

# Centre for Geoinformation Science (CGIS) *Annual Report*

# 2013



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA  
Faculty of Natural and Agricultural Sciences

## Table of Contents

<b>Message from the Acting Director .....</b>	<b>1</b>
<b>The CGIS team .....</b>	<b>2</b>
1. Advisory Board .....	2
1.1 Chairperson .....	2
1.2 Representatives of key stakeholders .....	2
1.3 Heads of collaborating departments and schools.....	3
1.4 Ex officio members.....	3
2 Staff and collaborators .....	4
3 Postgraduate students.....	5
3.1 Masters students .....	5
3.2 Doctoral students.....	6
<b>2013 Highlights.....</b>	<b>8</b>
1. Internal platform at UP .....	8
1.1 Unit for Geoinformation and Mapping (UGM) .....	8
1.2 Prize winning students.....	9
1.3 Graduate and postgraduate lecturing .....	10
1.4 Research seminars.....	11
1.5 First UP GGM Postgraduate Seminar .....	12
2. Partner to the geoinformation industry of South Africa .....	12
2.1 CE at UP courses .....	13
2.2 Geo-information Society of South Africa (GISSA) .....	13
2.3 Committee for Spatial Information (CSI) of South Africa.....	14
2.4 Guest lectures .....	14
2.5 Georabble.....	15
2.6 Industry visits by first year students .....	16
3. Research .....	16
3.1 Conferences, workshops, meetings and visitors .....	16
3.2 Research projects.....	20
3.3 Peer-reviewed journal articles.....	21
3.4 Papers presented at refereed conferences .....	22
3.5 Chapters in books .....	23
3.6 Dissertations and Honours reports.....	23
<b>Funding .....</b>	<b>26</b>
<b>Annex A: Constitution of the Centre for Geoinformation Science (CGIS) .....</b>	<b>27</b>

## Message from the Acting Director

Geoinformation Science (GISc), also known as Geoinformatics, is concerned with the nature of geographic information and the use of geospatial technologies to collect, store, integrate, transform, retrieve, analyse, display and distribute geographic information from different sources. GISc is a multi-disciplinary endeavour, drawing on other disciplines, such as geography, mathematics, statistics and computer science.

The Centre for Geoinformation Science (CGIS) is a UP platform for individuals and teams involved in GISc research, education, training, professional development and community engagement. CGIS aims to facilitate GISc research collaborations; to establish education, training and professional alliances within South Africa and abroad; and to be a partner to the South African geoinformation industry in support of GISc research, education, training, professional development and community engagement.

Amongst others, we continue to support UP students and staff with geospatial software and data; we regularly host guest lectures and research seminars presented by local and international colleagues from the geoinformation community; we present a number of GISc certificate courses through CE at UP; and all of us are involved in a variety of multi-disciplinary research projects.

In the previous year the amended CGIS constitution was approved and foundations for achieving the CGIS vision were laid. In 2013, we reaped the first benefits of these foundations, amongst others:

- A group of nine CGIS members attended the 26th International Cartographic Conference (ICC) in Dresden, Germany.
- Research output doubled in comparison to the previous year.
- First results on landmine detection from remotely sensed images.
- Multi-disciplinary research was widened through new collaborations with researchers from other disciplines and countries, among these, the UP Department of Human Nutrition, the UP Natural Hazard Centre, the Geography Department at the University of Zürich and an independent research associate.
- We strengthened our partnership with the South African GISc profession through involvement in the development of the South African Geospatial Information Management Strategy; a survey of the geoinformation community together with the Geo-information Society of South Africa (GISSA); and the introduction of the 'GIS Professional Practice' course through CE at UP.

A salute and thank you to colleagues and students who make CGIS happen!

Prof Serena Coetzee  
CGIS: Acting Director

May 2014

# The CGIS team

## 1. Advisory Board

The Advisory Board provides strategic direction and advice regarding marketing, as well as the research, education and training, professional development, community engagement, and capacity building in CGIS; it also advises on operational decisions, reviews the annual budget and reviews the realization of the vision and the execution of the mission.

### 1.1 Chairperson



**Prof Anton Ströh**

Chairperson: CGIS Advisory Board

Dean: Faculty of Natural and Agricultural Sciences, University of Pretoria

### 1.2 Representatives of key stakeholders

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**Dr Herman Booysen**

Past National Chair: Geo-information Society of South Africa (GISSA)



**Dr Derek Clarke**

Vice-President: International Cartographic Association (ICA)



**Mr Adri de la Rey**

GIS Manager, Technology, Eskom



**Mr Gavin Fleming**

Chair: OSGeo Africa and  
Managing Director: Afrispatial



**Mr Ashwell Jeneker**

Deputy Director-General:  
Statistical Support and  
Informatics, Stats SA



**Dr Pat Manders**

Group Manager:  
Institutional Planning, CSIR



**Mr Paul Marshall**  
President: South African  
Council for Professional and  
Technical Land Surveyors  
(PLATO)



**Mr Magnus Rademeyer**  
Managing Director, AfriGIS



**Ms Chenay Simms**  
Esri Education, Esri South  
Africa

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### ***1.3 Heads of collaborating departments and schools***



**Prof Theo Bothma**  
Chair: School of Information  
Technology, University of  
Pretoria



**Prof Andries Engelbrecht**  
Head: Department of Computer  
Science, University of Pretoria



**Prof Pat Eriksson**  
Head: Department of Geology,  
University of Pretoria

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### ***1.4 Ex officio members***



**Prof Hannes Rautenbach**  
Head: Department of Geography,  
Geoinformatics and Meteorology,  
University of Pretoria

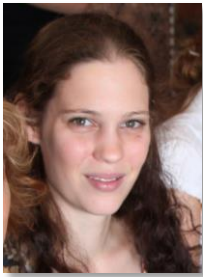


**Prof Serena Coetzee**  
Acting Director: CGIS,  
Associate Professor and Coordinator: Geoinformatics,  
Department of Geography, Geoinformatics and Meteorology,  
University of Pretoria

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## 2 Staff and collaborators

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**Ms Yvette Bevis**  
Cartographer, Unit for  
Geoinformation and Mapping



**Dr Joel Botai**  
Senior Lecturer and Departmental Coordinator: Earth  
Sciences, Group leader: CGIS research focus group on *Space  
geodesy, earth and atmospheric observation*

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**Ms Ingrid Booysen**  
Senior Cartographer, Head: Unit  
for Geoinformation and Mapping



**Prof Ludwig Combrinck**  
Extraordinary Professor, Affiliation: HartRAO

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**Mr Antony Cooper**  
Extraordinary Lecturer,  
Affiliation: CSIR



**Ms Sanet Eksteen**  
Lecturer, Group Leader: CGIS research focus group on *GISc  
Education and Training in Africa*

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**Mr Joos Esterhuizen**  
Lecturer



**Ms Erika Pretorius**  
Technical Assistant

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**Victoria Rautenbach**  
PhD Geoinformatics student  
CGIS student representative



**Dr Peter Schmitz**  
Extraordinary Senior Lecturer, Group Leader: CGIS research  
focus group on *Forensic geography*, Affiliation: CSIR

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**Mr Philemon Tsela**  
Junior Lecturer



**Mr Fritz van der Merwe**  
Senior Lecturer

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**Dr Konrad Wessels**  
Extraordinary Senior Lecturer,  
Affiliation: CSIR



**Brendon Wolff-Piggott**  
CGIS Research Associate

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### 3 Postgraduate students

In 2013, ten Masters and 14 doctoral students were associated with CGIS through their research. Their supervisors are from the Departments of Geography, Geoinformatics and Meteorology (GGM) and Computer Science, as well as the CSIR, HartRAO, SANSA and the University of Zürich. Degrees are conferred by the respective departments, schools and faculties.

