

ERNESTO ALVARADO-CELESTINO

Area of Expertise:

Forest Fire Science, Fire Management, Fire Policy, Fire Ecology, Smoke and Carbon Emissions, Tropical Forestry, Landscape and Disturbance Ecology, International Forestry.

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Education

Ph. D. University of Washington, Seattle, WA. Wildland Fire Sciences. 1992.

MS. Postgraduate College, Montecillos, Mexico. Silviculture and Forest Management. 1986.

B.S. Universidad Autonoma Chapingo, Chapingo, Mexico. Agricultural Engineer with a minor on forest and plant protection. 1980.

Academic and Professional Experience

July 1992-present. Senior Research Scientist. College of Forest Resources, University of Washington, Seattle, Washington.

Area of Work: Quantitative fire ecology, fire management, fire behavior, fire severity, landscape fire ecology, biomass combustion modeling and emissions, tropical ecology.

Teaching:

FM324: Fire module of the Forest Protection course in 2004.

ESRM420: Wildland Fire Management. Full responsibility in 2007, lectures in 2006 and 2005.

CFR535: Fire Ecology. Full responsibility in 2007.

One lecture a year in CFR525 International Forestry, and ESRM101 Forest and People.

Supervisory Experience:

I have hosted the work of two visiting scientists at the College of Forest Resources (a combustion engineer from the University of Brasilia and a biogeographer from Mexico's National University).

Currently, I supervise five research scientists (one PhD and 3 Master of Sciences, one with a bachelor degree), one programmer, three temporary employees, and 3 undergraduate students.

Research.

I conduct field research on the Pacific Northwest, Alaska, Mexico, Brazil (Amazon forest), and Bolivia (Amazon forest and tropical dry forest). I collaborate on combustion research in laboratory with Brazil's National Institute for Space Research's Combustion and Propulsion Laboratory in Brazil. I have secured funding to conduct these research projects since 1992. My current funding at the University of Washington is over \$600,000 (as 10/23/2007). Over the past 6 years the funding has been over \$3millions. Dr. Jim Agee has been the sponsor PI for these research projects.

National and International Collaboration.

I participate in US national research efforts through the multi-institutional Core Fire Sciences Caucus and a national fuel modeling project. I hosted at the CUH facilities in 2005 and 2006 the National Core Fire Sciences Caucus, with an attendance of approximately 20 scientists from all the US.

I participate on advisory committees for the governments of Mexico and Bolivia in wildfire policy issues. I participate on fire training for the USFS and TNC's Fire initiative. I have consulted for the

World Bank on Brazil's Fire Protection Program (PROARCO) for the Amazon. I assist USAID/USFS International Programs to develop in Bolivia a national forest fire research program and wildfire management programs in Mexico's Natural Protected Areas.

I have collaborated for several years with the Office of Minority Affairs of the University of Washington on their Early Identification Program and the MacNair Program.

I collaborate with faculty and graduate students on wildfire related issues from several universities from the US, Spain, Sweden, Mexico, Brazil, Bolivia, Cuba, among others.

I also have a close communication and a working relation with scientists working on wildfires from federal laboratories (USFS Missoula, Riverside and Seattle Fire laboratories, Los Alamos NL, NIST, and NASA).

July-September of 1999. Visiting scientist at the Combustion and Propulsion Laboratory of Brazil's National Institute for Space Research (INPE) and the University of the State of Sao Paulo, Brazil.

Fall 1990-Winter 1992. Teaching Assistant. Center for Quantitative Sciences in Forestry, Fisheries and Wildlife, University of Washington. Seattle, Washington.

Courses: Analysis for biologists (derivation and integration), regression analysis, experimental designs, quantitative wildlife assessment.

January 1987-August 1987. Research Associate and lecturer of graduate courses.

Postgraduate College, Chapingo, Mexico.

Area of work: Wildfires, prescribed fires, forest protection.

September 1983-September 1984. Head of the Forest Protection Department. Forest Management Unit No. 2. Durango, Mexico.

Area of work: Wildfire management. I was in charge of fire management of a 1-million hectare forest concession at the Sierra Madre Occidental in Northern Mexico.

September 1980-September 1983. Lecturer and Extension Specialist. Forestry Technological Institute, Durango, Mexico.

Area of work: Forest protection, forest insects, forest diseases, wildfires.

Professional Affiliations

Society of American Foresters, Ecological Society of America, International Association of Wildland Fire, Xi Sigma Pi: Forest Management Honors Society, American Geophysical Union, American Association of Geographers.

