wageningen, The Netherlands
Member of the Scientific Committee of the Workshop of the EARSeL Special Interest Group on “Remote Sensing of Land Use & Land Cover”, May 2004, Dubrovnik, Croatia
Reviewer for Netherlands Remote Sensing Programme, Dutch User Support Programme, Belgian Earth Observation Programme, National Environment Research Council (UK), Canada Foundation of Innovation.

IN Volvement in scientific publications such as editorships:
Book Editor:
Buiten, H.J.

FUNCTIONS:
Co-chairman Commission VII Working Group 1 of the International Society for Photogrammetry and Remote Sensing (ISPRS)
Secretary of the Study Group on Remote Sensing in Agriculture and Environmental Control (WRSLN)
Secretary of the Laboratory of Geo-Information Science and Remote Sensing (GIRS)

CAREER:
1981 MSc degree in Agronomy at the Wageningen Agricultural University (WAU)
PhD degree in Agricultural Science at WAU on the subject “Application of remote sensing to agricultural field trials”
1994 Associate Professor Remote Sensing at the Laboratory of Geo-Information Science and Remote Sensing (WAU)

NUMBER OF PHD THESES 1999-2003: 2
LIST OF FIVE IMPORTANT REFEREED PAPERS:

Clevers, J.G.P.W.


Carvalho, L.M.T.; Fonseca, L.M.G.; Murtagh, F.; Clevers, J.G.P.W.


Clevers, J.G.P.W.; Jong, S.M. de; Epema, G.F.; Meer, F.D.; van der Bakker, W.H.; Skidmore, A.K.; Scholte, K.


LIST OF FIVE INVITED REVIEWS/PROCEEDINGS/BOOKCHAPTERS:

Clevers, J.G.P.W.; Jongschaap, R.E.E.


Clevers, J.G.P.W.


LIST OF FIVE IMPORTANT COURSES/WORKSHOPS/CONFERENCES:


Third EARSeL Workshop on Imaging Spectroscopy, 13-16 May 2003, Herrsching, Germany.

MERIS user workshop, 11-14 November 2003, Frascati, Italy.

LIST OF FIVE SUBSTANTIAL INTERNATIONAL COLLABORATIONS:

ReSeDA: Assimilation of multisensor & multitemporal remote sensing data to monitor soil & vegetation functioning, EU-project ENV4CT960326 (P.I. F. Baret).

The European phenology network, EU-project EVK2-CT-2000-20005 (P.I. A.J.W. van Vliet).

University of Lavras, Brazil: PhDs Luis de Tavares and Fausto Weimar in Wageningen.

Czech Academy of Sciences: PhD Zbyněk Malenovský in Wageningen.

OBTAINED EXTERNAL FUNDING:

Project title: Agricultural land use monitoring with improved RS techniques. Financed by the Netherlands Organization for Scientific Research (NWO).

Project title: Multisensor RS capabilities land. Financed by the National Remote Sensing Programme, BCRS-project 3.1/AP-01.

Project title: MERIS multiscale land applications study. Financed by the National Remote Sensing Programme, BCRS-project 3.1/AP-07.

PhD project: Deriving sub-pixel information for MERIS by an integrated spatial, spectral and temporal analysis. Financed by the Space Research Organization Netherlands.
Dr. G.F. Epema
Geo-Information Science and Remote Sensing

DATE OF BIRTH, QUALIFICATIONS:
9 August 1955
1980 MSc, Fysische Geografie; (R)UU
1992 PhD, Agricultural University of Wageningen (presently Wageningen University)

MEMBERSHIP OF PROFESSIONAL ORGANISATIONS:
GIN
SILVA network

IN INVOLVEMENT IN SCIENTIFIC PUBLICATIONS SUCH AS EDITORSHIPS:
Reviewer for journals:
IJGIS
JAG
International Journal of Remote Sensing