#### 3.1 Masters students

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**Adeniyi Adeyemi**, MSc Geoinformatics

*Supervisor:* Dr Joel Botai (GGM)

*Research:* Analysis of impervious surfaces across Tshwane by use of remote and in-situ measurements

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**Paul Barasa**, MSc Geoinformatics

*Supervisor:* Dr Joel Botai (GGM)

*Research:* Integration, evaluation and analysis of meteorological data as applied to Satellite and Lunar Laser Ranging

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**Rebecca Ditlopo**, MSc Geoinformatics

*Supervisor:* Dr Joel Botai (GGM)

*Research:* Analysis of water reservoirs by use of remote sensing and in-situ data in Vhembe District, Limpopo Province, South Africa

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**Nondimizo Dlamini**, MSc Geography

*Supervisors:* Dr Joel Botai (GGM) and Dr Moses Cho (CSIR)

*Research:* Investigating the characteristics of expansive soils through remote sensing and in situ measurements

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**Lauren Hankel**, MSc Geoinformatics

*Supervisors:* Dr Serena Coetzee (GGM) and Mr Graeme McFerren (CSIR Meraka Institute)

*Research:* Distributed geoprocessing of high velocity streaming data

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**Jared Jacobson**, MSc Geoinformatics

*Supervisors:* Dr Serena Coetzee (GGM) and Prof Derrick Kourie (Computer Science)

*Research:* Assessing OpenGIS for 2D rendering and visualization in a GIS

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**Samy Katumba**, MSc Geoinformatics

*Supervisor:* Dr Serena Coetzee (GGM)

*Research:* Evaluating the suitability of different metadata vocabularies for spatial data discovery on the web

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**Cilence Munghemezulu**, MSc Geography

*Supervisors:* Prof Ludwig Combrinck (HartRAO) and Dr Joel Botai (GGM)

*Research:* Space Geodesy technique and geological knowledge to calculate the velocity fields of sub-continental plates of Africa to support the African Geodetic Reference Frame (AFREF) project

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**Noh Tewolde**, MSc Computer Science

*Supervisor:* Dr Serena Coetzee (GGM)

*Research:* Using address ontologies for address standard interoperability

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**Dinao Tjia**, MSc Geoinformatics

*Supervisor:* Dr Serena Coetzee (GGM)

*Research:* A profile of the land administration domain model for South Africa

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### **3.2 Doctoral students**

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**Abiodun Adeola**, PhD Geoinformatics

*Supervisors:* Dr Joel Botai (GGM) and Dr Jane Olwoch (SANSA)

*Research:* Malaria Early Warning System (MEWS) for South Africa

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**Omolola Adisa**, PhD Geoinformatics

*Supervisor:* Dr Joel Botai (GGM)

*Research:* Vulnerability of livestock production systems under the Changing Climate: South Africa

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**Christina Botai**, PhD Meteorology

*Supervisor:* Prof Ludwig Combrinck (HartRAO)

*Research:* Evaluation of Earth gravity field models used for precise satellite orbit determination through applications of satellite laser ranging data

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**Antony Cooper**, PhD Computer Science

*Supervisors:* Dr Serena Coetzee (GGM) and Prof Derrick Kourie (Computer Science)

*Research:* Volunteered geographic information (VGI) for spatial data infrastructures (SDI)

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**Jeofrey Ditsela**, PhD Computer Science

*Supervisor:* Dr Serena Coetzee (GGM)

*Research:* Address assignment schemes

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**Olalekan Isioye**, Phd Geoinformatics

*Supervisor:* Dr Joel Botai (GGM)

*Research:* Developing a near- real-time water vapour system using GNSS for Nigeria

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**Kibii Komen**,

*Supervisor:* Dr Joel Botai (GGM)

*Research:* Climate change, malaria and the Limpopo province

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**Edward Kurwakumire**, PhD Geoinformatics

*Supervisor:* Dr Serena Coetzee (GGM)

*Research:* Value chain dynamics of geographic information in spatial data infrastructures

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**Freddy Milambo**, PhD Environment and Society

*Supervisors:* Dr Joel Botai (GGM) and Dr Jane Olwoch (SANSA)

*Research:* Impact of climate change on the distribution of tomato pests in the Limpopo province of South Africa

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**Webby Miyoba**, Phd Geoinformatics

*Supervisor:* Dr Joel Botai (GGM)

*Research:* Development of an integrated and automated space geodetic system for continuous monitoring of vector ties at the Hartebeesthoek radio observatory

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**Ivan Muzondo**, Phd Geoinformatics

*Supervisor:* Dr Joel Botai (GGM)

*Research:* Analysis and interpretation of current and theoretical development of a more optimal Global Navigation Satellite System network for the African Geodetic Reference Frame

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**Laven Naidoo**, Phd Geoinformatics

*Supervisor:* Dr Konrad Wessels (CSIR) and Dr Renaud Mathieu (CSIR)

*Research:* Savannah Woody Structural Assessment in the Greater Kruger National Park region, South Africa, using a Multi-frequency, Multi-seasonal and Polarimetric Synthetic Aperture Radar (SAR) and optical data integrated approach

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**Wiafe Owusu-Banahene**, PhD Geoinformatics

*Supervisor:* Dr Serena Coetzee (GGM)

*Research:* Integrating linked data into a thematic geospatial web service

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**Victoria Rautenbach**, Phd Geoinformatics

*Supervisor:* Dr Serena Coetzee (GGM) and Dr Arzu Çöltekin (University of Zürich)

*Research:* 3D geovisualization for spatial planning

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**Kisco Sinvula**, Phd Geoinformatics

*Supervisor:* Dr Serena Coetzee (GGM)

*Research:* Modelling spatial data infrastructures

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# 2013 Highlights

Activities in 2013 continued to contribute towards achieving the CGIS vision: striving to be an internal platform for GISc at UP, a facilitator of UP GISc research collaborations and a partner to the geoinformation industry of South Africa. Highlights of 2013 activities are provided in this section.

## 1. Internal platform at UP

CGIS aims to be a internal platform at UP from where the excellence of UP individuals and teams involved in GISc research, education and training, professional development and community engagement is supported and strengthened. Much of this is accomplished through the UGM, but also through lecturing on graduate and postgraduate level. Highlights from 2013 are presented here.

### 1.1 Unit for Geoinformation and Mapping (UGM)

The UGM, during 2013, delivered as usual **GIS and cartographic services, geospatial information and general cartographic advice** to students and staff from various departments at UP. Database compilation, visualization and mapping, all in GIS, continued for internal and external clients. UGM staff members are affiliated with the GISSA (Geo-information Society of South Africa) Gauteng branch.

Again, the unit acquired (with the aid of faculty funds) the Esri GIS and Exelis ENVI **software** for another year. Three thousand licenses were made available for students and staff to use both on and off campus. ArcGIS was installed on approximately 900 desktop computers (PCs), laptops and PCs in university laboratories. The free ArcGIS e-learning courses included in the annual license available to all UP staff and enrolled students are administered by the UGM and students were enrolled for more than 500 e-courses in 2013. Departments like Zoology and the Centre for Environmental Studies made a few of these ArcGIS virtual campus courses compulsory in their curricula.

Acquiring and providing access to recent specialized **geospatial data**, such as aerial and satellite imagery from the City of Tshwane and SANSA (South African Space Agency) and Census 2011 results from StatsSA, is one of the functions of the Unit.

The unit, comprising two full-time cartographers (Ingrid Booysen and Yvette Bevis) and one part-time GIS assistant, continued to educate and train under- and postgraduate students by developing **step-by-step user friendly manuals** for some of the software products (e.g. ARcGIS, SuperCross for Census 2011 data). Students and staff use this software to search for geospatial data, analyse and visualise their research results. Advice and guidance on open source GIS software, e.g. Quantum GIS (QGIS) and SAGA, is also provided. A few ad hoc **introductory undergraduate lectures** were presented during 2013, amongst others on the use of SAGA GIS and the availability of geospatial data on the campus server. UGM also contributed to the section on Map Design of the **Certificate Programme in Introductory Geographic Information Systems** presented by CGIS through CE at UP.

One of the UGM staff members, Yvette Bevis, together with a UP PhD Geoinformatics student participated in the two week training course on “The use of social media, crowdsourcing and web mapping to enable spatial web presence for the private sector in Southern Africa” in Windhoek, Namibia. Yvette **presented a lecture** on geospatial data sources in Southern Africa. The course was presented by the Dutch University of Twente’s Faculty of Geo-information and Earth Observation (ITC) from 28 October 2013 to 8 November.

**Within the University** sphere, our own Department of Geography, Geoinformatics and Meteorology, as well as departments of Architecture, Landscape Architecture, Town and Regional Planning, Consumer Science, Geology, Civil Engineering, Plant Sciences, Veterinary Sciences, Zoology and Entomology, Animal and Wildlife Sciences, Historical & Heritage Studies, Anthropology and Archaeology, Statistics, the Centre for Environmental Studies and the UP Water Institute, continue to make use of the skills of the UGM staff.

