

Curriculum Vitae

Ikuko Wada
Postdoctoral Associate

Department of Geosciences
Virginia Polytechnic Institute and State University
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Citizenship Japan

Status in Canada Permanent resident

Gender Female

Languages English and Japanese

Primary Field of Specialization Numerical modelling of fluid mechanics and heat transfer

Research Interests

The geodynamics of the Earth – My past and current research has focused primarily on subduction zone geodynamics. The research topics include

- State of stress in the subducting and overriding plates and its relation to tectonic forces
- Effective elastic thickness of oceanic plates and plate bending at convergent margins
- Viscous coupling between the subducting slab and the overriding mantle and its effect on mantle wedge flow
- Thermal and petrologic structures of subduction zones and their implications for subduction zone processes, including earthquakes and melt generation
- Evolution of mineral grain size in the mantle wedge and its effect on wedge properties (e.g., viscosity, seismic attenuation, and grain-scale permeability) and dynamics
- Distribution of fluid flux from the subducting slab and its relation to the fluid distribution in the mantle wedge
- Migration of aqueous fluids and melts in the mantle wedge and its relation to the location of the volcanic arc
- Effects of phase transformation on the dynamic evolution of subducting slabs and mantle plumes

Academic History

- 01/2012 – present **Postdoctoral Associate**, Department of Geosciences, Virginia Polytechnic Institute and State University (Virginia Tech)
- 11/2009 – 10/2011 **Postdoctoral Fellow** with funding provided by US NSF MARGINS program, Department of Geology and Geophysics, Woods Hole Oceanographic Institution (WHOI)
- 09/2003 – 08/2009 **Ph.D.**, Earth and Ocean Sciences (EOS), University of Victoria (UVic) jointly at Pacific Geoscience Centre (PGC), Geological Survey of Canada, BC, Canada
- 05/1998 – 08/2003 **B.Sc. with Honours**, EOS, UVic, BC, Canada

Teaching Experience

- 09/2006 – 04/2008 **Laboratory instructor** for a first-year physics course, UVic
01/2006 – 04/2006 **Laboratory coordinator** for a first-year geology course, UVic
01/2004 – 12/2005 **Laboratory instructor** for a first-year geology course, UVic

Employment History

- 01/2002 – 08/2002 **Geophysical research assistant**, PGC
08/2001 – 12/2001 **Petrological research assistant**, UVic
05/2001 – 07/2001 **Paleontological research assistant**, UVic

Field Experience

- 07/2010 **Research cruise**, collecting rock samples from submarine volcanoes in the Marianas
06/2010 **Field school** in Central Alps, Switzerland and Italy (as part of an MIT/WHOI geodynamics seminar)
02/2005 **Research cruise**, marine heat flow probing offshore Ecuador and Colombia, the international natural hazards AMADEUS project
01/2004 – 04/2006 **Laboratory instructor** for field trips for a field project of a first-year geology course, UVic.
08/2003 **Research cruise**, seismic survey offshore of Vancouver Island, Canada
08/2002 **Field work**, geological mapping and sampling rocks in Sooke, BC, Canada
2001-2002 **Two undergraduate field schools**, geological mapping in western Canada and shipboard geophysical measurements offshore of Vancouver Island, Canada

Peer-Reviewed Publications

- Wada, I.**, M. D. Behn, and A. M. Shaw, Effects of localized hydration in the incoming plate, slab rehydration, and mantle wedge hydration on slab-derived fluid flux in subduction zones, submitted to *Earth Planet. Sci. Lett.*
- Wada, I.**, M. D. Behn, and J. He (2011), Grain size distribution in the mantle wedge of subduction zones, *J. Geophys. Res.*, *116*, doi:10.1029/2011JB008294.
- Wada, I.**, C. A. Rychert, and K. Wang (2011), Sharp thermal transition in the forearc mantle wedge as a consequence of nonlinear mantle wedge flow, *Geophys. Res. Lett.*, *38*, doi:10.1029/2011GL047705.
- Wada, I.**, S. Mazzotti, and K. Wang (2010), Intraslab stresses in the Cascadia subduction zone from inversion of earthquake focal mechanisms, *Bull. Seism. Soc. Am.*, *100*, 2002-2013.
- Wada, I.**, and K. Wang (2009), Common depth of decoupling between the subducting slab and mantle wedge: Reconciling diversity and uniformity of subduction zones, *Geochem. Geophys. Geosyst.*, *10*, doi:10.1029/2009GC002570.
- James, T. S., E. J. Gowan, **I. Wada**, and K. Wang (2009), Viscosity of the asthenosphere from glacial isostatic adjustment and subduction dynamics at the northern Cascadia subduction zone, British Columbia, Canada, *J. Geophys. Res.*, *114*, doi:10.1029/2008JB006077.

