

CURRICULUM VITAE

LENNART DE GROOT

JULY 2022 - L.V.DEGROOT@UU.NL

ACADEMIC EDUCATION

- 2008 – 2013 PhD in Geophysics, *cum laude* (top 3 to 5%), Utrecht University. Dissertation: High-resolution records of non-dipole variations in the intensity of the Earth's magnetic field, ISBN: 978-90-6266-332-3.
- 2007 – 2008 Master program Geophysics, Utrecht University. GPA: 4.0. One semester of the program was done at Colorado School of Mines, Golden, CO, USA.
- 2002 – 2007 Bachelor program Earth Sciences, Utrecht University. Graduated in May 2007.
- 2001 – 2002 Bachelor program in Physics and Astronomy, Utrecht University.
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WORKING EXPERIENCE

- 2021 – today **Associate professor** in geomagnetism, paleomagnetic laboratory Fort Hoofddijk, department of Earth Sciences, faculty of Geosciences, Utrecht University, the Netherlands.
- 2016 – 2021 **Assistant professor**, paleomagnetic laboratory Fort Hoofddijk, Utrecht University.
- 2016 **Visiting Research Fellow** at the Paleomagnetic lab of Scripps Institute of Oceanography, UCSD, La Jolla, USA, working together with prof. Lisa Tauxe.
- 2013 – 2016 **Postdoctoral research fellow** at paleomagnetic laboratory Fort Hoofddijk; as of 2015 working on my VENI project '*Capturing short-lived treats of the Earth's magnetic field*'.
- 2012 – 2013 Extension of my PhD project to compensate the time invested as lecturer for the course '*Mathematics for Earth Sciences*' for three years on a row.
- 2008 – 2012 **PhD candidate** at paleomagnetic laboratory Fort Hoofddijk. PhD project: '*A new approach for determining the absolute paleointensity of the Earth's magnetic field*' under supervision of dr. Mark J. Dekkers and prof.dr. Cor G. Langereis.
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ACADEMIC LEADERSHIP & COMMITTEES OF TRUST

- 2022 **Committee member** for the Edward A. Flinn III Award of the American Geophysical Union.
- 2022 **Committee member** for the Vening Meineszprize 2022 of the Dutch Science Foundation (NWO).
- 2021 **External examiner** for the PhD VIVA of Simon Lloyd, University of Liverpool, UK.
- 2020 **Co-convener** of the session '*Earth's core structure, dynamics and evolution: observations, models, experiments*', EGU General Assembly (virtual)
- 2017 – 2020 **Early career representative** on the board of the Geomagnetism, Paleomagnetism, and Electromagnetism section of the American Geophysical Union (AGU).
- 2017 **Convener** of the session '*Fundamental rock and Mineral Magnetism*', AGU Fall Meeting 2017, New Orleans, USA
- 2017 **Co-convener** of the session '*eLightning General Contributions in Geomagnetism Paleomagnetism and Electromagnetism*', AGU Fall Meeting 2017, New Orleans, USA
- 2016 – 2017 **Lead organiser** of the '*International Conference on Rock Magnetism 2017*' (ICRM17), Utrecht, NL
- 2015 **Convener** of the session '*Fundamental rock and Mineral Magnetism*', AGU Fall Meeting
- 2013 **Convener** of the session '*Full vector records of Earth's ancient magnetic field: methods and models*', AGU Fall Meeting

2008 – 2013 **Board member** of PhD Network Utrecht (PrOUT). Chair from 09/2009 – 02/2011, treasurer from 02/2011 – 03/2013.

