Annual Report to

NOAA’s Climate Observations Program

Cumulative Publications List

High Resolution Climate Data From Research and Volunteer Observing Ships

Project Manager: C. W. Fairall, Chief of Clouds, Radiation, and Surface Fluxes Division.

NOAA Environmental Technology Laboratory, 325 Broadway, Boulder, CO 80305

303-497-3253 [Chris.Fairall@noaa.gov](mailto:Chris.Fairall@noaa.gov)

Finance Contact: Jo Novosel, 303-497-6588 [Jo.Novosel@noaa.gov](mailto:Jo.Novosel@noaa.gov)

Lab Director: William D. Neff

PUBLICATIONS (2003 – 2012)

Petersen, Walter A., R. Cifelli, D. J. Bocippio, S. A. Rutledge, and C. W. Fairall, 2003: Convection and easterly wave structure observed in the Eastern Pacific warm-pool during EPIC-2001. *J. Atmos. Sci.*, **60**, 1754-1773.

Fairall, C. W., E. F. Bradley, J. E. Hare, A. A. Grachev, and J. B. Edson, 2003: Bulk parameterization of air-sea fluxes: Updates and verification for the COARE algorithm. *J. Clim.*, **16**, 571-591.

Brunke, M. A., C W. Fairall, and X. Zeng, 2003: Which bulk aerodynamic algorithms are least problematic in computing ocean surface turbulent fluxes? *J. Clim*., **16**, 619-635.

Grachev, A. A., C. W. Fairall, J. E. Hare, and J. B. Edson, 2003: Wind stress vector over ocean waves. *J. Phys. Oceanography*, **33**, 2408-2429.

Bretherton, C. S., T. Uttal, C. W. Fairall, S. E. Yuter, R. A. Weller, D. Baumgardner, K. Comstock, and R. Wood, 2004: The EPIC 2001 Stratocumulus Study. *Bull. Am. Met. Soc*., **85**, 967-977.

Hare, J. E., C. W. Fairall, W. R. McGillis, B. Ward, and R. Wanninkhof, 2004: Evaluation of the NOAA/COARE air-sea gas transfer parameterization using GasEx data*. J. Geophys. Res*., **109** (C8): Art. No. C08S.

Curry, J. A., and 18 coauthors, 2004: SEAFLUX. *Bull. Am. Met. Soc.,* **85**, 409-424

Zeng, X., M. A. Brunke, M. Zhou, C. W. Fairall, N. A. Bond, and D. H. Lenschow, 2004: Marine atmospheric boundary layer height over the Eastern Pacific: Data analysis and model evaluation. *J. Clim*., **17**, 4159-4170.

Raymond, D. J., S. K. Esbensen, M. Gregg, C. S. Bretherton, L. K. Shay, and T. Uttal, 2004: EPIC2001 and the coupled ocean-atmosphere system of the tropical East Pacific. *Bull. Am. Met. Soc*., 85, 1341-1354.

Pyatt, Hollis, B. A. Albrecht, C. W Fairall, Nick Bond, and P. Minnis, 2005: Evolution of marine atmospheric boundary layer structure across the Cold Tongue ITCZ Complex. *J. Clim*., **18**, 737-753.

Kollias, Pavlos, C. W. Fairall, P. Zuidema, J. Tomlinson, and G. A. Wick, 2004: Observations of marine stratocumulus in SE Pacific during the PACS 2003 Cruise. *Geophys. Res. Lett*., **31**, Art. No. L22110.

Huebert, B., B. Blomquist, J. E. Hare, C. W. Fairall, T. Bates, and J. Johnson, 2004: Measurements of the sea-air DMS flux and transfer velocity using eddy correlation. *Geophys. Res. Lett.*, **31** (23): Art. No. L23113.

Wick, Gary A., J. Carter Ohlmann, Christopher W. Fairall, and Andrew T. Jessup, 2005: Improved oceanic cool-skin corrections using a refined solar penetration model.  *J. Phys. Oceanogr.*, **35**, 1986-1996.

Cronin, M. F., N. Bond, C. W. Fairall, and R. A. Weller, 2006: Surface cloud forcing in the Eastern Tropical Pacific. *J. Clim.*, **19**, 392-409.

Zhou, Mingyyu, Xubin Zeng, Michael Brunke, Zhanhai Zhang, and C. W. Fairall, 2005: Study on macro- and microphysical properties of stratus and stratocumulus over the Eastern Pacific. *Geophys. Res. Lettl.,* **33(2)**, Art. No. L02807.

Cronin, M., C. W. Fairall, and M. J. McPhaden, 2006: An assessment of buoy-derived and NWP surface heat fluxes in the Tropical Pacific. *J. Geophys. Res.*, **111**, C06038, doi:10.1029/2005JC003324.

Fairall, C. W., J. E. Hare, Ludovic Bariteau, A. Grachev, and R. J. Hill, 2006: Coastal effects on turbulent bulk transfer coefficients and ozone deposition velocity in ICARTT. *J. Geophys.* **111**, D23S20, doi:1029/2006JD007597.

