



Office of the Washington State Climatologist

PHILIP W. MOTE

Washington's State Climatologist

JISAO/CSES Climate Impacts Group, Box 354235
University of Washington
Seattle, WA 98195

philip@atmos.washington.edu
www.climate.washington.edu
(206) 616-5346

Education

UNIVERSITY OF WASHINGTON

Ph.D. in Atmospheric Sciences, January 1994.

Seattle, WA

HARVARD UNIVERSITY

B.A. with Honors in Physics, June 1987.

Cambridge, MA

Research Experience

**Research
Scientist**
(1/98-present)

JISAO/SMA Climate Impacts Group, University of Washington *Seattle, WA*
Climate variability and change, description and impacts; public outreach, interdisciplinary research.

Consultant
(7/98-present)

NorthWest Research Associates *Bellevue, WA*
Dynamics of the stratosphere and upper troposphere.

**Research
Scientist**
(8/96-6/98)

NorthWest Research Associates *Bellevue, WA*
Dynamics of the stratosphere.

**Research
Fellow**
(2/94-7/96)

Department of Meteorology, University of Edinburgh *Edinburgh, Scotland*
UK Universities' Global Atmospheric Modelling Programme.

Teaching Experience

Lecturer
(9/00-12/00,
1/02-3/02) and

Visiting Lecturer (3/97-6/97)

Department of Atmospheric Sciences, University of Washington *Seattle, WA*
Atmospheric Sciences 211 (Climate and Climate Change)

Teaching Asst.
(1/93-3/93)

Department of Atmospheric Sciences, University of Washington *Seattle, WA*
Atmospheric Sciences 102 (Climate)

Teacher
(9/87-6/89)

Monte Vista Christian High School *Watsonville, CA*
Physics, Mathematics (Algebra II through Calculus). Introduced
Advanced Placement Calculus, reformed math department curriculum,
coached math team in statewide contests.

Teaching Asst.
(6/88-8/88)

Department of Physics, Harvard College *Cambridge, MA*
Physics S1

Leadership

- Conference organizer** NATO Advanced Study Institute on Numerical Modelling of the Global Atmosphere, May-June 1998, *Castelvechio Pascoli, Italy*; International conference on regional integrated assessment, September 2002, *Castelvechio Pascoli, Italy*; Second International Conference on Climate Impacts Assessment, June-July 2004, *Grainau, Germany*; Third International Conference on Climate Impacts Assessment, July 2006, *Cairns, Australia*; Annual meeting of the American Association of State Climatologists, July 2007, *Coeur d'Alene, Idaho*
- Convener** Four sessions at meetings of the American Geophysical Union (5/99, 12/00, 12/08); Program Committee, Symposium on Connections between Mesoscale Processes and Climate Variability, AMS annual meeting 2007, *San Antonio, TX*; Program Chair, 21st Conference on Climate Variability and Change, American Meteorological Society, Phoenix, January 2009.
- Member** Climate Variations and Change Committee, American Meteorological Society, 2004-present. *National Integrated Drought Information System* Implementation Team.

Professional Societies

American Geophysical Union, American Meteorological Society, American Association of State Climatologists

Fellowships and Awards

- Listed in *Marquis Who's Who in America* since 2006.
University of Washington Distinguished Staff Award 2008.
Named one of the 25 most influential people in the region by Seattle Magazine, November 2008.
As lead author of the IPCC 4th assessment report, shared in the 2007 Nobel Peace Prize.
NASA Group Achievement Award to the Upper Atmosphere Research Satellite team, 2006.
Affiliate Professor, UW Department of Atmospheric Sciences, 2002-present.
NASA global change fellowship, 1991-1994; Harvard College Scholarship (meritorious award), 1986.