FELLOWSHIPS, GRANTS & AWARDS

- 2020 **NWO (Netherlands Organization for Scientific Research) – NWA Science Communication: 'Hoe?Zo! Show'**. Funding received together with Barbara Braams to develop the Hoe?Zo! Show into a nation-wide program to teach elementary school kids about information skills and help PhD candidates to make a start with outreach activities, **k€ 50**.
- 2020 **Young Academy of Europe – Fellowship**.
- 2019 **European Research Council – Starting Grant: 'Paleomagnetism and rock-magnetism by Micro-Magnetic Tomography'** (MIMATOM), **k€ 1,820**, PI.
- 2019 **NWO – VIDI: 'The Spatial and Temporal Evolution of Geomagnetic Anomalies'**, **k€ 800**, PI.
- 2019 **Utrecht University – Public Engagement Seed Fund**: Funding for an outreach initiative to bring science to elementary schools and train young scientists in outreach, **k€ 2**.
- 2018 **NWO – Open Competition Earth and Life Sciences: 'Unravelling magnetic behaviour of igneous rocks by Micromagnetic Tomography'**, **k€ 329**, PI.
- 2018 **American Geophysical Union – William Gilbert Award 2018**: the William Gilbert Award is given annually to one honoree in recognition of 'outstanding and unselfish work in magnetism of Earth materials and of the Earth and planets' by the Geomagnetism, Paleomagnetism and Electromagnetism section.
- 2018 **NWO – DeepNL: 'Probing the micromechanics of small magnitude earthquake slip'**, **725 k€**, co-PI.
- 2017 **KNAW – Congresssubsidiefonds**: Support for 'International Conference on Rock Magnetism 2017', **7 k€**.
- 2016 **NWO – Vening Meinesz prize 2016**: the Vening Meinesz prize is a bi-annual talent award for an outstanding young researcher in Earth Sciences in the Netherlands within six years after obtaining his/her doctorate degree, **10 k€**.
- 2015 **NWO – VENI: 'Capturing short-lived treats of the Earth's magnetic field'**, **250 k€**, PI.
- 2013 **NWO – ISES: 'Vibrating Sample Magnetometer including expertise'**, **232 k€**, co-PI.
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OTHER COURSES & ACTIVITIES

- 2017 – today Speaker for the **Rector's League**, Utrecht University's program to promote science among High School students
- 2016 – today **Certified Emergency Response Officer** (*bedrijfshulpverlener, BHV*), degree awarded by the Nederlands Instituut voor Bedrijfshulpverlening (NIBHV)
- 12/2015 **Associate LabVIEW developer**, degree awarded by National Instruments
- 01/2014 **Basic University Teaching Qualification** (*Basis Kwalificatie Onderwijs, BKO*), awarded by the faculty of Geoscience, Utrecht University
- 07/2010 Doctoral summer school of the League of European research universities (LERU), 'Communication about research – Towards a sustainable future', 4-13 July, Utrecht

ACADEMIC RESUMÉ

LENNART DE GROOT

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PUBLICATIONS

2022

28. Cortés-Ortuño, D.I., Fabian, K., **de Groot, L.V.**: Mapping magnetic signals of individual magnetite grains to their internal magnetic configurations using Micromagnetic Models, *Journal of Geophysical Research: Solid Earth*, 127, e2022JB024234, doi: 10.1029/2022JB024234
27. Out, F., Cortés-Ortuño, D.I., Fabian, K., van Leeuwen, T., **de Groot, L.V.**: A first-order statistical exploration of the mathematical limits of Micromagnetic Tomography, *Geochemistry, Geophysics, Geosystems*, 22, e2021GC010184, doi: 10.1029/2021GC010184

2021

26. **de Groot, L.V.**, Fabian, K., Béguin, A., Kusters, M.E., Fu, R.R., Jansen, C.M.L., Harrison, R.J., van Leeuwen, T., Barnhoorn, A.: Micromagnetic Tomography for Paleomagnetism and Rock-magnetism, *Journal of Geophysical Research: Solid Earth*, 126, e2021JB022364, doi: 10.1029/2021JB022364.
25. Cortés-Ortuño, D.I., Fabian, K., **de Groot, L.V.**: Single particle multipole expansions from Micromagnetic Tomography, *Geochemistry, Geophysics, Geosystems*, doi: 10.1029/2021GC009663.
24. Béguin, A., Pimentel, A.H.G., **de Groot, L.V.**: Full-vector paleosecular variation curve for the Azores: enabling reliable paleomagnetic dating for the past 2 ky, *Journal of Geophysical Research - Solid Earth*, doi: 10.1029/2020JB01974.