CAREER:
1980-1982 (State) University of Utrecht researcher
1982-1999 LH/ LU/ WU Soil Science and Geology, researcher, assistant professor
1994-2002 LH/ LU/ WU Laboratory for Geo-Information Science and Remote Sensing / Education Institute Environmental Sciences: course director MSc GIS for rural applications
1999-present WU Laboratory for Geo-Information Science and Remote Sensing, assistant professor
2000-present WU Education Institute Environmental Sciences, programme coordinator BSc and MSc Forest and Nature Conservation & MSc Geo-information Science

NUMBER OF PHD THESES 1999-2003: 2

Casanova, D. (1998). Quantifying the effects of land conditions on rice growth, a case study in the Ebro delta (Spain) using remote sensing. (co-promotor)


LIST OF FIVE IMPORTANT REFEREED PAPERS:
Casanova, D.\Goudriaan, J.\Bourma, J.\Epema, G.F.
Yield gap analysis in relation to soil properties in direct-seeded flooded rice.

Clevers, J.G.P.W.\Jong, S.M. de\Epema, G.F.\Meer F. van der\Bakker, W.H.\Skidmore, A.K.\Addink, E.A.
MERIS and the red-edge position.

Meer, F. van der\Bakker, W.\Scholte, K.\Skidmore, A.\Jong, S. de\Clevers, J.\Addink, E.\Epema, G.
Spatial scale variations in vegetation indices and above-ground biomass estimates: implications for MERIS.

Wielemaker, W.G.\Bruin, S. de\Epema, G.F.\Veldkamp, A.
Significance and application of the multi-hierarchic landsystem in soil mapping,
Catena 43 (2001) 15-34.

Kooistra, L.\Wanders, J.\Epema, G.F.\Leuven, R.S.E.W.\Wehrens, R.\Buydens, L.M.C.
The potential of field spectroscopy for the determination of sediment properties in river floodplains.
Analytica Chimica Acta 484 (2003) 189-200

LIST OF FIVE INVITED REVIEWS/PROCEEDINGS/BOOK CHAPTERS:
Jong, S.M. de\Epema, G.F.
Imaging Spectrometry for Surveying and Modelling Land Degradation.
LIST OF FIVE IMPORTANT COURSES/WORKSHOPS/CONFERENCES:
Frans I. Rip en Gerrit F. Epema Towards competencies for the MSc curriculum Geo-information Science, Agile Kreta April-May 2004

LIST OF FIVE SUBSTANTIAL INTERNATIONAL COLLABORATIONS:
SILVA-network 45 universities in Europe
SUNRISE- Italy, Ethiopia, Kenya, Netherlands, UK

OBTAINED EXTERNAL FUNDING:
PhD project Peter F. Okoth (extension)
PhD project Imaging Spectroscopy (GO) PhD position in Imaging Spectroscopy “Deriving sub-pixel information for MERIS by an integrated spatial, spectral and temporal analysis” Doorstroomprogramma Bos- en Natuurbeheer en Milieukunde, tweede tranche middelen LNV, 141.00 euro
‘Plan dienstverlening WUR aan het Groen Hoger Onderwijs’ 55.000 euro

OTHER:
Representative of WUR in project team of Euroleague ELLS Forestry group
Dr. ir. S. de Bruin

Geo-Information Science and Remote Sensing

DATE OF BIRTH, QUALIFICATIONS:
15 maart 1964
MSc
PhD

IN_INVOLVEMENT IN SCIENTIFIC PUBLICATIONS SUCH AS EDITORSHIPS:
Reviewer: Agriculture, Ecosystems & Environment
Reviewer: International Journal of Geographical Information Science
Reviewer: Photogrammetric Engineering and Remote Sensing
Reviewer: Stochastic Environmental Research & Risk Assessment
Book reviewer: Bierkens, M.F.P. \ Finke, P.A. \ De Willigen, P.: Upscaling and Downscaling for Environmental Research.

