

CURRICULUM VITAE

Sander (Jaap) Zwart

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Date of birth March 30, 1976
Place of birth Drachten, the Netherlands
Nationality Dutch

SKILLS

Broad experience in integration and analysis of spatial data for regional applications such as water balances, irrigation performance monitoring, and water productivity assessment. Strong background and understanding in irrigated agriculture, water productivity, food production and (regional) water issues, with a focus on arid and semi-arid environments. High level of skill and understanding of the surface energy balance, including application of the SEBAL algorithm for estimation of actual evapotranspiration and crop yields from satellite imagery such as AVHRR, Landsat, MODIS and Aster. General capabilities in land use classification and change detection from remotely sensed imagery, in GIS and in surveying techniques with GPS.

EDUCATION

2003 – 2010 Ph.D. Water Productivity (part-time)
 Supervisor: Prof. WGM Bastiaanssen, Delft University of Technology, the Netherlands

2000 – 2002 M.Sc. Geo-information Science
 Wageningen University (Wageningen, the Netherlands)
 Major: Remote sensing
 subjects: geo-information tools, remote sensing principles, spatial data-infrastructures, data management, spatial modelling, spatial data integration

1994 – 2002 M.Sc. Tropical Land Use
 Wageningen University
 Major: Irrigation and Water Engineering
 subjects: irrigation design, agro-irrigation, irrigation management, hydrology, hydraulics, sustainable land use, natural resource management, soil and water conservation, sociology, gender issues in agriculture, development economics

1988 – 1994 Pre-university education
 Nienoordcollege (Leek, the Netherlands)

PROFESSIONAL EXPERIENCE

- 2010 – present Africa Rice Center (Cotonou, Bénin)
researcher remote sensing and GIS
- 2007 International Water Management Institute (Colombo, Sri Lanka)
guest researcher 'global modelling of water productivity' (1 month)
- 2002 – 2010 WaterWatch BV (Wageningen, the Netherlands)
irrigation and remote sensing specialist, project leader
Responsible for international projects: image processing, spatial data analysis, communications, reporting and presenting to customers.
Recently coordinated and prepared a proposal to the European Union (2009).

Selected projects

- monitoring the performance of irrigation in the Office du Niger irrigation scheme using satellite technology (Office du Niger, 2010-12)
- water productivity developments in AquaCrop and WATPRO for analysing wheat, maize and rice (Food and Agriculture Organization of the United Nations, 2010)
- development of an operational drought monitoring and prediction system in Andalucía, Spain (Netherlands Space Office, 2008-09)
- water balance and evaluation of water saving investments in Tunisian agriculture (World Bank 2007-08)
- evaluating irrigation performance of rice cultivation in Office du Niger, Mali (Programme National d'Infrastructure Rural, 2007)
- assessment of rice yields in Gilan Province, Iran and the impact of natural hazards on crop development (SajSystems, 2006).
- identifying irrigated area, cropping patterns and water use in Sudan, including a water balance of the Gezira-Managil Scheme (World Bank, 2006)
- groundwater abstractions in Yaqui Valley and Hermosillo Irrigation districts in Sonora, Mexico (Instituto Nacional del Agua, 2005).
- irrigation development and water use in Saudi Arabia 1979-2003; AVHRR image processing, SEBAL application, time integration and trend analysis (World Bank, 2004-05).
- geometric correction of IKONOS high resolution satellite imagery, including a three week GPS field survey across irrigated areas in Egypt (World Bank, 2004).
- analysis of water use in the Krishna basin, India during the Kharif and Rabi seasons; MODIS evapotranspiration, rainfall, spatial analysis (International Water Management Institute, 2002-03).
- quantification of actual evapotranspiration across California using MODIS satellite imagery; spatial processing of meteorology input data, SEBAL, validation (SNA Inc., 2003).
- water productivity assessment in Sirsa, India; integration of Landsat and AVHRR evapotranspiration and yield maps at different spatial resolution to calculate water productivity (Wageningen University, 2002-03).
- AVHRR time series to calculate evapotranspiration and yield in 1) Harran Plain, Turkey (Grontmij, 2002), 2) Nile basin, Egypt (KfW, 2002), 3) Lake Urmia, Iran (ITC, 2003);

2000 – 2001 Information Technology Group, Wageningen University
course-assistant 'Data Management'

2000 Irrigation and Water Engineering Group, Wageningen University
course-assistant 'Sustainable Land Use in Spain'

1997

ARCADIS Euroconsult BV (Arnhem, the Netherlands)
trainee in the project 'Strengthening the Soil Survey of Pakistan', Lahore, Pakistan

COUNTRIES WITH WORK EXPERIENCE

Africa	Mali, Benin, Egypt, Tunisia, Sudan
Americas	Mexico, United States
Asia	Sri Lanka, Pakistan, India, China, Iran
Europe	Netherlands, Hungary, Spain, Italy, Ukraine, Turkey

