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

Finance Contact: Jo Novosel, 303-497-6588 Jo.Novosel@noaa.gov

Lab Director: William D. Neff

PUBLICATIONS (2003 – 2014)

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. Appl. Met. Clim*., **53**, 117–135. doi: <http://dx.doi.org/10.1175/JAMC-D-12-0225.1>.

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***149**, 165–178, DOI 10.1007/s10546-013-9843.

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*., ., **95**, 357–375. doi: <http://dx.doi.org/10.1175/BAMS-D-11-00246.1>.

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,* **110,** DOI: 10.1073/pnas.1317840110, 20034-20039.

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*. Bound.-Layer Meteorol.,* **152**, 245–276, DOI 10.1007/s10546-014-9926-2.

Moum, J.A., Simon P. de Szoeke, William D. Smyth, James B. Edson, H. Langley DeWitt, Aurélie J. Moulin, Elizabeth J. Thompson, Christopher J. Zappa, Steven A. Rutledge, Richard H. Johnson and Christopher W. Fairall, 2014: Air-sea interactions from westerly wind bursts during the November 2011 MJO in the Indian Ocean. *Bull. Am. Meteor. Soc*., doi:10.1175/BAMS-D-12-00225.

Coburn, S., I. Ortega, R. Thalman, B. Blomquist, C. W. Fairall, and R. Volkamer, 2014: Measurements of diurnal variations and Eddy Covariance (EC) fluxes of glyoxal in the tropical marine boundary layer: description of the Fast LED-CE-DOAS instrument. *Atmos. Meas. Tech*., **7**, 3579–3595, [www.atmos-meas-tech.net/7/3579/2014/](http://www.atmos-meas-tech.net/7/3579/2014/), doi:10.5194/amt-7-3579-2014.

Ghate, Virendra P., Mark A. Miller, Bruce A. Albrecht, and C. W. Fairall, 2014: Thermodynamic and radiative structure of stratocumulus topped boundary layers. *J. Atmos. Sci*., accepted.