Publications

* not yet published

† Chapters in *Rhythms of Change: An Integrated Assessment of Climate Impacts on the Pacific Northwest*. A.K. Snover and E.L. Miles, eds. MIT Press, Boston, MA.

publication number bold: paper was peer-reviewed

† Mantua, N.J., and P.W. Mote, 200X: The Underlying Rhythms: Characteristics of Pacific Northwest Climate. Ch. 4.

† Mote, P.W., 200X: Possible Future Climate. Ch. 5.

† Hamlet, A.F., P.W. Mote, A.K. Snover, and E.L. Miles, 200X: Climate, water cycles, and water resources management in the Northwest. Ch. 6.

† Keeton, W.S., J.F. Franklin, and P.W. Mote, 200X: Climate Variability, Climate Change, and Forest Ecosystems in the Pacific Northwest. Ch. 8.

† Canning, D.J., and P.W. Mote, 200X: Climate impacts on the coasts of the Northwest. Ch. 9.

* Mote, P.W., J.R. Minder, and J.D. Lundquist, 200X: Surface and free-air variations in temperature: what is the true lapse rate in the Pacific Northwest? *Manuscript in preparation*.

* Mote, P.W., and J.D. Lundquist, 200X: Fine-scale temperature variability at Mt. Rainier, Washington. *Manuscript in preparation*.

* Casola, J.H., L. Cuo, B. Livney, D.P. Lettenmaier, P.W. Mote, and J.M. Wallace, 200X: Assessing the impacts of global warming on Pacific Northwest snowpack. *J. Climate*, in review.

* Slaughter, R., A.F. Hamlet, D. Huppert, J. Hamilton, and P.W. Mote, 200X: Policy vs. markets: Addressing over-allocation of Pacific Northwest river basins. *Journal of Natural Resources Policy Research*, in review.

* Beever, E.A., C. Ray, P.W. Mote, and J.L. Wilkening, 200X: Testing alternative mechanisms of climate stress in the ecoregional collapse of an alpine mammal. *Ecol. Appl.*, in review.

* Brown, R.D., and P.W. Mote, 2009: The response of northern hemisphere snow cover to a changing climate. *J. Climate*, in press.

* Fueglistaler, S., A.E. Dessler, T.J. Dunkerton, I. Folkins, Q. Fu, and P.W. Mote, 2009: The tropical tropopause layer. *Rev. Geophys.*, in press.

* Mote, P.W., 2008: Variability and trends in mountain snowpack in western North America. In *Proceedings of the AAAS Pacific Division annual meeting*, F. Wagner, ed., in press.

* in press.

70. Mote, P.W., and G. Kaser, 2008: The shrinking glaciers of Kilimanjaro: can global warming be blamed? pp 63-82 in *Melting Glaciers and Rising Sea Levels: Impacts and Implications*, P.S. Ranade, ed. Icfai University Press, Hyderabad, India.

69. Mote, P., E. Salathé, V. Dulière, and E. Jump, 2008: *Scenarios of future climate for the Pacific Northwest*. A report of the Climate Impacts Group for the State of Washington. 14 pp.

68. Kaser, G., and P.W. Mote, 2008: Gletscherschwund am Kilimanjaro. *Spectrum der Wissenschaft*, Januar, 62-69.

67. Mote, P.W., A. Peterson, H. Shipman, W.S. Reeder, and L. Whitely Binder, 2008: Sea level rise in the coastal waters of Washington. Report for the *Climate Impacts Group*, University of Washington, Seattle. 11pp.

66. National Research Council, 2008: *Research and Networks for Decision Support in the NOAA Sectoral Applications Research Program*. H.M. Ingram and P.C. Stern, eds., Committee on the Human Dimensions of Global Change, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press. 85pp.

65. Mote, P.W., A.F. Hamlet, and E.P. Salathé, Jr., 2007: Has spring snowpack declined in the Washington Cascades? *Hydrology and Earth System Sciences Discussions*, 4, 2073-2110, and *Hydrology and Earth System Sciences* 12, 193-206 (2008).

