

Prof. Dr. Virginia Gail Toy

Curriculum Vitae



Private address: Fuchstanzstraße 50, 60489 Frankfurt am Main, GERMANY.

Email: virginiatoy@gmail.com

Ph: +49 151 2127 1012.

ORC-ID: [0000-0002-7621-2064](https://orcid.org/0000-0002-7621-2064)

1. Academic qualifications

2008	PhD (Geology), University of Otago, New Zealand (awarded 03. May)
2006	MPhil (Earth Sciences), Australian National University, Australia
2001	MSc (Hons, Geology), University of Auckland, New Zealand
1999	BSc (Geology), University of Auckland, New Zealand

2. Professional positions held

Oct 2019 – present	Professorin für Strukturgeologie und Tektonik, Universität Mainz, Germany; Honorary Research Associate Professor, University of Otago, NZ;
Dec 2018-Sept 2019	Associate Dean – International, Division of Sciences, University of Otago, NZ.
Feb 2018-Sept 2019	Research Associate Professor, University of Otago, NZ.
Feb 2013-Jan 2018	Senior Lecturer, University of Otago, NZ ('above the bar' since February 2017)
June-Sept 2017	Visiting Associate Professor, Graduate School of Sciences, Hokkaido University, Japan
Aug-Oct 2016	Visiting Professor, Yachay Tech University, Urcuquí, Ecuador
Jan 2009-Jan 2013	Lecturer, University of Otago; confirmed Sept 2011.
Aug-Dec 2008	Postdoctoral Researcher, University of Wisconsin-Madison and Texas A&M University, USA.
Jan-July 2008	Lecturer, University of Otago.
2005-2007	Teaching Assistant, University of Otago, NZ.
2003	Teaching Assistant, Monash University, Australia
2001-2002	Engineering Geologist, Fraser Thomas Ltd., Auckland, NZ.
1999-2000	Research Assistant, Engineering Geology Ltd., Auckland, NZ.

3. Research/professional speciality

Structural geology and tectonics: My major interest is the mechanics of fractures, faults and shear zones throughout Earth's lithosphere. I currently apply my expertise to (i) study of fractured geothermal reservoirs and induced seismicity, (ii) the electrical properties of typical fault and shear zone rocks and fluids, aiming to ensure these properties can be better used for remote geophysical imaging, and (iii) understanding earthquake hazard and promoting societal resilience. I also have experience in paleoseismology and landscape evolution, engineering geology, subduction zone structure, and deformation of ultramafic rocks.

Methods: I am principally a field geologist, but I also undertake microtextural analysis, particularly by electron beam and synchrotron methods, perform deformation experiments, and validate results by simple computational models. I am an active member of the global continental and oceanic scientific drilling consortia, and have interests in scientific data management and science communication/outreach.

4. Awards and distinctions

Selected Research Grants

Since award of my PhD in 2008 I have administered approximately NZ\$ 7.1M research funds as a Principal Investigator (PI) and NZ\$ 5.9M as an Associate Investigator (AI). Highlights include:

2022-2025	BMW Grant 'RESTLESS' to explore induced seismicity in relation to geothermal exploration in the Rhine Graben. Total project budget c. 2.5M €, my share 424k €.
2022-2025	Humboldt Foundation Henriette Herz Scout . ~450k € equivalent value.

- 2022 Deutsch Forschungs-gemeinschaft (DFG) Program Large Research Equipment Grant INST for a Field Emission Scanning Electron Microscope (FE-SEM) with Cryo-system. 700k €.
- 2022-2025 DFG Grant TO901/1-1 for electrical structure of the DIVE drillsite. 360k €.
- 2018,2019 Support for 2 x 2 month invited research visits to Université Grenoble-Alpes. 9.7k€
- 2017-2021 PI: Rutherford Discovery Fellowship. NZ\$ 800k.
- 2012-2015 PI: ICDP (International Continental Scientific Drilling Program) funding for Alpine Fault – Deep Fault Drilling Project Stage 2. US\$ 1.35M, and AI – Marsden Full Grant GNS1002 for the same project, NZ\$ 920k.
- 2012 Shipboard science party member, IODP Expedition 343 – “J-FAST”.
- 2010-2012 PI; Marsden Fast Start Grant. NZ\$ 300k.