The UGM was involved in a number of external GIS and related geospatial **projects**, amongst others, with the WWF on the protection of wild dogs in Zambia; the translation and compiling of Afrikaans GIS 'Groot Trek' Maps for the Afrikaanse Taal- en Kultuurvereniging (ATKV) (with Prof F Pretorius of UP); presentations, graphics and mapping for UNISA; and four meetings with researchers for the ongoing Kruger National Park, Geology and Geosites project - GIS mapping for publications, posters and exhibits.

The **goal for 2014** (if time allows it) is to participate more in international projects and conferences and publish in accredited journals.

### **1.2 Prize winning students**

#### **René Smit wins the Esri Young Scholar Award**



*René Smit*



*Landing page of the Hiking through GIS game*

René Smit, a student in BSc (Hons) Geoinformatics, won the 2013 Esri Young Scholars Award. The award is an Esri initiative to showcase the work of up-and-coming scholars in the geospatial field.

René entered a digital game, Hiking through GIS, which she developed as part of her 2012 third year Geoinformatics project. To be considered for this award, students were required to submit a full-text academic article to Esri South Africa. René was sponsored by Esri to present her article at the Esri International User Conference in San Diego, USA, in July 2013.

Stefan de Bruin, a BSc (Hons) Geoinformatics student from the Department of Geography, Geoinformatics and Meteorology (GGM) at the University of Pretoria was awarded the first prize in the category 'Best Student Project' at the first annual Stats SA Isibalo Award Evening on 4 December 2013.

This award stems from the recently introduced Isibalo User Group Symposiums at which users of Stats SA statistical data were invited to make presentations on how they were using official statistics in evidence-based decision making. Stefan's prize was sponsored by African Bank and includes an all-expenses-paid trip to attend the African Symposium on Statistical Development (ASSD) in Gaborone in January 2014.

## Stefan de Bruin wins the Stats SA Isibalo ‘Best Student Project’



*Mr Pankaj Talwar (African Bank), Mr Pali J. Lehohla (Statistician-General of South Africa), Stefan de Bruin and Dr Arul Naidoo (StatsSA)*

The aim of Stefan’s project, conducted under the supervision of Ms Sanet Eksteen, was to establish a methodology for measuring how fortunate a community is in terms of what they perceive as being important vs. what is provided to them by government organisations. The perceptions of what respondents consider important were determined using a list of predefined goods and services. The best statistical method to calculate a fortunate index was identified and evaluated using various statistical methods. All data sets for this project were provided by Stats SA.

### **1.3 Graduate and postgraduate lecturing**



*GMT 320, Geoinformatics Project – Class of 2013*

On 7 November 2014 the final year Geoinformatics students exhibited their projects at the first **Geoinformatics Project Day**. Students were divided into groups and followed a project management process between July and November to complete a Geoinformatics project assigned to them. The project is an opportunity to apply a variety of knowledge and skills acquired during their undergraduate years. 15 students exhibited four projects:

- *MapUs*, An evaluation of the quality of river data in South Africa.
- *Prime Meridian Solutions*, Project Atlas: An all-inclusive GIS solution.
- *Yakhani*, Analysing the Grade 12 results of Gert Sibande District in the Mpumalanga Province over the years 2010-2012.
- *Izinkomba*, Investigating the risk of seismic events in the Witwatersrand area with specific reference to the insurance.

**‘Cross-lecturing’ between departments** continues on under- and postgraduate level where students from one department and/or faculty enrol for modules in another. For

example, undergraduate GIS modules presented by the Department of Geography, Geoinformatics and Meteorology Students are attended by students enrolled for degrees in the Faculties of Education, Humanities and Engineering, Built Environment & Information Technology, as well as students from 'neighbouring' departments in the Faculty of Natural and Agricultural Sciences. In turn, the curriculum for BSc Geoinformatics includes modules from the Faculties of Economic and Management Sciences, Law, Engineering, Built Environment & Information Technology, as well as a number of departments in the Faculty of Natural and Agricultural Sciences, such as Mathematics and Statistics.

The Honours module, **COS 787, Spatial databases, is presented jointly** between the Department of Computer Science and the Department of Geography, Geoinformatics and Meteorology. There is also collaboration on the COS 326, Database systems, module presented by the Department of Computer Science, for which Dr Coetzee presents an introduction to spatial databases.4.2 Facilitator of UP GISc research collaborations.

### 1.4 Research seminars

Monthly CGIS research seminars continued in 2013 with the objective to exchange research information and provide opportunities for students to get experience in presenting. Seminar invitations are published campus-wide on the CGIS website, in the campus news, and on the student web. Email invitations are also sent to a list of industry contacts.

Date	Program	Research focus group
15 Apr	<p><i>Spatial data discovery using general purpose web search engines</i> by Samy Katumba, MSc Geoinformatics student</p> <p><i>Initial results from a literature review of the development of the SDI concept</i> by Brendon Wolff-Piggott (Research Associate) and Serena Coetzee</p> <p><i>An analysis of the SDI supply chain</i> by Edward Kurwakumire, PhD Geoinformatics student</p> <p><i>Value-added resellers (VAR) and spatial data infrastructures</i> by Antony Cooper, Built Environment, CSIR</p>	Spatial data infrastructures
13 May	<p><i>Forensic Geoscience</i> by Dr Peter Schmitz, Built Environment, CSIR</p>	Forensic geography
10 Jun	<p><i>System for automated geoscientific analysis (SAGA)</i> by Yvette Bevis, Unit for Geoinformation and Mapping</p>	Open source and data for geospatial
24 Jul	<p><i>Importance of the Hartebeesthoek Radio Astronomy Observatory to the global network of Very Long Baseline Interferometry (VLBI)</i> by David Mayer, visiting student from TU Wien, Austria</p>	Space geodesy, earth and atmospheric observation
2 Aug	<p><i>Spatial data discovery using general purpose web search engines</i> by Samy Katumba, MSc Geoinformatics student</p> <p><i>Integrating linked open data into open source web mapping</i> by Wiafe Owusu-Banahene, PhD Geoinformatics student</p>	Spatial data infrastructures
6 Sep	<p><i>Student impressions from the 2013 Esri international user conference</i> by René Smit, BSc Hons Geoinformatics student</p>	GISc Education and Training in Africa

	<i>Forensic mapping in South Africa: Four examples</i> by Dr Peter Schmitz, Built Environment, CSIR	Forensic geography
4 Oct	<i>The effect of changing impervious surfaces on surface temperature over Gauteng Province, South Africa</i> by Adeniyi Adeyemi, MSc Geoinformatics student	Space geodesy, earth and atmospheric observation
1 Nov	<i>Towards modelling the spatial data infrastructure supply chain in South Africa: The case of land administration data</i> by Edward Kurwakumire, PhD Geoinformatics student  <i>A description of spatial data infrastructure stakeholders in Ghana using the ICA model</i> by Wiafe Owusu-Banahene, PhD Geoinformatics student	Spatial data infrastructures

### **1.5 First UP GGM Postgraduate Seminar**

Serena Coetzee and Victoria Rautenbach, initiated and arranged the First Postgraduate Seminar by the Department of Geography, Geoinformatics and Meteorology (UP GGM Postgrad 2013), held on 10 and 11 October 2013 in the UP Library. The Dean of the Faculty of Natural and Agricultural Sciences, Prof Anton Ströh, opened the seminar. Dr Arzu Çöltekin from the University of Zürich presented a keynote address on 'Human factors in geovisualization design'. Her visit was funded by the NRF's Knowledge and Interchange (KIC) grant.



*Prof Ströh at the opening of the First Postgraduate Seminar by the Department of Geography, Geoinformatics and Meteorology*

The seminar was attended by students and lecturers from the department. The majority of postgraduate students in the department, among them eight from CGIS, presented about their research. Students had to submit either an abstract or a paper through an online submission system. These were peer-reviewed by fellow students and lecturers. In this way students gained first hand experience of conference submission and the blind peer-reviewing process. The presentations at the seminar were an opportunity to exchange knowledge and ideas between different research groups in the department and for students to get experience with presenting.

