

21st CONFERENCE ON AGRICULTURAL AND FOREST METEOROLOGY

11th CONFERENCE ON BIOMETEOROLOGY AND AEROBIOLOGY

March 7 - 11, 1994

San Diego, California

Sponsored by

American Meteorological Society

Front Cover: Courtesy of Lawrence E. Hipps, Department of Plants, Soils, and Biometeorology,
Utah State University, Logan, UT

UB/TIB Hannover 89
113 013 930



All Rights Reserved. No part of this publication may be reproduced or copied in any form or by any means -- graphic, electronic, or mechanical, including photocopying, taping, or information storage and retrieval systems -- without the prior written permission of the publisher. Contact AMS for permission pertaining to the overall collection. Authors retain their individual rights and should be contacted directly for permission to use their material separately. The manuscripts reproduced herein are unrefereed papers presented at the *21st Conference on Agricultural & Forest Meteorology and 11th Conference on Biometeorology and Aerobiology*. Their appearance in this collection does not constitute formal publication.

AMERICAN METEOROLOGICAL SOCIETY
45 Beacon Street, Boston, Massachusetts USA 02108-3693

TABLE OF CONTENTS

21ST CONFERENCE ON AGRICULTURAL AND FOREST METEOROLOGY

Page

III FOREWORD

v AUTHOR INDEX

SESSION 2: RADIATIVE EXCHANGES IN VEGETATED SURFACES

- 1 2.1 THE UVB AND PAR RADIATION ENVIRONMENT OF SORGHUM BICOLOR CANOPIES. R. H. Grant, M. A. Jenks, and P. J. Rich, Purdue Univ., W. Lafayette, IN
- 5 2.2 CANOPY ARCHITECTURE AND RADIATION INTERCEPTION: MEASUREMENTS AND SIMULATION FOR A FRUIT TREE. Fabrizio Nerozi, F. Rossi, O. Facini, Fruit Trees Ecophysiology Inst.; and T. Georgiadis, Inst. of Physics & Chemistry of Lower and Upper Atmosphere, Consiglio Nazionale delle Ricerche, Italy
- 9 2.3 ARE CROPS AND FORESTS SPHERICAL?: THE ROLE OF CANOPY RADIATIVE TRANSFER MODELS ON CALCULATING CANOPY CO₂ AND ENERGY EXCHANGE RATES. Dennis Baldocchi, NOAA/Atmospheric Turbulence and Diffusion Div. (ATDD), Oak Ridge, TN
- * 2.4 OPTICAL REMOTE SENSING OF VEGETATED LAND SURFACES. Ranga B. Myneni, NASA/Goddard Space Flight Ctr. (GSFC), Greenbelt, MD
- 12 2.5 INFLUENCE OF PENUMBRA ON UNDERSTORY PHOTOSYNTHESIS IN RELATION TO CANOPY STRUCTURE IN A FOREST CANOPY. Hongliang Tong and R. W. Pearcy, Univ. of California, Davis, CA
- 16 2.6 ATMOSPHERIC EMISSIVITY UNDER CLOUDLESS AND CLOUDY SKIES. Esmail Malek and G. E. Bingham, Utah State Univ., Logan, UT

SESSION 3: THE STRUCTURE OF THE ABL: MEASUREMENTS AND MODELLING

- 20 3.1 STRUCTURE OF THE ATMOSPHERE IN AN URBAN PLANETARY BOUNDARY LAYER FROM LIDAR AND RADIOSONDE OBSERVATIONS. D. I. Cooper, W. E. Eichinger, and C. R. Quick, Los Alamos National Lab. (LANL), Los Alamos, NM
- 24 3.2 HIGH RESOLUTION PROPERTIES OF THE MARINE ATMOSPHERIC BOUNDARY LAYER. D. I. Cooper, W. Cottingham, W. E. Eichinger, P. Forman, C. Lebeda, D. Poling, and R. Thorton, LANL, Los Alamos, NM
- 28 3.3 ATMOSPHERIC BOUNDARY LAYER CIRCULATIONS IN NORTHEASTERN NEVADA. E. G. Astling, Dugway Proving Ground, Dugway, UT
- 32 3.4 WIND-SPEED MEASUREMENTS WITH A SCANNING ELASTIC-BACKSCATTER LIDAR. William T. Buttler and W. E. Eichinger, LANL, Los Alamos, NM
- 36 3.5 AN ANALYSIS OF ABL DATA OBTAINED DURING FIFE BY A 3-D LES MODEL. Kemal Güreç, G. J. Tripoli, and E. W. Eloranta, Univ. of Wisconsin, Madison, WI
- 3.6 PAPER WITHDRAWN

