

# NATALIE M. KEHRWALD

United States Geological Survey  
Geoscience and Environmental Change Science Center  
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Denver, CO 80225

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## EDUCATION

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**Ph.D., Earth Sciences, The Ohio State University, 2009**

Dissertation: Low-latitude ice cores and freshwater availability  
Advisor: Prof. Lonnie G. Thompson

**M.S. Geosciences, University of Massachusetts, Amherst, 2004**

Thesis: Investigating the use of oxygen-isotope variations in land-snail shells in European loess as a paleoclimate record  
Advisor: Prof. William D. McCoy

**B.A. Environmental Science/Geology, Colorado College, 1999**

Thesis: Marine terrace response to active tectonics of the southern Peninsula de Nicoya, Costa Rica  
Advisor: Prof. Eric M. Leonard

## APPOINTMENTS

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2015- present	<b>Research Geologist</b> United States Geological Survey (USGS), Lakewood, CO
2011 – present	<b>Research Scientist</b> Department of Environmental Sciences, Informatics and Statistics University of Venice (Ca' Foscari), Italy
2009 - 2011	<b>Marie Curie Post-Doctoral Fellow</b> Italian National Research Council (CNR), Venice, Italy Advisor: Prof. Carlo Barbante
2009	<b>Visiting Assistant Professor</b> Geology Department Colorado College, Colorado Springs, CO
1999-2001	<b>U.S. Peace Corps, Bolivia</b> Environmental Engineer

## RESEARCH INTERESTS

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Paleoclimatology using ice and lake cores; Water resources and melting glaciers; Adaptation to climate change; Biomass burning and human activity; Anthropogenic alteration of atmospheric chemistry

## TEACHING INTERESTS

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Global climate change; Paleoclimatology; Environmental Geology; Geomorphology; Mountain environments

## **INDEPENDENT FUNDING, FELLOWSHIPS AND AWARDS**

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P.I. on all initiatives unless indicated otherwise

- 2015 – 2016      **Ca' Foscari University of Venice**  
€ 29,500  
Project Title: The last tree standing: Deforestation and human activity on Easter Island (L'ultimo albero sull'isola di Pasqua. L'attività antropica come principale causa della deforestazione.)
- 2014-2016      **CNR-CAS: Italian National Research Council and Chinese Academy of Sciences**  
¥ 40,000  
Project Title: Biomass burning recorded in Tibetan ice cores
- 2013-2015      **PNRA: Italian National Antarctic Research Program**  
€ 90,000  
Project Title: Biomass burning over glacial-interglacial cycles recorded in the Talos Dome ice core
- 2013-2015      **Italian National Research Council**  
€ 300,000, Co-PI  
Project Title: NextData: Eastern European Alpine climate change using lake, bog, and ice cores
- 2012-2013      **National Natural Science Foundation of China**  
¥ 20,000  
Project Title: Biomass burning recorded in Tibetan Plateau ice cores
- 2011-2015      **European Research Council – ERC Advanced Grant**  
€ 2,370,000  
Project Acronym: EARLYhumanIMPACT ([www.earlyhumanimpact.eu](http://www.earlyhumanimpact.eu))  
• I played a major role in designing and writing the proposal that was submitted by my post-doctoral supervisor as P.I. I currently manage the project research.
- 2009-2011      **European Research Council– Marie Curie International Incoming Fellowship**  
€ 157,000  
Project Acronym: PaleoFire  
The European Research Council is highlighting my funded research as one of their 2010-2015 success stories:  
[http://ec.europa.eu/research/iscp/pdf/biographies%20\\_and\\_key\\_messages.pdf](http://ec.europa.eu/research/iscp/pdf/biographies%20_and_key_messages.pdf)
- 2008-2009      **WAIS Divide ice core project**  
\$12,000  
Division of Hydrologic Sciences, Desert Research Institute
- 2008              **Dan David Foundation Scholarship**  
\$15,000  
<http://www.dandavidprize.org/scholars/2008/future-geosciences/kehrwald-natalie>
- 2006-2008      **Gary Comer Climate Change Fellowship**  
\$50,000  
Funding for all tuition, university fees, graduate stipend and laboratory supplies
- 2006              **NASA Graduate Student Summer Program in Earth System Science**  
\$5800  
Advisor: Dr. Gavin A. Schmidt

1998-2008 Numerous research, student awards, and travel grants including funding from NSF and the William M. Keck Consortium. Friends of Orton Hall Student Award, The Ohio State University; Leo M. Hall Memorial Student Research Award, University of Massachusetts

## **PUBLICATIONS**

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### **PEER-REVIEWED PUBLICATIONS (\* = student author)**

2016

Zangrando, R., Barbaro, E., Vecchiato, M., **Kehrwald**, N., Barbante, C., Gambaro, A. (2016) Levoglucosan and phenols in marine, coastal and inland Antarctic aerosols, *Science of the Total Environment*, 544, 606-616, doi:10.1016/j.scitotenv.2015.11.166