CAREER:
1989-1990 Research assistant: Atlantic Zone Programme (CATIE\UAW\IMAG), Costa Rica
1991 Soil expert: Oil Palm Research Program, Compania Palma Tica (Chiquita Brands), Costa Rica
1992-1993 Expert soil science and land evaluation; Universidad Nacional Agraria; Nicaragua
1993-1995 Lecturer/Researcher (several temporal appointments)
1996 Researcher
1995-1999 PHD-student; Wageningen University
2000-2001 Postdoctoral researcher
2001-present Assistant Professor geo-information science

NUMBER OF PHD THESES 1999-2003: 1
• Bruin, S. de (2000). Geographical information modelling for land resource survey. (author)

LIST OF FIVE IMPORTANT REFEREED PAPERS:
Bruin, S. de \ Wielemaker, W.G. \ Molenaar, M.
Formalisation of soil landscape knowledge through interactive hierarchical disaggregation.
Geoderma 91 (1999) 151-172

Bruin, S. de
Predicting the areal extent of land cover types using classified imagery and geostatistics.

Bruin, S. de \ Gorte B.G.H.
Probabilistic image classification using geological map delineations applied to land cover change detection.

Bruin, S. de \ Bregt, A.K. \ Ven, M. van de
Assessing fitness for use: the expected value of spatial data sets.

Bruin, S. de \ Hunter, G.J.
Making the trade-off between decision quality and information cost.

LIST OF FIVE INVITED REVIEWS/PROCEEDINGS/BOOKCHAPTERS:
Bruin, S. de \ Molenaar, M.
Remote sensing and geographical information systems.

Bruin, S. de
Spatial uncertainty in estimates of the areal extent of land cover types.
Bruin, S. de
The value of spatial information – Decision-analytical assessment of a quality component.
In: Proceedings 4th AGILE Conference on Geographic Information Science; April 2001; Brno. Masaryk University (2001) 545-552

Bruin, S. de; Bregt, A.K.
Decision analytical assessment of the fitness of uncertain spatial.

Zeng, Y.; Bartholomeus, H.M.; Bruin, S. de; Epema, G.F.; Clevers, J.G.P.W.
Using hyperspectral remote sensing data for identifying geological and soil units in the Alora region, Southern Spain.

OBTAINED EXTERNAL FUNDING:
“Geschiktheid van Geometrische basisbestanden voor ruimtelijke analyses” funded by Rijksplanologische Dienst, Ruimtelijk Onderzoek en Planontwikkeling, Order number: 20.61.011.
Prof. M. Molenaar

Prof. M. Molenaar has been invited or elected for the following functions:

- Member Program Committee "Aardobservatie" NWO-ALW. 1999-2002
- Member of the Netherlands Commission of Geodesy (NCG), 1984-present
  - since 1988 member of the daily board of this commission
  - since 1992 Secretary of this commission
- Chairman of the Subcommittee of NCG for 'Geo-information Theory', 1989-2000
- Netherlands representative to OEEPE, 1997–present
- Chairman of EuroSDR (OEEPE) Scientific Committee, 2000-present
- Member of the board of the Netherlands Society for Photogrammetry, 1992-present
- President of Netherlands Society for Earth observation and Geo-informatics (NKAOG), 1998-2001
- Member of the Council of NKAOG since 1995-2001
- Chairman of ISPRS Working group IV/III on 'Conceptual aspects of GIS', 1996-2000
- Member local organizing committee ISPRS Congress 2000, Amsterdam
  - chairman scientific program committee
- Honorary Professor at Wuhan Technical University of Survey and Mapping, Wuhan, China, 1999-2000
- Honorary Professor at Wuhan University, China, 2000-present
- Chairman Netherlands Federation for International Education (FION), 2002-present
- Chairman Foundation for Netherlands International Educational Institutes (SAIL, 2002-present
- Member National Users Platform Earth Observation (NGPA), 2002-present
- Member National Coordinating Group GEO, 2003-present
- Member National GMES Steering Committee (GSC), 2003-present

Dr. R. van Lammeren

Dr. R. van Lammeren has been invited or elected for the following functions:

- Member of the task force of the EURURALIS research group
- Coordinator for research topics in the BSIK-VNN consortium
- Participating researcher in the BSIK-LUMOS consortium
- Professional memberships in GIN, NCG, and VIAS
- Accredited member of the Dutch National Register of Architects
- Representative of the founding member of AGILE
- Memberships in task forces and sub-groups of PEER, PSPE, PEATWISE, and EUROLEAGUE/ELLS
- Reviewer for Landscape & Urban Planning
Appendix 2: Publications

List of all publications (both inside as well as outside PE&RC) of the chair ordered per year and per graduate school.

