

# Serena Martha Coetzee

## Curriculum Vitae



### Personal details

Full names	Serena Martha Coetzee
Maiden name	Krüger
Date of birth	20 July 1968
ID Number	680720 0034 082
Gender	Female
Citizenship	South African
Language proficiency	<i>English, Afrikaans, German: read, write, speak; Tswana: speak (limited)</i>
Mobile	082 464 4294
E-mail	<a href="mailto:serena.coetzee@up.ac.za">serena.coetzee@up.ac.za</a>
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### Qualifications

- 2009: PhD Computer Science, University of Pretoria, South Africa
- 1997: MSc Computer Science *cum laude*, University of Pretoria, South Africa
- 1991: Higher Education Diploma, University of Pretoria, South Africa
- 1990: BSc (Hons) Computer Science *cum laude*, University of Pretoria, South Africa
- 1989: BSc (Computer Science & Mathematics), University of Pretoria, South Africa
- 1986: Matric. Distinctions in English, Afrikaans, German, Natural Science, Biology, Latin. Other: Mathematics, Music.

### Professional registration and memberships

- Registered as Geomatics Professional (GISc) (GPr GISc1245) with the South African Geomatics Council
- Member of the Geo-information Society of South Africa (GISSA)
- Member of the South African Institute for Computer Science and Information Technology (SAICSIT)
- Senior Member of the Institute of Electrical and Electronics Engineers (IEEE)
- Member of the Association for Computing Machinery (ACM)

### Biographical overview

Serena is Professor and Head of the Department of Geography, Geoinformatics and Meteorology at the University of Pretoria (UP) and an NRF rated researcher (C1). Serena started her career as a software engineer on the global software development teams of desktop GIS products. Subsequently, as director and project manager at AfriGIS, she led GIS projects ranging from spatial data capturing, manipulation and maintenance to geocoding, spatial analysis and Internet GIS until she joined the University of Pretoria in 2006.

Serena's research focuses on the ever-increasing volumes of geographic information and the challenges of making the information findable, accessible and usable. The research is of an interdisciplinary nature, mainly in geoinformatics and computer science. The concept of an SDI (the collection of people, technologies, standards, policies and institutional arrangements for facilitating the sharing and use of geographic information) underlies most of her research, which contributes to understanding and improving SDI practice and theory. Specific research foci are address data, standards, open principles and geovisualisation. Her research has revealed the delicate balance between stakeholders across different levels of governments when making national address data available, accessible and usable.

Serena chairs the [Commission on SDIs and Standards](#) of the [International Cartographic Association](#) (ICA). She actively participates in international geographic information standardization efforts through the [International Organization for Standardization's](#) (ISO) technical committee [ISO/TC 211, Geographic Information/Geomatics](#), and nationally through the [South African Bureau of Standards](#) (SABS) mirror committee. She led the work on ISO 19160-1, *Addressing Part 1: Conceptual model*, and is currently leading the work on ISO 19160-2, *Addressing Part 2: Assigning and maintaining addresses for objects in the physical world*. She was also the project lead for different parts of SANS 1883, *Geographic information Addresses*, published in 2009 and 2018. These standards facilitate the assignment of addresses, e.g. in former townships, rural areas and informal settlements, and they contribute to online validation of addresses required for e-commerce, e-governance, elections, financial intelligence, as well as geocoding for detecting emerging infection clusters.

Currently, Serena represents the Council on Higher Education (CHE) on the South African Committee for Spatial Information (CSI), which coordinates the implementation of the South African Spatial Data Infrastructure (SASDI). From 2016 to 2020, she represented the CHE on the South African Geomatics Council

In 2019, Serena was a finalist in the 'TW Kambule-NSTF Awards: Researchers' of the National Science and Technology Foundation (NSTF) and the runner up in the Geo-information Society of South Africa (GISSA) award for the 'Advancement of the geospatial industry'. Earlier, she received an award from the Universal Postal Union in their 2015 Addressing Solution Design Challenge and an SABS award in recognition of the contribution to the development of SANS 1883 in 2009.

