

CURRICULUM VITAE

Mike Flannigan

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Education:

BSc., 1977, Physics, University of Manitoba, Winnipeg MB
MT35 1978/79 (Meteorologist Training) Course 1979, Environment Canada, Downsview, ON
MS., 1985, Atmospheric Science, Colorado State University, Fort Collins CO
Ph.D., 1993, Plant Sciences, University of Cambridge, Cambridge UK

Selected Experience:

Meteorologist, Atmospheric Environment Service, 1977-1981
Physical Scientist, Canadian Forest Service, 1981-1993
Research Scientist, Canadian Forest Service, 1994-2001
Senior Research Scientist, Canadian Forest Service, 2002-2013
Professor of Wildland Fire, University of Alberta, 2012-
Director, Western Partnership for Wildland Fire Science, 2010-

Selected Professional Activities :

Editor-in-Chief, International Journal of Wildland Fire 2002-2008
Associate Editor, Canadian Journal of Forest Research 2000-2016
Invited participant for the U.S. National Assessment Program on Global Change – Leader of the Impact of climate change on the fire regime task.
Task leader, *Landscape Scale Processes, Fire Modelling* IGBP program for Global Change and Terrestrial Ecosystems (GCTE), 1997-2002.
Invited Speaker, Fires and Climate Change in Circumboreal Forests, IGBP Open Science Conference, July 2002, Amsterdam.
Co-leader of an NCEAS project on Global change and landscape fire.
Invited Keynote Speaker International Conference on Forest Fire Research Portugal 2002, 2006 & 2014.
Invited Keynote Speaker, Forest Fires and Climate Change, International Boreal Forest Research Association, AK May 2004.
Co-leader of IGBP fast-track initiative on global forest fire regimes – past, present and future 2002-2007.
Invited Speaker, for two sessions – fires and climate change and fires and carbon, American Geophysical Union Fall Meeting, Dec. 2005, San Francisco.
Invited Plenary Speaker – Fires and climate change. Fire Congress, Nov. 2006, San Diego.
Expert Reviewer for the IPCC Fourth Assessment Report
Invited Plenary Speaker - Fire and Climate Change at the '88 Fires: Yellowstone and Beyond Conference, Jackson Hole WY Sept. 2008
Program Chair for the International Conference on Forest Fire Research (Portugal 2006, 2010 & 2014)
Invited Plenary Speaker Megafires Conference – Tallahassee FL Nov. 2011
Co-chair of the Wildland Fire Canada conference October 2012

Research Interests

Dr. Flannigan's primary research interests are atmospheric science and disturbances and in particular include fire and weather/climate interactions including the potential impact of climatic change, lightning-ignited forest fires, landscape fire modelling and interactions between vegetation (peat in particular), fire and weather. Dr. Flannigan has published over 200 papers (130+ journal papers) during his career and a number of which are frequently cited. His h-index is 50 (scopus) and 62 google scholar with over 8,700 citations (scopus) and 14,500 citations (google scholar).

Publications

Recognized Scientific Journals

- Wang, Xianli; Parisien, Marc-Andre; Taylor, Steve; Candau, Jean-noel; Stralberg, Diana; Marshall, Ginny; Little, John; Flannigan, Mike. 2017. Projected changes in daily fire spread across Canada over the next century. *Environmental Research Letters*. ERL-103076.R1. (Accepted)
- Xianli Wang; Mike Wotton; Alan Cantin; Marc-André Parisien; Kerry Anderson; Brett Moore; Mike Flannigan. An R package for the Canadian Forest Fire Danger Rating System. 2017. *Ecological Processes*. ECPR-D-16-00046R1 . (Accepted)
- Robinne, F.-N. Parisien, M.A. and Flannigan M.D. 2016. Anthropogenic influence on wildfire activity in Alberta, Canada. *International Journal of Wildland Fire*. 25:1131-1143.
- Cary GJ, Davies ID, Bradstock, RA, Keane RE, and Flannigan MD. 2016. Importance of fuel treatment for limiting moderate-to-high intensity fire: Findings from comparative fire modelling. *Landscape Ecology*. doi:10.1007/s10980-016-0420-8.
- Parisien, M-A., Miller, C., Parks, S.A., DeLancey, E. and Flannigan, M.D. 2016. The spatially varying influence of humans on fire probability in North America. *Environmental Research Letters*. <http://dx.doi.org/10.1088/1748-9326/11/7/075005>.
- Rogeanu, M-P. Flannigan, M.D. and Parisien M-A. 2016. Fire history sampling strategy of fire intervals associated with mixed- to full-severity fires in Southern Alberta, Canada. *Forest Science*. <http://dx.doi.org/10.5849/forsci.15-053>. 62:613-622.
- Legrand, M., McConnell, J., Fischer, H., Wolff, E.W., Preunkert, S., Chellman, N. Leuenberger, D, Maselli, O., Sigl, M., Schupbach, S. and Flannigan, M. 2016. Boreal fire records in Northern Hemisphere ice cores: A review. *Climate of the Past*. 12:2033-2059. doi:10.5194/cp-12-2033-2016.
- Rogeanu, M-P. Flannigan, M.D. Hawkes, B.C. and Arthur, R.J. 2016. Fire regime departure in southern Alberta, Canada: implications for forest and wildfire management. *International Journal of Wildland Fire*. 25:1117-1130. <http://dx.doi.org/10.1071/WF15120>.
- Stockdale, C., Flannigan, M. and Macdonald, E. 2016. A critical Analysis of the use of Fire Regimes as the basis of Forest Ecosystem Management with examples from the Canadian Western Cordillera. *Environmental Reviews*. 24:233-243. doi.org/10.1139/er-2016-0002
- Abbott, B. W., Jones, J.B., Schuur, E.A.G., Chapin III, F.S., Bowden, W.B., Bret-Harte, M.S.,