Brovkin, V., Brücher, T., Kleinen, T., Zaehle, S., Joos, F., Roth, R., Spahni, R., Schmitt, J., Fischer, H., Leuenberger, M., Stone, E., Ridgeway, A., Chappellaz, J., **Kehrwald**, N., Barbante, C., Blunier, T., Dahl Jensen, D., (2016) Comparative carbon cycle dynamics of past and present interglacials, *Quaternary Science Reviews*, 137, 15-32, DOI/10.1016/j.quascirev.2016.01.028

2015

\*Zennaro, P., N. **Kehrwald**, J. Marlon, W. F. Ruddiman, T. Brücher, C. Agostinelli, D. Dahl-Jensen, R. Zangrando, A. Gambaro, and C. Barbante (2015), Europe on fire three thousand years ago: Arson or climate?. *Geophys. Res. Lett.*, 42, 5023–2033. doi: [10.1002/2015GL064259](https://doi.org/10.1002/2015GL064259).

Wang, N., Xiaobo, W., **Kehrwald**, N., Li, Z., Li, Q., Jiang, X., Pu, J. (2015) Fukushima Nuclear Accident Recorded in Tibetan Plateau Snow Pits, *PLoS ONE*, 10 (2) e0116580

Portenga, E.W., Bierman, P.R., Duncan, C., Corbett, L.B., **Kehrwald**, N.M., Rood, D.H. (2015) Erosion rates of the Bhutanese Himalaya determined using in situ-produced <sup>10</sup>Be, *Geomorphology*, 233, 122-126 doi:[0.1016/j.geomorph.2014.09.027](https://doi.org/10.1016/j.geomorph.2014.09.027)

Schüpbach, S., Kirchgeorg, T., Colombaroli, D., Beffa, G., Radaelli, M., **Kehrwald**, N., Barbante, C. (2015) Combining charcoal sediment and molecular markers to infer a Holocene fire history in the Maya lowlands of Petén, Guatemala, *Quaternary Science Reviews* 05/2015; 115. DOI:10.1016/j.quascirev.2015.03.004

2014

\*Zennaro, P., **Kehrwald**, N., McConnell, J., Schüpbach, S. Masselli, O., Marlon, J., Zangrando, R., Vallelonga, P., S. Spolaor, A., Varin, C., Borrotti, M., Gambaro, A., Barbante, B., Fire in ice: Two millennia of Northern Hemisphere fire history from the Greenland NEEM ice core, *Climate of the Past*, 10, 1905–1924, 2014 www.clim-past.net/10/1905/2014/ doi:10.5194/cp-10-1905-2014

\*Kirchgeorg, T., Schüpbach, S. **Kehrwald**, N., McWethy, D., Barbante, C. (2014) Method for determining levoglucosan, mannosan and galactosan in sediment to reconstruct past fire activity, *Organic Geochemistry*, 71, 1-6, DOI:10.1016/j.orggeochem.2014.02.014

Guo, Z., Wang, N., **Kehrwald**, N.M., Mao, R., Wu, H., Wu, Y., Jiang, X., (2014) Temporal and spatial changes in Western Himalayan firn line altitudes from 1998 to 2009. *Global and Planetary Change*, 118, 97-105. DOI: 10.1016/j.gloplacha.2014.03.012

Gabrielli, P., Hardy, D.R., **Kehrwald**, N., Davis, M., Cozzi, G., Turetta, C., Barbante, C., Thompson, L.G. (2014) Deglaciated areas of Kilimanjaro as a source of volcanic trace elements deposited on the ice cap during the late Holocene, *Quaternary Science Reviews*, 93, 1-10, DOI:10.1016/j.quascirev.2014.03.007

2013

**Kehrwald**, N., Whitlock, C., Barbante, C., Brovkin, V., Daniau, A-L-, Kaplan, J.O., Marlon, J.R., Power, M.J., Thomicke, K., Van der Werf, G., (2013) Fire Research: Linking Past, Present and Future Data, *EOS*, Vol. 94, No. 46, 12 November 2013, DOI: 10.1002/2013EO460001

Barbante, C., **Kehrwald**, N., Marianelli, P., Vinther, B. M., Cozzi, G., Hammer, C., Clausen, H., Siggard Andersen, M., (2013) Greenland ice core evidence of the 79 AD Vesuvius eruption, *Climate of the Past*, 9, 1221–1232, 2013 www.clim-past.net/9/1221/2013/ doi:10.5194/cp-9-1221-2013

+ = These authors contributed equally to this work

Spolaor, A., Vallelonga P., Plane, J.M.C, **Kehrwald** N., Gabrieli J., Varin C., Turetta C., Cozzi G., Boutron C. and Barbante C. (2013) Halogen species record Antarctic sea ice over glacial-interglacial periods, *Atmospheric Chemistry and Physics*, 13, 6623–6635, 2013 www.atmos-chem-phys.net/13/6623/2013/ doi:10.5194/acp-13-6623-2013