64. Mote, P.W., J. Casson, A. Hamlet, and D. Reading, 2007: Sensitivity of Northwest ski areas to warming. *Proc. Western Snow Conf. 2007*, B. McGurk, ed., 63-67.

63. Salathé, E.P., P.W. Mote, and M.W. Wiley, 2007: Review of scenario selection and downscaling methods for the assessment of climate change impacts on hydrology in the United States Pacific Northwest. *International Journal of Climatology*, 27, 1611-1621, doi: 10.1002/joc.1540.

62. Colman, R., W. Collins, J. Haywood, M. Manning, and P. Mote, 2007: The Physical Science behind climate change. *Scientific American*, August, 64-71.

61. Mote, P.W., and G. Kaser, 2007: The shrinking glaciers of Kilimanjaro: can global warming be blamed? *American Scientist*, 95, 318-325.

60. Trenberth, K.E., P.D. Jones, P. Ambenje, R. Bojariu, D. Easterling, A. Klein Tank, D. Parker, F. Rahimzadeh, J.A. Renwick, M. Rusticucci, B. Soden and P. Zhai, 2007: Observations: Surface and Atmospheric Climate Change. Chapter 3 in *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. 102pp.

59. Lemke, P., J. Ren, R.B. Alley, I. Allison, J. Carrasco, G. Flato, Y. Fujii, G. Kaser, P. Mote, R.H. Thomas and T. Zhang, 2007: Observations: Changes in Snow, Ice and Frozen Ground. Chapter 4 in: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. 48pp.

58. Hamlet, A.F., P.W. Mote, M.P. Clark, and D.P. Lettenmaier, 2007: 20th century trends in runoff, evapotranspiration, and soil moisture in the Western U.S. *J. of Climate*, 20, 1468-1486.

57. Keeton, W.S., P.W. Mote, and J.F. Franklin, 2007. Climate variability, climate change, and western wildfire with implications for the urban-wildland interface. In A. Troy and R. Kennedy (eds.), *Living on the Edge: Economic, Institutional and Management Perspectives on Wildfire Hazard in the Urban Interface*, pp 225-253. Elsevier Ltd., Oxford.

56. Alley, R., et al., 2007: Summary for Policymakers. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. 18pp.

55. Miles, E.L., A.K. Snover, L.C. Whitely Binder, E. Sarachik, P.W. Mote, and N.J. Mantua, 2007: An approach to designing a National Climate Service. *Proceedings of the National Academies of Sciences*, 103, 19616-19623. doi: 10.1073/pnas.0609090103.

54. Mote, P.W., 2006: Climate-driven variability and trends in mountain snowpack in western North America. *J. Climate*, 19, 6209-6220.

53. Mote, P.W., and R. Frey, 2006: Variability of clouds and water vapor in low latitudes: view from Moderate Resolution Imaging Spectroradiometer (MODIS), *J. Geophys. Res.*, 111, D16101, doi:10.1029/2005JD006791. 14pp.

52. Mote, P.W., E.P. Salathé and C. Peacock, 2006: Energy-relevant impacts of climate change in the Pacific Northwest. A report prepared for Portland General Electric Center for Science in the Earth System, University of Washington, Seattle.) 19pp.

51. Mote, P.W., A.F. Hamlet, and D.P. Lettenmaier, 2005: Variability and trends in mountain snowpack in western North America. In *Proceedings of the Western Snow Conference, April 19-22, 2004, Richmond, BC*. K. Elder et al., eds., 15-22.

50. Mote, P.W., E.P. Salathé, and C. Peacock. 2005. *Scenarios of Future Climate for the Pacific Northwest*. Climate Impacts Group, Center for Science in the Earth System, Joint Institute for the Study of the Atmosphere and Ocean, University of Washington. 13pp.