* Manuscript not available

TABLE OF CONTENTS

21ST CONFERENCE ON AGRICULTURAL AND FOREST METEOROLOGY

POSTER SESSION P1: SURFACE-ATMOSPHERE INTERACTIONS

- 40 P1.1 EMISSIONS OF IODINE AND CESIUM FROM AGRICULTURAL AND FORESTRY BURNING. B. D. Amiro, F. L. Johnston, S. C. Sheppard, and W. G. Evenden, AECL Research, Whiteshell Labs., Pinawa, Manitoba, Canada
- 42 P1.2 A COMPARISON OF THE MICROCLIMATE IN THREE SHADE ENVIRONMENTS. Elizabeth A. Graser and H. Xia, Univ of Hawaii, Honolulu, HI
- 46 P1.3 PC GRAPHICS FOR PROJECT WIND DATA. John D. Kincheloe, Physical Science Lab., Las Cruces, NM
- 50 P1.4 EFFECTS OF CANOPY MICROMETEOROLOGY ON THE TURBULENT TRANSPORT WITHIN AN URBAN DECIDUOUS FOREST. Frank J. Marsik and P. J. Samson, Univ. of Michigan, Ann Arbor, MI
- 52 P1.5 MICRO-SCALE ADVECTION TO A CIRCULAR BARE WET OPENING IN A STRAW MULCH. Michael D. Novak, W. Chen, A. L. Orchansky, and R. Ketter, Univ. of British Columbia, Vancouver, B.C., Canada
- 56 P1.6 INFLUENCE OF TURBULENCE ON THE LIGHT ENVIRONMENT WITHIN PLANT CANOPIES. Hongliang Tong, Univ. of California, Davis, CA; and L. E. Hips, Utah State Univ., Logan, UT
- * P1.7 AGMETNET: AN ELECTRONIC MAIL INFORMATION EXCHANGE FOR AUTOMATED AGRICULTURAL WEATHER STATION INTERESTS. Rodger R. Getz, NOAA/NWS, Auburn, AL
- 60 P1.8 CHANGES IN THE EDDY FLUXES OF HEAT, LATENT HEAT, CARBON DIOXIDE, AND OZONE OVER A VINEYARD DURING A PARTIAL SOLAR ECLIPSE. Harold H. Neumann and G. den Hartog, Atmospheric Environment Service (AES), Downsview, Ontario, Canada
- 64 P1.9 COMPARISON OF GROUND-DERIVED AND SATELLITE-DERIVED SURFACE ENERGY FLUXES FROM A SHRUB-STEPPE SITE. R. R. Kirkham and G. W. Gee, Battelle, Pacific Northwest Lab. (PNL), Richland; and L. J. Fritschen, Univ. of Washington, Seattle, WA

SESSION 4: TRANSPORT MECHANISMS BETWEEN VEGETATION AND THE ATMOSPHERE

- 68 4.1 ON ANALYZING THE PRESENCE AND EFFECTS OF VEGETATIVE CANOPIES UPON THE AMBIENT SURFACE LAYER AIRFLOW. Ronald M. Clonco and J. H. Byers, U.S. Army Research Lab., White Sands Missile Range, NM
- 72 4.2 AIRFLOW INDICES AND CHARACTERISTICS WITHIN AND ABOVE REGULAR AND IRREGULAR ROUGHNESS DOMAINS. Brian L. Orndorff and R. M. Clonco, U.S. Army Research Lab., White Sands Missile Range, NM
- 76 4.3 AN INTERMITTENT MODEL FOR DESCRIBING HEAT AND MASS TRANSFER WITHIN PLANT CANOPIES. Rushdi M. M. El-kilani and A. A. F. G. Jacobs, Wageningen Agricultural Univ., Wageningen; and J. H. Van Boxel, Univ. of Amsterdam, The Netherlands
- 80 4.4 INTERMITTENT CANOPY TURBULENT TRANSPORT, CORRELATIONS TIME DOMAIN MAPS AND THE RESULTING INHERENT INADEQUACY OF USING LARGE TIME AVERAGED SECOND ORDER CLOSURE TO DESCRIBE CANOPY TURBULENT TRANSPORT PROCESSES. Rushdi M. M. El-kilani, and A. A. F. G. Jacobs, Wageningen Agricultural Univ., Wageningen; and J. H. Van Boxel, Univ. of Amsterdam, The Netherlands
- 84 4.5 APPLICATION OF THE TRANSILIENT TURBULENCE THEORY TO MODEL TURBULENT TRANSPORT PROCESSES IN VEGETATION. Xiusheng Yang, W. Ni, and D. R. Miller, Univ. of Connecticut, Storrs, CT