Recent Awards and Scholarships

- 2019, 2020 Invited to Stage II interviews for ERC Consolidator Grants.
- 2019, 2013 Assessed as an A-grade researcher in the 2013-2018, and a B-grade researcher in 2007-2012 Performance-Based Research Funding quality evaluations ([PBRF](#)).
- 2013 University of Otago Early Career Award for Distinction in Research.
- 2008 Exceptional PhD Thesis, University of Otago (top 10% of theses).
- 2004-2007 University of Otago Postgraduate Scholarship.
- 2001 Senior Scholar in Geology and Bartrum Memorial Prize in Geology (Honours) at UoA.

Invited Talks/Participations

- 2015 Invited speaker, Japan Top Collaboration Program, Hokkaido University.
- 2013, 2016 Invited participant, International Continental Scientific Drilling Program (ICDP) Science Planning Conferences, Potsdam, Germany
- 2010-2022 Plenary speaker, e.g at Gordon Res. Conf. on Rock Deformation, NH, USA. 2020, 2021.

5. Contributions to the research environment

Research Community Development

- 2020- Editor for *Journal of Structural Geology*, Topical Editor for *Solid Earth*
- 2011-2013 Organised symposium in honour of Profs. R.J Norris & A. F. Cooper.
- Session Convenor – AGU Meeting, USA (2010, 2012-13, 2015), EGU Meeting, Austria (2018)
- 2009-2010 Editor, Geological Society, London, Special Publication 359
- 2009 Convenor of NZ Geol. and Geophys. Societies’ Annual Conf., Oamaru
- 2006-2021 Reviewer for journals such as *Nature*, *Geology*, *J Geophysical Research*, *NZ J Geology & Geophys.*, and agencies such as *ERC*, *NSF*, *NERC*, *Catalyst Fund*.

Selected Memberships

- 2018-2021 ICDP Science Advisory Group (SAG)
- 2016-2020 UNESCO International Geosciences Program Scientific Board; Geological Society of London Books Advisory Committee
- 2014-2018 Science Assessment Committee, *Australian – NZ IODP Consortium (ANZIC)*; Editorial Advisory Board, *Journal of Structural Geology*
- 2005- German Geological Society (DGGV); American Geophysical Union; NZ Federation of Graduate Women, Geoscience Society of New Zealand.

6. Leadership and service roles

- 2022- Internationalisation Rep, and International Senate Member, Faculty 09, Universität Mainz
- 2020- ElektronmikroskopieZentrum Mainz (EMZM) Steering Committee
- 2020- Leader of the [FORTHM Alliance Climate & Resources Lab](#), Universität Mainz
- 2021- Member of the Universität Mainz Gutenberg Nachwuchskolleg (for promotion of ECRs)
- 2019-2021 Founder of the Universität Mainz Institut für Geowissenschaften Outreach Committee
- 2018-2019 Founder (with Prof. G. Wilson) of the [Otago Repository for Core Analysis](#) (ORCA)
- 2018 Member of Otago Division of Sciences PBRF Review Panel.
- 2017-2019 Leader of the Scientific Drilling @ Otago Group
- 2016-2019 Otago Energy Research Centre ([OERC](#)) Steering Committee member

2014	Participant in Otago Division of Sciences Strategic Planning Day
2013-2019	Member of O-zone Early Career Researchers Group, University of Otago
2011	Member of academic staff interview panel for the University of Otago Academic Audit
2011-2019	Outreach Coordinator, Department of Geology, University of Otago
2009-2016	Member of the Otago Division of Sciences Outreach and Engagement Committee (SNAP)
2009-2019	Member of the Hands-on-Science (now Hands-on-at-Otago) Committee

7. Outreach

I lead the 'Outreach' working package of the BMWK (Ministry for Economy and Climate) project 'RESTLESS'.

I regularly provide informed scientific expertise and commentary, e.g. for a Wind Farm consent hearing (2016), the Franz Josef [Fault Avoidance Zone](#) (2018-2021), and discussions of a ban on fracking (2012)

I contributed to a textbook / Schulebuch 'Seydlitz Erdkunde Rheinland-Pfalz', 2020.

I have hosted RSNZ Primary Teacher Fellows, e.g. Ruth Baldwin (Balclutha Primary), 2012.