GRS 1999
C.T. De Wit Graduate School for Production Ecology and Resource Conservation

1. PHD THESES

Cheng, T.

Droesen, W.
Spatial modelling and monitoring of natural landscapes : with cases in the Amsterdam Waterworks Dunes Wageningen Agricultural University. Promotor: Prof.dr.ir. M. Molenaar, promotor Prof.dr. J. Sevink. - Wageningen : Droesen, 1999. - p. 163

Sanders, M.E.
Remotely sensed hydrological isolation : A key factor predicting plant species distribution in fens Wageningen Agricultural University. Promotor: Prof.dr.ir. M. Molenaar, co-promotor Dr. G.B.M. Pedroll. - Wageningen : Sanders, 1999. - p. 136

2A. IN REFEREED JOURNALS

Addink, E.A.
Method to monitor and quantify the environmental impact of European agriculture : conceptual outline International journal of Applied earth observation and geo-information 1 (1999) 1. - p. 4-8

Addink, E.A. Stein, A.

Bregt, A.K.

Bruin, S. de Wielemaker, W.G. Molenaar, M.

Casanova, D. Goudriaan, J. Bouma, J. Epema, G.F.

Cheng, T. Molenaar, M.

Cheng, T. Molenaar, M.

Clevers, J.G.P.W.

Jong, S.M. de Roo, A.P.J. de Paracchini, M.L. Bertolo, F. Folving, S. Megier, J.

Molenaar, M.


2C. BOOK CHAPTERS


2D. MONOGRAPHS AND EDITED BOOKS


Jong, S.M. de\ Je weet niet wat je ziet vanuit een satelliet Wageningen : Wageningen Universiteit, 1999. - p. 16

2E. PROCEEDINGS

Carsjens, G.J.\Kluskens, R.\Lammeren, R.J.A. van\ Methodology to integrate environmental aspects into physical planning In: Emerging technologies for sustainable land use and water management / A. Musy, L. Santos Pereira, M. Fritsch (eds), 2nd Inter-regional conference on environment-water, Lausanne, Switzerland, 1999. Proceedings and full paper on CD-ROM. - Lausanne: Presses polytechniques et universitaires romandes, 1999. - p. np


Jong, S.M. de\Sommer, S.\Lacaze, B.\Scholte, K.\Meer, F. van der\ The DAIS La Peyne Experiment : using airborne imaging spectrometry for land degradation survey and modelling In : Operational remote sensing for sustainable development / N.J.A. Nieuwenhuis, R.A. Vaughan, M. Molenaar (eds). - Rotterdam : A.A. Balkema, 1999. - p. 247-255


Molenaar, M.\ Spatial objects without boundaries In: Proceedings of the international symposium on spatial data

Roo, A. de Knijff, J. van der Horritt, M. Schmuck, G. Jong, S.M. de

Sanders, M.A. Clevers, J.G.P.W.

Uitermark, H.T. Oosterom, P.J.M. van Mars, N.J.I. Molenaar, M.

Zeeuw, C.J. de Bregt, A.K. Sonneveld, M.P.W. Brink, J.A.T. van den

2F. SCIENTIFIC REPORTS

Brouwer, L.C. Jong, S.M. de Th., H.
An integrated approach to assess and monitor desertification processes in the Mediterranean Basin Final EU-DeMon-II Report, i.o.v. EU. - Trier : University Trier, 1999. - p. 46


Clevers, J.G.P.W. Vonder, O.W.