* Manuscript not available

TABLE OF CONTENTS

21ST CONFERENCE ON AGRICULTURAL AND FOREST METEOROLOGY

- 86 4.6 MODELLING TURBULENT AIRFLOW IN SPARSE TREE CANOPIES. Steve Green, Horticultural and Food Research Inst. of New Zealand Ltd., Palmerston North, New Zealand; N. Hutchings, Macaulay Land Use Research Inst., Craigiebuckler, Aberdeen; and J. Grace, Edinburgh Univ., Edinburgh, UK
- 88 4.7 A COMPARISON OF TWO LARGE-EDDY SIMULATIONS OF TURBULENT FLOW ABOVE AND WITHIN A FOREST CANOPY. Edward G. Patton, Univ. of California, Davis, CA and NCAR, Boulder, CO; R. H. Shaw, K. T. Paw U, Univ. of California, Davis, CA; and C.-H. Moeng, NCAR, Boulder, CO
- 92 4.8 REVISION OF THE TWO-LAYER RESISTANCE MODEL FOR THE ENERGY BALANCE OF SPARSE CANOPIES. K. G. McNaughton, Horticultural and Food Research Inst. of New Zealand, Palmerston North, New Zealand; and B. J. J. M. van den Hurk, Wageningen Agricultural Univ., Wageningen, The Netherlands
- 94 4.9 ESTIMATING GASEOUS EMISSION USING BACKWARD LAGRANGIAN STOCHASTIC DISPERSION MODELS. T. K. Flesch and J. D. Wilson, Univ. of Alberta, Edmonton; and E. Yee, Defence Research Establishment Suffield, Medicine Hat, Alberta, Canada
- 98 4.10 THE USAGE OF STRUCTURE FUNCTIONS IN STUDYING TURBULENT COHERENT STRUCTURES AND ESTIMATING SENSIBLE HEAT FLUX. K. T. Paw U and H.-B. Su, Univ. of California, Davis, CA
- 100 4.11 TOWARDS THE DEVELOPMENT OF AN EMPIRICAL-DYNAMIC MODEL OF COHERENT STRUCTURES IN ASSOCIATION WITH VEGETATIVE CANOPIES. William D. Ohmstede, Las Cruces; and R. M. Clonco, U.S. Army Research Lab., White Sands Missile Range, NM
- 104 4.12 A SURFACE RENEWAL DESCRIPTION OF THE EXCHANGE OF SCALARS BETWEEN FULL CANOPIES AND THE ATMOSPHERE. Antonio R. Pereira, Piracicaba-SP, Brazil; and K. T. Paw U, Univ. of California, Davis, CA
- 106 4.13 PSEUDO-WAVELET ANALYSIS OF TURBULENCE PATTERNS IN THREE VEGETATION LAYERS. Jie Qiu, K. T. Paw U, and R. H. Shaw, Univ. of California, Davis, CA

SESSION 5: FOOTPRINTS AND BOUNDARY LAYER INTERACTIONS FOR HETEROGENEOUS SURFACES

- * 5.1 THE IMPACT OF SPATIAL VARIABILITY OF LAND-SURFACE CHARACTERISTICS AT THE CANOPY SCALE ON ENERGY FLUXES IN THE ATMOSPHERIC SURFACE LAYER. R. Avissar, D. C. Collins, and B. Li, Rutgers Univ., New Brunswick, NJ
- * 5.1a LARGE-EDDY SIMULATIONS OF THE ATMOSPHERIC PLANETARY BOUNDARY LAYER IN HETEROGENEOUS LANDSCAPES. R. Avissar, F. Zeng, and T. Schmidt, Rutgers Univ., New Brunswick, NJ
- * 5.1b THE IMPACT OF MESOSCALE CIRCULATIONS GENERATED BY LANDSCAPE DISCONTINUITIES AND TURBULENCE ON SUBGRID-SCALE FLUXES IN LARGE-SCALE ATMOSPHERIC MODELS. R. Avissar, F. Chen, and B. H. Lynn, Rutgers Univ., New Brunswick, NJ
- 110 5.2 A LARGE-EDDY SIMULATION OF FOOTPRINTS IN THE CONVECTIVE BOUNDARY LAYER. M. Y. Leclerc and S. Shen, Univ. of Quebec, Montreal, Quebec, Canada; and B. Lamb, Washington State Univ., Pullman, WA
- 5.3 PAPER WITHDRAWN
- 114 5.4 VERIFICATION OF A SOURCE FOOTPRINT MODEL FOR SCALAR FLUX MEASUREMENTS IN THE ATMOSPHERIC SURFACE LAYER. D. Finn and B. Lamb, Washington State Univ., Pullman, WA; M. Y. Leclerc, Univ. of Quebec, Montreal, Quebec, Canada; and T. Horst, NCAR, Boulder, CO