## Selected peer-reviewed publications

A comprehensive list of publications is available at [www.up.ac.za/ggm](http://www.up.ac.za/ggm), click About us > Staff > Serena Coetzee.

- Gertrud Schaab, Sybil Adams and **Serena Coetzee**, 2020 online. Conveying map finesse: thematic map making essentials for today's university students, *Journal of Geography in Higher Education*, DOI: 10.1080/03098265.2020.1850656.
- Gertrud Schaab, Sybil Adams and **Serena Coetzee**, 2020. Drawing attention via diversity in thematic map design, as demonstrated by student maps of Northern South Africa. *International Journal of Cartography*, doi.org/10.1080/23729333.2020.1839207.
- Susan Henrico, **Serena Coetzee**, Antony K Cooper and Victoria Rautenbach, 2020 online. Understanding the acceptance and use of open source geospatial software – The case of QGIS in South Africa. *Transactions in GIS*. DOI:10.1111/tgis.12697
- Serena Coetzee**, Siegfried Vanlshout, Raf Buyle, Veerle Beyaert, Lindy-Anne Siebritz and Joep Crompvoets, 2020 online. Changing stakeholder influences in managing authoritative information – the case of the Centraal ReferentieAdressenBestand (CRAB) in Flanders, *Journal of Spatial Science*, <https://doi.org/10.1080/14498596.2019.1650301>
- Bolelang Sibolla, Terence van Zyl and **Serena Coetzee**, 2021. Determining real time patterns of lightning strikes from sensory observations. *Journal of Geovisualization and Spatial Analysis*, 5(4), <https://doi.org/10.1007/s41651-020-00070-7>.
- Ivan Henrico, Susan Henrico and **Serena Coetzee**, 2020. A comparison between two DEM products to calculate a visibility analysis for military operations using FOSSGIS, *Geogr. Fis. Dinam. Quat.* 43(2020), DOI 10.4461/GFDQ.2019.43.6.
- Susan Henrico, **Serena Coetzee** and Antony K Cooper, 2020. Is open source GIS feasible in military operations? Evaluation by application of a use case. *Scientia Militaria* 48(1):41-60. DOI: 10.5787/48-1-1259.
- Edward Kurwakumire, **Serena Coetzee** and Peter MU Schmitz, 2020. Towards monitoring and managing the production of cadastral information in land information infrastructures using supply chain mapping and the Supply Chain Operations Reference (SCOR) model. *South African Journal of Geomatics* 9(2):163-178. DOI: <http://dx.doi.org/10.4314/sajg.v9i2.12>
- Serena Coetzee**, Martijn Odijk, Bastiaan Van Loenen, Janette Storm and Jantien Stoter, 2020. Stakeholder analysis of the governance framework of a national SDI dataset – Whose needs are met in the buildings and address register of the Netherlands? *International Journal of Digital Earth*, 13(3). <https://doi.org/10.1080/17538947.2018.1520930>
- Serena Coetzee**, Ivana Ivánová, Helena Mitasova, Maria A. Brovelli, 2020. Open geospatial software and data: a review of the current state and a perspective into the future, *ISPRS International Journal of Geo-Information*, 9(2).