Foreign Languages

Fluent in English, Spanish, and Portuguese. I read and can communicate in Italian

Graduate Student Committees (List of UW graduate attached)

I participate in MS and PhD student committees at the Graduate School of the University of Washington (5 MS and 2 PhDs in the past, currently serving in one graduate committee). I also hold affiliate positions and have been appointed to graduate student committees at the Instituto Nacional de Pesquisas de Amazonia in Manaus, Brazil (2 MS committees), Mexico's National University,

UNAM, (one MS and several undergraduates), and Mexico's Universidad Autonoma Chapingo (two undergraduates) and the University of Guadalajara (one MS and two undergraduates).

Selected Publications

Alvarado Celestino, E.; Morfin Ríos, J.E.; Jardel Peláez, E.J.; Vihnanek, R.E.; Wright, D.K.; Michel Fuentes, J.M.; Wright, C.S.; Ottmar, R.D.; Sandberg, D.V.; Nájera Díaz, A. (In review). Photo Series for Quantifying Forest Fuels in Mexico: Montane Subtropical Forests of the Sierra Madre del Sur. and Temperate Forests and Montane Shrubland from the Northern Sierra Madre Oriental. Fire Science Publication No. XX. Seattle, Washington: University of Washington, College of Forest Resources. XX pp

Yokelson, R.; S. Urbanski; E. Atlas; D. Toohey; **E. Alvarado**; J. Crouse; P. Wennberg; M. Fisher; C. Wold; T. Campos; K. Adachi; P. R. Buseck; W. M. Hao. 2007. Emissions from forest fires near Mexico City. Submitted to Atmos. Chem. Phys.

Christian, T.; R.J. Yokelson; J.A. Carvalho Jr.; D. W.T. Griffith; **E. C. Alvarado**; J. C. Santos; T. G. S. Neto, C. A. Gurgel; W. M. Hao. 2007. The tropical forest and fire emissions experiment: Trace gases emitted by smoldering logs and dung from deforestation and pasture fires in Brazil. Journal of Geophysical Research, VOL. 112, D18308, doi:10.1029/2006JD008147, 2007.

R.J. Yokelson, R.J.; Karl, T.; Christian, T.J.A.; Artaxo, P.; Carvalho Jr.; **Alvarado, E. C.;** Greenberg, J.; Blake, D.R.; Gunther, A. 2007. Airborne and ground-based measurements of fire and biogenic emissions during the 2004 Amazonian dry season. iLEAPS Newsletter 4, June 2007: 30-32.

Shlinsky, A.; J. Waugh; P. Gonzalez; M. Gonzalez; M. Manta; H. Santoso; **E. Alvarado**; A. Ainuddin Nuruddin; D.A. Rodriguez Trejo; R. Swaty; D. Schmidt; M. Kaufmann; R. Myers; A. Alencar; F. Kearns; D. Johnson; J. Smith; D. Zollner; W. Fulks. 2007. Fire, Ecosystems and People: Threats and Strategies for Global Conservation. GFI Technical Report 2007-2. The Nature Conservancy. 20 pp.

Veras, C.A.G.; **Alvarado, E.C.** 2006. The role of smoldering combustion on smoke emission in tropical forest fires. In: Proc. of the 5th International Conference on Forest Fire Research. November 27-30, 2006. Figueira de Foz, Portugal.

Carvalho Jr., J.A.; Soares Neto, T.G.; Veras, C.A.G.; **Alvarado, E.C.;** Sandberg, D.V.; Santos, J.C. 2006. Carbon sequestration through charcoal formation in Amazonian forest fires. In: Proc. of the 5th International Conference on Forest Fire Research. November 27-30, 2006. Figueira de Foz, Portugal.

Soja, A. J.; R. B. Pierce; J. A. Al-Saadi; **E. Alvarado**; D.V. Sandberg; R.D. Ottmar; C. Kittaka; W.W. McMillian; G.W. Sachse; J.X. Warner; J.J. Szykman. Description of a ground-based methodology for estimating boreal fire emissions for use in regional- and global-scale transport models. Submitted to Journal of Geophysical Research 2006.

Alvarado C., E. 2006. Wildfires in tropical and temperate forests in protected areas of Mexico and Brazil. Book Chapter In. Flores G., J.G. y Rodríguez T., D.A. (Eds.). Forest Fires: Defining the Problem, Ecology and Management, Social Participation, and Capacity Building. Pp 171-184. CONAFOR-MundiPrensa. Mexico, D.F. 254 p.

