

Ryan Woodard

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EDUCATION

Ph.D. Physics. University of Alaska Fairbanks, August 2004
Thesis: Building Blocks of Self-Organized Criticality
Advisor: David Newman

M.S. Physics. Georgia Institute of Technology, 1991

B.S. Physics. Georgia Institute of Technology, 1989

RESEARCH AND PROFESSIONAL EXPERIENCE

Cryosphere Complexity Scientist. British Antarctic Survey, 2005-present.

Study complexity theory with applications to: the Earth's cryosphere, including cellular automaton models of ice fracture dynamics and ice sheet flow; conflict/cooperation event-based conflict early warning systems; heavy-tailed distributions and self-organized criticality.

Volunteer Guest Researcher. Victoria University Wellington (Wellington, NZ), 2005.

Sat, discussed and read papers with Artificial Intelligence Group, studying Bak-Sneppen model, genetic information and neuronal dynamics.

Researcher. Industrial Research Laboratory (Wellington, NZ), 2005.

Researched and co-wrote successful first round proposal (for Marsden Fund) to study dynamics of ion channels.

Research Assistant (Ph.D. student). University of Alaska Fairbanks, 2000–2004.

Major research involved studying self-organized criticality (SOC) as a paradigm for turbulent transport in confined fusion plasmas. This led to new and interesting results in SOC, power spectra and rescaled range analysis and applications to space plasmas and earthquake data.

Research Assistant. University of Alaska Fairbanks, 1996–1997.

Designed parts for, operated and collected data from Nd:YAG laser lidar system at Poker Flat Research Range, Alaska. Studied circular depolarization of light by polar stratospheric clouds.

PUBLICATIONS

Ryan Woodard, D. E. Newman, R. Sánchez, and B. A. Carreras. "Persistent dynamic correlations in self-organized critical systems away from their critical point." *Physica A* (2006). In press, available online.

Ryan Woodard, D. E. Newman, R. Sánchez, and B. A. Carreras. "On The Identification Of SOC Dynamics In The Sun-Earth System." In A. T. Y. Lui, Y. Kamide, and G. Consolini (Editors), *Multiscale Coupling of Sun-Earth Processes* (Elsevier Publ. Co., 2005). Amsterdam, The Netherlands.

Ryan Woodard, D. E. Newman, R. Sánchez, and B. A. Carreras. "Comment on "Do Earthquakes Exhibit Self-Organized Criticality?"" *Phys. Rev. Lett.* **93**, 249801 (2004).

Ryan Woodard. *Building blocks of self-organized criticality*. Ph.D. thesis, Univ. of Alaska Fairbanks (2004). URL http://www.timehaven.org/misc/woodard_thesis.pdf.

R. Sánchez, D. E. Newman, B.A. Carreras, R. Woodard, W. Ferenbaugh, and H.R. Hicks. "Modelling of ELM-like phenomena via SOC-diffusive dynamics." *Nuclear Fusion* **43**, 1031 (2003).

TEACHING AND OUTREACH

Youth Facilitator. Project K (Wellington, NZ), 2005.

Supervised groups of 14-15 year olds in structured outdoor activities (backpacking, climbing, caving) with educational basis (goal setting, journal writing).

Stand-in Lecturer. University of Alaska Fairbanks, 2001-2004.

Occasionally substituted for wayward and conference-bound professors in freshman and sophomore physics classes.

Science Fair Reviewer. Alaska Statewide High School Science Symposium, 2003.

Teacher. Upward Bound, 1999.

Taught computer skills and web page design (using HTML) to high school students with no family history of attending higher education. (Do not confuse this program with Outward Bound.)

Substitute High School Teacher. West Valley High School, 1998-1999.

Taught Mathematics, English and Special Education. Tutored students in all subjects.

Teaching Assistant. University of Alaska Fairbanks, 1996-1997.

Freshman Chemistry (Chem. 105, 106) and Freshman Physics (Phys. 212). Prepared, lectured, and graded laboratory exercises.

Whitewater Instructor. Outdoor Recreation Georgia Tech, 1987-1994.