2020

23. Béguin, A., Paterson, G.A., Biggin, A.J., **de Groot, L.V.**: Paleointensity.org: an online, open source, application for the interpretation of paleointensity data, *Geochemistry, Geophysics, Geosystems*, 21, doi: 10.1029/2019GC008791.
22. Ertepinar, P., Langereis, C.G., Biggin, A.J., **de Groot, L.V.**, Kulakoglu, F.: Archaeomagnetism at Kültepe: untangling the order of fire events in antiquity, in: *Integrative approaches to the archaeology and history of Kültepe-Kaneš*, Subartu series XLV, vol. 45, pp 99-112, ISBN: 978-2-503-58559-8
21. Kapper, L., Serneels, V., Panovska, S., Garcia Ruiz, R., Hellio, G., **de Groot, L.V.**, Goguitchaichvili, A., Morales, J., Cejudo Ruiz, R.: Novel insights on the geomagnetic field in West Africa from a new intensity reference curve (0-2000 AD), *Scientific Reports*, 10, 1121, doi: 10.1038/s41598-020-57611-9.

2019

20. de Groot, B.M., **de Groot, L.V.**: A low-cost device for measuring local magnetic anomalies in volcanic terrain, *Geoscientific Instrumentation, Methods and Data Systems*, 8, 217–225, doi: 10.5194/gi-8-217-2019.
19. Béguin, A., Filippidi, A., de Lange, G.J., **de Groot, L.V.**: The evolution of the Levantine Iron Age Geomagnetic Anomaly captured in Mediterranean sediments, *Earth and Planetary Science Letters*, 511, 55-66, doi: 10.1016/j.epsl.2019.01.021.
18. Fabian, K., **de Groot, L.V.**: A uniqueness theorem in potential theory with implications for tomography-assisted inversion, *Geophysical Journal International*, 216, 760–766, doi: 10.1093/gji/ggy455.

2018

17. Monster, M.W.L., van Galen, J., Kuiper, K.F., Dekkers, M.J., **de Groot, L.V.**: A late-quaternary full-vector geomagnetic record from El Golfo section, El Hierro, Canary Islands, *Geophysical Journal International*, 215, 1701–1717, doi: 10.1093/gji/ggy361.
16. ter Maat, G.W., Pennock, G.M., **de Groot, L.V.**: A chemical, crystallographic and magnetic characterisation of individual iron-oxide grains in Hawaiian lavas, *Scientific Data*, 5, art.nr.: 180168, doi: 10.1038/sdata.2018.162.

15. **de Groot, L.V.**, Fabian, K., Béguin, A., Reith, P., Barnhoorn, A., Hilgenkamp, J.W.M.: Determining individual particle magnetizations in assemblages of micro-grains, *Geophysical Research Letters*, 45, doi: 10.1002/2017GL076634.
14. Monster, M.W.L., Langemeijer, J., Wiarda, L.R., Dekkers, M.J., Biggin, A.J., Hurst, E., **de Groot, L.V.**: Full-vector geomagnetic field records from the East Eifel, Germany, *Physics of the Earth and Planetary Interiors*, 274, p. 148-157, doi: 10.1016/j.pepi.2017.11.009.

2016

13. Mullender, T.A.T., Frederichs, T., Hilgenfeldt, C., **de Groot, L.V.**, Fabian, K., Dekkers, M.J.: Automated paleomagnetic and rock magnetic data acquisition with an in-line horizontal '2G' system, *Geochemistry, Geophysics, Geosystems*, doi: 10.1002/2016GC006436.
12. **de Groot, L.V.**, Pimentel, A.H.G., Di Chiara, A.: The multi-method paleointensity approach applied to volcanics from Terceira: full-vector geomagnetic data for the past 50 kyr, *Geophysical Journal International*, 206, 590-604, doi: 10.1093/gji/ggw095.
11. Pimentel, A.H.G., Zanon, V., **de Groot, L.V.**, Hipolito, A., Di Chiara, A., Self, S.: Stress-induced comenditic trachyte effusion triggered by trachybasalt intrusion: multidisciplinary study of the 1761 AD eruption at Terceira Island (Azores), *Bulletin of Volcanology*, 78:22, doi: 10.1007/s00445-016-1015-6.
10. Ertepinar, P., Langereis, C.G., Biggin, A.J., **de Groot, L.V.**, Kulakoğlu, F., Omura, S., Süel, A.: Full vector archaeomagnetic records from Anatolia between 2000 and 1400 BCE: implications for geomagnetic field models and the dating of fires in antiquity, *Earth and Planetary Science Letters*, 434, 171-186, doi: 10.1016/j.epsl.2015.11.015.