Deurloo, H.
Towards a land use database to assist decision making processes for area closures and livestock allocation to grazing land in Tigray Ethiopia Wageningen : Wageningen University, 1999. - p. 19

Deurloo, H. Epema, G.F.
Parameters to describe the socio-economic system in the adwa area : an overview of data Wageningen : Wageningen University, 1999. - p. 17

Deursen, W.P.A. van Bagré, A. Jong, S.M. de Teeffelen, P.B.M. van

Hartog, R. Lammeren, R.J.A. van Vonder, O.W.
Quick Scan Leermogeving Wageningen : Wageningen University, 1999. - p. 28

Lammeren, R.J.A. van
Ariadne's thread http://online.kennis.org/nl/welkom.htm. - p. np

MERILAND : MERIS potential for land applications Wageningen : [s.n.], 1999. - p. 108

Ruijvekamp, G. Epema, G.F. Eweg, H.
The use of geographical information systems and remote sensing for agro-biodiversity Wageningen : Wageningen University, 1999. - p. 22

Schmidt, A.M. Bregt, A.K. Hilgen, P.R. Lentjes, P.G. Seubring, A.M. Zeeuw, C.J. de
3. PROFESSIONAL PUBLICATIONS AND PRODUCTS

Bregt, A.K.
Generalisatie voor geo-informatie In: Generalisatie met de computer / ed. by B. Kobben. -
Amersfoort : [s.n.]. 1999. - (NVK pubicatiereeks; 28). - p. 61-66

Bregt, A.K.
Ruimtelijke statistiek kwantificeert onzekerheid voor desicion support Vi Matrix 7/2 (1999). - p. 35-37

Bregt, A.K.

Clevers, J.G.P.W.
Distance learning in remote sensing at Wageningen University: Remote double EARSeL Newsletter 40 (1999). - p. 22-23

Clevers, J.G.P.W.

Clevers, J.G.P.W.

Jong, S.M. de

Jong, S.M. de

Jong, S.M. de

Lammeren, R.J.A. van

Lammeren, R.J.A. van

Lammeren, R.J.A. van

Litzenberg, A.A.

Li Xiuzhen
Assessment of Land Use change using GIS : A Case study in the Llanos de Orinoco Wageningen : Wageningen Universiteit, 1999. - p. 88

Loedeman, J.H.
Ambition of ISPRS to integrate RS and GIS; an interview with Prof.dr.ir. Klaas-Jan Beek, congress director ISPRS 2000 GIM International 13 (1999) 8. - p. 38-41

Loedeman, J.H.
Challenges are in the semantic domain; interview with Prof.dr. ir. Martien Molenaar,Chairman of the scientific committee ISPRS 2000 GIM Internationaal 13 (1999) 9. - p. 42-45
Loedeman, J.H.

Loedeman, J.H.
Trimble to have stronger strategic focus; interview with Steven Berglund, CEO of Trimble Navigation

Loedeman, J.H.

Loedeman, J.H.

Loedeman, J.H.
DMC: designed with the end-use in mind GIM International 13 (1999) 10. - p. 44-45

Loedeman, J.H.

Molenaar, M.

Molenaar, M.
The role of topologic and hierarchical spatial object models in database generalization In: Generalisatie met de computer / B. Kobben (ed.). - Amersfoort : [s.n.], 1999. - (Publicatiereeks; 28). - p. 5-27

Nieuwenhuis, G.J.A. | Vaughan, R.A. | Molenaar, M.

Smaalen, J.W.N. van
Generalization based on topology In: Generalisatie met de computer / Kobben B. (ed.). - Amersfoort : [s.n.], 1999. - (Publicatiereeks; 28). - p. 29-33

Vonder, O.W. | Clevers, J.G.P.W.