Wolfe, D. E., C.W. Fairall, D.C. Welsh, M. Ratterree, A.W. Brewer, J.M. Intrieri, C.J. Senff, B.J. McCarty, S. Tucker, D.C. Law, A.B. White, and D.E. White, 2007: Shipboard multi-sensor merged wind profilers from NEAQS 2004: Radar wind profiler, high-resolution Doppler lidar, GPS rawinsonde, *J. Geophys. Res.*, **112**, D10S15, doi:10.1029/2006JD007344.

Fairall, C. W., J. E. Hare, T. Uttal, D. Hazen, Meghan Cronin, Nicholas A. Bond, and Dana Veron, 2008: A seven-cruise sample of clouds, radiation, and surface forcing in the Equatorial Eastern Pacific. *J. Clim*., **21**, 655-673.

Weller, R.A., E.F. Bradley, J. Edson, C.W. Fairall, I. Brooks, M.J. Yelland, and R.W. Pascal, 2008: Sensors for physical fluxes at the sea surface: Energy, heat, water, and salt. *Ocean Sci. Discuss*., **5**, 327-373, 2008.

De Szoeke, S.P., C.W. Fairall, and S. Pezoa, 2009: Ship observations of the tropical Pacific Ocean along the coast of South America. *J. Clim.*, **22**, 458-464.

Ghate, Virendra P., Bruce A. Albrecht, Christopher W. Fairall and Robert A. Weller, 2009: Climatology of marine stratocumulus cloud fraction in the South-East Pacific using surface longwave radiative flux observations*. J. Clim.*, **22**, 5527-5540.

DeSzoeke, Simon P., C. W. Fairall, D.E. Wolfe, L. Bariteau, and P. Zuidema 2009: Surface flux observations in the southeastern tropical Pacific and attribution of SST errors in coupled ocean-atmosphere models. *J. Clim.*, 23, pp 4152-4174.

Bariteau, L., D. Helmig, C.W. Fairall, J.E. Hare, J. Hueber, and E.K. Lang, 2010: Determination of oceanic ozone deposition by ship-borne eddy covariance measurements.  *Atmos. Meas. Tech.*, 3, pp 441-455.

Fairall, C. & Co-Authors, 2010: Observations to Quantify Air-Sea Fluxes and Their Role in Climate Variability and Predictability in *Proceedings of OceanObs’09: Sustained Ocean Observations and Information for Society (Vol. 2),* Venice, Italy, 21-25 September 2009, Hall, J., Harrison D.E. & Stammer, D., Eds., ESA Publication WPP-306.

Woods, R., and 32 coauthors, 2010: The VAMOS Ocean-Cloud-Atmosphere-Land Study Regional Experiment (VOCALS-REx): Goals, platforms, and field operations. *Atmos. Chem. Phys. Discuss.,* **10**, 20769-20822, 2010. www.atmos-chem-phys-discuss.net/10/20769/2010/.

Andreas, E.L., K.F. Jones, and C.W. Fairall, 2011: The production velocity of sea spray droplets. *J. Geophys. Res.*, **115**, C12065, doi:10.1029/2010JC006458.

Rowe, M.D., C.W. Fairall, and J.A. Perlinger, 2011: Chemical sensor resolution requirements for near-surface measurements of turbulent fluxes*. Atmos. Chem. Phys.*, **11**, 5263–5275, doi:10.5194/acp-11-5263-2011.

De Leeuw, G., C.W. Fairall, E.L Andreas, M.D. Anguelova, E.R. Lewis, C. O’Dowd, M. Schulz, and S.E. Schwartz, 2011: Primary production of sea spray aerosol. *Rev. Geophys.*, **49**, RG2001, doi:10.1029/2010RG000349.

Grachev, A. A., Ludovic J. Bariteau, J. Hueber, K. Lang, D. Helmig, C. W. Fairall, and J. E. Hare, 2011: Near-surface Ozone fluxes from ship-based eddy-correlation measurements during TexAQS 2006. *J. Geophys. Res.,* **116**, D13110, doi:10.1029/2010JD015502.

Yang, M., B.W. Blomquist, C.W. Fairall, S.D. Archer, and B.J. Huebert, 2011: Effects of sea surface temperature and gas solubility on air-sea exchange of Dimethylsulfide (DMS).  *J. Geophys. Res*., **116**, C00F05, doi:10.1029/2010JC006526.

Lauvset, S. K., W. R. McGillis, L. Bariteau, C. W. Fairall, T. Johannessen, A. Olsen, and C. J. Zappa, 2011: Direct measurements of CO2 flux in the Greenland Sea, *Geophys. Res. Lett.*, **38**, L12603, doi:10.1029/2011GL047722.

