V.Y. CHOW

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big problems + big data + big math = big exciting data/research scientist position

Highly creative, big thinking scientist with a deep modeling, statistical, and analysis background. Motivated by intense curiosity and desire to attack interesting & relevant problems by developing and using innovative analysis and modeling approaches. Talented at both teasing out and telling the story hidden within the data.

Education

PhD, Applied Mathematics, School of Eng. & Applied Sciences, Harvard University, Expected 2013
My thesis quantifies the carbon budget of the Amazon Basin to determine if the Basin is a source/sink of carbon. I collaborated on 2 aircraft campaigns in Brazil and developed a terrestrial biosphere model that uses ground based, aircraft, & satellite data to compute the net hourly exchange of CO_2 (i.e. CO_2 fluxes) between the atmosphere and the biosphere. I coupled the modeled CO_2 fluxes to a Lagrangian atmospheric transport model and calculated an *a priori* carbon budget for the Basin over the wet and dry seasons. I conducted Maximum Likelihood Estimation & Bayesian inversions to optimize the parameters in my model to produce *a posteriori* fluxes and used bootstrap and Markov Chain Monte Carlo methods for the error analysis.

MS, Applied Mathematics, School of Engineering & Applied Sciences, Harvard University, May 2007
MS, Forest Science, School of Forestry & Environmental Studies, Yale University, May 2000
BSc, Natural Resource Conservation, Faculty of Forestry, University of British Columbia, May 1997

Awards and Fellowships

NASA Earth and Space Science Fellowship (2008-2011)
Harvard University Presidential/Library Technology Instructional Fellow (2006-Present)
National Science & Engineering Research Council Doctoral Scholarship (2007-2009) declined
Carpenter/Sperry Grant – Yale University (1998-2000)
Natural Resources Defense Council Armbretch Fund (1999)

Selected Research Experience

Doctoral Candidate, School of Engineering & Applied Sciences, Harvard Univ., Sept 2005 – Present

- Generated mesoscale meteorological fields for use in a receptor oriented atmospheric transport model (a Lagrangian Particle Dispersion Model).
- Created a prognostic terrestrial biosphere model driven by meteorological fields and satellite data.
- Adapted fire and wetland emissions inventories for input into the terrestrial biopshere model.
- Compared my Lagrangian model output to various Eulerian global-model output.
- Optimized and conducted inversions using airborne mixing ratio measurements as a top-down constraint to estimate a basin-wide CO_2 budget.
- Processed global-scale model output as lateral boundary conditions for the atmospheric transport model.
- Responsible for flight planning during the Brazil aircraft campaigns. Used real-time data and predicted particle transport and air mass movements using a Principle Component Analysis.
- Conducted extensive fieldwork for data collection both on the ground and on aircraft programs - deployed the CO and CO_2 airborne sensors in Brazil aircraft and the CO_2 instrument during the Costa Rica stratospheric aircraft program and in a balloon experiment in Ft. Sumner, NM.

Research Assistant, School of Engineering & Applied Sciences, Harvard Univ., May 2002 – Aug 2005

- Modeled atmospheric transport of trace gases (CO and CO_2) using Markov processes and Bootstrapping.
- Conducted experimental design, managed fieldwork, and data analysis using R for biomass studies for Harvard Forest, Bhutan National Forests, and the Tapajos National Forest in Santarem, Brazil.
- Devised flight planning & assisted with instruments on an aircraft campaign over NE USA & Canada.
- Studied biomass and eddy flux measurements using ArcGIS and Imagine (remote sensing) software.
- Developed Coarse Woody Debris model based on the Ecosystem Demography model; programmed in C.

Research Assistant, Centre for Conservation Medicine, Tufts University, January 2001 – May 2002
- Devised database for baseline data of marine and coastal birds of Northeast USA.
- Completed GIS & statistical analysis to correlate mortality events with possible contaminant causes and develop vulnerability indices of various species to oil spill events.
- Developed an ecosystem health research project in Meru National Park, Kenya.

Yale Forest Forum Fellow, Yale School of Forestry & Environmental Studies, September 1998 – June 2000
- Collaborated with the Natural Resources Defense Council to investigate & analyze regulatory and non-regulatory government approaches to certified wood procurement policies.
- Organized workshop & forum and co-wrote summary report for *Yale Forest Forum Review* publication
- Authored internal report for NRDC on sustainable forest policies.

Selected Teaching & Leadership Experience

Teaching Fellow, School of Engineering & Applied Sciences, Harvard University
Earth & Planetary Science 236 Data Modeling & Analysis (Spring 2007 & 2009)
- Upper level graduate course on linear, stochastic, inverse, and atmospheric chemistry modeling using R.
- Lectured (3-hours) introductory statistics and led weekly labs and tutorials.
- Designed and graded problem sets and assisted students with final modeling and data analysis projects.

Applied Math 205 Practical Scientific Computing (Fall 2007)
- Upper graduate course on computational methods for solving problems that cannot be done analytically.
- Assisted students with understanding and implementing numerical methods using MATLAB.
- Led weekly section and graded problem sets.