Vonder, O.W.
Digital lectures: Een toolkit voor audio gestuurde slide shows via Internet

Vonder, O.W.
Technische ondersteuning (1): de database, interview met Oscar Vonder

Vonder, O.W. | Clevers, J.G.P.W.
Digital lectures: A toolkit to create audio controlled slide shows for Internet

Vonder, O.W. | Clevers, J.G.P.W.
Behind the scenes of remote sensing online lectures EARSeL Newsletter 40 (1999). - p. 23-26

Vonder, O.W. | Lammeren, R.J.A. van
Wageningen online lifelong learning KUS kwartaalbrief 6 (1999). - p. 7
4. PUBLICATIONS FOR THE GENERAL PUBLIC

Jong, S.M. de


WAGENINGEN INSTITUTE FOR ENVIRONMENT AND CLIMATE RESEARCH
2F. SCIENTIFIC REPORTS

Li Xiuzhen, \ Assessment of Land Use change using GIS : A Case study in the Llanos de Orinoco Wageningen : Wageningen Universiteit, 1999. - p. 88

GRS 2000
C.T. DE WIT GRADUATE SCHOOL FOR PRODUCTION ECOLOGY AND RESOURCE CONSERVATION

1. PHD THESES

Bruin, S. de


2A. IN REFEREED JOURNALS


Bruin, S. de

Bruin, S. de


Meer, F.D. van der\Jong, S.M. de\ Improving the results of spectral unmixing of Landsat thematic mapper imagery by enhancing the orthogonality of end-members International Journal of Remote Sensing 21 (2000) 15. - p. 2781-2797

Meer, F.D. van der\Bakker, W.\Scholte, K.\Skidmore, A.K.\Jong, S.M. de\Dorresteijn, M.\Clevers, J.G.P.W.\Epema, G.F.\ Scaling to the MERIS resolution : mapping accuracy and spatial variability Geocarto International 15 (2000) 1. - p. 37-47
Meer, F. van den Bakker, W.H.\Scholte, K.\Skidmore, A.K.\Jong, S.M. de\Clevers, J.P.G.W.\Epema, G.F.\

Molenaar, M.\Cheng, T.\

2B. IN OTHER JOURNALS

Bruin, S. de\
Profijt van GIS bij kartering blijft voor landinventarisaties onderbenut Vi Matrix 57 (2000). - p. 18-19

Jong, S.M. de\

Lee, Y.C.\Molenaar, M.\

2C. BOOK CHAPTERS

Bregt, A.K.\

Molenaar, M.\

Molenaar, M.\Krefeld, M. van\Wagner, F.\Weibel, R.\

2D. MONOGRAPHS AND EDITED BOOKS

Lee, Y.C.\Molenaar, M.\

2E. PROCEEDINGS

Bloemmen, M.\Lammeren, R.J.A. van\Kerkstra, K.\

Bosse, W.\Bloemmen, M.\Lammeren, R.J.A. van\Kerkstra, K.\

Bruin, S. de\

Bulens, J.D.\Luremans, P.\Kramer, H.\Lammeren, R.J.A. van\
Carsjens, G.J.

Groeneveld, G.M.

Kluskens, R.

Lammeren, R.J.A. van

Ligtenberg, A.


Carvalho, L.M.T.

Fonseca, L.M.G.

Murtagh, F.

Clevers, J.G.P.W.


Clevers, J.G.P.W.

Vonder, O.W.

Jongschaap, R.E.E.

Desprats, J.F.

King, C.

Prévot, L.

Bruguier, N.


Clevers, J.G.P.W.

Jong, S.M. de

Epema, G.F.

Meer, F.

van der Bakker, W.H.

Skidmore, A.K.


Hornstra, T.

Maas, H.G.

Jong, S.M. de


Jong, S.M. de

Clevers, J.P.G.M.

Pebesma, E.

Lacaze, B.


Koster, E.

Lucieer, A.

Jong, S.M. de

Jetten, V.G.


Ligtenberg, A.

Beers, G.

Goetgeluk, R.

Rijswijk, J.H. van


Ligtenberg, A.

Lammeren, R.J.A. van

Bregt, A.K.


Ligtenberg, A.

Lammeren, R.J.A. van

Bregt, A.K.


Meer, F.D.

van der Bakker, W.

Scholte, K.

Skidmore, A.K.

Jong, S.M. de

Clevers, J.G.P.W.

Epema, G.F.

Molenaar, M.