49. Mote, P.W., A.K. Snover, L.C. Whitely Binder, A.F. Hamlet, and N.J. Mantua, 2005: *Uncertain Future: Climate Change and Its Effects on Puget Sound - Foundation Document*. Climate Impacts Group, Center for Science in the Earth System, Joint Institute for the Study of the Atmosphere and Oceans, University of Washington. 42pp.

48. Snover, A.K., P.W. Mote, L.C. Whitely Binder, A. F. Hamlet, and N.J. Mantua. 2005. *Uncertain Future: Climate Change and Its Effects on Puget Sound*. Climate

Impacts Group, Center for Science in the Earth System, Joint Institute for the Study of the Atmosphere and Oceans, University of Washington. 36pp.

47. Hamlet, A.F., P.W. Mote, M.P. Clark, and D.P. Lettenmaier, 2005: Effects of precipitation and temperature variability on snowpack trends in the western United States, *J. Climate*, 18, 4545–4561.

46. Mote, P.W., A.F. Hamlet, M.P. Clark, and D.P. Lettenmaier, 2005: Declining mountain snowpack in western North America, *Bull. of the Amer. Meteorol. Soc.*, 86, 39–49.

45. Mote, P.W., 2004: Global climate is changing. (and) Response to Patrick Michaels. *Spring Hill Review*, L. Austen, ed. 2pp.

44. McKenzie, D., Z. Gedalof, D. Peterson, and P. Mote, 2004: Climatic change, wildfire, and conservation, *Cons. Biol.*, 18, 890–902.

43. Mote, P.W., 2004: Declines in snow water equivalent in the Pacific Northwest and their climatic causes. In *Proc. Western Snow Conf.*, B. McGurk, ed., 77–83.

42. Mote, P.W., 2004: “How and why is Northwest climate changing?” in *Climate Change, Carbon, and Forestry in Northwestern North America*, edited by David L Peterson and John L. Innes. Pacific Northwest research station general technical report, pp 11–22.

41. Mote, P.W., and T.J. Dunkerton, 2004: Kelvin wave signatures in stratospheric trace constituents. *J. Geophys. Res.*, 109, 10.1029/2002JD00370. 9pp.

40. Mote, P.W., A.F. Hamlet, and M. Clark, 2004: Variability and trends in mountain snowpack in western North America. *Proc. 15th Conf. on Global Climate Variations and Change*, Amer. Meteorol. Soc., Boston Mass. 10pp.

39. Mote, P.W., 2003: Twentieth-century fluctuations and trends in temperature, precipitation, and mountain snowpack in the Puget Sound/Georgia Basin region, *Canadian Water Resources Journal*, 28, 567–586.

38. Mote, P.W., 2003: Trends in temperature and precipitation in the Pacific Northwest, *Northwest Science*, 77, 271–282.

37. Mote, P.W., E.A. Parson, A.F. Hamlet, W.S. Keeton, D. Lettenmaier, N. Mantua, E.L. Miles, D.W. Peterson, D.L. Peterson, R. Slaughter, and A.K. Snover, 2003: Preparing for climatic change: the water, salmon, and forests of the Pacific Northwest. *Climatic Change*, 61, 45–88.

36. Mote, P.W., 2003: Trends in snow water equivalent in the Pacific Northwest and their climatic causes, *Geophys. Res. Letts.* 30, doi:10.1029/2003GL017258. 4pp.

35. Mote, P.W., and T.J. Dunkerton, 2003: Subseasonal water vapor variability in the tropical tropopause region. Proceedings of the Symposium on variability of water vapor, American Meteorological Society, Boston, MA.

34. Mote, P.W., and N.J. Mantua, 2002. Causes of climate variability in the Pacific Northwest. *Climate Report* 3(2) 2–6.

33. Snover, A.K., and P.W. Mote, 2002. Climate impacts on the natural resources of the Pacific Northwest. *Climate Report* 3(2) 7–11.

32. Mote, P.W., and N.J. Mantua, 2002: Coastal upwelling in a warmer future. *Geophys. Res. Letts.*, 10.1029/2002GL016086. 4pp.