Presidential Technology Instructional Fellow, Harvard University, 2006 – Present
- Collaborated with Library IT Services and librarians to design a virtual reference touch-screen platform.
- Designed website with searchable database using the MIT Exhibit Widget for Medieval Manuscripts.
- Evaluated needs of HCL librarians, created JavaScript tools, & provided design tutorials.
- Trained librarians on HTML coding, using the JavaScript tools, and image processing.

Research Assistant, School of Engineering & Applied Sciences, Harvard University, May 2002 – Aug 2005
- Directed the Research Experience for Teachers program (2004-2007) and the Research Experience for Undergraduates program (Summers 2004, 2007).
- Mentored Physics and Chemistry undergraduate senior thesis (2003 - 2004): *Landscape-Scale Spatial Variability of Carbon in Live and Dead Biomass in the Tapajós National Forest, Brazil*. This thesis won the prestigious Thomas T. Hoopes Prize, which recognizes the outstanding senior theses at Harvard College.

Canadian National Team, Ultimate Frisbee, 1998 – 2009
- Team captain – Bronze, 1998 World Championships & 4th place, 2009 World Games.
- Gold, 2001 World Games; Gold & Bronze, 2000 & 2008 World Championships respectively.

Publications

Manuscripts in Preparation
- **Chow, V.Y.**, M. Longo, J. Ceballos, S. Saleska, S.C. Wofsy (2012). Working title - Validating Common Model Drivers with Remote Sensing Data. To be submitted to *Journal of Geophysical Research* or *Geophysical Research Letters*.

- **Chow, V.Y.**, C. Gerbig, M. Longo, L.V. Gatti, J.B. Miller, L. Hess, J. Ceballos, K.M. Longo, J.W. Munger, H. Chen, O. Kolle, J. Steinbach, B.C. Daube, E.W. Gottlieb, P. Artaxo, K.Wiedemann, M.A.F. de Silva Dias, P. Celso, F. Morais, A.C. Ribeiro, M.O. Andreae, N. Jürgens, S.C. Wofsy (2012). Working title - Constraining the carbon flux of the Brazilian Amazon Basin during BARCA. Journal TBD

- **Chow, V.Y.**, C. Gerbig, M. Longo, and S.C. Wofsy (2012). Working title – A Vegetation Photosynthesis Respiration Model for the Amazon Basin. Journal TBD

Peer Reviewed

- Chen, H., J. Winderlich, C. Gerbig, A. Hoeferl, C.W. Rella, E.R. Crosson, A.V. Pelt, J. Steinbach, O. Kolle, V. Beck, B.C. Daube, E.W. Gottlieb, **V.Y. Chow**, G.W. Santoni, S.C. Wofsy (2010). High-accuracy continuous airborne measurements of greenhouse gases (CO_2 and CH_4) during BARCA. *Atmospheric Measurement Techniques,* doi: 10.5194/amt-3-375-2010.

- Miller, S.M., D.M. Matross, A.E. Andrews, D.B. Millet, M. Longo, E.W. Gottlieb, A.I. Hirsch, C. Gerbig, J.C. Lin, B.C. Daube, R. Hudman, P.L. da Silva Dias, **V.Y. Chow**, S.C. Wofsy. (2008). Sources of carbon monoxide and formaldehyde in North America determined from high-resolution atmospheric data. *Atmospheric Chemistry and Physics*, 8, 7673-7696.

- Pyle, E.H., G.W. Santoni, H.E.M. Nascimento, L.R. Hutyra, P.B. Carmargo, S. Vieira, D.J. Curran, J. van Haren, S.R. Saleska, **V.Y. Chow**, W.F. Laurance, and S.C. Wofsy. Effects of Disturbance on Biomass, Structure and Carbon Balance in Two Amazonia Forests. *Journal of Geophysical Research – Biogeosciences*, 113,G00B08, DOI: 10.1029/2007JG000592.

- Pathmathevan, M., S.C. Wofsy, D.M. Matross, X. Xiao, J.C. Lin, C. Gerbig, **V.Y. Chow**, E. Gottlieb. A Satellite-Based Biosphere Parameterization for Net Ecosystem CO2 Exchange: Vegetation Photosynthesis and Respiration Model (VPRM). *Journal of Geophysical Research -Global Biogeochemical Cycles,* 22, GB2005, doi: 10.1029/2006GB002735.

- Lin, J. C., C. Gerbig., S. C. Wofsy, **V. Y. Chow**, E. Gottlieb, B. C. Daube, and D. M. Matross (2007). Designing Lagrangian experiments to measure regional-scale trace gas fluxes, *J. Geophys. Res.*, 112:D13312.

- Lin, J.C., C. Gerbig, S.C. Wofsy, B.C. Daube, D.M. Matross, **V.Y. Chow**, E. Gottlieb, A.E. Andrews, M. Pathmathevan, and J.W. Munger (2006). What have we learned from intensive atmospheric sampling field programs of CO_2? *Tellus*, 58B:331-341.