* Manuscript not available

TABLE OF CONTENTS

21ST CONFERENCE ON AGRICULTURAL AND FOREST METEOROLOGY

- 118 5.5 RESOLUTION DEPENDENCE OF MEASURES ACQUIRED FROM SCALING IN HOMOGENEOUS FIELDS. Michael R. Duncan, R. Pelletier, and P. H. Schuepp, Macdonald College, Ste Anne-de-Bellevue, Quebec, Canada
- 120 5.6 HOW LARGE MUST GROUND PATCHES BE BEFORE THEY MODIFY THE OVERLYING BOUNDARY LAYER? Shaohua Shen and M. Y. Leclerc, Univ. of Quebec, Montreal, Quebec, Canada

POSTER SESSION P2: AGROCLIMATOLOGY

- 124 P2.1 ON THE CAUSE OF CRANBERRY SCALD. Paul J. Croft, Rutgers Univ., New Brunswick, NJ
- * P2.2 AWON: THE ALABAMA WEATHER OBSERVATION NETWORK. Rodger R. Getz, NOAA/NWS, Auburn, AL
- * P2.3 A COMPARISON OF METHODS OF ESTIMATING POTENTIAL EVAPOTRANSPIRATION IN MISSOURI. Jeffrey N. Savadel and W. L. Decker, Univ. of Missouri, Columbia, MO

SESSION 6: FOREST-ATMOSPHERE INTERACTIONS

- 126 6.1 PRELIMINARY RESULTS FROM THE 1993 BOREAS FIELD PHASE. David R. Fitzjarrald, K. E. Moore, and R. K. Sakai, State Univ. of New York (SUNY), Albany, NY
- 130 6.2 CHARACTERIZATION OF HARDWOOD FOREST CANOPIES IN THE EASTERN UNITED STATES. Xiusheng Yang and D. R. Miller, Univ. of Connecticut, Storrs, CT; and J. J. Witcosky, George Washington National Forest, Harrisonburg, VA
- 134 6.3 SEASONAL VARIATION IN TURBULENT AND RADIATIVE EXCHANGE OVER AND WITHIN A DECIDUOUS FOREST. Kathleen E. Moore, D. R. Fitzjarrald and R. K. Sakai, SUNY, Albany, NY
- 137 6.4 TEMPERATURES OF CONIFER SHOOTS DURING SUMMER FROSTS. R. Adams, British Columbia Forest Service, Vernon; and T. A. Black, Univ. of British Columbia, Vancouver, B.C., Canada
- 141 6.5 EVALUATION OF NATURAL AND ANTHROPOGENIC RISK FACTORS FOR ALPINE EROSION PROTECTION FORESTS. W. Nater, W. Graber, and U. Joss, Paul Scherrer Inst., Villigen, Switzerland
- 145 6.6 TURBULENT FLUXES OF CO₂, WATER VAPOR, AND HEAT IN A FOREST STAND IN COMPLEX TERRAIN - EXPERIMENTAL SETUP. Johannes P. Böhm, Swiss Federal Inst. of Forest, Snow, and Landscape Research, Birmensdorf, Switzerland
- 148 6.7 USE OF WITHIN-STAND CONCENTRATION PROFILES TO DETERMINE ATMOSPHERE-FOREST EXCHANGE RATES. Xuhui Lee and T. A. Black, Univ. of British Columbia, Vancouver, B.C., Canada
- 152 6.8 THE EFFECT OF DIFFERENTLY SPACED TREES ON ENERGY PARTITIONING IN A HETEROGENEOUS AGRO-FOREST SITE. M. R. Irvine and A. P. Morse, Univ. of Liverpool, Liverpool; and B. A. Gardiner, Forestry Authority, Roslin, Midlothian, UK
- 160 6.9 INVESTIGATING THE RELATIONSHIPS BETWEEN LEAF AREA INDEX AND TURBULENT EXCHANGE IN A DECIDUOUS FOREST. Ricardo K. Sakai, D. R. Fitzjarrald, and K. E. Moore, SUNY, Albany, NY