## **2. Partner to the geoinformation industry of South Africa**

CGIS aims to be a partner to the South African geoinformation industry in support of GISc research, education and training, professional development, community engagement. CGIS members are actively engaged in the South African geoinformation

industry through the presentation of short courses, involvement in the Geo-Information Society of South Africa (GISSA) and South Africa's Committee for Spatial Information (CSI), guest lectures by industry representatives and student visits to organizations in the geoinformation industry. We consider the interaction with the geoinformation industry as important, amongst others, because the Geoinformatics degrees offered by the Department of Geography, Geoinformatics and Meteorology were accredited in 2012 to comply with the academic requirements for professional registration with the South African Council for Professional and Technical Land Surveyors (PLATO).

### **2.1 CE at UP courses**

Courses listed below were presented in 2013 through CE at UP.

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*Certificate Course in Introductory Geographic Information Systems*

Course leader: Ms Sanet Eksteen

Presenters:

Erika Pretorius, Yvette Bevis, Peter Schmitz, Joos Esterhuizen, Sanet Eksteen

Dates: 2 April – 31 October

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*Certificate Course in Advanced Geographic Information Systems*

Course leader: Ms Sanet Eksteen

Presenters:

Sanet Eksteen, Peter Schmitz, Victoria Rautenbach, Erika Pretorius

Dates: 1 March – 30 November

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*GISc professional practice*

Course leader: Dr Serena Coetzee

Presenters: Serena Coetzee, Sanet Eksteen

Dates: August – November 2013

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*The Basics of GIS*

Course leader: Ms Sanet Eksteen

Presenters: Sanet Eksteen

Dates: 17 – 19 July 2013

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### **2.2 Geo-information Society of South Africa (GISSA)**

GISSA represents the geoinformation community of South Africa as a national, unified, representative body to promote and protect the interests of its members on all forums. CGIS members were involved in GISSA in 2012 in various ways.

#### ***GISSA Gauteng Annual General Meeting (AGM) on campus***

The GISSA Gauteng Annual General Meeting (AGM) was hosted on campus on 16 March 2013. The meeting was attended by more than 100 delegates from the geoinformation industry, including 17 UP students from third year to PhD level. CGIS encourages students to register with GISSA by paying 50% of their annual registration fees.

#### ***2013 GISSA student function at UP***

In 2013, the Geographical Information Society of South Africa (GISSA) for Gauteng again hosted another student function at the University of Pretoria. 50 students from a variety of departments (including geoinformatics, geology and science) attended the function. S'lindi Mhlongo (Eskom), Ndilisa Didiza (SRK Consulting) and Gerhard Brits (Eskom) enlightened the students with their experiences in working in the GISc industry. They covered topics, such as job hunting, applying for bursaries and internships, and the sensitive issue of remuneration.



*GISSA representatives*



*Students attending the function*

### ***GISSA Survey of the geoinformation community***

Towards the end of the year, CGIS prepared a survey of the geoinformation community in collaboration with GISSA. The aim of the survey was to gain a better understanding of who the members of the South African geo-information community are and what they do at work. The survey was distributed to GISSA members in November in 2013. First results of the survey will be presented at the GISSA Annual General Meeting in March 2014.

### ***2.3 Committee for Spatial Information (CSI) of South Africa***

The South African Spatial Data Infrastructure Act was promulgated in 2003 (Act 54 of 2003) and the Committee for Spatial Information (CSI), as described in the Act, was established in 2010. Amongst the objectives of the SDI Act are the establishment of the South African Spatial Data Infrastructure (SASDI) and an electronic metadata catalogue. CSI consists of a principal committee, established according to the Act, and six sub-committees on Data, Systems, Standards, Policy and legislation, Education and training, and Marketing.

Mr Antony Cooper, extraordinary lecturer at UP, represents his employer, the CSIR, on the CSI and he is also the Chair of the CSI sub-committee on Standards. Dr Serena Coetzee and Ms Victoria Rautenbach are members of the sub-committee on Education and Training. They continue to contribute to the sub-committee's work.

Dr Coetzee was appointed by the CSI as Head of the Sub-Commission: Capacity Building to facilitate the drafting of 'Chapter 3: Capacity and Capability Requirements' of the South African Geospatial Information Management Strategy. Work on the development of the strategy commenced in 2014.

### ***2.4 Guest lectures***

As part of the module in advanced GIS theory, practice and applications (GIS 310), Sanet Eksteen arranged a number of guest lectures by speakers from industry at UP. The lectures give students the opportunity to meet people in the industry and to get updated on state-of-the-art GIS applications. Invitations were published campus-wide on the CGIS website, in the campus news, and on the student web. Invitations were also distributed to a CGIS mailing list, consisting mainly of GISc industry members. From 2014 onwards GISc professionals will be able to collect CPD points for attending the guest lectures.

<b>Guest Lecturer</b>	<b>Date</b>	<b>Topic</b>
Dr Corne Eloff	22 Feb	The battle against rhino poaching.



Michael Breetzke	1 Mar	Visualising the world from above (3D GIS, change detection and LiDAR data)
Dr Gregory Breetzke	8 Mar	Auto Correlation
Dr Gregory Breetzke	5 Apr	Hot Spot Analysis (Crime and Health)
Stuart Martin	12 Apr	Unleashing the Power of imagery to Improve your Business Intelligence
Hentie Viviers	19 Apr	Optimisation and establishment of medical waste sites in Gauteng.
Dr Peter Schmitz	26 Apr	Voting Patterns in South Africa
Dr Peter Schmitz	3 May	Crime Analysis - Geographic profiling and Crime mapping
Dr Terence van Zyl	13 May	Beyond GIS with EO4Vistrails
Alize le Roux	17 May	Quantifying the spatial implications of future land use policies in South Africa. Reshaping a city through land use modelling

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## 2.5 Georabble

The inaugural African GeoRabble, sponsored by AAM Africa, took place on 10 July 2014 at CGIS. GeoRabble ([georabble.org](http://georabble.org)) is an initiative that celebrates the every day challenges and triumphs of working with location. The purpose of GeoRabble is to have fun, share and inspire. There are a few simple rules:

1. Celebrate each others' triumphs
2. Respect each others' choice - no technology bigotry
3. No sales pitches - this includes services, software, data etc.
4. No company logos or 'about us' slides
5. Keep it short - 10 minutes per talk



Over 30 GeoRabblers from industries spanning education, government, private and non-profit organisations were treated to geoinspired talks from academic and industrial leaders.

First up was Peter Schmitz from the CSIR/CGIS who shared his experiences of applying GISc to solve complex crime mysteries.

Next Marius van der Merwe from Google who unpacked "cloud computing in plain English" and its effects on the GISc community in a world where people demand information at their fingertips - a truly inspiring look into the future of GIS applications and data storage, dissemination and analysis.

Moving from the cloud to the sun, Samy Katumba from CGIS exposed rabblers to geoapplications in renewable energy mapping and how solar energy is being used to "em-power" African communities in remote locations.

Stuart Martin from GTI took GeoRabblers for a walk down memory lane using imagery. His interactive talk titled "Looking Beyond the Picture" captured moment's history and showed how one can, by spending a little more time, extract more than meets the eye.

Before we knew it, Victoria Rautenbach from CGIS was in the spotlight sharing insights into spatial cognition and perception. Victoria shed light on how GIS and gaming is demystifying gender stereotypes in spatial perception.