Zhan, Q.\Molenaar, M.\Gorte, B.\ Urban land use classes with fuzzy membership and classification based on integration of remote sensing and GIS In: International Archives of Photogrammetry and Remote Sensing,Vol. XXXIII, Part B7 - [S.l.] : [s.n.], 2000. - p. 1751-1760


2F. SCIENTIFIC REPORTS
Addink, E.A.\Clevers, J.G.P.W.\Meer, F.D. van der\Jong, S.M. de\Epema, G.F.\Skidmore, A.K.\ Bakker, W.H.\ Meriland-2: MERIS Multiscale land applications study Wageningen : Wageningen University, Environmental Sciences, 2000. - ( ; CGI-2000-08 - p. 48

Bregt, A.K.\Bulens, J.D.\Heusden, M. van\Hilferink, M.\Lammeren, R.J.A. van\Ligtengberg, A.\Rijswijk, J.H. van\Schans, R. van den\Scholten, H.\Winter, W.P. de\ SimRuralis; een multi-actor spel voor de planvorming van het landelijk gebied Den Haag : LEI, 2000. - (Report ; 4.00.03). - p. 120


Hornstra, T.\ Jong, S.M. de

Jong, S.M. de

Jong, S.M. de\ Lucieer, A.\ Koster, E.

Keizer, E.W.H.\ Clevers, J.G.P.W.

Meer, F.D. van\ Clevers, J.G.P.W.\ Jong, S.M. de\ Bakker, W.H.\ Epema, G.F.\ Skidmore, A.K.\ Scholte, K.

Smaalen, J. van

Teeffelen, P. van\ Jong, S.M. de

Zeeuw, C.J. de\ Bulens, J.D.\ Bregt, A.K.\ Knapen, R.\ Lentjes, P.J.\ Schans, R. van der

3. PROFESSIONAL PUBLICATIONS AND PRODUCTS

Bregt, A.K.\ Crompvoets, J.W.H.C.

Lammeren, R.J.A. van\ Loedeman, J.H.

Loedeman, J.H.
Goal to Change Procurement Model; interview with David Nale, president and CEO of ADR Inc GIM International 14 (2000) 1. - p. 6-9

Loedeman, J.H.
Manufacturers Cannot See Past Instrumentation; interview with Dr. Richard Trainer, Strata Software GIM International 14 (2000) 2. - p. 6-9

Loedeman, J.H.
Creating Standards Is The Most Significant Thing; interview with Richard Nasmith, director of international sales, PCI Geomatics GIM International 14 (2000) 3. - p. 6-9

Loedeman, J.H.
The Right to Lobby is in the 1st Ammendment; interview John Pallatiello, executive director, MAPPS GIM International 14 (2000) 4. - p. 6-9

Loedeman, J.H.
Loedeman, J.H.
We want to expand in the Global Marketplace; interview with Toyohisa Kuramoto, president and CEO of Nikon Geotechs GIM International 14 (2000) 6. - p. 6-9

Loedeman, J.H.
A customer always deserves the system he selects; interview with Patrick Wong, president and CEO of International Systemap Corporation GIM International 14 (2000) 7. - p. 6-9

Loedeman, J.H.
Customer applications influence hardware Platforms; interview with Paul Manson, marketing manager, Trimble Europe GIM International 14 (2000) 8. - p. 6-9

Loedeman, J.H.

Loedeman, J.H.
The one strategic item: a digital aerial camera; interview with Bruce Wald, president and CEO of LH Systems GIM International 14 (2000) 11. - p. 6-9

Loedeman, J.H.
Providing airborne LIDAR services needs partnership; interview with Dr. Uwe Lohr, managing director of TopoSys and Willem Philipse, managing director of Aerodata Int GIM International 14 (2000) 11. - p. 44-47

Loedeman, J.H.
Further consolidation in surveying industry; interview with Steve Berglund, CEO of Trimble and Karl Ramstroen, former president of Spectra Precision. GIM International 9 (2000). - p. 54-57

WAGENINGEN INSTITUTE FOR ENVIRONMENT AND CLIMATE RESEARCH

1. PHD THESES

Li Xiuzhen,

GRS 2001
C.T. DE WIT GRADUATE SCHOOL FOR PRODUCTION ECOLOGY AND RESOURCE CONSERVATION

1. PHD THESES

Addink, E.A.