- Epstein, H.E., Flannigan, M.D. et al. 2016. Biomass offsets little or none of permafrost carbon release from soils, streams, and wildfire. An expert assessment. *Environmental Research Letters*. 11, 034014 doi:10.1088/1748-9326/11/3/034014
- Robinne, F-N. Emelko, M., Miller, C., Bladon, K., Parisien, M.A. and Flannigan M.D. 2016. A global index for mapping the exposure of water resources to Wildfire. *Forests*. 7(1), 22; doi:[10.3390/f7010022](https://doi.org/10.3390/f7010022)
- Smith, A.M., Kolden, C.A., Paveglio, T.B., Cochrane, M.A., Bowman, D.M., Moritz, M.A., Klisley, A.D. Alessa, L., Hudak, A.T., Hoffman, C.M., Lutz, J.A., Queen, L.P., Goetz, S.J., Higuera, P.E., Boschetti, L., Flannigan. M.D., Yedinak, K.M., Watts, A.C., Strand, E.K., van Wagendonk, J.W., Anderson, J.W., Stocks, B.J. and Abatzoglou, J.T. 2016. The Science of firescapes: Achieving Fire Resilient Communities. *Bioscience*. 66:130-146. Doi: 10.1093/biosci/biv182
- Wang, X., Parisien, M-A., Taylor, S.W. Perakis, D.D., Little, J.M. and Flannigan. M.D. 2016. Future burn probability in south-central British Columbia. *International Journal of Wildland Fire*. 25:200-212. <http://dx.doi.org/10.1071/WF15091>
- Blouin, K.D., Flannigan, M.D., Wang, X. and Kochtubajda, B. 2016. Ensemble lightning prediction models for the province of Alberta, Canada. *International Journal of Wildland Fire*. 25:421-432. <http://dx.doi.org/10.1071/WF15111>.
- Flannigan, M.D., Wotton, M., Marshall, G., de Groot, W.J., Johnston, J. Jurko, N. and Cantin, A.S. 2016. Fuel moisture sensitivity to temperature and precipitation: Climate change implications. *Climatic Change*. 134:59-71. DOI 10.1007/s10584-015-1521-0.
- Field, R.D., Spessa, A.C. Aziz, N.A. Camai, A. Cantin, A., Carr, R., de Groot, W.J. Dowdy, A.J. Flannigan, M.D., Manomaiphiboon, K., Pappenberger, F., Tanpipat, V. and Wang, X. 2015. Development of a Global Fire Weather Database. *Natural Hazards Earth Systems Science*. 15, 1407-1423, doi:10.5194/nhess-15-1407-2015.
- Reisen, F., Duran, S.M., Flannigan, M.D., Elliott, C. and Rideout, K. 2015. Wildfire smoke and public health risk. *International Journal of Wildland Fire*. 24:1029-1044.
- Flannigan, M.D. 2015. Fire Evolution split by continent. *News and Views. Nature Geoscience*. Doi:10.1038/ngeo2360.
- French, N., Jenkins, L. Loboda, T. Flannigan, M., Jandt, R. Bourgeau-Chavez L., and Whitley, M. 2015. Fire in Arctic tundra of Alaska: Past fire activity, future fire potential, and significance for land management and ecology. *International Journal of Wildland Fire*. 24:1045-1061.
- Wang, X., Thompson, D.K., Marshall, G.A., Tymstra, C., Carr, R. and Flannigan, M.D. 2015. Increasing frequency of extreme fire weather in Canada with climate change. *Climatic Change*. 130:573-586. DOI 10.1007/s10584-015-1375-5.
- Kettridge, N., Turetsky, M., Sherwood, J., Thompson, D., Miller, C., Benscoter, B., Flannigan, M., Wotton, M. and Waddington, M. 2015. Moderate drop in water table increases peatland vulnerability to post-fire regime shift. *Scientific Reports*. 5:8063. doi:10.1038/srep08063.
- Price, O.J., Pausas, J.G., Govender, G., Flannigan, M.D., Fernandes, P.M., Brooks, M.L. and Bird, R.B. 2015. Global patterns in fire leverage: the response of annual area burnt to previous fire. *International Journal of Wildland Fire*. 24:297-306.
- Wang, X., Parisien, M-A., Flannigan. M.D., Parks, S.A. Anderson, K.R. Little, J.M. and Taylor, S.W. 2014. The potential and realized spread of wildfires across Canada. *Global Change Biology*. 20:2518-2530. doi: 10.1111/gcb.12590.