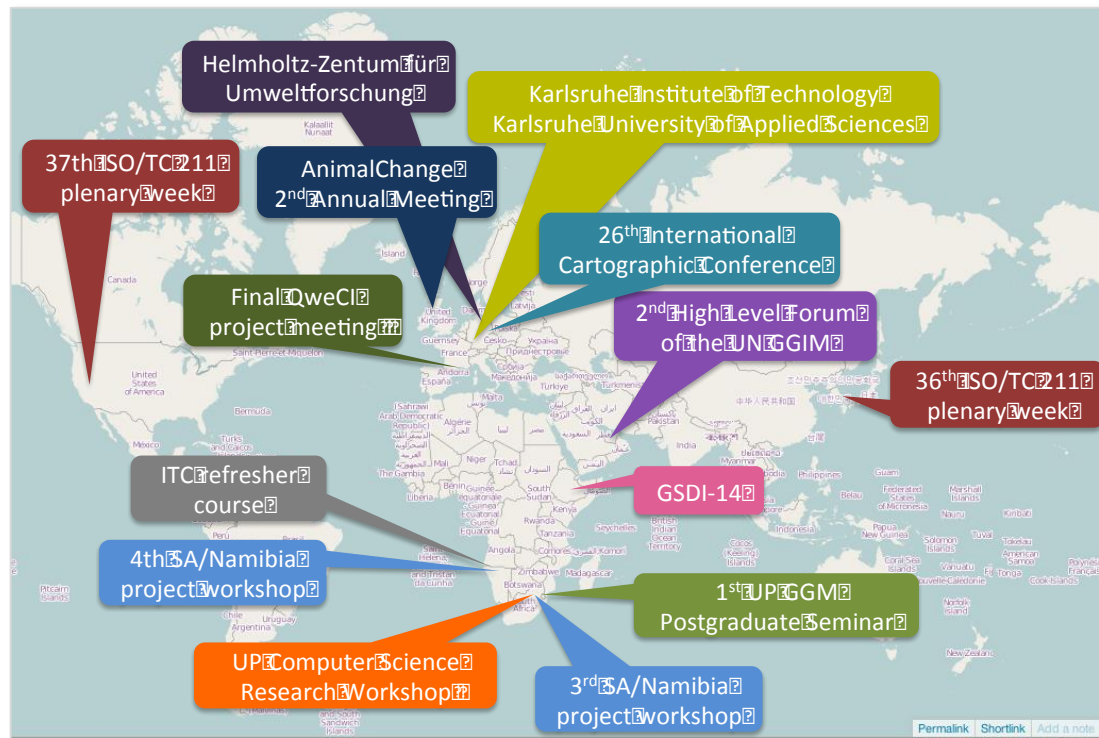
## 2.6 Industry visits by first year students

In 2013, students in GIS 120, Geoinformatics, visited Stats SA, the Independent Electoral Commission (IEC) and AfriGIS, respectively. During the 90-minute visit at each organization, students received a presentation and tour of the GIS operations at each of the organizations. The majority of these students are enrolled for degrees in Geoinformatics, Meteorology and Geology.

## 3. Research

CGIS aims to be a facilitator of UP GISc research collaborations, education and training and professional alliances within South Africa and abroad. In 2013, CGIS members were involved in projects and collaborative initiatives with colleagues and researchers from all over the world. Funding was provided by a variety of sources, acknowledged in the relevant publications. See also 4. Funding. Highlights are presented below. Research output published in 2013 is listed with the names of CGIS authors in bold. Note that the number of publications doubled since the previous year.

### 3.1 Conferences, workshops, meetings and visitors



*David Mayer*, Masters student, Institute of Geodesy and Geophysics, at the Vienna University of Technology, September 2012-July 2013

David is a Masters student in Geodesy and Geophysics. His visit was arranged by Prof Ludwig Combrinck from HartRAO (who is also an Extraordinary Professor in the department) and his supervisors in Vienna, Prof Johannes Boehm and Prof Harald Schuh. David's research is related to identifying and evaluating suitable sites for Very Long Baseline Interferometry (VLBI) telescopes, of which there is only one in Africa, at HartRAO. David arrived in September 2012 and has a desk in the CGIS postgraduate laboratory. He stayed until July 2013.

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*2nd High Level Forum of the United Nations Global Geospatial Information Management (UN-GGIM)*, Doha, Qatar, 4-6 February 2013

Attended by *Serena Coetzee*

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*3<sup>rd</sup> SA/Namibia project workshop*, Pretoria, South Africa 11-13 February 2013

The Namibian collaborators, Martin Hipondoka, Kisco Sinvula and Emma Nangolo from the University of Namibia attended the workshop. South African project team members are Serena Coetzee, Antony Cooper, Victoria Rautenbach and Wiafe Owusu-Banahene.

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*University of Pretoria Computer Science Research Workshop*, 9-10 May 2013

Serena Coetzee presented about 'Geoinformatics and Computer Science – Results and opportunities for research collaboration'

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*Final QweCI project meeting entitled "Quantifying weather and climate impacts on health in developing countries"*, Barcelona, Spain, May 16th-18th 2013

Joel Botai presented his research work together with two PhD students, Abiodun Adeola and Kibii Komen.

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*36th Plenary week of ISO/TC 211, Geographic information/Geomatics*, Busan, Korea, 27-31 May 2013

Attended by Antony Cooper (Head of the South African delegation), Serena Coetzee and Victoria Rautenbach, who contributed to the meetings in various ways.

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*Standards in Action Workshop*, Busan, Korea, 29 May 2013

Serena Coetzee presented on 'The need and the benefits of an international address standard'.

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*2nd Annual AnimalChange meeting*, 27-28 June, Dublin, Ireland

Joel Botai and Omolola Adisa attended the meeting.

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*GeoRabble*, Pretoria, South Africa, 10 July 2013

Hosted by CGIS and organized by Roger Blewett (AAM Africa). Victoria Rautenbach, Samy Katumba and Peter Schmitz presented at the event.

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*GISSA Gauteng General Meeting*, Pretoria, South Africa, 19 July 2013

Serena Coetzee presented on 'GISc professionalism and professional ethics'. A lively debate followed.

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*4<sup>th</sup> SA/Namibia project workshop*, Namibia, Windhoek 29-31 July 2013

Serena Coetzee, Antony Cooper, Victoria Rautenbach and Wiafe Owusu-Banahene attended the workshop, hosted by our Namibian collaborators at the Department of Geography and Environmental Studies, University of Namibia. Namibian participants were Martin Hipondoka, Kisco Sinvula and Emma Nangolo.

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*Karlsruhe Institute of Technology (KIT) and the Karlsruhe University of Applied Sciences (KUAS)*, August 2013

Wiafe Owusu-Banahene, a PhD student, visited the Karlsruhe Institute of Technology (KIT) and the Karlsruhe University of Applied Sciences (KUAS), his alma matres in Germany. At KIT, Wiafe met with Prof Hans-Peter Bähr, Prof Dieter Prinz and Dr Charlotte Kaempf in the Resources Engineering (RE) department of the Faculty of Civil, Geo- and Environmental Engineering, and presented about his PhD research, Geospatial thematic web services, at the KIT RE Alumni Get-Together. Wiafe also established contact with Prof Reiner Jaeger and Prof Gertrud Schaab at the Geomatics department of KUAS and discussed potential future collaboration between CGIS and his alma mater in Germany.

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*Prof Reiner Jaeger and Wiafe Owusu-Banahene (with a copy of the CGIS 2012 Annual Report), after their meeting at the Karlsruhe University of Applied Sciences, Karlsruhe, Germany.*



*Wiafe Owusu-Banahene (front: first from right) at the Resources Engineering (RE) department of Karlsruhe Institute of Technology (KIT). Back, from right: Dr. Charlotte Kaempf (second), Prof Dieter Prinz (third), Prof Hahns-Peter Bähr (fourth). The rest are alumni attendants of the 2013 RE Alumni Get Together in KIT, Karlsruhe, Germany.*

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*Helmholtz-Zentrum für Umweltforschung, Leipzig, Germany, August 2013*

Peter Schmitz presented an invited lecture on Environmental Crimes.

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*26th International Cartographic Conference (ICC) 2013, Dresden, Germany, 26-30 August 2013*

Peer-reviewed papers were presented by Serena Coetzee, Antony Cooper, Sanet Eksteen, Samy Katumba, Wiafe Owusu-Banahene, Erika Pretorius, Victoria Rautenbach, Peter Schmitz and Kisco Sinvula. Various pre-conference workshops were attended, including a workshop by the ICA Commission on Geoinformation Standards and Infrastructures, chaired by Antony Cooper.



*South African attendants at the 26th ICC in Dresden, from left to right: Dr Derek Clarke, Dr Serena Coetzee, Ms Erika Pretorius, Mr Samy Katumba, Mr Johan Brits, Mr Wiafe Owusu-Banahene, Dr Peter Schmitz, Mr Kisco Sinvula, Ms Sanet Eksteen, Mr Antony Cooper, Ms Victoria Rautenbach.*

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*Dr Arzu Çöltekin, Senior Researcher, Department of Geography, University of Zurich, Switzerland*  
Dr Çöltekin presented the keynote address at the First UP GGM Postgraduate Seminar. She also



*Dr Çöltekin presenting the keynote address*

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*ITC Refresher Course on The Use of Social Media, Crowdsourcing and Web Mapping to Enable Spatial Web Presence for the Private Sector in Southern Africa, Windhoek, Namibia, 28 October – 8 November*

ITC together with support from CGIS and financially supported by the Dutch government, organized a refresher course for alumni from Namibia and neighbouring countries who completed any NFP-funded training or education programme at least two years before the scheduled starting date of the course concerned.