TABLE OF CONTENTS

21ST CONFERENCE ON AGRICULTURAL AND FOREST METEOROLOGY

- 163 6.10 WIND AND STABILITY EFFECTS ON AERIAL SPRAY PENETRATION INTO A HARDWOOD FOREST. D. R. Miller, Y. Wang, and K. Ducharme, Univ. of Connecticut, Storrs, CT; M. A. McManus, USDA Forest Service, Hamden, CT; R. Reardon, USDA Forest Service, Morgantown, WV; and W. Yendol and K. Merizjewski, Penn State Univ., State College, PA
- 167 6.11 PRESSURE FLUCTUATIONS DURING COHERENT MOTIONS AND THEIR EFFECTS ON THE BUDGETS OF TURBULENT KINETIC ENERGY AND MOMENTUM FLUX WITHIN A FOREST CANOPY. Y. Zhuang and B. D. Amiro, AECL Research, Pinawa, Manitoba, Canada
- 171 6.12 AIRFLOW AND TURBULENT FLUX DEVELOPMENT ACROSS A MOORLAND/FOREST INTERFACE. B. A. Gardiner, Forestry Authority, Roslin; M. Baker, Loretto School, Mussleburgh, Midlothian, Scotland; M. R. Irvine, Univ. of Liverpool, Liverpool; and M. K. Hill, Holtech Associates, Harwood-in-Teesdale, County Durham, England
- 175 6.13 THE ROLE OF STATIC PRESSURE FLUCTUATIONS IN THE STRUCTURE OF TURBULENCE WITHIN A HARDWOOD FOREST CANOPY. Paul S. Conklin and K. R. Knoerr, Duke Univ., Durham, NC

SESSION 7: FOREST METEOROLOGY: THE HARTX EXPERIMENT IN GERMANY

- 179 7.1 COMPONENTS OF THE HEAT BALANCE OF THE HARTHEIM SCOTS PINE PLANTATION WITH RESPECT TO TWENTY YEARS OF ENERGY BALANCE CLIMATOLOGY. Lutz W. Jaeger and A. Kessler, Univ. of Freiburg, Freiburg, Germany
- 156 7.2 FLUX AGREEMENT ABOVE A SCOTS PINE PLANTATION. Lloyd W. Gay and J. H. Blanford, Univ. of Arizona, Tucson, AZ; R. Vogt, Univ. of Basel, Basel, Switzerland; and C. Bernhofer, Agricultural Univ. of Austria, Vienna
- 181 7.3 SPATIAL CHARACTERISTICS OF SURFACE AND ATMOSPHERIC PROPERTIES DURING HARTX. Sylke Ernst, Albert-Ludwigs Univ., Freiburg, Germany; and M. Wuthrich, Univ. of Basel, Basel, Switzerland
- 185 7.4 TURBULENCE AND FLUX-GRADIENT RELATIONSHIPS ABOVE A FOREST. Roland Vogt, Univ. of Basel, Basel, Switzerland
- 158 7.5 THE MAY-OCTOBER ENERGY BUDGET OF THE SCOTS PINE PLANTATION AT HARTHEIM, GERMANY. Lloyd W. Gay and J. H. Blanford, Univ. of Arizona, Tucson, AZ; R. Vogt, Univ. of Basel, Basel, Switzerland; and A. Kessler, Univ. of Freiburg, Freiburg, Germany
- 187 7.6 ESTIMATES OF XYLEM SAP FLOW AND CANOPY CONDUCTANCE OF SCOTS PINE TREES UTILIZING CONSTANT HEATING AND CONSTANT TEMPERATURE DIFFERENCE METHODS. B. Kostner, Univ. of Bayreuth, Bayreuth, Germany; P. Biron, Univ. L. Pasteur, Strassbourg, France; R. Siegwolf, Paul-Scherrer-Inst., Villigen, Switzerland; and A. Granier, INRA, Ctr. de Recherches Forestieres, Seichamps, France
- * 7.7 COMPARISON OF SAP FLOW AND VAPOUR FLUXES AT STAND LEVEL AND DERIVATION OF CANOPY CONDUCTANCE FOR SCOTS PINE. A. Granier, INRA, Ctr. de Recherches Forestieres, Seichamps, France; P. Biron and G. Najjar, Univ. L. Pasteur, Strassbourg, France; and L. W. Gay, Univ. of Arizona, Tucson, AZ
- 191 7.8 CANOPY CONDUCTANCE FROM MICROMETEOROLOGICAL MEASUREMENTS. Ch. Bernhofer, Inst. fur Meteorological und Physik, Univ. fur Bodenkultur, Wien, Austria; and R. Siegwolf, Paul-Scherrer-Inst., Villigen, Switzerland
- 193 7.9 CONTRIBUTION OF UNDERSTORY EVAPOTRANSPIRATION TO TOTAL WATER VAPOR FLUX AT THE HARTHEIM SCOTS PINE PLANTATION. J. Tenhunen, M. Wedler, B. Heindl, B. Kostner, and S. Hahn, Bayreuth Inst. for Terrestrial Ecosystem Research (BITOK), Bayreuth, Germany