Peer-Reviewed Publications (cont.)

- Kao, H., K. Wang, R.-Y. Chen, **I. Wada**, J. He, and S. D. Malone (2008), Identifying rupture plane of the 2001 Nisqually, Washington Earthquake, *Bull. Seis. Soc. Am.*, *98*, 1546-1558.
- Wada, I.**, K. Wang, J. He, and R. D. Hyndman (2008), Weakening of the subduction interface and its effects on surface heat flow, slab dehydration, and mantle wedge serpentinization, *J. Geophys. Res.*, *113*, doi:10.1029/2007JB005190.
- Wang, K., **Wada, I.**, and Ishikawa, Y. (2004), Stresses in the subducting slab beneath southwest Japan and relation with plate geometry, tectonic forces, slab dehydration, and damaging earthquakes, *J. Geophys. Res.*, *109*, doi:10.1029/2003JB002888.
- Wang, K., J. C. Cassidy, **I. Wada**, and A. J. Smith (2004), Effects of metamorphic crustal densification on earthquake size in warm slabs, *Geophys. Res. Lett.*, *31*, doi:10.1029/2003GL018644.

Other Publication

- Spence, G., L. Trevor, B. Marcaillou, and **I. Wada** (2005), AMADEUS: Heat flow operations on the convergent margin off Colombia and Ecuador, Centre for Earth And Ocean Research Report 2005-1, University of Victoria, Victoria, BC, Canada

Awards and Fellowship

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| 2009 – present | US NSF MARGINS postdoctoral fellowship |
| 2008 | AGU Outstanding Student Paper Award |
| 2007 | SEOS Graduate student workshop, best presentation award, UVic |

Conferences, Workshops, and Synergistic Activities

- Upcoming talks: (1) Invited keynote speaker at a joint US NSF GeoPRISMS-EarthScope Science Workshop in Portland OR in April 2012, (2) invited keynote speaker at 2012 EGU Meeting, Vienna, Austria in April 2012, and (3) invited seminar speaker at the University of Oregon OR in May 2012.
- Invited presentation at 2011 AGU Fall Meeting: Slab-derived fluid flux in subduction zones: Effects of localized hydration in the incoming plate and rehydration during subduction
- Invited keynote presentation at US NSF GeoPRISMS Planning Workshop for the Alaska Primary Site in September, 2011: Dynamic processes in the mantle wedge
- Oral presenter at Goldschmidt Conference, Prague, Czech Republic, August 2011: Focusing of upward fluid migration due to mineral grain size variations in the mantle wedge
- Poster presenter at Gordon Research Conference, South Hadley, MA, June 2011
- Invited seminar speaker for Geodynamics Seminar at Lamont-Doherty Earth Observatory, Columbia University, NY, March 2011
- Invited seminar speaker at Monash University, Melbourne, Australia, February 2011
- Invited break-out session co-leader and Poster presenter at US NSF MARGINS/GeoPRISMS implementation workshop, Austin, TX, January 2011: Grain size distribution in the mantle wedge and its implications for wedge dynamics.

Conferences, and Synergistic Activities (cont.)