- Jean Brodeur, **Serena Coetzee**, David Danko, Stephane Garcia and Jan Hjelmager, 2019. Geographic Information Metadata—An Outlook from the International Standardization Perspective. *ISPRS Int. J. Geo-Inf.*, 8, 280.
- Raf Buyle, Ziggy Vanlshout, **Serena Coetzee**, Dieter De Paepe, Mathias Van Comperolle, Geert Thijs, Bert Van Nuffelen, Laurens De Vocht, Björn De Vidts, Peter Mechant, Erik Mannens, 2019. Raising Interoperability among Base Registries: The Evolution of the Linked Base Registry for Addresses in Flanders, *Journal of Web Semantics*, 55:86-101.
- Bolelang Sibolla, **Serena Coetzee** and Terence van Zyl, 2018. A Framework for Visual Analytics of Spatio-Temporal Sensor Observations from Data Streams. *ISPRS International Journal of Geo-Information*, 7(12):1-28.
- Aphiwe Madubedube, Victoria Rautenbach and **Serena Coetzee**, 2018. Investigating the impact of different types of directions on wayfinding efficiency in an informal settlement. *South African Journal of Geomatics*, 7 (2):164 - 176.
- Lilija Friesen, Gertrud Schaab, **Serena Coetzee**, Victoria Rautenbach, Tessa Marcus and Jannie Hugo, 2018. Community oriented primary care (COPC) in the City of Tshwane (South Africa) – A web map application in support of responsive and dynamic health care, *Kartographische Nachrichten*, 4:173-182.
- Serena Coetzee** and Victoria Rautenbach, 2017. A design pattern approach to cartography with big geospatial data. *The Cartographic Journal*, 54(4):301-312.
- Samy Katumba and **Serena Coetzee**, 2017. Employing Search Engine Optimization (SEO) Techniques for Improving the Discovery of Geospatial Resources on the Web. *ISPRS International Journal of Geo-Information*, 6(9):284-304.
- Yvette Bevis, Gertrud Schaab, Victoria Rautenbach and **Serena Coetzee**, 2017. Expert opinions on using the third dimension to visualise wind speed uncertainty in wind farm planning, *International Journal of Cartography*, 3(1):61-75.
- Keagen Liebenberg, Ansie Smit, **Serena Coetzee**, Andrzej Kijko, 2017. A GIS approach to seismic risk assessment with an application to Johannesburg, South Africa, *Acta Geophysica*, 65(4): 645-657.
- Serena Coetzee**, Stefan Steiniger, Barend Köbben, Adam Iwaniak, Iwona Kaczmarek, Petr Rapant, Antony K Cooper, Franz-Josef Behr, Govert Schoof, Samy Katumba, Rumiana Vatsava, Kisco Sinvula and Harold Moellering, 2017. The Academic SDI – Towards understanding spatial data infrastructures for research and education. In: *Advances in Cartography and GIScience - Selections from the International Cartographic Conference 2017*, edited by Michael Peterson, Springer.
- Kisco M Sinvula, **Serena Coetzee**, Antony K Cooper, Wiafe Owusu-Banahene, Emma Nangolo, Victoria Rautenbach, Martin Hipondoka, 2017. A comparative analysis of stakeholder roles in the spatial data infrastructures of South Africa, Namibia and Ghana. *International Journal of Spatial Data Infrastructure research (IJS DIR)*, 12:1-12.