- Scotto, M. G., Gouveia, S., Carvalho, A., Monteiro, A., Martins, V., Flannigan, M., San Miguel-Ayanz, J., Miranda, A.I. and C. Borrego. 2014. Area burned in Portugal over the last decades: an extreme value analysis. *International Journal of Wildland Fire*. 23:812-824.
<http://dx.doi.org/10.1071/WF13104>
- Parisien, M-A., Parks, S.A., Krawchuk, M.A., Little, J.M., Flannigan, M.D., Gowman, L.M., and Moritz, M.A. 2014. An analysis of controls on fire activity in boreal Canada: comparing models built with different temporal resolutions. *Ecological Applications*. 24:1341-1356.
<http://dx.doi.org/10.1890/13-1477.1>
- Lehsten, V., de Groot, W.J., Flannigan, M.D., Charles, G.T. and Balzter H. 2014. Wildfires in boreal ecoregions: evaluating the power law assumption and intra- and inter-annual variations. *JGR –Biogeosciences*. 119:14-23. DOI: 10.1002/2012JG002252
- Brandt, J.P., Flannigan, M.D., Maynard, D., Thompson, I. and Volney, W.J.A. 2013. An Introduction to Canada's boreal zone: ecosystem processes, health, sustainability and environmental issues. *Environmental Reviews*. 21:207-226.
- Price, D.T., Alfaro, R.I. Brown, K.J., Flannigan, M.D., Fleming, R.A., Hogg, E.H., Girardin, M.P., Lakusta, T., Johnston, M., McKenney, D.W., Pedlar, J., Stratton, T. Sturrock, R. Thompson, I., Trofymow, J.A. and Venier, L.A. 2013. Anticipating the consequences of climate change for Canada's boreal forest ecosystems. *Environmental Reviews*. 21:322-365.
- Keane, R., Cary, G., Flannigan, M., Parsons, R., Davies, I., King, K., Li, C., Bradstock, R., and Gill, A.M. 2013. Exploring the role of fire, succession, climate, and weather on landscape dynamics using comparative modeling. *Ecological Modelling*. 266:172-186.
- Flannigan, M.D. Cantin, A.S. de Groot, W.J. Wotton, M. Newbery, A. and Gowman, L.M. 2013. Global wildland fire season severity in the 21st century. *Forest Ecology and Management*. 294:64-71.
- de Groot, W.J., Flannigan, M.D., and Cantin, A.S. 2013. Climate change impacts on future boreal fire regimes. *Forest Ecology and Management*. 294:35-44.
- de Groot, W.J., Cantin, A.S., Flannigan, M.D., Soja, A.J., Gowman, L.M. and Newbery, A. 2013. A comparison of Canadian and Russian boreal forest fire regimes. *Forest Ecology and Management*. 294:23-34.
- Waddington, J.M. Thompson, D.K. Wotton, M. Quinton, W.L. Flannigan, M.D. Benscoter, B.W. Baisley, S.A. and Turetsky, M.R. 2012. Examining the utility of the Canadian Forest Fire Weather Index System in Canadian Boreal Peatlands. *Canadian Journal of Forest Research*. 42:47-58.
- Beverly, J.L. Flannigan, M.D. Stocks, B.J. and Bothwell, P. 2011. The association between Northern Hemisphere climate patterns and interannual variability in Canadian wildfire activity. *Canadian Journal of Forest Research*. 41:2193-2201.
- Carvalho, A. Monteiro, A. Flannigan, M. Solman, S. Miranda, A.I. and Borrego, C. 2011. Forest fires in a changing climate and their impacts on air quality. *Atmosphere Environment*. 45:5545-5553.
- Shabbar, A., Skinner, W. and Flannigan, M. 2011. Prediction of Seasonal Forest Fire Severity in Canada from Large-Scale Climate Patterns. *Journal of Applied Meteorology and Climatology*. 50:785-799.
- Benscoter, B.W., Thompson, D.K., Waddington, J.M., Flannigan, M.D., Wotton, B.M., de Groot, W.J. and Turetsky, M.R. 2011. Interactive effects of vegetation, soil moisture and bulk density on depth of burning of thick organic soils. *International Journal of Wildland Fire*. 20:418-429.