* Manuscript not available

TABLE OF CONTENTS

21ST CONFERENCE ON AGRICULTURAL AND FOREST METEOROLOGY

- 197 7.10 ERS-1 SAR COMPARED TO THERMAL INFRA-RED TO ESTIMATE SURFACE SOIL MOISTURE. Michael Wuthrich, Univ. of Basel, Basel, Switzerland

POSTER SESSION P3: ENVIRONMENTAL MEASUREMENTS

- 201 P3.1 MINIATURE HOT WIRE ANEMOMETER TO MEASURE VERY LOW WIND SPEEDS. A. L. Orchansky, X. Lee, and M. D. Novak, Univ. of British Columbia, Vancouver, B.C., Canada
- 203 P3.2 THE DESIGN OF A LOW POWERED VENTILATED RADIATION SHIELD. Richard H. Grant, Purdue Univ., W. Lafayette, IN; and G. M. Heisler, USDA Forest Service, Syracuse, NY
- 207 P3.3 TURBULENT VAPOUR TRANSFER THROUGH UNIFORM STRAW MULCHES USING AN IMPROVED TENSION-PLATE APPARATUS. Wenjun Chen, M. D. Novak, and R. Ketler, Univ. of British Columbia, Vancouver, B.C., Canada
- 211 P3.4 MEASUREMENT OF TURBULENCE DURING RAINFALL. Kirk M. Ducharme and D. R. Miller, Univ. of Connecticut, Storrs, CT
- 215 P3.5 ON-FARM CALIBRATION OF PYRANOMETERS. William L. Bland, Univ. of Wisconsin, Madison, WI

SESSION 8: EVOLUTION OF BOUNDARY LAYER STRUCTURE AND SURFACE FLUXES IN HETEROGENEOUS SURFACES

- 217 8.1 AN EXPERIMENTAL AND NUMERICAL STUDY OF BOUNDARY LAYER STRUCTURE OVER AREAS OF INHOMOGENEOUS SENSIBLE HEAT FLUXES. Shiyuan Zhong and J. C. Doran, Battelle, PNL, Richland, WA
- 221 8.2 ON THE DEVELOPMENT OF BOUNDARY LAYER SECONDARY CIRCULATIONS RESULTING FROM HORIZONTALLY VARYING SURFACE HEAT FLUX. W. J. Shaw and J. C. Doran, Battelle, PNL, Richland, WA
- 225 8.3 A COMPARISON OF TWO SOIL MOISTURE ESTIMATION TECHNIQUES. Michael W. Nichols and H. E. Fuelberg, Florida State Univ., Tallahassee, FL
- 229 8.4 OBSERVATIONS OF INLAND BREEZES GENERATED BY IRRIGATION. L. Mahrt, J. Sun, and D. Vickers, Oregon State Univ., Corvallis, OR; J. I. MacPherson, National Research Council; R. Desjardins, Agriculture Canada, Ottawa, Ontario, Canada; and J. R. Pederson, California Air Resources Board, Sacramento, CA
- 233 8.5 SUBCLOUD LAYER TURBULENCE FLUX ANALYSIS OVER DIFFERENT TYPES OF TERRAIN. Zekai Otles, Iowa State Univ., Ames, IA; and J. A. Young, Univ. of Wisconsin, Madison, WI
- 235 8.6 SPECTRAL AND QUADRANT ANALYSIS OF SURFACE LAYER TURBULENCE IN LOCAL ADVECTION CONDITIONS. Leo J. M. Kroon, Wageningen Agricultural Univ., Wageningen, The Netherlands
- 239 8.7 HORIZONTAL AND VERTICAL TRANSPORT OF SATURATION DEFICIT TO A WET SURFACE AND THE EFFECTS ON EVAPORATION. Alejandro Zermeno and L. E. Hipps, Utah State Univ., Logan, UT
- 243 8.8 SPATIAL DISTRIBUTION OF SURFACE FLUXES ESTIMATED FROM REMOTELY SENSED SATELLITE VARIABLES. Jielun Sun, D. Vickers, and L. Mahrt, Oregon State Univ., Corvallis, OR; J. I. MacPherson, National Research Council; and R. Desjardins, Agriculture Canada, Ottawa, Ontario, Canada