2015

9. Monster, M.W.L., **de Groot, L.V.**, Langereis, C.G., and Dekkers, M.J.: MSP-Tool: a VBA-based software tool for the analysis of multispecimen paleointensity data, *Frontiers in Earth Science*, 3:86, doi: 10.3389/feart.2015.00086.
8. van Hinsbergen, D.J.J., **de Groot, L.V.**, van Schaik, S.J., Spakman, W., Bijl, P.K., Sluijs, A., Langereis, C.G., and Brinkhuis, H.: A paleolatitude calculator for paleoclimate studies, *PLoS ONE*, 10(6): e0126946, doi:10.1371/journal.pone.0126946
7. **de Groot, L.V.**, Béguin, A., Kosters, M.E., van Rijnsingen, E.M., Struijk, E.L.M., Biggin, A.J., Hurst, E.A., Langereis, C.G., and Dekkers, M.J.: High paleointensities for the Canary Islands constrain the Levant geomagnetic high, *Earth and Planetary Science Letters*, 419, 154-167, doi: 10.1016/j.epsl.2015.03.020.
6. Monster, M.W.L., **de Groot, L.V.**, Biggin, A.J., and Dekkers, M.J.: The performance of various palaeointensity techniques as function of rock-magnetic behaviour – a case study for La Palma, *Physics of the Earth and Planetary Interiors*, 242, p. 36-49, doi: 10.1016/j.pepi.2015.03.004.

2014

5. **de Groot, L.V.**, Fabian, K., Bakelaar, I.A., Dekkers, M.J.: Magnetic Force Microscopy reveals meta-stable magnetic domain states that prevent reliable absolute palaeointensity experiments, *Nature Communications*, 5, p. 1-10, doi: 10.1038/ncomms5548.
4. **de Groot, L.V.**, Dekkers, M.J., Visscher, M. and ter Maat, G.W., 2014: Magnetic properties and paleointensities as function of depth in a Hawaiian lava flow, *Geochemistry, Geophysics, Geosystems*, 15, doi:10.1002/2013GC005094.

2013

3. **de Groot, L.V.**, Biggin, A.J., Dekkers, M.J., Langereis, C.G. and Herrero-Bervera, E., 2013: Rapid regional perturbations to the recent global geomagnetic decay revealed by a new Hawaiian record, *Nature Communications*, 4, p. 1–7, doi: 10.1038/ncomms3727.
2. **de Groot, L.V.**, Mullender, T.A.T. and Dekkers, M.J., 2013: An evaluation of the influence of the experimental cooling rate along with other thermomagnetic effects to explain anomalously low palaeointensities obtained for historic lavas of Mt Etna (Italy), *Geophysical Journal International*, 193, p. 1198–1215, doi: 10.1093/gji/ggt065.

2012

1. **de Groot, L.V.**, Dekkers, M.J. and Mullender, T.A.T., 2012: Exploring the potential of acquisition curves of the anhysteretic remanent magnetization as a tool to detect subtle magnetic alteration induced by heating, *Physics of the Earth and Planetary Interiors*, 194-195, p. 1–14, doi: 10.1016/j.pepi.2012.01.006.
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INVITED PRESENTATIONS