Ms Victoria Rautenbach presented an OpenStreetMap tutorial at the course. Ms Yvette Bevis attended the course, but also presented a lecture on geospatial data sources in Southern Africa.



*Delegates busy with hands-on lab work at the ITC Refresher Course in Windhoek, Namibia.*

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*GSDI 14/AfricaGIS 2014 Conference, Addis Ababa, Ethiopia, 4-8 November 2013*

Wiafe Owusu-Banahene and Edward Kurwakumire presented their peer-reviewed book chapters.



*Edward Kurwakumire and Wiafe Owusu-Banahene at the GSDI-14*

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*Dr Hendrik Paasche, Helmholtz Centre for Environmental Research, UFZ, Leipzig, Germany.*

Dr Paasche visited the CGIS Forensic Geography group and presented a lecture on 'Feature detection, optimal strategies sampling, interpolation: why quantitative information integration is worthwhile' on campus.

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*37th Plenary week of ISO/TC 211, Geographic information/Geomatics, Redlands, USA, 11-15 November 2013*

Attended by Antony Cooper (Head of the South African delegation), Serena Coetzee and Victoria Rautenbach, who contributed to the meetings in various ways.

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*Article Writing Workshop, 2-4 December 2013*

Prof Jana Olivier, extraordinary professor in the Department of Geography Geoinformatics and Meteorology presented the workshop to postgraduate students in the department. Nine CGIS students, as well as Brendon Wolff-Piggott, a CGIS Research Associate, attended the workshop.

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### **3.2 Research projects**

In 2013 CGIS members were involved in a number of research projects, listed below.

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*AnimalChange*, a European Union (EU) funded project on the integration of mitigation and adaptation options for sustainable livestock production under climate change

CGIS involvement in 2013: Dr Joel Botai, Mr Adisa Omolola

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*Applied Centre for Climate and Earth System Studies (ACCESS)*, a DST NRF Centre of Excellence for Climate and Earth System Science funded by the Department of Science and Technology (DST)

CGIS involvement in 2013: Dr Joel Botai, Ms Malebo Dlopho and Mr Adeniyi A Adeodayo

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*ARCHE\_NET Network*, a network throughout the Indian Ocean to strengthen the exchanges and share of knowledge between research centers, extension services and supply chain actors.

CGIS involvement in 2013: Dr Joel Botai

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*Atmospheric Research in Southern Africa and the Indian Ocean (GDRI ARSAIO)*, an international research group of an atmospheric environment observatory network together with research teams from various institutions in South Africa and France

CGIS involvement in 2013: Dr Joel Botai, Mr Freddy Milambo

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*Background research to inform the setting up of a national observatory for spatial data assembly and analysis*, for the National Planning Commission, The Presidency of South Africa.

CGIS involvement in 2013: Dr Serena Coetzee (GGM)

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*Content writing of a section on standards for best practice for the acquisition, storage, maintenance of fundamental geospatial datasets*, for the Chief Directorate: National Geo-spatial Information, Department of Rural Development and Land Reform

CGIS involvement in 2013: Dr Serena Coetzee (GGM), Mr Antony Cooper (CSIR), Ms Victoria Rautenbach (GGM)

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*NRF Incentive for Rated Researchers, 2013*, funded by the National Research Foundation (NRF)

CGIS involvement in 2013: Dr Serena Coetzee, Ms Victoria Rautenbach, Mr Edward Kurwakumire, Mr Wiafe Owusu-Banahene (GGM)

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*NRF Knowledge Interchange and Collaboration Grant*, 2013, funded by the National Research Foundation (NRF)

CGIS involvement in 2013: Dr Serena Coetzee, Ms Victoria Rautenbach, Mr Francis Nsubuga, Mr Ryan Anderson, Ms Yvette Bevis, Mr Sean Cullen (GGM)

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*Modelling a national health spatial data infrastructure for Namibia* (bilateral South Africa/Namibia project), April 2012 – March 2014, funded by the National Research Foundation (NRF)

CGIS involvement in 2013: Dr Serena Coetzee (GGM), Mr Antony Cooper (CSIR), Mr Wiafe Owusu-Banahene (GGM), Ms Victoria Rautenbach (GGM), Mr Kisco Sinvula (UP student from Namibia)

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*Prediction of Climate Variations and its Applications in the South Africa Region*, funded by the Science and Technology Research Partnership for Sustainable Development (SATREPS), a Japanese government program

CGIS involvement in 2013: Dr Joel Botai, Mr Adeniyi Adeyemi, Mr Freddy Malebo

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*Quantifying Weather and Climate Impacts on Health in Developing Countries (QWECI)*, an EU funded project

CGIS involvement in 2013: Dr Joel Botai, Mr Adeola Abiodun, Mr Kibii Komen

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*Survey of the geoinformation community of South Africa*, for the Geo-Information Society of South Africa (GISSA)

CGIS involvement in 2013: Dr Serena Coetzee, Ms Sanet Eksteen, Mr Bradley Savage-Reid (GGM)

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### **3.3 Peer-reviewed journal articles**

Renaud Mathieu, **Laven Naidoo**, Moses Cho, Brigitte Leblon, Russell Main, **Konrad Wessels**, Gregory Asner, Joseph Buckley, Jan van Aardt, Barend Erasmus and Izak Smit (2013). Toward structural assessment of semi-arid African savannahs and woodlands: The potential of multitemporal polarimetric RADARSAT-2 fine beam images, *Remote Sensing of Environment*, ISSN: 0034-4257, DOI: 10.1016/j.rse.2013.07.011, 138, pp. 215 - 231.

**Konrad Wessels**, MS Colgan, Barend Erasmus, Gregory Asner, WC Twine, Renaud Mathieu, Jan van Aardt, JT Fisher and IPJ Smit (2013). Unsustainable fuelwood extraction from South African savannas, *Environmental Research Letters*, ISSN: 1748-9326, DOI: 10.1088/1748-9326/8/1/014007, 8, pp. 1 - 10.

**Joel O Botai**, **Ludwig Combrinck** and **Hannes Rautenbach** (2013). On the global geodetic observing system: Africa's preparedness and challenges, *Acta Astronautica*, ISSN: 0094-5765, DOI: 10.1016/j.actaastro.2012.09.002, 83, pp. 119 - 124.

Frances Nsubuga, Jane Olwoch, Hannes Rautenbach and **Joel Botai** (2013). Analysis of mid-twentieth century rainfall trends and variability over south-western Uganda, *Theoretical and Applied Climatology*, ISSN: 1434-4483, DOI: 10.1007/s00704-013-0864-6, 111(3-4), pp. 1 - 19.

Frances Nsubuga, **Joel Botai**, Jane Olwoch, Hannes Rautenbach, **Yvette Bevis** and AO Adetunji (2013). The nature of rainfall in the main drainage sub-basins of Uganda, *Hydrological Sciences Journal*, ISSN: 2150-3435, DOI: 10.1080/02626667.2013.804188.

M Tesfaye, **Joel Botai**, V Sivakumar and G Mengistu Tsidu (2013). Evaluation of Regional Climatic Model Simulated Aerosol Optical Properties over South Africa Using Ground-Based and Satellite Observations, *ISRN Atmospheric Sciences*, ISSN: 2314-4645, DOI: 10.1155/2491, 2013.