Spolaor A., Vallelonga P., Gabrieli J., **Kehrwald** N., Turetta C., Cozzi G., Poto L., Plane J.M.C., Boutron C.F., Barbante C. (2013) Speciation analysis of iodine and bromine at picogram-per-gram levels in polar ice, *Analytical and Bioanalytical Chemistry*, DOI: 10.1007/s00216-012-5806-0

Kirchgeorg, T., Dreyer, A., Gabrieli, J., **Kehrwald**, N., Sigl, M., Schwikowski, M., Boutron, C., Gambaro, A., Barbante, C., Ebinghaus, R. (2013) Temporal Variations of Perfluoroalkyl Substances and Polybrominated Diphenyl Ethers in Alpine Snow, *Environmental Pollution* 178, 367-374.

Zangrando, R., Barbaro, E., Zennaro, P., Rossi, S., **Kehrwald**, N.M., Gabrieli, J., Barbante, C., Gambaro, A., (2013) Biomass burning molecular markers in Arctic aerosols *Environmental Science and Technology*, 47, 8565–8574, dx.doi.org/10.1021/es400125r

Spolaor, A., Vallelonga, P., Cozzi, G., Gabrieli, J., Varin, C., **Kehrwald**, N., Zennaro, P., Boutron, C., Barbante, C., (2013) Iron speciation influences iron bioavailability over glacial-interglacial cycles, *Geophysical Research Letters*, 40, 8, 618–1623, DOI: 10.1002/grl.50296

Poto, L., Gabrieli, J., Crowhurst, S., Appleby, P.G., Ferretti, P., Zaccone, C., Surian, N., Ferretti, P., Cozzi, G., Turetta, C., **Kehrwald**, N.M., Barbante, C. (2013) The first continuous last Late Glacial - Holocene peat bog record from the Dolomites (NE Italian Alps) *Quaternary International*, <http://dx.doi.org/10.1016/j.quaint.2013.05.001>

2012

**Kehrwald**, N., Zangrando, R., Gabrielli, P., Barbante, C., Gambaro, A., (2012). Levoglucosan as a specific marker of fire events in Greenland snow. *Tellus B*, 64, May. 2012. Available at: <http://www.tellusb.net/index.php/tellusb/article/view/18196>

Scalabrin, E., Zangrando, R., Barbaro, E., **Kehrwald**, N.M., Gabrieli, J., Barbante, C., Gambaro, A., (2012) *Atmospheric Chemistry and Physics*, Amino acids in Arctic aerosols 12, 10453-10463, [www.atmos-chem-phys-discuss.net/12/17367/2012/](http://www.atmos-chem-phys-discuss.net/12/17367/2012/) doi:10.5194/acp-12-10453-2012

Gabrielli, P., Barbante, C., Carturan, L., Cozzi, G., Dalla Fontana, G., Dinale, R., Dragà, G., Gabrielli, J., **Kehrwald**, N., Mair, V., Mikhalenko, V., Seppi, R., Spolaor, A., Thompson, L.G., Tonidandel, D. (2012) *Geografia Fisica e Dinamica Quaternaria* Discovery of cold ice in a deep drilling site in the Eastern European Alps. 35, 101-105, DOI 10.4461/GFDQ.2012.35.10

2011

Gabrieli, J., Carturan, L., Gabrielli, P., **Kehrwald**, N., Turetta, C., Cozzi, G., Spolaro, A., Dinale, R., Staffler, H., Seppi, R., dalla Fontana, G., Thompson, L.G., Barbante, C. (2011) Impact of Po Valley emissions on the highest glacier of the Eastern European Alps, *Atmospheric Chemistry and Physics*, 11, 15, 8087-8102, DOI: 10.5194/acp-11-8087-2011

2010

**Kehrwald**, N. McCoy, W., Thibeault, J., Burns, S., Oches, E. (2010) Paleoclimatic implications of modern and LGM European land-snail shell  $\delta^{18}\text{O}$ , *Quaternary Research*, 74, 1, 167-177

2009

Fortner, S, Fountain, A., Lyons, W., Welch, K., **Kehrwald**, N, (2009). Trace element and major ion concentrations and dynamics in glacier snow and melt: Eliot Glacier, Oregon Cascades. *Hydrological Processes*, 23, 2987-2996.

2008 and before

**Kehrwald**, N.M., Thompson, L.G., Yao, T., Mosley-Thompson, E., Schotterer, U., Alfimov, V., Beer, J., Eikenberg, J., Davis, M.E. (2008), Mass loss on Himalayan glacier endangers water resources, *Geophysical Research Letters*, 35, L22503, doi:10.1029/2008GL035556

*Nature* featured the above publication as a Research Highlight:  
"Climate Fallout", *Nature*, vol. 456, p. 678, 11 December, 2008

Gardner, T., Marshall, J., Merritts, D., Bee, B., Burgette, R., Burton, E., Cooke, J., **Kehrwald**, N., Protti, M., Fisher, D., Sak, P. (2001) Holocene forearc block rotation in response to seamount subduction, southeastern Peninsula, Costa Rica. *Geology*, 29, 2, 151-154.