PUBLICATIONS

Peer reviewed journals

- Zwart, SJ**, H Pelgrum, WGM Bastiaanssen, 2010. *A global map of the growing season of wheat using high resolution NDVI time-series of SPOT-Vegetation*. (forthcoming).
- Klok, L, **SJ Zwart**, H Verhagen, E Mauri, 2010. *The surface heat island of Rotterdam derived from satellite imagery*. (forthcoming).
- Immerzeel, WW, P Droogers, WGM Bastiaanssen, **SJ Zwart**, 2010. *Calibrating hydrological models using remotely sensed evapotranspiration: the importance of scale*. Water Resources Research (submitted).
- Zwart, SJ**, WGM Bastiaanssen, C de Fraiture, DJ Molden, 2010. *A global benchmark map of water productivity for rainfed and irrigated wheat*. Agricultural Water Management (in press).
- Zwart, SJ**, WGM Bastiaanssen, C de Fraiture, DJ Molden, 2010. *WATPRO: a remote sensing based model for mapping water productivity for wheat*. Agricultural Water Management (in press).
- Zwart, SJ**, LMC Leclert, 2010. *A remote sensing based irrigation performance assessment: a case study of the Office du Niger in Mali*. Irrigation Science 28, pp. 371-385.
- Wipfler, EL, K Metselaar, JC van Dam, RA Feddes, E van Meijgaard, B van Ulft, B van den Hurk, **SJ Zwart**, WGM Bastiaanssen, 2009. *Seasonal evaluation of the ECMWF land surface scheme against remote sensing derived energy fluxes of the Transdanubian region in Hungary*. Hydrology and Earth System Sciences Discussions 6, pp. 6293-6334.
- Immerzeel, WW, A Gaur, **SJ Zwart**, 2008. *Integrating remote sensing and a process-based hydrological model to evaluate water use and productivity in a south Indian catchment*. Agricultural Water Management 95(1), pp. 11-24.
- Zwart, SJ**, WGM Bastiaanssen, 2007. *SEBAL for detecting spatial variation of water productivity and scope for improvement in eight irrigated wheat systems*. Agricultural Water Management 89(3), pp. 287-296.
- Zwart, SJ**, WGM Bastiaanssen, 2004. *Review of measured crop water productivity values for irrigated wheat, rice, cotton and maize*. Agricultural Water Management 69(2), pp. 115-133.
(listed in "Top 5 most cited articles" of Agricultural Water Management)

Conference papers

- Zwart, SJ**, LMC Leclert, 2010. *A remote sensing based irrigation performance assessment: a case study of the Office du Niger in Mali*. Africa Rice Congress, 22-26 March, 2010, Bamako, Mali.
- Klok, L, **SJ Zwart**, H. Verhagen, E. Mauri, 2009. *The surface heat island of Rotterdam derived from satellite imagery*. SENSE symposium on Climate Proofing Cities, December 1, 2009, Amsterdam/Volendam, the Netherlands.
- Leclert, LMC, WGM Bastiaanssen, **SJ Zwart**, 2009. *Irrigation performance assessment framework based on remote sensing: an example of Egypt*. ENVIROWATER 12th Inter Regional Conference. 9-11 November, Marrakech, Morocco.
- Van Meijgaard, E, L Wipfler, B van den Hurk, K Mestelaar, J van Dam, R Feddes, B van Ulft, **S Zwart**, W Bastiaanssen, 2009. *Evaluation of the land surface scheme HTESSSEL with satellite derived surface energy fluxes at the seasonal time scale*. 2nd Lund Regional-scale Climate Modelling Workshop: 21st Century Challenges in Regional-scale Climate Modelling, 4 - 8 May 2009, Lund, Sweden.

- Wipfler, EL, E van Meijgaard, B van den Hurk, K Metselaar, J van Dam, RA Feddes, **SJ Zwart**, 2008. *Modification and testing of the land surface scheme as adopted by the regional climate model RACMO*. AHS HydroPredict2008 conference, 15-18 September 2008, Prague, Czech Republic.
- Sharifi, MA, WGM Bastiaanssen, **SJ Zwart**, 2008. *Development of a decision support system for natural damage assessment based on remote sensing and bio-physical models*. 4th GIS Conference along with ISPRS Workshop on Geoinformation and Decision Support Systems, 6-7 January 2008, Tehran-Iran.
- Zwart, SJ**, WGM Bastiaanssen, J Garatuza-Payan, CJ Watts, 2006. *SEBAL for detecting spatial variation of water productivity for wheat in the Yaqui Valley, Mexico*. International Conference on Earth Observation for vegetation monitoring and water management, 10-11 November 2005, Naples, Italy. AIP Conf. Proc. 852, pp. 154-161.
- Thoreson, B, **SJ Zwart**, WGM Bastiaanssen and G Davids. 2004. *Estimating actual evapotranspiration without land use classification*. Water Rights and Related Water Supply Issues, USCID Water Management Conference, October 13-16, 2004, Salt Lake City, Utah.