- Parisien, M.-A., Parks, S.A., Krawchuk, M.A., Flannigan, M.D., Bowman, L.M., and Moritz, M.A. 2011. Scale-dependent controls on the area burned in the boreal forest of Canada, 1980-2005. *Ecological Applications*. 21:789-805.
- Drobyshev, I., Flannigan, M., Bergeron Y., Girardin, M. and Suran, B. 2010. Variation in local weather explains differences in fire regimes within a Quebec south-eastern boreal forest landscape. *International Journal of Wildland Fire*. 19:1073-1082.
- Wotton, B.M., Nock, C.A. and Flannigan, M.D. 2010. Forest fire occurrence and climate change in Canada. *International Journal of Wildland Fire*. 19:253-271.
- Wang, Y., Flannigan, M. and Anderson, K. 2010. Correlations between forest fires in British Columbia, Canada, and sea surface temperature of the Pacific Ocean. *Ecological Modelling*. 221:112-129.
- Meyn, A., Taylor, S.W., Flannigan, M.D., Thonicke, K. and Cramer, W. 2010. Relationship between fire, climate oscillations, and drought in British Columbia, Canada, 1920-2000. *Global Change Biology*. 16:977-989. doi: 10.1111/j.1365-2486.2009.02061.x.
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- Flannigan, M.D., Krawchuk, M.A., de Groot, W.J., Wotton, B.M. and Gowman, L.M. 2009. Implications of changing climate for global wildland fire. *International Journal of Wildland Fire*. 18:483-507.
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- Spracklen, D.V., Mickley, L.J., Logan, J.A., Hudman, R.C., Yevich, R., Flannigan, M.D. and Westerling, A.L. 2009. Impacts of climate change from 2000 to 2050 on wildfire activity and carbonaceous aerosol concentrations in the western United States. *Journal of Geophysical Research*. 114, D20301, doi:10.1029/2008JD010966.
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- Amiro, B.D., Cantin, A., Flannigan, M.D. and de Groot, W. 2009. Future Emissions from Canadian Boreal Forest Fires. *Canadian Journal of Forest Research*. 39:383-395.
- Cary, G., Flannigan, M., Keane, R., Bradstock, R., Davies, I., Li, C., Lenihan, J., Logan, K., and Parsons, R. 2009. Relative importance of fuel management, ignition management and weather for area burned: Evidence from five landscape-fire-succession models. *International Journal of Wildland Fire*. 18:147-156.
- Drever, C.R., Bergeron Y., Drever, M.C., Flannigan, M., Logan, T. and Messier, C. 2009. Effects of climate on occurrence and size of large fires in a northern hardwood landscape: historical trends, future predictions, and implications for climate change in Témiscamingue, Québec. *Applied Vegetation Science*. DOI: 10.1111/j.1654-109X.2009.01035.x
- Balshi, M.S., McGuire, A.D., Duffy, P., Flannigan, M., Walsh, J., and Melillo, J. 2009. Assessing the response of area burned in western boreal North America using a Multivariate

- Adaptive Regression Splines (MARS) approach. *Global Change Biology*. 15: 578-600. DOI: 10.1111/j.1365-2486.2008.01679.x.
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- Krawchuk, M.A., Cumming, S.G. and Flannigan, M.D. 2008. Predicted changes in fire weather suggest increases in lightning fire initiation and future area burned in the mixedwood boreal forest. *Climatic Change*. 92:83-97. DOI 10.1007/s10584-008-9460-7.
- Le Goff, H. Girardin, M-P. Flannigan, M. and Bergeron, Y. 2008. Dendroclimatic inference of wildfire activity in Quebec over the 20th century and implications for natural disturbance-based forest management at the northern limit of the commercial forest. *International Journal of Wildland Fire*. 17:348-362.
- Carvalho, A., Flannigan, M., Logan, K., Miranda A. and Borrego C. 2008. Fire activity in Portugal and its relationship to weather and the Canadian Fire Weather Index System. *IJWF*. 17:328-338.
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