#### **BOOK CHAPTER**

**Kehrwald**, N., Zangrando, R., Gambaro, A., Barbante, C. (2010) Fire and climate: Biomass burning recorded in ice and lake cores, *European Physical Journal Web of Conferences*, 9, 105-114, DOI: 10.1051/epjconf/201009008

#### **EDITOR-REVIEWED PUBLICATIONS**

**Kehrwald**, N., Aleman, J., Coughlan, M., Courtney-Mustaphi, C., Githumbi, E., Magi, B., Marlon, J., Power, M. (*Submitted – Frontiers of Biogeography*) One thousand years of fires: Integrating proxy and model data

Hantson, S., Kloster, S., Coughlan, M., Danialu, A-L., Vanniere, B., Brücher, T., **Kehrwald**, N., Magi, B. (2016) Fire in the Earth System – Bridging Data and Modeling Research, *Bull. Amer. Meteor. Soc.* Doi:10.1175/BAMS-D-15-00319.1, in press

**Kehrwald**, N., Zennaro, P., Schüpbach, S., Kirchgeorg, T., McConnell, J.R., Zangrando, R., Gambaro, A., Barbante, C. (2015) Two thousand years of boreal biomass burning recorded in the NEEM ice cores, *PAGES Magazine* Vol. 23, 1, 14-15

\*Zennaro, P., **Kehrwald**, N., Kirchgeorg, T., Zangrando, R., Battistel, D., Schüpbach, S., Gambaro, A., Barbante, C., (2014) Fire in ice and sediments: Looking for early human impacts, *Società Italiana per le Scienze del Clima (SISC) Conference Proceedings (In English)* p. 794-811. ISBN 978 – 88 – 97666 – 04 – 2

**Kehrwald**, N., P. Zennaro, Barbante, C., (2013) Biomass burning records over the present and past interglacial periods, *PAGES News*, 21, 1

**Kehrwald**, N., Zangrando, R., Gambaro, A., Cescon, P., Barbante, C. (2010) Specific molecular markers in ice cores provide large-scale patterns in biomass burning, *PAGES News*, 18, 2

## **PRESENTATIONS**

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### **INVITED TALKS**

2016

**American Quaternary Association (AMQUA)** Talk title: “Increasing fire activity in a warming climate? Biomass burning, climate, and human impacts in Holocene ice and lake cores”, 29 June, 2015, Santa Fe, NM

2015

**American Geophysical Union (AGU)** Talk title: “Fire impacts on the cryosphere” Session C014: Dust, Black Carbon, and other Aerosols in the Cryosphere, December, 2015, San Francisco, CA

**United States Geological Survey (USGS)** Talk title: “Fire: Climate and Human Impacts” August 25, 2015, Boulder, CO

**United States Geological Survey (USGS)** Talk title: “Fire, Climate and Human Impacts” 28 July, 2015, Reston, VA

**Northwest University** Talk Title: “Biomass burning recorded in ice and lake cores” 29 April 2015, Xi’an, China

**Chinese Academy of Sciences** Talk title: “Human and pastoral animal activity recorded in lake cores” 23 April 2015, Lanzhou, China

**Physics Institute**, University of Bern, Talk title: “Fire activity recorded in mountain and polar ice cores” 16 February 2015, Bern, Switzerland

**Laboratoire des Sciences du Climat et de l'Environnement**, Talk title: Early anthropogenic alteration of the atmosphere“ 12 February 2105, Paris, France

**University of Utah**, Talk title: “Ice and lake cores record pre-industrial human impacts on the climate system” 5 February 2015, Salt Lake City, UT

2014 **Chinese Academy of Sciences** Talk title: Is biomass burning increasing Tibetan Plateau glacier melt? 5 December 2014, Lanzhou, China

**United States Geological Survey (USGS)** Talk title: “Investigating climate change using ice, sediments and land snails”, 5 November 2014, Denver, Colorado

**Colorado College**, Talk titles: “Climate change and water resources” and “Fire activity recorded in polar and mountain ice cores”, Alumni Climate Forum, 6 November 2014, Colorado Springs, Colorado

**Hamilton College** Talk title: “Investigating climate change using ice, sediments and snails”, 13 February 2014: Clinton, NY

2013 **Santa Clara University**, Talk title: “Playing with fire: Biomass burning, ice cores and climate change” Santa Clara, California, 5 November 2015

**European Academy of Bolzano (EURAC)**, Talk title: “Biomass burning recorded in ice cores”, Bolzano, Italy 9 September 2013

**British Antarctic Survey and University of Cambridge**, Talk title: “Playing with fire: ice core biomass burning records from four continents”, Cambridge, UK: 2 July 2013