31. Mantua, N.J., and P.W. Mote, 2002: Uncertainty in scenarios of human caused climate change. *Amer. Fish. Soc. Symp.*, 32, 263–272.

30. Mote, P.W., T.J. Dunkerton, and D. Wu, 2002: Kelvin waves in stratospheric temperature observed by the Microwave Limb Sounder. *J. Geophys. Res.*, 107(D14), 10.1029/2001JD001056, 2002, 10pp.

29. Mote, P.W., 2001: Scientific assessment of climate change: global and regional scales. White Paper. JI-SAO/SMA Climate Impacts Group, University of Washington, Seattle. 10pp.

28. Mote, P.W., and A.F. Hamlet, 2001: Anthropogenic climate change and snow in the Pacific Northwest. In *Proceedings of the Western Snow Conference*, K. Elder, ed., pp. 51-52.

27. Parson, E.A., P.W. Mote, A. Hamlet, N. Mantua, A. Snover, W. Keeton, E. Miles, D. Canning, and K. Ideker, 2001: Potential consequences of climate variability and change for the Pacific Northwest. Chapter 9 in *Climate Change Impacts in the United States, Foundation, National Assessment Synthesis Team*. Cambridge University Press. pp 247–280.

26. Gettelman, A., J. Harries, and P. Mote, 2000: Distribution and Variability of Water Vapour, Chapter 3 in *SPARC Assessment of Water Vapour in the Upper Troposphere and Lower Stratosphere*, D. Kley, J. Russell, and C. Phillips, eds., World Climate Research Programme, Paris. pp 197–264.

25. Mote, P.W., H.L. Clark, T.J. Dunkerton, R.S. Harwood, and H.C. Pumphrey, 2000: Intraseasonal variations of water vapor in the tropical upper troposphere and tropopause region. *J. Geophys. Res.*, 105, 17,457–17,470.

24. book: Mote, P.W., and A. O'Neill, editors, 2000: *Numerical Modeling of the Global Atmosphere in the Climate System*, Kluwer Academic Press, Dordrecht. 517pp.

23. Mote, P.W., 2000: Designing a GCM experiment: Fundamentals of the planning process. In: *Numerical Modeling of the Global Atmosphere in the Climate Sys-*