- 2022 Invited seminar 'Magnetic recording properties of lava - a case study on the 2021 La Palma eruption', Multi-scale laboratories network seminar series, EPOS NL
- 2021 Invited lecture '*Micromagnetic Tomography for Paleomagnetism and Rock-magnetism*', LMU München
- 2019 Invited seminar '*Unravelling the behavior of the geomagnetic field by pushing paleomagnetism to the micro-scale*', Earth and Planetary Magnetism Group seminar, ETH Zürich, CH
- 2019 Invited lecture '*The geomagnetic field: the Earth's invisible shield against radiation from the universe*', Bachelor's Honours program, Leiden University, NL
- 2018 Invited lecture '*The geomagnetic field: the Earth's invisible shield against radiation from the universe*', Bachelor's Honours program, Leiden University, NL
- 2018 Seminar '*Micromagnetic tomography: Going to the grain scale to obtain reliable paleomagnetic field intensities*', Earth Planets Space group, Harvard University, Cambridge, MA, USA
- 2017 Invited presentation '*Micro-magnetic tomography in practise*', Magnetic Interactions Meeting, Edinburgh, UK.
- 2016 Invited Earth and Planetary Science Department seminar at UC Berkeley, USA: '*Unravelling the short-term behavior of the Earth's magnetic field*'
- 2016 Invited lecture on Paleointensities at the IRM Summer School, Institute for Rock Magnetism, University of Minneapolis, USA
- 2016 Invited presentation '*The multi-method approach for high resolution full-vector curves of geomagnetic intensity variations*', EGU General Assembly
- 2016 Invited presentation '*The potential of micro-magnetic tomography*', EGU General Assembly
- 2015 Friday Earth Sciences Talk (FEST), department of Earth Sciences, Utrecht University: '*Unravelling the short-term behavior of the Earth's magnetic field*'
- 2015 Invited lecture '*Origin and significance of the geomagnetic field*' for the Bachelor Honours program at Leiden University
- 2015 Invited presentation '*Rapid changes in the geomagnetic field revealed*' at the *van Waterschoot van de Gracht penning* award ceremony for prof.dr. Cor Langereis, Utrecht University
- 2014 Invited presentation '*Meta-stable magnetic domain states that prevent reliable absolute paleointensity experiments revealed by magnetic force microscopy*', AGU Fall Meeting
- 2014 Invited presentation '*High-resolution records of non-dipole variations derived from volcanic edifices*', EGU General Assembly
- 2012 Invited presentation '*Absolute paleointensities: methods & tests*', University of Liverpool, UK
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TEACHING

- 2021 – today Guest lecturer for a '*Natural Hazards*' course (~ 150 students, 2nd year BSc level). Lecture on Space Weather and the impact of geomagnetic storms; designing exam questions.
- 2020 – today Coordinator/lecturer for the BSc course '*Wiskunde voor Aardwetenschappers*' (7.5 ECTS, ~150 students and ~12 TAs per year). Developing course material; giving lectures; supervising TAs; making and grading exams.
- 2011 – today Lecturer first years' MSc course '*Paleomagnetism & rock magnetism*' (7.5 ECTS). Giving lectures, assisting with practicals, hosting discussions; approximately 15 to 30 students.

2010 – today	Lecturer/supervisor of a first years' BSc field excursion (three/four days) to the Ardennes, Belgium. Giving field instructions, supervising TAs, grading reports; approximately 45 students and 7 TAs.
2016 – 2019	Lecturer for the BSc course ' <i>Basis Wiskunde en Fysica</i> ' (7.5 ECTS, ~150 students and ~12 TA's per year). Developing course material; giving lectures; supervising TAs; making and grading exams.
2010 – 2013	Lecturer first years' BSc course ' <i>Wiskunde voor Aardwetenschappen</i> ' (7.5 ECTS). Giving lectures and practicals, designing exercises and exams, supervising teaching assistants (TAs), grading exams; approximately 120-150 students and 12 TA's.

OUTREACH & SCIENCE POLICY

Here only my key outreach activities are outlined, for a comprehensive list, please see:

<https://www.lennartdegroot.nl/outreach.html>

2021

- Interview for a news item on the eruption of the Cumbre Vieja volcano on La Palma in **Atlas**, a weekly scientific news show of the Dutch public broadcast service NTR (starting from 11:00 min), September 22
- Interview for *Het aardmagnetisch veld beweegt. Hoe gevaarlijk is dat?* (The Earth's magnetic field is dynamic. Is that dangerous?), a science radio program/podcast on **NPO Radio 1**, a Dutch national public broadcaster, September 1
- *De dolende noordpool* (the wandering North pole), a special of the **De Kennis van Nu** ('Today's knowledge'), a scientific documentary program of the Dutch public broadcast service NTR, August 25

2020

- Lecture at the **Universiteit van Nederland**: '*Hoe beschermt de aarde onze WiFi?*' ('How does the Earth protect our Wifi?'), June 18
- Featured in an episode about the Earth's magnetic field of '**het Klokhuis**', a daily documentary show for primary school children and young teenagers on Dutch national television (NOS), January 15.