- Invited oral presenter at 2010 AGU Fall Meeting: Thermo-petrologic structure of subduction zones and its implications for fluid availability at depth
- Oral presenter at 2010 AGU Fall Meeting: Mineral grain size in the mantle wedge and its implications for subduction zone dynamics
- Poster presenter at 2009 AGU Fall Meeting and MARGINS successor planning workshop, San Antonio, TX, 2010: Sharp thermal transition in the forearc mantle wedge as a consequence of nonlinear mantle wedge flow
- Invited keynote speaker at MARGINS Workshop on Volatiles TEI workshop, Mt. Hood, OR, 2009: Slab-mantle decoupling and its implications for subduction zone thermal structure, fluid supply, and geophysical processes
- Invited oral presenter at 2008 AGU Fall Meeting: Common maximum depth of slab-mantle wedge decoupling: Understanding variations in fluid supply and thermal-petrologic processes among subduction zones
- Presenter at MARGINS Workshop on The Next Decade of the Seismogenic Zone Experiment, Mt. Hood, OR, September 2008: Exploring the thermal and metamorphic controls on the seismogenic zones of subduction thrust faults
- Workshop for Advancing Numerical Modelling of Mantle Convection and Lithospheric Dynamics, UC Davis, Davis, CA, July 2008
- Invited seminar speaker for the Geodynamics Seminar Series at Woods Hole Oceanographic Institution, Woods Hole, MA, 2008: Thermal structure of subduction zones and its implications for subduction zone processes
- Oral presenter at 2007 AGU Fall Meeting: Comparative study of subduction zone thermal structure: Implications for slab dehydration and fluid supply for subduction zone processes
- Workshop on the Future of Marine Heat Flow, U. Utah, Salt Lake City, UT, 2007
- Seminar speaker at Menlo Park Science Center, USGS, 2007: Weakening of subduction interface and effects on surface heat flow
- Oral presenter at 2006 AGU Fall Meeting: The effect of reduced slab-mantle wedge coupling on mantle wedge flow and the thermal and metamorphic states of the forearc mantle wedge
- Seminar speaker at Yokosuka Center, Japan Agency for Marine-Earth Science and Technology (JAMSTEC) and at Kyoto University, Japan, 2006 (in Japanese)
- Session chair and Oral presenter at 2006 Western Pacific Geophysical Meeting, Beijing, China: Spatial extent of mantle wedge serpentinization and its effects on mantle wedge flow
- Poster presenter at 2005 AGU Fall Meeting: Effects of plate coupling and margin topography on forearc stresses
- Poster presenter at 2004 AGU Fall Meeting: Oblique subduction as a controlling factor for stresses and earthquakes in subducting slabs at Cascadia and Nankai
- Oral presenter at 2004 AGU-CGU Joint Assembly, Montreal, Quebec, Canada: Stress and metamorphic conditions for warm-slab earthquakes: Geiyo area, Southwest Japan
- Poster submission to 2003 AGU Fall Meeting: In-slab stresses and damaging in-slab earthquakes in Southwest Japan

Graduate Advisor

Kelin Wang (UVic/PGC)

Post-doctoral Advisors

Mark D. Behn and Alison M. Shaw at WHOI
Scott D. King at Virginia Tech

Collaborators during the past 48 months

Scott D. King (Virginia Tech)	Kelin Wang (PGC/UVic)
Nancy L. Ross (Virginia Tech)	Jianheng He (PGC)
Mark D. Behn (WHOI)	Roy D. Hyndman (PGC/UVic),
Alison M. Shaw (WHOI)	Thomas S. James (PGC/UVic)
E. Marc Parmentier (Brown Univ.)	Honn Kao (PGC)
Catherine A. Rychert (U. Bristol)	Stephane Mazzotti (now at U. Montpellier, France)
Rob N. Harris (Oregon State U.)	Evan J. Gowan (now at ANU, Australia)
Paul J. Wallace (U. Oregon)	Yoshihiko Tamura (JAMSTEC)
Peter van Keken (U. Michigan)	Marc W. Spiegelman (Columbia U.)

Referees Providing Letters

Mark D. Behn (postdoctoral advisor), Associate Scientist, Department of Geology and Geophysics (G&G), Woods Hole Oceanographic Institution (WHOI), Woods Hole, MA, USA; Tel. 508-289-3637; mbehn@whoi.edu

Kelin Wang (Ph.D. supervisor), Research Scientist, Pacific Geoscience Centre (PGC), Geological Survey of Canada (GSC), Sidney, BC, Canada; Tel. 250-363-6429; kwang@nrcan.gc.ca

Peter van Keken, Professor, Earth and Environmental Sciences, University of Michigan, Ann Arbor, MI, USA; Tel. 734-763-4690; keken@umich.edu

Scott D. King (postdoctoral advisor), Professor, Department of Geosciences, Virginia Tech, Blacksburg, VA, USA: Tel. 540-231-8954; sdk@vt.edu

Alison M. Shaw (postdoctoral advisor), Associate Scientist, G&G, WHOI; Tel. 508-289-3775; ashaw@whoi.edu