Wright, C.S.; R. E. Vihnanek; **E. Alvarado**; J.M Morfin-Rios; E. Jardel-Pelaez; A. Najera-Diaz; C. E. Edminster. 2006. Natural fuels photo series for the Borderlands and Mexico. In. Proceedings of the Sixth Conference on Research and Resource Management in the Southern Deserts: Borders,

Boundaries, and Time Scales – Fronteras, Limtes y Escalas de Tiempo. May 2-5, 2006. Tucson, AZ. Pp 134-136.

Forti, M.C.; Gielow R; Carvalho, J.A.; **Alvarado, E.C.**; Sandberg, D.V.; Santos, J. C. Soil water chemistry changes after a slashing and burning of a “Terra Firme” forest parcel in Southern Amazon (Alta Floresta/MT, Brazil) Submitted to Forest Ecology and Management, September 2006.

Alvarado, E.; D. V. Sandberg; J. A. de Carvalho Jr.; R. Gielow; J. C. Santos. 2004. Landscape fragmentation and fire vulnerability in primary forest adjacent to recent land clearings in the Amazon arc of deforestation. *Floresta* 34(2) 169-174.

Rabelo, E.R.C.; Veras, C.A.G.; Carvalho, J.A., Jr.; **Alvarado, E.C.**; Sandberg, D. V.; Santos, J.C. 2004. Log smoldering in a forest clearing in the Amazonian arc of deforestation. *Atmospheric Environment* 38 (2004): 203-211.

Hessburg, P. F., B.G. Smith, R.B. Salter, R.D. Ottmar, **E. Alvarado**. 2004. Recent changes (1930s-1990s) in spatial patterns of interior northwest forests, USA. In. *Proceedings: Views from the Ridge—Considerations for planning at the landscape scale*. Gucinski, Hermann; Miner, Cynthia; Bittner, Becky, eds. USDA Forest Service, Pacific Northwest Research Station Gen. Tech. Rep. PNW-GTR-596. 133 p.

Gielow, R.; Carvalho, J.A., Jr.; **Alvarado, E.**; Sandberg, D. V.; Costa, F. S.; Santos, J.C. (Submitted). Natural drying of logs in slashed areas in the Amazon region. *Acta Amazonica*.

Carvalho Jr, J. A.; C. A. G. Veras, **E. C. Alvarado**, D. V. Sandberg, R. Gielow, E. R. Carvalho, and J. C. Santos (Submitted 2006). Fire spread from a forest-clearing site in the Amazonian arc of deforestation. Submitted to the *International Journal of Wildland Fire*.

Heyerdahl, Emily; **Alvarado, Ernesto**. 2003 . The Influence of Climate and Land Use on Historical Surface Fires in Pine-Oak Forests, Sierra Madre Occidental, Mexico. In. Veblen, T. T.; Montenegro, G.; Swetnam, T. W. (Eds.) *Fire and Climatic Change in Temperate Ecosystems of the Western Americas*. Series: Ecological Studies. Volume. 160. Springer.

Hessburg, Paul F.; Smith, Bradley G.; Salter, R. Brion; Ottmar, R. D.; **Alvarado, Ernesto**. 2002. Interior Columbia Basin Forests and Rangelands, 1930 to Present. In. *Rapport, David and others (Eds.). Managing for Healthy Ecosystems*. CRC Press LLC. Pp 616-692.

Carvalho, João A., Jr. ; Costa, Fernando S. ; Gurgel Veras, Carlos A. ; Sandberg, David V. ; **Alvarado, Ernesto C.** ; Gielow, Ralf ; Serra, Aguinaldo M., Jr. ; Santos, José C. 2001 Biomass fire consumption and carbon release rates of rainforest-clearing experiments conducted in northern Mato Grosso, Brazil. *J. Geophys. Res.* Vol. 106 , No. D16 , p. 17,877-17,888

Avalos, C. D., D. L. Peterson, **Alvarado, E.**, and Ferguson, S. A. and Besag, J. E. 2001. Space-time modeling of lightning-caused forest fires in the Blue Mountains, Oregon. *Can. J. For. Res.* 31(9): 1579-1593.