- Ayanda Shabala, **Ludwig Combrinck** and Robert McCrindle (2013). Effect of farming activities on seasonal variation of water quality of Bonsma Dam, KwaZulu-Natal, South African Journal of Science, ISSN: 0038-2353, DOI: 10.1590/sajs.2013/20120052, 109(7/8).
- Kalumba AM, Jane Olwoch, van Aardt I, **Joel O Botai**, **Philemon Tsela**, Frances Nsubuga, and **Abiodun Adeola** (2013). Trend Analysis of Climate Variability over the West Bank - East London Area, South Africa (1975 - 2011), Journal of Geography and Geology, ISSN: 1916-9779, DOI: 10.5539/jgg.v5n4p131, 5(4), pp. 131 - 147.
- André Breytenbach, Corné Eloff and **Erika Pretorius** (2013). Comparing Three Spaceborne Optical Sensors by Fine Scale Pixel-based Urban Land Cover Classification Products. South African Journal of Geomatics, ISSN: 2225-8531, 2(4), pp. 309 - 324.
- Dinao Tjia** and **Serena Coetzee** (2013). Application of the Land Administration Domain Model to the City of Johannesburg Land Information System. South African Journal of Geomatics, ISSN: 2225-8531,2(3), pp. 260 - 279.
- Serena Coetzee**, **Sanet Eksteen** and Christopher Grundling (2013). Sustainable Development: The contribution from GISc education in South Africa. South African Journal of Geomatics, ISSN: 2225-8531,2(3), pp. 246 - 259.
- Peter Schmitz**, Corné Eloff, Reynold Talmakkies, Chris Linnen & Rudi Lourens (2013) Forensic mapping in South Africa: four examples, Cartography and Geographic Information Science, ISSN: 1545-0465, DOI: 10.1080/15230406.2013.800273, 40(3), pp. 238 - 247.
- Antony K Cooper**, Harold Moellering, Jan Hjelmager, Petr Rapant, Tatiana Delgado, Dominique Laurent, David M Danko, Paloma Abad, Ulrich Düren, **Serena Coetzee**, Adam Iwaniak, Abbas Rajabifard, Michel Huet, and Jean Brodeur (2013). A spatial data infrastructure model from the computational viewpoint, International Journal of Geographical Information Science, ISSN: 1362-3087, DOI: 10.1080/13658816.2012.741239, 27(6), pp. 1133 - 1151.
- Malete Daniel Sebake** and **Serena Coetzee** (2013). Address Data Sharing: Organizational Motivators and Barriers and their Implications for the South African Spatial Data Infrastructure, International Journal of Spatial Data Infrastructure (IJS DIR), ISSN: 1725-0463, 8, pp. 1 - 20.
- Byron Ludwig and **Serena Coetzee** (2013). Implications of security mechanisms and service level agreements (SLAs) of platform-as-a-service (PaaS) clouds for geoprocessing services, Applied Geomatics, ISSN: 1866-9298, DOI: 10.1007/s12518-012-0083-3, 5(1), pp. 25 - 32.
- Victoria Rautenbach**, **Serena Coetzee** and Adam Iwaniak (2013). Orchestrating OGC web services to produce thematic maps in a spatial information infrastructure, Computers Environment and Urban Systems, ISSN: 0198-9715, DOI: 10.1016/j.compenvurbsys.2012.08.001, 37, pp. 107 - 120.

### ***3.4 Papers presented at refereed conferences***

- Erika Pretorius** (2013). Image Classification towards Mapping of Vegetation Structure: A practical approach, 26th International Cartographic Conference, Dresden, Germany, 25 - 30 August 2013.
- Serena Coetzee**, Francis Harvey, Adam Iwaniak and **Antony Cooper** (2013). Sharing and coordinating SDIs in the age of crowdsourcing and mobile technologies, 26th International Cartographic Conference, Dresden, Germany, 25 - 30 August 2013.
- Samy Katumba** and **Serena Coetzee** (2013) Spatial data discovery using general purpose web search engines, 26th International Cartographic Conference, Dresden, Germany, 25 - 30 August 2013.
- Wiafe Owusu-Banahene** and **Serena Coetzee** (2013) Integrating Linked Open Data into Open Source Web Mapping, 26th International Cartographic Conference, Dresden, Germany, 25 - 30 August 2013.
- Victoria Rautenbach** and **Serena Coetzee** (2013) Books for SDI Education and Training in South Africa, 26th International Cartographic Conference, Dresden, Germany, 25 - 30 August 2013.



### 3.5 Chapters in books

**Sanet Eksteen and Serena Coetzee** (2013) *The State of GISc Education and SDI Implementation in the SADC Countries: A Comparative Study*, In *Cartography from Pole to Pole, Lecture Notes in Geoinformation and Cartography*, edited by Manfred Buchroithner, Nikolas Prechtel, and Dirk Burghardt Springer, ISBN: 978-3-642-32618-9, DOI: 10.1007/978-3-642-32618-9, pp. 471 - 482.

**Antony K Cooper, Serena Coetzee, Petr Rapant, Dominique Laurent, and David M. Danko** (2014) *Exploring the Impact of a Spatial Data Infrastructure on Value-Added Resellers and Vice Versa*, In *Cartography from Pole to Pole, Lecture Notes in Geoinformation and Cartography*, edited by Manfred Buchroithner, Nikolas Prechtel, and Dirk Burghardt Springer, ISBN: 978-3-642-32618-9, DOI: 10.1007/978-3-642-32618-9, pp. 395 - 404.

**Kisco M Sinvula, Serena Coetzee, Antony K Cooper, Emma Nangolo, Wiafe Owusu-Banahene, Victoria Rautenbach, and Martin Hipondoka** (2014) *A Contextual ICA Stakeholder Model Approach for the Namibian Spatial Data Infrastructure (NamSDI)*, In *Cartography from Pole to Pole, Lecture Notes in Geoinformation and Cartography*, edited by Manfred Buchroithner, Nikolas Prechtel, and Dirk Burghardt Springer, ISBN: 978-3-642-32618-9, DOI: 10.1007/978-3-642-32618-9, pp. 381 - 394.

**Wiafe Owusu-Banahene, Foster Mensah, Serena Coetzee, Antony K Cooper, Victoria Rautenbach, Kisco M Sinvula, Emma Nangolo and Martin Hipondoka** (2013). *A description of spatial data infrastructure stakeholders in Ghana using the ICA model*. In *Spatial Enablement in Support of Economic Development and Poverty Reduction: Research, Development and Education Perspectives*, edited by Onsrud H and Rajabifard A, GSDI Association, 2013, ISBN: 978-0-9852444-2-2, pp. 63 - 84.

**Edward Kurwakumire, Serena Coetzee and Peter Schmitz** (2013). *Towards modelling the SDI supply chain in South Africa: The case of land administration data*. In *Spatial Enablement in Support of Economic Development and Poverty Reduction: Research, Development and Education Perspectives*, edited by Onsrud H and Rajabifard A, GSDI Association, 2013, ISBN: 978-0-9852444-2-2, pp. 21 - 36.

### 3.6 Dissertations and Honours reports

The titles of Masters dissertations and Honours projects of students graduating in 2013 are listed below. Their supervisors were from the Departments of Geography, Geoinformatics and Meteorology (GGM), Computer Science, and Human Nutrition, as well as from the CSIR and HartRAO.

#### Masters dissertations

Jacob Modiba (2013). *Towards the design and implementation of a spatial online analytical processing (SOLAP) methodology*. M IT dissertation, supervised by Serena Coetzee (GGM).

Cilence Munghemezulu (2013). *Space Geodesy technique and geological knowledge to calculate the velocity fields of sub-continental plates of Africa to support the African Geodetic Reference Frame (AFREF) project*. MSc Geography dissertation supervised by Ludwig Combrinck (HartRAO) and Joel Botai (GGM).

Victoria Rautenbach (2013). *Orchestrating standard web services to produce thematic maps in a geoportal of a spatial data infrastructure*. MSc Geoinformatics, supervised by Serena Coetzee (GGM).

#### Honours reports

Yvette Bevis (2013). *Modelling South African informal settlements in 3D using procedural techniques*. Honours project report, supervised by Victoria Rautenbach (GGM) and Serena Coetzee (GGM).

Sean Cullen (2013). *Identifying the optimal location for new South African Police Service stations using geographical information systems*. Honours project report, supervised by Alize le Roux (CSIR).