TABLE OF CONTENTS

21ST CONFERENCE ON AGRICULTURAL AND FOREST METEOROLOGY

POSTER SESSION P4: APPLIED CLIMATOLOGY

- * P4.1 AN ASSESSMENT OF ENSO EVENTS AFFECT DROUGHTS IN THE ROCKY MOUNTAIN REGION. Jianhe Qu and W. E. Marlatt, Colorado State Univ., Ft. Collins, CO
- 247 P4.2 ASSESSING THE REGIONAL COMPONENT OF CLIMATE CHANGE. Michael D. McCorcle and S. E. Peckham, SAIC, McLean, VA; and W. E. Hellman, USDA-Forest Service, East Lansing, MI
- 465 P4.3 SOLAR ACTIVITY, WATER VAPOUR DENSITY AND RADIOREFRACTIVITY FOR DIFFERENT MONSOON PERIODS OF KERALA. K. Retna Kumari, G. Renuka, and M. S. Sindhu, Kariavattom, Trivandrum, India
- 251 P4.4 A BILINEAR MODEL FOR DAILY TEMPERATURE SERIES. Glenn P. Fernandez, USDA/Agriculture Research Service (ARS), Durant OK

SESSION 9: TRACE GAS EXCHANGE IN VEGETATED SURFACES

- 253 9.1 CARBON DIOXIDE EXCHANGE IN A PEATLAND ECOSYSTEM. N. J. Shurpall, S. B. Verma, and J. Kim, Univ. of Nebraska, Lincoln, NE
- 255 9.2 RELATIONSHIP BETWEEN CO₂ FLUXES FROM A GRASSLAND ECOSYSTEM AND SATELLITE-BASED VEGETATION INDICES. R. L. Desjardins, and H. Hayhoe, Agriculture Canada, Ottawa, Ontario; R. Pelletier and P. H. Schuepp, McGill Univ., Ste-Anne-de-Bellevue, Quebec; J. I. MacPherson, National Research Council; and J. Cihlar, Canada Ctr. for Remote Sensing, Ottawa, Ontario, Canada
- 259 9.3 MEASUREMENT OF CROP NET CARBON DIOXIDE EXCHANGE RATE IN SOYBEAN (GLYCINE MAX (L) MERR.). Phillippe Rochette, R. L. Desjardins, E. Pattey, and R. Lessard, Agriculture Canada, Ottawa, Ontario, Canada
- 261 9.4 ESTIMATING CANOPY CONDUCTANCE TO OZONE UPTAKE FROM CANOPY SCALE EVAPOTRANSPIRATION OBSERVATIONS OR BY SCALING UP LEAF STOMATAL CONDUCTANCE MEASUREMENTS: DOES EITHER METHOD WORK? William J. Massman, Rocky Mountain Forest and Range Experiment Station, Ft. Collins, CO
- 263 9.5 ROLE OF LEAF WETNESS AND STOMATAL CONDUCTANCE IN DETERMINING OZONE FLUX TO COTTON IN THE SAN JOAQUIN VALLEY. D. A. Grantz and X. J. Zhang, Univ. of California, Riverside; J. R. Pederson, California Air Resources Board, Sacramento, CA; W. J. Massman, USDA Forest Service, Ft. Collins; and A. Delany and S. Oncley, NCAR, Boulder, CO
- * 9.6 TRACE GAS AND ENERGY EXCHANGE OVER HETEROGENEOUS SURFACES: THE CODE GRID SITE AS A NATURAL LABORATORY. C. Mitic, R. Pelletier, and P. H. Schuepp, McGill Univ., Ste-Anne-de-Bellevue, Quebec; R. L. Desjardins, Agriculture Canada; and J. I. MacPherson, National Research Council, Ottawa, Ontario, Canada
- 267 9.7 FLUXES OF NITRIC OXIDE FROM A SUGARCANE FIELD. Elizabeth A. Graser and R. Martinez, Univ. of Hawaii, Honolulu, HI
- 269 9.8 EDDY CORRELATION MEASUREMENTS OF METHANE AND NITROUS OXIDE FLUXES OVER A DECIDUOUS FOREST. R. M. Staebler, H. H. Neumann, and G. den Hartog, AES, Downsview, Ontario, Canada
- 271 9.8a TUNABLE DIODE LASER MEASUREMENTS OF METHANE FLUXES FROM AN IRRIGATED RICE PADDY FIELD IN THE PHILLIPPINES. I. J. Simpson, G. W. Thurtell, G. E. Kidd, and M. Lin, Univ. of Guelph, Guelph, Ontario, Canada; T. H. Demetriades-Shah, I. D. Flitcroft, E. T. Kanemasu, and D. Nie, Univ. of Georgia, Griffin, GA; and K. F. Bronson and H. U. Neue, International Rice Research Inst., Los Banos, The Philippines