- Biomass burning and atmospheric aerosols conference**, Talk title: “Combustione di biomasse: effetti sul clima”, Padova, Italy 19 March, 2013
- 2012 **Keynote address: Destination Europe**, “Science on the summit: Combining scientific strengths of multiple continents”, 6-7 December 2012, San Francisco, CA, USA  
<http://ec.europa.eu/research/iscp/index.cfm?pg=sanfransico-event>
- Keynote address: IPICS (International Partnerships in Ice Core Sciences) Open Science Conference**; “Fire in ice: Implications for the global carbon cycle”  
 4 October 2012: Presqu'île de Giens, Côte d'Azur, France, <http://www.ipics2012.org/>
- Italian Aerosol Society**, Talk title: “Combustione di biomasse: effetti sul clima”, 26 October, 2012: Bergamo, Italy
- Chinese Academy of Sciences**, Cold and Arid Regions Environment and Engineering Research Institute, Talk Title; “Biomass burning recorded in ice cores”, 13 August 2012: Lanzhou, China
- University of Southampton**, Talk title: “Holocene biomass burning recorded in polar and low-latitude ice cores” 22 March, 2012: Southampton, UK
- University of Toledo**, Talk title: “Freshwater resources limited by glacial thinning and atmospheric warming” 2 March, 2012: Toledo, OH
- University of Rhode Island** Talk title: “Does atmospheric warming from black carbon cause glacial thinning?” 23 February 2012: Kingston, RI, USA
- 2011 **International Union for Quaternary Research (INQUA) Congress**; Session: “*Isotope hydrology as a tracer of Quaternary climate*” Talk title: “Reconstruction of past isotope gradients using modern and fossil European land-snail shell  $\delta^{18}\text{O}$ ”, 21-27 July, 2011: Bern, Switzerland
- Harvard Summer School**, Talk Title: “How long have humans been affecting the climate system?” 10 June, 2011: Ca'Foscari, Italy
- Chinese Academy of Sciences**, Cold and Arid Regions Environment and Engineering Research Institute, Talk Title; “Organic biomarkers reconstruct regional fire history in ice cores”, 10 March, 2011: Lanzhou, China
- 2009 **Colorado College**, Talk title: “High-altitude ice cores and climate change”, 19 October, 2009: Colorado Springs, Colorado
- 2009 **Quest University**, Talk title: “High-latitude ocean circulation”, 18 June, 2009: Squamish, BC, Canada

#### **SELECTED PRESENTATIONS AND ABSTRACTS (\* = student author)**

2014

**Kehrwald**, N., Zennaro, P., Kirchgeorg, T., Li, Q., Wang, N., Power, M., Zangrando, R., Gabrielli, P., Thompson, L.G., Barbante, C. (2014) Human and climate impacts on Holocene fire activity recorded in polar and mountain ice cores, *Geophysical Research Abstracts*, EGU2014-11594

\*Zennaro, P., **Kehrwald**, N., Zangrando, R., Gambaro, A., Barbante, C. Fire in Ice: Glacial-Interglacial biomass burning in the NEEM ice core, *Geophysical Research Abstracts*, EGU2014-14490

\*Kirchgeorg, T., Schüpbach, S., **Kehrwald**, N., McWethy, D., Barbante, C. (2014) Determination of specific molecular markers of biomass burning in lake sediments, *Geophysical Research Abstracts* EGU2014-11227

\*Zennaro, P., Kehrwald, N., Kirchgeorg, T., Zangrando, R., Battistel, D., Schüpbach, S., Gambaro, A., Barbante, C., (2014) *SISC, Second Annual Conference* Climate change: scenarios, impacts and policy Venice, September 29-30.

2013

**Kehrwald, N., Li, Q., Wang, N., Zennaro, P., Zangrando, R., Barbante, C.** (2013) High pre-industrial and modern Tibetan Plateau fire activity, *EOS Trans. AGU*, Abstract 1813387

**Kehrwald, N., Power, M., Zennaro, P., McWethy, D., Whitlock, C., Zangrando, R., Gambaro, A., Barbante, C.** (2013) EPICA Dome C ice core fire record demonstrates a major biomass burning increase over the past 500 years, *Geophysical Research Abstracts* Vol. 15, EGU2013-5256, EGU

**Kehrwald, N., Zennaro, P., Kirchgeorg, T., Power, M., Zangrando, R., Thompson, L., Barbante, C.,** (2013) Playing with Fire: Biomass burning, Climate and the Cryosphere, WCRP Cryosphere in a Changing Climate, 16-18 October, Tromsø, Norway

**Kehrwald, N., Zennaro, P., Zangrando, R., Gambaro, A., Barbante, C.,** (2013) Combustione di biomasse: effetti sul clima, L'inquinamento atmosferico e combustioni di biomasse, Padova, 19 March 2013

2012

**Kehrwald, N., Zennaro, P., Zangrando, R., Gabrielli, P., Thompson, L.G., Davis, M.E., Barbaro, E., Gambaro, A., Barbante, C.,** (2012) Fire in ice: Implications for the global carbon cycle, *International Partnerships in Ice Core Sciences FIRST OPEN SCIENCE CONFERENCE 1-5 October 2012, Presqu'île de Giens, Côte d'Azur, France*

\*Zennaro, P., **Kehrwald, N., Zangrando, R., Barbaro, E., Gambaro, A., Barbante, C.,** (2012) Fire in ice: Detecting biomass burning using ice cores, *AIQUA Congress Abstracts*

\*Zennaro, P., Barbante, C., **Kehrwald, N., Zangrando, R., Gambaro, A., Gabrieli, J.** (2012) Late Holocene fire activity recorded in a Greenland ice core, *Geophysical Research Abstracts* Vol. 14, EGU2012-3624.