- tem, pp 119–126, P.W. Mote and A. O'Neill (eds), Kluwer Academic Press, Dordrecht.
22. Mote, P.W., E. Sarachik, and M. Déqué, 2000: Seasonal predictions. In: *Numerical Modeling of the Global Atmosphere in the Climate System*, pp 387–402, P.W. Mote and A. O'Neill (eds), Kluwer Academic Press, Dordrecht.
21. Mote, P.W., D. Paquin, and J. Yin, 2000: Snow White and the six dwarves run climate models in Italy. *Bull. of the Amer. Meteorol. Soc.*, 81, 1041–1045.
20. Mote, P.W., M. Holmberg, and N.J. Mantua, 1999: *Impacts of climate variability and change: Pacific Northwest. Executive summary*. A report of the JISAO/SMA Climate Impacts Group. 12 pp.
19. Mote, P.W., and 18 co-authors, 1999: *Impacts of climate variability and change: Pacific Northwest*. A report of the JISAO/SMA Climate Impacts Group. 110 pp.
18. Miles, E.L., N. Mantua, and P. Mote, 1999: ENSO impacts on the Pacific Northwest: An integrated assessment. *25th anniversary public proceedings of the School of Marine Affairs, May 7-8, 1998, Seattle*. W. Wooster and W. T. Burke (eds), University of Washington, pp 90–98.
17. Mote, P.W., W.S. Keeton, and J.F. Franklin, 1999: Decadal variations in forest fire activity in the Pacific Northwest. *11th Conference on Applied Climatology*, American Meteorological Society, pp 155–156.
16. Clark, H.L., R.S. Harwood, P.W. Mote, and W.G. Read, 1998: Variability of water vapor in the tropical upper troposphere as measured by the Microwave Limb Sounder on UARS. *J. Geophys. Res.*, 103, 31,695–31,708.
15. Mote, P.W., T.J. Dunkerton, and H.C. Pumphrey, 1998: Sub-seasonal variations in lower stratospheric water vapor. *Geophys. Res. Lett.*, 25, 2445–2448.
14. Mote, P.W., T.J. Dunkerton, M.E. McIntyre, E.A. Ray, P.H. Haynes, and James M. Russell III, 1998: Vertical velocity, vertical diffusion, and dilution by midlatitude air in the tropical lower stratosphere. *J. Geophys. Res.*, 103, 8651–8666.
13. Mote, P.W., P.A. Stott, and R.S. Harwood, 1998: Stratospheric flow during two recent winters simulated by a mechanistic model. *Mon. Wea. Rev.*, 128, 1655–1680.
12. Elson, L.S., W. Read, J.W. Waters, P.W. Mote, J.S. Kinnersley, and R.S. Harwood, 1996: Space-time variations in water vapor as observed by the UARS Microwave Limb Sounder. *J. Geophys. Res.*, 101, 9001–9015.
11. Mote, P.W., K.H. Rosenlof, M.E. McIntyre, E.S. Carr, J.C. Gille, J.R. Holton, J.S. Kinnersley, H.C. Pumphrey, J.M. Russell III, and J.W. Waters, 1996: An atmospheric tape recorder: The imprint of tropical tropopause temperatures on stratospheric water vapor. *J. Geophys. Res.*, 101, 3989–4006.
10. Mote, P.W., 1995: Reconsideration of the cause of dry air in the southern middle latitude stratosphere. *Geophys. Res. Letters*, 22, 2025–2028.
9. Mote, P.W., K.H. Rosenlof, J.R. Holton, R.S. Harwood, and J.W. Waters, 1995: Seasonal variations of water vapor in the tropical lower stratosphere, *Geophys. Res. Letters*, 22, 1093–1096.
8. Carr, E.S., R.S. Harwood, P.W. Mote, G.E. Peckham, R.A. Suttie, W.A. Lahoz, A. O'Neill, L. Froidevaux, R.F. Jarnot, W.G. Read, J.W. Waters, and R. Swinbank, 1995: MLS stratospheric water vapor in the tropics, *Geophys. Res. Letters*, 22, 691–694.
7. Mote, P.W., 1995: The annual cycle of stratospheric water vapor in a general circulation model. *J. Geophys. Res.*, 100, 7363–7380.
6. Mote, P.W., 1994: Assessment of stratospheric water vapor in a general circulation model. PhD Thesis, University of Washington, Seattle. Advisor Jim Holton.
5. Mote, P.W., J.R. Holton, and B.A. Boville, 1994: Characteristics of stratosphere-troposphere exchange in a general circulation model. *J. Geophys. Res.*, 99, 16,815–16,829.
4. Mote, P.W., J.R. Holton, J.M. Russell III, and B.A. Boville, 1993: A comparison of observed (HALOE) and modeled (CCM2) methane and stratospheric water vapor. *Geophys. Res. Lett.*, 20, 1419–1422.
3. Mote, P.W., and J.R. Holton, 1992: Stratospheric water vapor in the NCAR CCM2. Eighth Conference on the Middle Atmosphere, January 5-10 1992, Atlanta, Georgia, American Meteorological Society, pp. 41–46.
2. Boville, B.A., J.R. Holton and P.W. Mote, 1991: Simulation of the Pinatubo aerosol cloud in a general circulation model. *Geophys. Res. Lett.* 18, 2281–2284.
1. Mote, P.W., J.R. Holton and J.M. Wallace, 1991: Variability in total ozone associated with baroclinic waves. *J. Atmos. Sci* 48, 1900–1903.