Organising committee member (2009-2017) and project leader (2006-2018) for [Hands on at Otago](#).

Scientific Expert in the documentary TV series [Beneath New Zealand](#) and the popular science book [Terrain](#)

I star in [blog posts](#) and [youtube movies](#) designed to communicate research initiatives in accessible forms.

8. Teaching

Significant Educational Contributions

During my time at the Universities of Otago and Mainz I have taught classes at all year levels, and been involved in significant curriculum revisions. These activities are detailed in the full version of my CV. Recent educational highlights include designing, co-ordinating and teaching two classes to international students:

1. Joint online lecture series with French, Italian and Spanish staff and students, and a hybrid online-in person field class in Spain about "Sedimentary Basin Records of Earth's Past Climate" in the framework of the [FORTHEM Alliance](#), in August and September **2022**.
2. A joint Summer School in Structural Geology, Geophysics, and Marine Geosciences, with University of Hokkaido, Japan in Aug/Sept **2015**, and June/July **2017-2019**.

During the Corona crisis I also constructed and taught my first semester of classes at the University of Mainz remotely, while 'trapped' in Auckland due to closure of international borders, and as a result of this and ongoing restrictions in Germany, I developed significant new methods, particularly for field teaching.

I also co-ordinated two journal special issues to publish Digital Education Resources developed in the Corona crisis, in *Solid Earth/Geoscience Education* and the *Journal of Structural Geology*.

Postdoctoral Scholar and Postgraduate Student supervision

I currently supervise 4 postdoctoral researchers, 1 PhD student, 3 student assistants, and 1 Bachelor thesis. In the past I have supervised 8 postdocs, 17 PhD students (2 incomplete), 13 MSc students, 5 BSc(Hons) students, 8 Bachelor theses, 5 student assistants, and 3 student interns.

My postgrads and postdocs have come from NZ, Australia, Switzerland, Italy, USA, Japan, Bulgaria, Iran, and China. I estimate that at least 50% of them have or had English as a second language. My past advisees have proceeded to successful careers including 2 Associate Professors in the USA, Postdocs in the USA, NZ and UK, a handful of Geological Survey staff (USA, Germany), and numerous industry consultants.

I participated in Otago's HEDC Postgraduate Research Supervisors' program – 2010-2011.

9. Selected publications

In summary, since 2006 I have published from 4 to 11 manuscripts per year, and a total of 85 research articles – 14 as lead author – in scientific journals and monographs with ISI Web of Science Impact Factors (IF) in the top 25% of Geosciences (e.g. G-cubed IF = 3.5; Nature, IF = 43.8; Science IF = 38.0).

The quality of my published research is demonstrated by my citation records. On 27 Sept 2023, my h-index was 30 via ISI Web of Science and 34 via Google Scholar. Additionally, Google Scholar calculates an i10 index of 58, and indicates there have been 3950 total citations of my published works, 2257 since 2018.

For a complete publication list please see: <https://www.geowiss.uni-mainz.de/publikationen-virginia-toy/>.