2011

**Kehrwald, N., Zennaro, P., Zangrando, R., Gabrielli, P., Thompson, L.G., Gambaro, A., Barbante, C.,** (2011) Holocene biomass burning recorded in polar and low-latitude ice cores, *Eos Trans. AGU* GC33E-08

**Kehrwald, N., Barbaro, E., Gabrielli, P., Gambaro, A., Thompson, L.G., Zangrando, R., Zennaro, P., Barbante, C.,** (2011) Polar and tropical ice cores record fire activity across present and previous interglacial cycles, *Geophysical Research Abstracts* Vol. 13, EGU2011-11310, 2011

**Kehrwald, N., Zangrando, R., Thompson, L.G., Zennaro, P., Barbaro, E., Gambaro, A., Barbante, C.,** (2011) Decadal-scale changes in East African fire activity for the past 4000 years, *INQUA Congress Abstracts*, ID 1937

**Kehrwald, N., McCoy, W., Thibeault, J., Burns, S., Oches, S.,** (2011) Reconstruction of past isotope gradients using modern and fossil European land-snail shell  $\delta^{18}\text{O}$ , *INQUA Congress Abstracts*, ID 1229

\*Zennaro, P., **Kehrwald, N., Zangrando, R., Barbaro, E., Gambaro, A., Barbante, C.,** (2011) Reconstructing past fire regimes through levoglucosan determination in the North Eemian (NEEM) Greenland ice core, *INQUA Congress Abstracts*, ID 2016

2010

**Kehrwald**, N.M., Zangrando, R., Gabrielli, P., Gambaro, A., Thompson, L.G., Barbante, C. (2010) Fire activity in Eastern Africa during the last 4000 years *Eos Trans. AGU*

**Kehrwald**, N., Zangrando, R., Gambaro, A., Cescon, P., Thompson, L. G., Gabrielli, P., Barbante, C. (2010) Fire emission reconstruction in Africa during the last 500 years: A pilot study, *Geophysical Research Abstracts, 12, EGU2010-1866*

**Kehrwald**, N., Zangrando, R., Gambaro, A., Cescon, P., Thompson, L.G., Gabrielli, P., Barbante, C. (2010) Organic biomarkers reconstruct regional fire history in Kilimanjaro ice cores, *Global Change and the World's Mountains Proceedings*, Perth, Scotland, 26-30 September, 2010

Gabrielli, P., **Kehrwald**, N.M., Cozzi, G., Barbante, C., Thompson, L.G. (2010) Determination of atmospheric trace elements in Kilimanjaro ice to reconstruct regional African aerosol history. *Eos Trans. AGU*

2008

**Kehrwald**, N.M., Czimeczik, C., Santos, G., (2008) Concentration and <sup>14</sup>C Content of Total Organic Carbon and Black Carbon in Small (<100 ug C) Samples from Low-Latitude Alpine Ice Cores, *Eos Trans. AGU*, Abstract 8031

2007

**Kehrwald**, N.M., Urmann, D.H., Thompson, L.G., (2007) Abrupt tropical climate change: Monsoons and typhoons, Gary C. Comer Abrupt Climate Change Fellowship Conference, May 2 – May 5, 2007

**Kehrwald**, N.M., Thompson, L.G., Schmidt, G.A., (2006) Twentieth century warming recorded in low-latitude ice cores and GISS ModelE, *Eos Trans. AGU*, 87(52), Fall Meet. Suppl., U41E-06

## **TEACHING EXPERIENCE**

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**Advised:** 3 post-docs, 4 PhD students, 1 M.S. student, and 1 B.S. student.

### **Teaching:**

- 2015           **Colorado College**, Colorado Springs, CO  
*Guest Lecturer*  
Designed and taught a three-day intensive field course on aerosols and glacier melt
- 2014           **Colorado College**, Colorado Springs, CO  
*Guest Lecturer*  
Lecture series on climate change and impacts on society
- 2011- present   **Claremont McKenna – Pitzer --Scripps Colleges**, Claremont, CA  
*Guest Lecturer*  
Teach interactive lectures on using ice cores in paleoclimate reconstruction
- 2012           **Harvard Summer School**, Venice, Italy  
*Guest Lecturer*  
Led Earth and the climate system seminars on climate archives and chronologies. Helped organize an overnight field excursion to the Dolomites.
- 2009           **Colorado College**, Colorado Springs, CO  
*Visiting Assistant Professor*  
Taught a semester-equivalent field-based Introductory Geology course for 25 students including independent geologic mapping.