Hessburg, P. F., B.G. Smith, R.B. Salter, R.D. Ottmar, **E. Alvarado**. 2000. Recent changes (1930s-1990s) in spatial patterns of interior northwest forests, USA. *Forest Ecology and Management* 136 (1-3): 53-83

Cairns, Michael, A.; Hao, Wei Min; **Alvarado Ernesto**; and Haggerty, Patricia K. 2000. Carbon emissions from spring 1998 fires in tropical Mexico. In *Proceedings of the Joint Fire Conference and Workshop: Crossing the Millennium: Integrating Spatial Technologies and Ecological Principles for*

a New Age in Fire Management. June 15-17, 1999. Boise Idaho. The University of Idaho. Vol. I. pp. 242-248.

Alvarado Ernesto, David V. Sandberg, and Bruce B. Bare 1999. Analysis of Area Burned by Wildfires Through the Partitioning of a Probability Model. In. Proc. of the symposium on fire economics, planning, and policy: bottom lines. April 5-9, 1999. San Diego, California. USDA Forest Service Gen. Tech. Rep. PSW-GTR-173. Albany, CA. pp. 59-68.

Cairns, Michael, A.; Hao, Wei Min; **Alvarado Ernesto**; and Haggerty, Patricia K. 1998. Carbon emissions from spring 1998 fires in tropical Mexico. In International Congress on Global Climate Change. Manila, Philippines. November 1998.

Carvalho Jr., J. A.; F. S. Acosta; **E. Alvarado**; N. Higuchi; T. M. Araujo; C. A. G. Veras; A. M. Serra Jr.; R. Gielow; G. H. Negreiros; and J. C. Santos. 1998. Combustion completeness in rainforest clearings in the Brazilian Amazon region. In. III International Conference on Forest Fire Research and 14th. Conference on Fire and Forest Meteorology. Vol II. Pp 1417-1431. Luso, 16/20 November 1998.

Negreiros, G.H.; Sandberg, D.; **Alvarado, E.**; Andrade de Carvalho Jr, J.; and Hinckley, T. 1998. A flammability model for the Brazilian Amazon Forest near the ecotone with the Cerrado- from ecosystem to biome. 4th Brazilian Congress. October 1998. Belem, Para, Brazil.

Alvarado, E., D. V. Sandberg, and S. G. Pickford. 1998. Modeling large forest fires as extreme events. Northwest Science 72:66-75.

Negreiros, G.H.; Nepstad, D.; Sandberg, D.; **Alvarado, E.**; Hinckley, T.; Pereira, M. 1998. Fire along transition between the Amazon forest and the cerrado ecosystems. In: Proceedings of the 13th conference on fire and forest meteorology; 1996 October 24- November 2; Lorne, Australia: 63-68.

Ottmar, R. D, **E. Alvarado**, and P. F. Hessburg 1998. Linking recent historical and current forest vegetation patterns to smoke and crown fire in the Interior Columbia River basin. In: Proceedings of the 13th conference on fire and forest meteorology; 1996 October 24- November 2; Lorne, Australia: 523-533.

Avalos Díaz , C. and **E. Alvarado**.1998. Space-time analysis of fire patterns in the Blue Mountains, Oregon. In: Proceedings of the 13th conference on fire and forest meteorology; 1996 October 24- November 2; Lorne, Australia.

Arcos, A., **E. Alvarado**, and D. V. Sandberg. 1998. Volume estimation of large woody debris with a stereoscopic vision technique. In: Proceedings of the 13th conference on fire and forest meteorology; 1996 October 24- November 2; Lorne, Australia.

Alvarado, E., E. K. Heyerdahl, S. A. Drury, E. Merlin, J. L. Bretado, J. R. Bacon, And R. E. Vihnanek. 1996. Wildfire Regime and Stand Dynamics of Unmanaged Coniferous Forests in Mexico's Sierra Madre Occidental. 1996 Annual Meeting. Ecological Society of America. Providence Rhode Island. 10-14 August 1996.

Mckenzie, D., D. L. Peterson and **E. Alvarado**. 1996. Extrapolation problems in modeling fire effects at large spatial scales: A review. International Journal of Wildland Fire 6:165-176.

Mckenzie, D., D. L. Peterson and **E. Alvarado**. 1996. Predicting the effect of fire on large scale vegetation patterns in North America. Research Paper PNW-RP-489. Portland, OR: USDA Forest Service, PNW Research Station. 38 p.

Ottmar, R. D., M. D. Schaaf and **E. Alvarado**. 1996. Smoke considerations for using fire in maintaining healthy ecosystems. In: C. Hardy and S. Arno (eds.). *The Use of Fire in Forest Restoration*. USDA Forest Service Gen. Tech. Rep. INT-GTR-341. Ogden, Utah. Pp. 24-28.