Taught and led hundreds of university students, faculty and staff in whitewater canoing, kayaking and rafting to friendly and scary rivers in the eastern and western United States.

VISITS, COURSES AND SCHOLARSHIPS

Santa Fe Institute 4 week Complex Systems Summer School, 2006.

University of Alaska Fairbanks 1.5 week collab. with David Newman, Raúl Sánchez on SOC, 2006.

Oak Ridge National Lab, Oak Ridge, Tennessee. 4 weeks of plasma and SOC study with Ben Carreras and Raúl Sánchez, 2003.

Universidad Carlos III de Madrid, Madrid, Spain. 3 weeks of plasma and SOC study with Raúl Sánchez, 2002.

Center for Global Change. Received award for tuition and stipend in competitive selection, 1996-1997.

TALKS AND POSTERS (MOST RECENT)

Dynamics of Complex Systems Meeting, Fairbanks, Alaska, 2006, "Conflict, cooperation and casualties: drivers, responses in power laws of war." (Talk)

American Geophysical Union Annual Meeting, San Francisco, California, 2005, "The dynamics of SOC systems with diffusion." (Poster)

Festival of Doubt, Victoria University of Wellington, Wellington, New Zealand, 2005, "Correlated dynamics in neuronal firings." (Talk)

Festival of Doubt, Victoria University of Wellington, Wellington, New Zealand, 2004, "Correlated events in a self-organized criticality system." (Talk)

Transport Task Force Annual Meeting, Salt Lake City, Utah, 2004, "Distinguishing characteristics of SOC-like systems." (Poster)

Dept. of Chemical and Physical Sciences Seminar, Victoria University of Wellington, Wellington, New Zealand, 2004, "Self-organized criticality: an intro. and glimpse at some current research." (Talk)

Conference on Sun-Earth Connections: Multiscale Coupling in Sun-Earth Processes, Kona, Hawaii, 2004, "Distinguishing characteristics of SOC-like systems." (Talk)

American Geophysical Union Annual Meeting, San Francisco, California, 2003, "Signatures of self-organized criticality as system forcing changes." (Poster)

American Physical Society, Div. of Plasma Physics Meeting, Albuquerque, New Mexico, 2003, "Understanding transport dynamics with spectral and R/S analysis of long SOC time series." (Poster)

FIELD EXPERIENCE

Confident and competent outside collecting data, using scientific, electrical and mechanical instruments, making field repairs and quick decisions, working in inclement weather.

GPS Field Assistant. GNS Science (Wellington, NZ), 2005.

Installed and collected data from temporary and permanent Global Positioning System stations throughout the farms of New Zealand.

Field Assistant. Geophysical Institute (Fairbanks, Alaska), 2003.

Gathered data and worked camp on Black Rapids Glacier, Alaska. Part of statewide glacier survey.

GPS Technician. Geophysical Institute (Fairbanks, Alaska), 1998–1999.

Installed and collected data from temporary and permanent Global Positioning System stations throughout the wilds of Alaska. Study of tectonic plate motion and earthquake hazards.

COMPUTER SKILLS

Programming. Excellent scientific programmer in Python, C, C++, FORTRAN, shell scripts, IDL, Matlab and others. Can wade through Perl.

Web and Presentation. Proficient in HTML, XML, PHP, MySQL and the LAMP paradigm. Can create and manage web sites integrated with databases. Proficient with content management systems (CMS), especially Zope/Plone. Papers, presentations, reports and CVs written in L^AT_EX.

Linux. Installed and administered a 15 machine system (Debian and Red Hat) for five years. Familiar with most distributions.

Security and Wireless. SSH, GPG, 802.11, data backup (AMANDA).

Hardware. Can break, troubleshoot and fix most PC hardware.

LANGUAGES AND INTERESTS

Spanish. Able to have slow, broken conversations with native speakers.

Music. I write songs, sing and play guitar; perform in seedy bars.

Ultimate frisbee. I play, organize and coach.

The usual. Books, outdoors, Mexican food.

REFERENCES

Dr. Mervyn Freeman
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