- 2008            **University of Ancash**, Huaraz, Peru  
*Instructor*  
Led glacier dynamics seminars for university faculty. All courses were taught in Spanish.
- 2004-2007      **The Ohio State University**, Columbus, OH  
*Teaching Assistant*  
Nominated for a “Best Teaching Assistant” award  
Developed curriculum, led laboratory work, and graded examinations for 17 classes of 7 – 200 undergraduate and graduate students
- 2002-2004      **University of Massachusetts**, Amherst, MA  
*Teaching Assistant*  
Responsible for the creation and implementation of all laboratory exercises for 8 courses of approximately 25 undergraduate students
- 2002            **Minnesota Diversified Industries**, St. Paul, MN  
*Vocational Trainer*  
Provided counseling and individualized career development for 35 employees with physical and mental disabilities.
- 1999 – 2001    **Peace Corps**, Pazña, Bolivia  
*Instructor*  
Built a radio station and instructed youth and adults to become radio announcers. The radio served as a means of communicating local information and interviews with community leaders, as well as environmental protection messages.

**Courses I have taught**

**Courses I am prepared to teach**

Glacier Dynamics Seminar (in Spanish)  
Geomorphology  
Environmental Geoscience  
Physical Geology  
Natural Hazards  
Introduction to Geology (Honors)  
Introduction to Human Geography

Paleoclimatology  
Geochemistry  
Environmental Conservation  
Sedimentology  
Water Cycle  
Mountain Environments  
Climate Change and Public Policy

**FIELD EXPERIENCE**

- 2010, 2011      **Western (Monte Rosa) and Eastern (Ortles and Marmolada) Alps, Italy**  
Supervisory position for a three-week drilling of multiple ice cores to bedrock.  
Analyzed recent anthropogenic emissions recorded in multiple 4 m snow pits and 10-15 m ice cores  
P.I. Paolo Gabrielli
- 2008 – 2009      **West Antarctic Ice Sheet (WAIS) Divide, Antarctica**  
Created a timeline for ~1000 m of brittle ice using in situ field measurements of dielectrical properties (DEP)  
P.I. Kendrick Taylor
- 2008            **Cordillera Blanca, Peru**  
Conducted a series of snow pit studies on the Quelccaya ice cap (5800 masl) and investigated potential sites for a future deep drilling project.  
P.I. Lonnie G. Thompson

- 2007            **Crawford Point, Greenland**  
Analyzed recent accumulation on the inland edge of the Jakobshavn Drainage Basin through an array of short cores (25 to 140 m) and density profiles. Collaboration with CRESiS (Center for the Remote Sensing of Ice Sheets).  
P.I. Ellen Mosley-Thompson
- 2006            **Naimona'nyi, Tibet, China**  
Drilled three cores to bedrock at 6100 m.a.s.l. to analyze atmospheric chemistry and possible anthropogenic influences freshwater supplies.  
P.I.s Lonnie G. Thompson and Yao Tandong (Chinese Academy of Sciences)
- 2002            **Phobjika Valley, Bhutan**  
Collected fluvial sediment samples in remote mountain rivers for cosmogenic dating to infer uplift versus erosion rates of the eastern Himalaya.  
P.I. Christopher Duncan
- 1999-2001      **Department of Oruro, Bolivia**  
Directed an analysis of water quality of regional rivers used for irrigation.
- 1998            **Nicoya Peninsula, Costa Rica**  
Collaborated with the Costa Rican Observatory of Volcanology and Seismology to calculate Holocene marine terrace uplift rates

#### **PROFESSIONAL SERVICE AND LEADERSHIP**

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- 2009-present    **Reviewer:**        *Arctic, Antarctic and Alpine Research*  
*Chemical Geology*  
*Climate of the Past*  
*Climatic Change*  
*The Cryosphere*  
*Environmental Earth Sciences*  
*Global Biogeochemical Cycles*  
*Hydrological Processes*  
*Journal of Glaciology*  
*Journal of Mountain Science*  
*Quaternary Research*  
*Quaternary Science Reviews*  
*Science of the Total Environment*  
*Tellus B*  
and multiple *NSF funding reviews*
- 2015 – present    **Global Palaeofire Working Group**, Advisory Board  
Establish interdisciplinary uses of the Global Charcoal Database for fire management and biodiversity conservation  
<http://www.gpwg.paleofire.org>
- 2014- present    **EGU Deputy Division President**, Climate: Past, Present and Future  
Organize the science program for the EGU Annual Meeting to ensure that all aspects of climate science are represented. Promote EGU journals and publications  
[\(http://www.egu.eu/publications/\)](http://www.egu.eu/publications/)
- 2015            **Paleofire: Data-Model Comparisons for the Past Millemmium**  
Invited participant in a workshop to determine how to best combine proxy and model data for determining human impacts on past and future fire activity