2019

- Organizer of the **Hoe?Zo! Show** during the Weekend van de Wetenschap (Weekend of Science), Utrecht University, together with Barbara Braams. The Hoe?Zo! Show is a live game show in which a team of PhD candidates must answer questions from kids in the audience, 6 October
- Presentation on the transition to Open Science for members of the **Tweede Kamer, the Dutch House of Representatives**, and their policy advisors, together with Barbara Braams (VU Amsterdam), March 5
- Citation in **NRC**: '*Open Access, mooi! Maar hoe dan?*', an article by Ellen de Bruin en Marcel aan de Brugh on the transition to Open Access, February 9
- Interview for '*De noordpool is aan de wandel, vertrouw niet op uw kompas*', an article by Marlies ter Voorde in **de Volkskrant** on the unforeseen update of the World Magnetic Model, January 15

2018

- Live interview on 'Sprakmakers' on **NPO Radio 1** on the challenges for young scientists in the transition to Open Access, December 5, 10:30 - 11:30
- Article in the Opinion pages of **de Volkskrant** together with Barbara Braams on the challenges for young scientists in the transition to Open Access: '*Jonge wetenschappers verdienen zekerheid*'
- Live interview on 'Sprakmakers', **NPO Radio 1**, June 8, 10:30 - 11:30, on the recent simultaneous eruptions of a number of volcanoes around the world
- Interview for '*Waarom explodeert de ene vulkaan wel en de andere niet?*' ('Why are some volcanoes explosive, while others are not?'), an article by **NOS op 3**

2017

- Participant in the Dutch National Science Quiz (**Nationale Wetenschapsquiz**), a 90 min. tv show aired on December 26 on national tv reaching 577.000 viewers
- Interview for Editie NL (**RTL 4**), a daily television program focussing on national news, featuring an item on noise nuisance by low frequency sounds
- Eindelijk komt de zon weer vroeger op', article on **Kennislink** regarding the offset between sun set and sun rise times around the winter solstice.

2016

- Leidse Winterlezing '*Snelle variaties in het aardmagneetveld ontrafeld*', Rijksmuseum voor Oudheden, Leiden, on invitation by GEA kring Rijnland
- Contribution to the article '*Magnetic vortices record history of Earth's magnetic field*' by Ian Randall on **Physicsworld.com**
- Article in **Le Journal de l'île de la Réunion** covering our fieldwork there: '*Le volcan pour décrypter le champ magnétique terrestre*'
- Interview for '**Editie NL**' (**RTL 4**), a daily television program focusing on national news featuring an item on mysterious sounds in the atmosphere (January 12)

2015

- Supervisor for the '**UTalent**' program of Utrecht University (extracurricular science program for excellent high school students, May 18-21)
- Article in **NRC Handelsblad**: '*Nederland lag vroeger waar Marokko nu ligt*' (June 15)
- Major press coverage associated with our PLoS ONE paper and www.paleolatitude.org: '*Waar lag jouw woonplaats in het dinotijdperk?*': **Pzc, De Gelderlander, Brabants Dagblad, Eindhovens Dagblad, BN De Stem**

2014

- '*Aardse krachten*', article in the September issue of popular science journal **Quest** (pp. 84-87) on the Earth's magnetic field
- '*Draaien de Noord- en Zuidpool ons dood?*', 30 min radiointerview on **FunX** (national Dutch radio station targeting youth in the larger cities) regarding the nature of the Earth's magnetic field and potential geomagnetic reversals

2013

- Page wide article in the Science pages of **De Volkskrant** (national Dutch newspaper) regarding my PhD thesis: '*Beter weten waar het noorden was*'.
- Interview **Business News Radio (BNR)** (~3 min, national radio station) regarding my PhD thesis
- ANP press release regarding my PhD thesis, published by most national Dutch and Belgian newspapers, such as: **de Volkskrant, Nu.nl, de Telegraaf, BN de Stem, RTV Utrecht, AD, Spits, de Morgen, de Stentor, Reformatorisch Dagblad, Trouw, Brabants Dagblad, Tubantia**, etc.

THESES

PhD thesis	De Groot, L.V. (2013), <i>cum laude</i> . <i>High-resolution records of non-dipole variations in the intensity of the Earth's magnetic field</i> , Utrecht Studies in Earth Sciences No. 037, ISBN 978-90-6266-332-3
MSc thesis	De Groot, L.V. (2008). <i>Inclination error correction in red beds, comparing methods using Permian red beds from the Lodève region, Southern France</i> , Utrecht University, grade 9/10
BSc thesis	De Groot, L.V. , (2006). <i>Measuring the anisotropy of isothermal or anhysteretic remanent magnetization</i> , Utrecht University, grade 9/10