Fairall, C.W., Mingxi Yang, Ludovic Bariteau, J.B. Edson, D. Helmig, W. McGillis, S. Pezoa, J.E. Hare, B. Huebert, and B. Blomquist, 2011: Implementation of the COARE flux algorithm with CO2, DMS, and O3. *J. Geophys. Res.*, **116**, doi:10.1029/2010JC006884.

Edson, J.B., C.W. Fairall, Ludovic Bariteau, C.J. Zappa, A. CIfuentes-Lorenzen, W.M. McGillis, S. Pezoa, J.E. Hare, and D. Helmig, 2011: Eddy-covariance measurement of CO2 gas transfer velocity during the 2008 Southern Ocean Gas Exchange Experiment: Wind speed dependency. *J. Geophys. Res.*, **116**, C00F10, doi:10.1029/2011JC007022.

Helmig, D., E.K. Lang, L. Bariteau, L. Ganzeveld, C.W. Fairall, J.E. Hare, P. Boylan, and J. Hueber, 2012: Atmosphere-ocean ozone fluxes during the TexAQS 2006, STRATUS 2006, GOMECC 2007, GasEX 2008, and AMMA 2008 cruises. *J. Geophys. Res.,* **117**, doi:10.1029/2011JD015955.

De Szoeke, Simon P., Sandra Yuter, David Mechem, C. W. Fairall, Casey Burleyson, Paquita Zuidema, 2012: Observations of stratocumulus clouds and their effect on the eastern Pacific surface heat budget along 20°S. *J. Clim.,* ***25****, 8542–8567. doi:* [*http://dx.doi.org/10.1175/JCLI-D-11-00618.1*](http://dx.doi.org/10.1175/JCLI-D-11-00618.1)

Blomquist, B.W., B.J.Huebert, S.T.Wilson, C.W.Fairall, 2012: Direct measurement of the oceanic carbon monoxide flux by eddy correlation.  *Atmos. Meas. Tech..,* ***5****, 3069–3075. www.atmos-meas-tech.net/5/3069/2012/doi:10.5194/amt-5-3069-2012*

Bourassa, M., S. Gille, C. Bitz, D. Carlson, I. Cerovecki, M. Cronin, W. Drennan, C. Fairall, R. Hoffman, G. Magnusdottir, R. Pinker, I. Renfrew, M. Serreze, K. Speer, L. Talley, and G. Wick, 2013: High-Latitude ocean and sea ice surface fluxes: Requirements and challenges for climate research. *Bull. Am. Met. Soc.*, **94**, 403-423.

Edson, J.B., J. V. S. Raju, C.W. Fairall, R.A. Welle**r**, S. Bigorre**,** A. Plueddemann, andHans Hersbach, 2013**:** On the Exchange of momentum over the open ocean. *J. Phys. Oceanogr.*, **43**, 1589–1610. doi: <http://dx.doi.org/10.1175/JPO-D-12-0173.1>

Grachev, A.A., Edgar L. Andreas, C. W. Fairall, Peter S. Guest, P. Ola G. Persson, 2013**:** The critical Richardson number and limits of applicability of local similarity theory in the stable boundary layer.  *Bound.-Layer Meteorol.*, **145**, DOI 10.1007/s10546-012-9771-0.

Ghate, Virendra P., Bruce A. Albrecht, Mark A. Miller, Alan Brewer, and Christopher W. Fairall, 2013: Turbulence and radiation in stratocumulus topped marine boundary layer: A case study from VOCALS-Rex. *J. Geophys. Res*., to appear.

Vecherin, S.N., V.E. Ostashev, C.W. Fairall, D.K. Wilson, and L. Bariteau, 2013: Sonic anemometer as a small acoustic tomography array. *Bound.-Layer Meteorol*., to appear.

Mechoso, Carlos R., Robert Wood, Robert Weller, Christopher S Bretherton, Anthony D Clarke, Hugh Coe, C.W. Fairall, J Tom Farrar, Graham Feingold, Rene Garreaud, Carmen Grados, James C McWilliams, Simon P de Szoeke, Sandra E Yuter, and Paquita Zuidema, 2013: Ocean-Cloud-Atmosphere-Land Interactions in the Southeastern Pacific: The VOCALS Program. *Bull. Am. Meteorol. Soc*., to appear.

Yang, M., P. Nightingale, Rachael Beale, Peter S. Liss, Byron Blomquist, and C.W. Fairall, 2013: Atmospheric deposition of Methanol over the Atlantic Ocean. *Proc. Nat. Academ. Sci*. *USA*, to appear.

Blomquist, B. W., L. Bariteau, J. W. Edson, C. W. Fairall, J. E. Hare, W. R. McGillis, B. J. Huebert, S. D. Miller, and E. S. Saltzman, 2013: Advances in ship-based air-sea CO2 flux measurement by eddy covariance*. J. Geophys. Res*., submitted.

Edson, J.B., J. V. S. Raju, C.W. Fairall, J.W. Wilczak, C. A. Friehe, S. D. Miller, and T.S. Hristov, 2013: Energy flux and its dissipation in the marine surface layer. *J. Geophys. Res*., submitted.