- 2015 **Convener** of EGU General Assembly session, CL0.0 “Open Session on Climate: Past, Present and Future”, Vienna, Austria
- 2014 **Lead convener and Co-Convener** of AGU Fall Meeting sessions: C06 “Diverse Impacts of Climate Change on Mountain Environments” and U33A “Is Global Citizen Science the Next Big Science?” San Francisco, CA
- 2013-present **AGU Fall meeting**, San Francisco, CA  
Judge for the Outstanding Student Presentation Award (OSPA)
- 2012 **Organized a PAGES (Past Global Changes) workshop**  
“Paleofire reconstruction during the Holocene and the last interglacial – proxies, data and models” Venice, Italy  
The workshop report is available in *PAGES News*, 21, 1, March 2013  
<http://www.pages-igbp.org/news/105-pages-newsletters/646-pages-news-vol-21-no-1>
- 2012 **Lead convener** of an AGU fall meeting session: C040: The ice core record of carbon cycle history and processes (Co-conveners: Barbante, C., Bauska, T., Brook, E.) San Francisco, CA
- 2011 **Chaired session**, Northern Hemisphere Holocene ocean and atmospheric variability  
Past4Future General Assembly, Copenhagen, Denmark

## OUTREACH

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- 2014 **Teton Gravity Research and Clif Bar**, “Higher” full-length movie  
Provide scientific commentary on melting mountain glaciers and analyze samples that pro snowboarder Jeremy Jones collected in the Himalaya  
e.g. <http://www.clifbar.com/article/dr-natalie-kehrwald>  
<http://www.clifbar.com/hubs/a-higher-calling>
- 2012 – present **Adventurers and Scientists for Conservation**, Bozeman, MT  
Collaborate with explorers to collect scientific samples in areas that are rapidly changing due to human activity (<http://www.adventurescience.org/>).  
e.g. *National Geographic*  
<http://voices.nationalgeographic.com/2014/09/30/missing-isotopes-whats-happening-in-the-worlds-highest-glaciers/>
- 2012 **Ligabue (no. 60\_72, 2012)**  
Magazine article and photos: “Il primo impatto: Quando l’uomo ha cominciato ad influenzare il clima della terra” C. Barbante and N. **Kehrwald** (in Italian and English). *Ligabue* is a magazine available at newsstands and is comparable to *Scientific American*.  
[http://www.ligabuemagazine.it/it/articoli/dettaglio\\_9.html](http://www.ligabuemagazine.it/it/articoli/dettaglio_9.html)
- 2011-2012 **Ortles project**, Province of Bolzano, Italy  
Involving high school students to in an international ice core drilling project, both on the glacier and in the classroom ([www.ortles.org](http://www.ortles.org))
- 2010- present **Beyond Penguins and Polar Bears**, online magazine for educators  
Winner of the *Science* prize for online resources in education (SPORE)  
(*Science* 28 January 2011: Vol. 331 no. 6016 p. 413 DOI: 10.1126/science.1196976)
- 2011 **Climalternati blog** (in Italian)  
Contributor to a blog where climate scientists explain climate science to a wide audience (<http://www.climalteranti.it>)

- 2009           **Big 10 Network**, Columbus, OH  
Television commercial development, Shot video footage of Antarctic fieldwork used in television depictions of student opportunities at Big 10 universities
- 2008           **Animal Planet UK**  
Video Diary, Shot field footage of glaciers and explained regional climate change for a TV series
- 2008           **Universidad Católica**, Lima, Peru  
Translated climate change talks for internationally recognized scientists
- 2008           **Bownocker Lecture**, Columbus, OH  
Facilitated question and answer session between Dr. James E. Hansen (NASA Goddard Institute for Space Studies) and community members in an open lecture.
- 2008           **State Science Fair**, Columbus, OH  
Judged experiments by 7<sup>th</sup>-12<sup>th</sup> grade students competing for a full college scholarship
- 2007-2008     **Photographer**, Tibet, Greenland, and Peru  
Published fieldwork photos in *Smithsonian*, *Somos* (won national prize for “Global Warming, Recommendations for Perú”), *The Antarctic Sun*, and *Field Notes*
- 2007           **Wings World Quest**, New York and Greenland  
Expedition collaborator for an organization that supports women explorers
- 2007           **Lifelong Learning Initiative**, Columbus State Community College, OH  
Lecturer for a climate change workshop for senior citizens
- 2006           **Shawnee Nature Center**, Portsmouth, OH  
Lecturer for a community group interested in environmental issues
- 2006-present   **Columbus Public Schools**, OH  
Led numerous tours of ice core research facilities for local school K-12 groups

## **LANGUAGES**

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**English:** Native speaker

**Italian:** Advanced (C1 international ranking)

**Spanish:** Advanced rating on ETS/ACTFL examination

**German:** Beginner (A2 international ranking)