Huff, M. H., R. O. Ottmar, **E. Alvarado**, R. E. Vihnanek, J. F. Lemkhul, P. F. Hessburg, and R. L. 1995. Historical and current forest landscapes in eastern Oregon and Washington. Part II. Linking vegetation characteristics to potential fire behavior and related smoke production. Gen. Tech. Rep. PNW-GTR-355. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Ottmar, R. D., R. Vihnanek, and **E. Alvarado**. 1993. Forest Health Assessment: Air Quality Tradeoffs. In: 12th Conference on Fire and Forest Meteorology. October 26-28, 1993, Jekyll Island, GA. Society of American Foresters/American Meteorological Society.

Sandberg, D. V. and **E. Alvarado C.** 1993. Global Climate Change and Ecosystem Management Science in the Management of the Mexican Forest Resources. In: II Mexican Forestry Congress. July 12-16 1993. Metepec, State of Mexico. Mexico.

Alvarado, E. 1992. Large forest fires: An analysis using extreme value theory and robust statistics approaches. Ph.D. Diss. University of Washington, Seattle, WA.

Alvarado C., E., M. Mendoza B. and D. Sotres R. 1991. Biomass equations for estimating live fuel loadings in the understory of *Pinus montezumae* Lamb. stands. *Agrociencia* (Natural Renewable Resources Series) 1:113-127.

Alvarado C., E., M. Mendoza B. D. Sotres R. and A. Velazquez M. 1988. Fire rate-of-spread in undisturbed stands of *Pinus montezumae* Lamb. *Agrociencia* 72:63--74.

Alvarado C., E. 1988. Estimation of fire fuel consumption in undisturbed stands of *Pinus montezumae* Lamb. Dead woody fuels. *Agrociencia* 72:75--84.

Publication and Presentation in Conferences, published in Proceedings

Alvarado, E; Soares Neto, T G; de Carvalho, J A; Gurgel Veras, C A; Lincoln, E N; Yokelson, R; Hao, W M; dos Santos, J C. (2006). Biomass Consumption, CO₂, CO and Main Hydrocarbon Gas Emissions in an Amazonian Forest Clearing Fire. *Eos Trans. AGU*, 87(52), Fall Meet. Suppl., Abstract. B31C-1139.

Soja, A J; Pierce, R B; Al-Saadi, J A; **Alvarado, E;** Sandberg, D V; Ottmar, R D; Kittaka, C; McMillian, W W; Sachse, G W; Warner, J X; Szykman, J J. (2006). Using RAQMS Chemical Transport Model, Aircraft In-situ and Satellite Data to Verify Ground-based Biomass Burning Emissions from the Extreme Fire Event in Boreal Alaska 2004. *Eos Trans. AGU*, 87(52), Fall Meet. Suppl., Abstract A51G-07.

Sandberg, D V; Ottmar, R D; Bluhm, A; **Alvarado, E.** (2000). Fire Severity and Carbon Release During the FrostFire Boreal Fire Experiment. *Eos Trans. AGU*, 81 (48), Fall Meet. Suppl., Abstract B12C-01 INVITED.

Ottmar, Roger D.; **Alvarado, Ernesto.** 2004. Linking vegetation patterns to potential smoke production and fire hazard. In: Murphy, Dennis D.; Stine, Peter A., eds. *Proceedings of the Sierra Nevada Science Symposium*. Gen. Tech. Rep. PSW-GTR-193. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station: 93-96

Ottmar, Roger D.; Vihnanek, Robert; **Alvarado, Ernesto** 1994. Forest Health Assessment: Air Quality Tradeoffs. Presented at the 12th Conference on Fire and Forest Meteorology, October 26-28, Jekyll Island, GA.

Ottmar, Roger D.; **Alvarado, Ernesto**; Hessburg, Paul F. 1998. Linking recent historical and current forest vegetation patterns to smoke and crown fire in the Interior Columbia River Basin. In: Weber, R, Chair. Proceedings 13th Conference on Fire and Forest Meteorology. Moran, WY: International Association of Wildland Fire.

Gielow, R., Sousa, C. S. S., Silva, J. T., Forti, M. C., Carvalho, J. A., **Alvarado, E. C.**, Sandberg, D.V., Santos, J. C. Rainfall climatology (1976 – 2004) and severe meteorological events in Northern Mato Grosso. 8. ISHCMO/AMS, Foz do Iguaçu, PR, 2006. CD ROM.