- Victoria Rautenbach, **Serena Coetzee** and Arzu Cöltekin, 2017. Development and evaluation of a specialized task taxonomy for spatial planning – A map literacy experiment with topographic maps. *ISPRS Journal of Photogrammetry and Remote Sensing*, Vol 126, pp16-26.
- Sibusisiwe Hlela, **Serena Coetzee** and Antony Cooper, 2016. Evaluating a Public Sector Organisation for SDI Readiness – The Case of a South African Government Department, *South African Journal of Geomatics*, 5(2):95-107.
- Victoria Rautenbach, **Serena Coetzee**, Danie Jooste 2016. Results of an evaluation of augmented reality mobile development frameworks for addresses in informal settlements, *Spatial Information Research*, 24(3):211-223.
- Victoria Rautenbach, Yvette Bevis, **Serena Coetzee** and Carin Combrinck, 2015. Evaluating procedural modeling for 3D models of informal settlements in urban design activities, *South African Journal of Science (SAJS)*, 111(11/12):1-10.
- Serena Coetzee** and Julian Smit, 2015. Development of an observatory for spatial planning in South Africa: a best practice review. *South African Journal of Geomatics*, 4(3):326-338.
- Isak Du Plessis, Keagen Liebenberg, Ansie Smit, **Serena Coetzee** and Andrzej Kijko, 2015. Preliminary investigation into the cause of acid mine water induced seismicity in Johannesburg. *South African Journal of Geomatics*, 4(3):299-308.
- Paddington Hodza, Gertrud Schaab, **Serena Coetzee**, Fritz Van der Merwe and B Vogt, 2015. Comparing proportional compositions of geospatial technology-related programs at three universities. *South African Journal of Geomatics*, 4(3):40-249.
- Samy Katumba and **Serena Coetzee**, 2015. Enhancing the online discovery of geospatial data through taxonomy, folksonomy and semantic annotations. *South African Journal of Geomatics*, 4(3):339-350.
- Serena Coetzee** and Brendon Wolff-Piggott, 2015. A Review of SDI Literature: Searching for Signs of Inverse Infrastructures. In: *Lecture Notes in Cartography – Maps Connecting the World*, edited by Robbi Sluter, Claudia, Madureira Cruz, Carla Bernadete, Leal de Menezes, Paulo Márcio, Springer, pp113-127.
- Serena Coetzee**, Victoria Rautenbach and Heindrich du Plessis, 2015. A qualitative comparison of South Africa's geomatics professional body's academic model against industry's understanding of SDI knowledge and skills requirements, *Journal of Geography in Higher Education*, 39(1):4-17.
- Serena Coetzee**, Sanet Eksteen and Adrian Roos, 2014. Results from a survey of the South African GISc community show who they are and what they do. *South African Journal of Geomatics*, 3(2):224-245.
- Serena Coetzee**, Sanet Eksteen and Christopher Grundling, 2013. Sustainable Development: The Contribution from GISc Education in South Africa. *South African Journal of Geomatics*, 2(3):246-259.
- 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*, 2(3):260-279.
- 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)*, Vol. 8:1-15.
- 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*, 5(1):25-32.
- Rautenbach V, **Coetzee S** and Iwaniak A, 2013. Orchestrating OGC web services to produce thematic maps in a spatial information infrastructure, *Computers Environment and Urban Systems*, 37:107-120.
- 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 (IJGIS)*, 27(6):1133-1151.
- Serena Coetzee** and Sanet Eksteen, 2012. Tertiary education institutions in Africa: Cloudy with a chance of GISc education in some countries, *South African Journal of Geomatics*, 1(2):119-132.
- Malete Daniel Sebake and **Serena Coetzee**, 2012. Results of three case studies for assessing motivators and barriers of address data sharing in South Africa. *South African Journal of Geomatics*, 1(1): 32-43
- Serena Coetzee**, 2012. Reference model for a data grid approach to address data in a dynamic SDI. *Geoinformatica*, 16(1):111-129.
- Serena Coetzee**, 2011. Results from a normative dependency analysis of geographic information standards. *Computer Standards and Interfaces*, 33(5): 485-493, DOI: 10.1016/j.csi.2011.02.004.
- Antony K Cooper, **Serena Coetzee** and Derrick Kourie, 2010. Perceptions of virtual globes, volunteered geographical information and spatial data infrastructures, *Geomatica*, 64(1):73-88.
- Serena Coetzee** and Judith Bishop, 2009. Address databases for national SDI: Comparing the novel data grid approach to data harvesting and federated databases, *International Journal of Geographical Information Science (IJGIS)*, 23(9):1179-1209.
- Serena Coetzee** and Antony K Cooper, 2007. What is an address in South Africa?, *South African Journal of Science (SAJS)*, 103(11/12):449-458.
- Serena Coetzee** and Judith Bishop, 1998. A new way to query GIS on the web, *IEEE Software*, 15(3):31-40.