Book chapters

- Molden, DJ, T Oweis, P Steduto, J Kijne, M Hanjra, P Bindraban, BAM Bouman, S Cook, O Erenstein, H Farnahi, A Hachum, H Mahoo, V Nangia, D Penden, A Sikka, P Silva, H Turrall, A Upadhyaya, **SJ Zwart**, 2007. *Pathways for increasing agricultural water productivity*. In: DJ Molden (ed.), Water for Food, Water for Life: the Comprehensive Assessment. Earthscan, London, and IWMI, Sri Lanka.
- Bastiaanssen, WGM, **SJ Zwart** and H Pelgrum, 2003. *Remote sensing analysis*. In: JC van Dam and RS Malik (eds.), Water productivity of irrigated crops in Sirsa district, India – integration of remote sensing, crop and soil models and geographical information systems. WATPRO final report, including CD-ROM, 173 p.

Other publications

- Jaarsma, M, D van den Bersselaar, **SJ Zwart**, WGM Bastiaanssen, 2005. *Remote Sensing for detecting hydrological constraints in the Northeastpolder, the Netherlands*. H2O 22, pp. 38-41 (in Dutch).

Project reports

- Klok, L, H ten Broeke, T van Harmelen, H Verhagen, H Kok, **SJ Zwart**, 2010. *Spatial distribution and causes of the urban heat island effect*.
- Zwart, SJ**, 2009. *The temporal and spatial distribution of heat in Rotterdam – a study on the urban heat island effect using satellite imagery and measurements of hobby meteorologists*.
- Zwart, SJ**, LMC Leclert and WGM Bastiaanssen, 2009. *Mapping evapotranspiration in the Guadalquivir river basin (Andalucía, Spain) - testing and comparing three ET algorithms on different satellite imagery*.
- Zwart, SJ** and LMC Leclert, 2008. *Suivre l'évolution de l'Office du Niger de l'espace – une analyse par télédétection pour aider à la prise de décision*.
- Zwart, SJ** and WGM Bastiaanssen, 2008. *Water balance and evaluation of water saving investments in Tunisian agriculture*.
- Zwart, SJ** and WGM Bastiaanssen, 2007. *Diagnosis of wet and dry problem areas in a study area in Zeeland province using remote sensing technology*.
- Zwart, SJ** and WGM Bastiaanssen, 2006. *Natural hazard damage assessment of rice yield in Gilan Province, Iran*.
- Zwart, SJ** and WGM Bastiaanssen, 2006. *Identification of irrigated area and evapotranspiration of summer and winter crops in Sudan*.
- Bastiaanssen, WGM, A Klaasse, **SJ Zwart**, WW Immerzeel and P Droogers, 2006. *The hydrological flow path and options for sustainable water resources management in the overexploited Rio Bravo Basin; A preliminary analysis from remote sensing and hydrological modeling*.
- Zwart, SJ** and WGM Bastiaanssen, 2006. *Satellite imagery analysis to detect changes in crop production in the D.G. Khan Canal Command Area (Punjab, Pakistan)*.
- Bastiaanssen, WGM, **SJ Zwart**, W Immerzeel and P Droogers, 2005. *An agro-hydrological analysis of southern and eastern Flevoland*.
- Bastiaanssen, WGM and **SJ Zwart**, 2005. *Constraints for water management in the Northeastpolder*.

Theses

- Zwart, SJ**, 2010. *Benchmarking water productivity in agriculture and the scope for improvement - remote sensing modelling from field to global scale*. Ph.D. thesis, Department of Water Resources, Delft University of Technology, The Netherlands.
- Zwart, SJ**, 2002. *Remote sensing tools for assessment of irrigation performance in the Northern Crimea Irrigation System, Republic of Crimea, Ukraine*. M.Sc. thesis, Irrigation and Water Engineering Group, Wageningen University, 72 p.
- Zwart, SJ**, 2001. *Analysis of spatial and temporal variability of salinisation at field level in a geographic information system - a case study of four irrigated fields in Sicily, Italy*. M.Sc. thesis, Laboratory of Geo-Information Science and Remote Sensing, Wageningen University, 51 p.
- Zwart, SJ**, 2000. *Precision irrigation as a management strategy for salinity control - two methodologies to establish management units for drip irrigated vineyard fields in Sicily, Italy*. M.Sc. thesis, Laboratory of Soil Science and Geology, Wageningen University, 86 p.

REVIEWER

Agricultural Water Management
Hydrological and Earth System Sciences

LANGUAGE SKILLS

Dutch (mother tongue), English (excellent, both written and spoken), Spanish (reasonable), French (basic knowledge), German (basic knowledge), Russian (poor)

COMPUTER SKILLS

General	MS Office (incl. MS Access, MS FrontPage)
Geo-information	Erdas Imagine, ArcGIS