- Edmund de Beer (2013). *Determining South Africa's social vulnerability*. Honours project report, supervised by Sanet Eksteen (GGM).
- Stefan de Bruin (2013). *Developing a fortunate index*. Honours project report, supervised by Sanet Eksteen (GGM).
- Rama Khatibu (2013). *Assessing inventories of Carbon emissions from biomass burning over southern Africa*. Honours project report, supervised by Philemon Tsela (GGM).
- Cobus Lotz (2013). *Visual analytic techniques for spatio-temporal data exploration of traffic incidents*. Honours project report, supervised by Victoria Rautenbach (GGM) and Serena Coetzee (GGM).
- Nico Luus (2013). *Error propagation of stockpile volumetric calculations derived from aerial LiDAR data*. Honours project report, supervised by Fritz van der Merwe (GGM).
- Andreas Naudé (2013). *Profiling social vulnerability to natural and man-made hazards of South Africa*. Honours project report, supervised by Alize le Roux (CSIR) and Sanet Eksteen (GGM).
- Mercy Phaphana (2013). *Using GIS in determining the availability and accessibility to fresh fruits and vegetables, transport and food shops in Arcadia's food environment*. Honours project report, supervised by Antony Cooper (CSIR) and Friede Wenhold (Human Nutrition).
- Lerato Segooa (2013). *Measuring the Quality of Life in Urban Areas*. Honours project report, supervised by Victoria Rautenbach (GGM) and Sanet Eksteen (GGM).
- Surita Siebrits (2013). *An assessment of the availability and quality of geospatial data for estimating water resource availability in the Mzimvubu to Keiskamma water management area*. Honours project report, supervised by Serena Coetzee (GGM).
- René Smit (2013). *Mapping and analyzing the influence of TNT on plants using in situ hyperspectral data*. Honours project report, supervised by Peter Schmitz (CSIR).
- Azwi Tuwani (2013). *Building a web accessible visualisation of the geospatial context around active fire events using WebGL*. Honours project report, supervised by Graeme McFerren (CSIR Meraka Institute).

## **Funding**

There were again two main sources of funding from which CGIS day-to-day operations were covered in 2013: an annual budget allocation from the faculty and profit allocations from CE at UP courses.

Our research activities and travel were supported by grants from the National Research Foundation (NRF), as well as other organizations, including the Chief Directorate: National Geo-spatial Information, Department of Rural Development and Land Reform; the Department of Science and Technology (DST); the European Union, the Geo-Information Society of South Africa (GISSA); the National Planning Commission in the Presidency of South Africa; the Norwegian Mapping Authority; and the South African Bureau of Standards (SABS).

## **Annex A: Constitution of the Centre for Geoinformation Science (CGIS)**

# University of Pretoria

## Constitution

### Centre for Geoinformation Science (CGIS)

#### Article 1 – Definition of Terms

- a) Advisory Board - As in Article 4
- b) CGIS - Centre for Geoinformation Science
- c) CGIS Director - Director of the CGIS, as in Article 6
- d) Dean - Dean of the Faculty of Natural and Agricultural Sciences
- e) Department - Department Geography, Geoinformatics and Meteorology
- f) GISc - Geographic Information Science (GISc)
- g) HOD - Head of the Department Geography, Geoinformatics and Meteorology
- h) Management Committee - As in Article 5
- i) Student representative - As in Article 5
- j) UP - University of Pretoria

#### Article 2 – Vision

In its *Vision* the UP CGIS strives to be:

- An internal platform at UP from where the excellence of UP individuals and teams involved in GISc research, education and training, professional development and community engagement is supported and strengthened.
- A facilitator of UP GISc research collaborations, education and training and professional alliances within South Africa and abroad.
- A partner to the South African geoinformation industry in support of GISc research, education and training, professional development, community engagement.

#### Article 3 – Mission

The UP CGIS aims to achieve the *Vision* statements by the following *Mission* actions:

- *Engaging* in research, education and training, professional development, community engagement and capacity building, in line with the overall strategy of UP.
- *Obtaining funding* for GISc research, education and training, professional development and community engagement by establishing new partnerships and alliances, as well as strengthening those already in existence.
- Creating high-level human resource capacity by *involving students* in GISc research, education and training, professional development and community engagement projects.
- *Transferring knowledge and expertise* through conferences, seminars, training, training events (e.g. workshops and short courses), publications and other appropriate avenues.
- *Communicating and coordinating* with other UP departments on GISc research, education and training, professional development and community engagement.
- *Collaborating* with other UP departments, universities and research institutes on GISc research, education and training, professional development and community engagement.

#### Article 4 – Advisory Board

- The Advisory Board is responsible for
  - providing *strategic direction and advice* regarding marketing, as well as the research, education and training, professional development, community engagement and capacity building in CGIS;
  - giving *advice* on operational decisions;
  - reviewing the annual *budget*; and
  - *reviewing* the realization of the vision and the execution of the mission of the UP CGIS.
- The Dean is the Chairperson of the Advisory Board.

- The Advisory Board consists of the Dean, HOD, the UP CGIS Director (ex officio), the heads of collaborating departments, representatives of key stakeholders as identified from time to time by the CGIS Director in consultation with the Chairperson.
- The Advisory Board meets at least once a year.

#### **Article 5 – Management Committee**

- The Management Committee consists of the CGIS Director; selected members of the Department and the Department's Unit for Cartography; a student representative as appointed by the CGIS Director; and one member per collaborating department.
- The Management Committee is responsible for:
  - coordinating CGIS research, education and training, professional development and community engagement activities;
  - evaluating, and making inputs into, the strategic plan of the CGIS;
  - evaluating, and making inputs into, the business plan of the CGIS;
  - identifying opportunities to further the vision, mission of the CGIS.
- The CGIS Director is the Chairperson of the Management Committee.
- The Management Committee meets at least once every six months.
- A quorum for the Management Committee is half of the members plus one.

#### **Article 6 – Appointment, powers, functions and duties of the CGIS Director**

The CGIS Director is appointed in terms of prevailing regulations of the University for the appointment of Directors.

- The CGIS Director is responsible for
  - preparing the annual strategic plan of the CGIS;
  - preparing the annual business plan of the CGIS;
  - preparing the annual financial report of the CGIS;
  - organising meetings as provided for in this Constitution;
  - marketing the CGIS outside and within UP;
  - fundraising for the CGIS;
  - initiating discussions with potential donors and funders;
  - financial and budget management;
  - information management; and
  - ensuring the realisation of the research, education and training, professional development activities and community engagement mandate of the CGIS.
- The CGIS Director reports to the Dean.

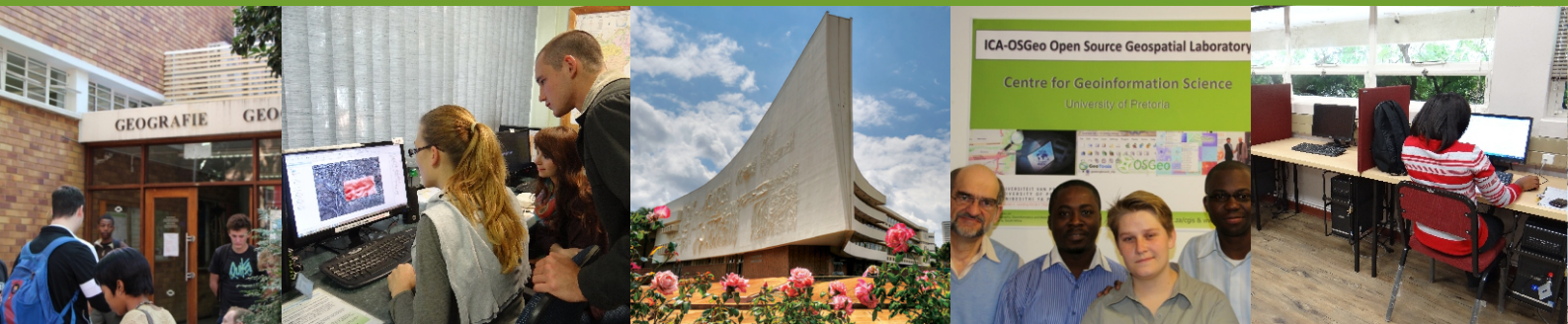
#### **Article 7 – Duties of the Department**

The Department will provide

- administrative support for meetings as provided in this Constitution; and
- administrative support for the operational and financial management of the CGIS.

#### **Article 8 – Approval and amendments**

The Senate Committee for Research of the University of Pretoria is responsible for the approval of this Constitution and any amendment thereof.



**UNIVERSITEIT VAN PRETORIA**  
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**YUNIBESITHI YA PRETORIA**  
Faculty of Natural and Agricultural Sciences