## Standards

- SANS 1883-2:2018, *Geographic information – Address, Part 2: Address data exchange*. South African Bureau of Standards (SABS), Pretoria, South Africa, 2018. (Contribution: project member).

- ISO 19160-1:2015, *Addressing – Part 1: Conceptual Model*, International Organization for Standardization (ISO), Geneva, Switzerland (Contribution: project lead).
- SANS 1883-1:2009, *Geographic information – Address, Part 1: Data format of addresses*. South African Bureau of Standards (SABS), Pretoria, South Africa, 2009. (Contribution: project lead).
- SANS 1883-3:2009, *Geographic information – Address, Part 3: Guidelines for address allocation and updates*. South African Bureau of Standards (SABS), Pretoria, South Africa, 2009. (Contribution: project lead).

## Technical reports

- Coetzee S**, Cooper AK and Katumba S, 2020. *Strengthening governance in the Gauteng City-Region through a spatial data infrastructure. The case of address data*. Available online at [https://gcro.ac.za/m/documents/Strengthening Governance through SDI - the case of address data.pdf](https://gcro.ac.za/m/documents/Strengthening_Governance_through_SDI_-_the_case_of_address_data.pdf) (Contribution: main author).
- Coetzee S**, Steiniger S, Köbben B, Iwaniak A, Kaczmarek I, Rapant P, Cooper AK, Behr F-J, Schoof G, Katumba S, Vatsava R, Sinvula KM and Moellering H, 2017. SDI implementations at universities and research institutes. Available online at <http://sdistandards.icaci.org/resources/> (Contribution: main author).
- ISO/TC 211, *Geographic information/Geomatics*, 2015. *Recommendations for the specification of cultural and linguistic adaptability (CLA) in ISO/TC 211 standards*. Document number N3936. (Contribution: main author).
- Serena Coetzee** and Julian Smit, 2014. *Background research to inform the setting up of the observatory proposed in Chapter 8 of the National Development Plan*. Research Report for the Secretariat of the National Planning Commission of South Africa.
- Open Geospatial Consortium (OGC), ISO/TC 211, Geographic information/Geomatics, and the International Hydrographic Organization (IHO), 2014. *A Guide to the Role of Standards in Geospatial Information Management*. Background document for the fourth session of the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) in New York, USA, August 2014. Available online at [http://ggim.un.org/ggim\\_committee.html](http://ggim.un.org/ggim_committee.html). (Contribution: contributing author).
- Open Geospatial Consortium (OGC), ISO/TC 211, Geographic information/Geomatics, and the International Hydrographic Organization (IHO), 2014. *A Guide to the Role of Standards in Geospatial Information Management – Companion Document on Standards Recommendations by Tier*. Background document for the fourth session of the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) in New York, USA, August 2014. Available online at [http://ggim.un.org/ggim\\_committee.html](http://ggim.un.org/ggim_committee.html). (Contribution: contributing author).
- ISO/TC 211, *Geographic information/Geomatics*, in cooperation with the Open Geospatial Consortium (OGC) and the International Hydrographic Organization (IHO), 2013. *The UN-GGIM inventory of issues and geographic information standardization*. Background document for the third session of the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) in Cambridge, United Kingdom, July 2013. Available online at [http://ggim.un.org/ggim\\_committee.html](http://ggim.un.org/ggim_committee.html). (Contribution: main author).
- Serena Coetzee**, 2012. *Executive summary: Availability of spatial data for renewable energy planning*, Eskom, Midrand, South Africa.
- ISO/TC 211, *Geographic information/Geomatics*, 2011. *Review summary of ISO 19160, Addressing*, (ISO/TC 211 document number N3188). Available online at <http://www.isotc211.org/address/iso19160.htm>, (Contribution: project lead).

## Employment history

Department of Geography, Geoinformatics and Meteorology, University of Pretoria, 2/2011 to date	Professor and Head of Department (10/2018 – ) Acting Head of Department (3/2018 – 9/2018) Associate Professor (2014 – 9/2018) Senior Lecturer (2011 – 2013)
Centre for Geoinformation Science, University of Pretoria, 2/2011 – 7/2019	Acting Director (2011 – 3/2015) Director (4/2015 – 7/2019)
Department of Computer Science, University of Pretoria, 1/2006 – 1/2011	Senior Lecturer (2010) Lecturer (2006 – 2009)
AfriGIS, 5/1999 – 12/2005	Client and Project Manager (10/2002 – 12/2005) Operational Director (9/2000 – 9/2002) Web Solutions Unit Manager (5/1999 – 8/2000)
Infotech, 3/1999 – 4/1999	Development Associate
Citadel Investment Solutions, 8/1998 – 2/1999	Software Engineer
Autodesk Development (Africa), 8/1995 – 7/1998	Software Engineer
Automated Methods, 3/1993 – 7/1995	Software Developer
Interface Connection (GmbH), 1/1992 – 12/1992	Programmer (Internship)