- Matross, D.M., A. Andrews, M. Pathmathevan, C. Gerbig, J.C. Lin, S.C. Wofsy, B.C. Daube, E.W. Gottlieb, **V.Y. Chow**, J.T. Lee, C. Zhao, P.S. Bakwin, J.W. Munger, and D.Y. Hollinger (2006). Estimating regional carbon exchange in New England and Quebec by combining atmospheric, ground-based, and satellite data. *Tellus*, 58B: 344-356.

Non-Peer Reviewed

- **Chow, V.Y.**, L. Hutyra, S. Saleska, and S.C. Wofsy. Carbon and Nitrogen Uptake and Pollution Effect on Forest Health in Bhutan. Report for the National Environmental Commission Secretariat and the Forest Department of the Ministry of Agriculture, Bhutan, November 2004.

- Binko, Heidi, **Victoria Chow**, and Gary Dunning. *Conservation Easements on Working Forests*. Yale Forest Forum Series Publication. Vol. 4:2, 2001.

- **Chow, V.Y**. *Examining the Science Behind Forest Certification*. Masters Thesis and NRDC Internal Report. Project funded by the NRDC Forest Initiative. May 2000.

Selected Oral Presentations

- **Chow, V.Y.**, C. Gerbig, M. Longo, F.-T. Koch, T. Nehrkorn, J. Eluszkiewicz, J.C. Ceballos, K. Longo, S.C. Wofsy. Comparing inversion techniques for constraining CO_2 fluxes in the Brazilian Amazon Basin with aircraft observations. *American Geophysical Union*, San Francisco, CA, Dec 3rd – 7th, 2012 (invited oral presentation).

- **Chow**, **V.Y.**, C. Gerbig, M. Longo, J.W. Munger, H. Chen, O. Kolle, J. Steinbach, B.C. Daube, E.W. Gottlieb, L.V. Gatti, J.B. Miller, R. Kretschmer, M.O. Andreae, N. Juergens, S.C. Wofsy. Constraining CO_2 fluxes in the Amazon Basin with a regional aircraft campaign. *Ecological Society Annual Meeting*, Portland, OR, Aug 5th – 10th, 2012 (oral presentation).

- **Chow, V.Y.**, C. Gerbig, M. Longo, B. Munger, C. Wiedinmyer, H. Chen, O. Kolle, J. Steinbach, B.C. Daube, E.W. Gottlieb, G. Santoni, L.V. Gatti, J.B. Miller, R. Kretschmer, M.O. Andreae, N. Juergens, S.C. Wofsy. Estimating the Carbon Budget of the Amazon during the BARCA Campaigns. *AGU Meeting of the Americas*, Foz do Iguacu, Brazil, Aug 8th – 13th, 2010 (oral presentation).

- **Chow, V.Y.**, M. Longo, B.C. Daube, E.W. Gottlieb, J.W. Munger, G.W. Santoni, S.C. Wofsy, C. Gerbig, O. Kolle, H. Chen, J. Steinbach, V. Beck, P. Artaxo, K.Wiedemann, M.A.F. de Silva Dias, F. Morais, A.C. Ribeiro, K.M. Longo, M.O. Andreae, N. Jürgens, L. Gatti, J.B. Miller, C. Wiedinmeyer. Constraining Regional Surface Fluxes of CO_2 for Amazonia using recent BARCA Aircraft Measurements. *8th International Carbon Dioxide Conference*, Jena, Germany, Sept 13th – 19th, 2009 (oral presentation).

Additional Qualifications

Data & Quantitative, Software, Hardware, and Computer Skills

- Data & Quantitative – vast experience with acquiring, processing, managing, validating, and analyzing big data sets; strong statistical/optimization skills; deep experience with model development & error analysis.
- Software – extensive work with R, S-Plus, Shell Scripting, Linux; proficient with Fortran, MATLAB, JavaScript, and Python; experience with GIS (ArcView), Remote Sensing (ERDAS Imagine), and C.
- Hardware – Linux, NAS, cluster computing, and system administration.
- Computing – NASA Pleiades supercomputer; research computing clusters; Mac, Windows, and Linux; extensive experience using MPI for executing parallelized FORTRAN code (ex. running BRAMS).
- Web and Graphic Design/Software: Adobe Photoshop, Illustrator, and Dreamweaver; MIT's Simile Exhibit, an open source database visualization software (JSON format).

Languages

- Native Language: English
- Conversational Level: Cantonese, French, Spanish (introductory course at Harvard), and Portuguese
- Reading/Comprehension Level: French

Interests

- Ultimate Frisbee: Canadian National Team - Gold & Bronze medals, World Games Captain (one of six women in Canada selected to play at the World Games & only woman to be selected for all three World Games); Gold & 3 Bronze medals, World Championships; 4-time U.S. National Champion and 4-time Canadian National Champion
- Recreational sports: backcountry skiing, hiking, backpacking, rock climbing, mountain biking, and running.
- Travel: Bhutan, Thailand, Japan, Brazil, Costa Rica, Nicaragua, Mexico, and Germany

References provided upon request