** denotes a supervised student or postdoc as first author. Citations from ISI Web of Science Oct 2022.

10 significant refereed manuscripts

1. Adam, L., Frehner, M., Sauer, K., **Toy, V.G.**, Guerin-Marthe, S., **2020**. Seismic anisotropy and its impact on imaging the shallow Alpine Fault: an experimental and modeling perspective. *Journal of Geophysical Research, Solid Earth*, 125(8), doi: 10.1029/2019JB19029 [citations = 7].
2. **Kirilova, M., **Toy, V.G.**, Rooney, J.S., Giorgetti, C., Gordon, K.C., Collettini, C., Takeshita, T. **2018**. Structural disorder of graphite and implications for graphite thermometry. *Solid Earth*, 9, 1-9, doi: 10.5194/se-9-1-2018. [citations = 23].
3. **Kidder, S., **Toy, V.G.**, Prior, D.J., Little, T.A., Macrae, C. **2018**. Constraints on Alpine Fault (New Zealand) Mylonitization Temperatures and Geothermal Gradient from Ti-in-quartz Thermobarometry. *Solid Earth*. doi: 10.5194/se-9-1123-2018. (2018). [IF = 4.1, citations = 1].
4. **Toy, V.G.**, Sutherland, R.S., Townend, J., and 66 other members of the DFDP-2B Science Team, **2017**. Bedrock geology of DFDP-2B, central Alpine Fault, New Zealand. *New Zealand Journal of Geology and Geophysics* 60 (4), 497-518, doi: 10.1080/00288306.2017.1375533. [citations = 21].
5. **Toy, V.G.**, Niemeijer, A.R., Renard, F. Wirth, R., Morales, L. **2017**. Striation and slickenline development on quartz fault surfaces at crustal conditions: origin and effect on friction. *Journal of Geophysical Research, Solid Earth* 122(5), 3497-3512. doi: 10.1002/2016JB013498. [citations = 12].
6. Sutherland, R., Townend, J., **Toy, V.G.**, Upton, P., DFDP-2 Science Team, **2017**. Extreme hydrothermal conditions at an active plate-bounding fault. *Nature* 546, 137-140, doi:10.1038/nature22355. [citations = 71].
7. Mitchell, T., **Toy, V.G.**, Di Toro, G., Renner, J., Sibson, R.H. **2016**. Fault welding by pseudotachylite formation. *Geology*, doi: 10.1130/G38373.1. [citations = 44].
8. Norris, R.J., **Toy, V.G.**, **2014**. Continental transforms: A view from the Alpine Fault. *Journal of Structural Geology* 64, 3-31. doi: 10.1016/j.jsg.2014.03.003. [citations = 62].
9. Chester, F.M., Rowe, C., Ujiie, K., Kirkpatrick, J., Regalla, C., Remitti, F., Moore, J.C., **Toy, V.G.**, Wolfson-Schwher, M., Bose, S., Kameda, J., Mori, J.J., Brodsky, E.E., Eguchi, N., Toczko, S., Expedition 343 and 343T Scientists. **2013**. Structure and composition of the plate-boundary slip-zone for the 2011 Tohoku-oki earthquake. *Science* 342, 1208-1212, doi: 10.1126/1243719 [citations = 172].
10. **Toy, V.G.**, Prior, D.J., Norris, R.J., **2008**. Quartz fabrics in the Alpine Fault mylonites: Influence of pre-existing preferred orientations on fabric development during progressive uplift. *Journal of Structural Geology* 30, pp. 602-621. [citations = 173].

5 other publications

1. Fagereng, A., **Toy, V.G.** **2019**. Fluid-Pressure Effects on Deformation: Analysis of the Lusi Mud Volcano. Ch 5 of "Problems and Solutions in Structural Geology and Tectonics". *Developments in Structural Geology & Tectonics* 5, doi:10.1016/B978-0-12-814048-2.00005-3. *Educational publication*.
2. **Toy, V.G.** **2017**. The Japan Trench Rapid Drilling Project (JFAST) yields new insights into the mechanics and structure of subduction thrust faults: IODP Expeditions 343 and 343T. In: Exon, N. (Ed): Exploring the Earth under the sea: Australian and New Zealand achievements in the first phase of IODP scientific ocean drilling, 2006-2013. *Australian National University Press*, pp. 116-121, doi: 10.22459/EEUS.10.2017. A popular science article.
3. **Toy, V.G.** Norris, R.J., Cooper, A.F., Sibson, R.H., Little, T., Sutherland, R., Langridge, R., Berryman, K. Tectonics of the Australian-Pacific Plate Boundary. Field Trip Guide, Geosciences **2016**. Geosciences Society of NZ Miscellaneous Publication 145B. *Field Guide*.
4. 17 December **2016**: Christchurch Press article summarising my (and colleagues') letter to the Westland District Council advising against removal of the Franz Josef 'Fault Avoidance Zone' (<http://www.stuff.co.nz/dominion-post/news/national/87658725/Scientific-advice-ignored-by-Westland-District-Council-when-it-axed-fault-avoidance-zone>)
5. Shervais, J., Evans, J., **Toy, V.**, Kirkpatrick, J., Clarke, A., **2014**. Eichelberger, J. Drilling to investigate processes in active tectonics and magmatism. *Scientific Drilling* 18, pp. 19-34. <https://doi.org/10.5194/sd-18-19-2014>. [CS = 1.3]. *Strategy document for the future of Continental Scientific Drilling in the USA*.