Carvalho, L.M.T. de

2A. IN REFEREED JOURNALS


Carvalho, L.M.T.; Fonseca, L.M.G.; Murtagh, F.; Clevers, J.G.P.W.

Cheng, T.; Molenaar, M.; Lin, H.

Epinat, V.; Stein, A.; Jong, S.M. de; Bouma, J.

Jong, S.M. de; Hornstra, T.; Maas, H.G.

Ligtenberg, A.; Bregt, A.K.; Lammeren, R.J.A. van

Meer, F. van der; Bakker, W.; Scholte, K.; Skidmore, A.K.; Jong, S.; Clevers, J.; Addink, E.; Epema, G.

Veldkamp, A.; Verburg, P.H.; Kok, K.; Koning, G.H.J.; de Priess, J.; Bergsma, A.R.
The need for scale sensitive approaches in spatially explicit land use change modeling Environmental Modeling and Assessment 6 (2001). - p. 111-121

2B. IN OTHER JOURNALS

Aalders, H.J.G.L.; Bregt, A.K.; Ven, M.P.J. van de

Rip, F.

2C. BOOK CHAPTERS

Bregt, A.K.; Zeeuw, C.J. de

Clevers, J.G.P.W.; Jongschap, R.E.E.

Feitoza, H.N.; Molenaar, M.; MeiJere, J. de; Stuiver, H.J.

Jong, S.M. de; Epema, G.F.

Meer, F.D. van der; Jong, S.M. de; Bakker, W.
2D. MONOGRAPHS AND EDITED BOOKS

Meer, F. D. van de Jong, S. M. de

2E. PROCEEDINGS

Bielsa, I., Jong, S. M. de Jongman, R. H. G.

Bregt, A. K., Lammeren, R. J. A. van Ligtenberg, A.

Bruin, S., Bregt, A. K.

Clevers, J. G. P. W., Jongenkins, R. E. E.

Dankers, R., Middelkoop, H., Jong, S. M. de

Deurloo, H., Epema, G. F., Ruivenkamp, G. Jellemma, A.

Epema, G. F., Fikre Botoro, M., Deurloo, H., Jong, S. M. de

Lammeren, R. J. A. van Kamps, S.

Paddenburg, A. van Wachowicz, M.

Teeffelen, P. B. M. van Berg, L. van den Jong, S. M. de

Teeffelen, P. B. M. van Jong, S. M. de


2F. SCIENTIFIC REPORTS


Dantas, M.\Pott, A.\Pott, V.\Rodrigues, C.A.G.\Vila da Silva, J.S.\Dehorster, O.\Tamisier, A.\Groce, G.\Gamboa, E.\Haque, E.\Jongman, R.H.G.\Meijere, J. de\Schok, H.A.\Lammeren, R.J.A.\ van\Loedeman, J.H.\Wenting, P.F.M.\ Ecological bases for the sustainable management of flooded tropical ecosystems: Case studies in the Llanos (Venezuela) and the Pantanal (Brazil) Corumba : Embrapa, 2001. - (Final Report EU project ERBIC 18 CT960087). - p. 47


Jong, S.M. de\Sande, C. van der\ River flood damage assessment using Ikonos imagery Ispra, Italy : JRC, 2001. - (Final Report to the Space Application Institute, Contract no. NL-410332). - p. 78

Lammeren, R.J.A.\ van\Annevelink, B.\Kramer, H.\Ruyten, F.\Uiterwijk, M.\Wachowicz, M.\ SALIX - simulatie agenten voor landschapsarchitectonisch en virtueel groenbeheer Wageningen : Wageningen UR, 2001. - (Landschapsarchitectuur). - p. 42


3. PROFESSIONAL PUBLICATIONS AND PRODUCTS

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