* Manuscript not available

TABLE OF CONTENTS

21ST CONFERENCE ON AGRICULTURAL AND FOREST METEOROLOGY

- 275 9.9 EVALUATION OF TWO RELAXED EDDY-ACCUMULATION SYSTEMS FOR MEASURING HERBICIDE VOLATILIZATION. Elizabeth Pattey, R. L. Desjardins, G. St.-Amour, and P. Rochette, Agriculture Canada, Ottawa; and A. J. Cessna, Agriculture Canada, Regina, Ontario, Canada

SESSION 10: WATER VAPOR FLUXES FROM THE SURFACE

- 279 10.1 SENSITIVITY OF A REGIONAL EVAPOTRANSPIRATION MODEL TO THE SPATIAL RESOLUTION OF DIGITAL EARTH RESOURCE DATA. Patricia A. Bresnahan and D. R. Miller, Univ. of Connecticut, Storrs, CT
- 283 10.2 ESTIMATION OF ACTUAL EVAPOTRANSPIRATION BY UTILIZING METEOROLOGICAL NUMERICAL MODELS. L. Kordova, Y. Mahrer, E. Rawitz, and M. Margolin, Hebrew Univ. of Jerusalem, Rehovot, Israel
- 287 10.3 ESTIMATING REGIONAL SURFACE FLUXES FROM MEASURED PROPERTIES OF THE ATMOSPHERIC BOUNDARY LAYER IN A SEMIARID ECOSYSTEM. Edward Swiatek, L. E. Hipps, and G. L. Wooldridge, Utah State Univ., Logan, UT
- 291 10.4 HORIZONTAL DISTRIBUTION OF EVAPORATION OVER LAKES: MEASUREMENTS AND MESOSCALE METEOROLOGICAL MODEL ESTIMATES. S. Assouline, Watershed Unit, Jordan District, Mekorot, Tiberias; and Y. Mahrer, Hebrew Univ. of Jerusalem, Rehovot, Israel
- 295 10.5 SURFACE EXCHANGE OF WATER VAPOR IN A PEATLAND IN NORTH CENTRAL MINNESOTA. J. Kim and S. B. Verma, Univ. of Nebraska, Lincoln, NE
- 297 10.6 VERIFICATION OF THE SURFACE RENEWAL METHOD FOR ESTIMATING EVAPOTRANSPIRATION. D. Spano, Univ. di Sassari, Sassari, Italy; and R. L. Snyder, K. T. Paw U, and E. DeFonso, Univ. of California, Davis, CA
- 299 10.7 THE IMPACT OF VEGETATION ON CONVECTIVE STORMS. Tsengdar J. Lee and R. A. Pielke, Colorado State Univ., Ft. Collins, CO
- 303 10.8 CO₂ SENSITIVITY OF PLANT LEAF TRANSPIRATION. Xiwu Zhan and D. S. Wilks, Cornell Univ., Ithaca, NY
- 305 10.9 BLUE HAZE AND THE CHEMISTRY OF TERPENES: BIOSYNTHESIS AND BIOGENESIS. David M. Bergstein, Chino Valley, AZ

SESSION 11: ENERGY BALANCE AND MICROCLIMATE OF VEGETATED SURFACES

- 309 11.1 WIND SPEED AND AIR TEMPERATURE CHARACTERISTICS WITHIN A DENSE VEGETATION CANOPY. A. F. G. Jacobs, Wageningen Agricultural Univ., Wageningen; J. H. van Boxel, Univ. of Amsterdam, Amsterdam, The Netherlands; and R. H. Shaw, Univ. of California, Davis, CA
- 313 11.2 A COMPARISON OF WIND AND TEMPERATURE PROFILES IN THE CONSTANT-FLUX BOUNDARY LAYERS OVER CORN AND SOYBEAN CANOPIES IN THE MIDWEST. John H. Prueger and J. L. Hatfield, National Soil Tilth Lab., Ames, IA
- 315 11.3 VISUALIZATION OF AIR FLOW IN WIDE-ROW CROPS. Elizabeth A. Graser, Univ. of Hawaii, Honolulu, HI
- 319 11.4 SURFACE-LAYER RESPONSE OVER SHRUB-STEPPE CANOPY DURING SPRINGTIME. J. M. Hubbe, R. R. Kirkham, J. L. Downs, and W. J. Shaw, Battelle, PNL, Richland, WA

TABLE OF CONTENTS

21ST CONFERENCE ON AGRICULTURAL AND FOREST METEOROLOGY

- 323 11.5 FLUXES OF SMALL PARTICULATE MATTER (PM_{10}) AND WATER VAPOR FROM AN ALMOND CANOPY IN THE SAN JOAQUIN VALLEY. D. A. Grantz, X. J. Zhang, and D. L. Vaughn, Univ. of California, Riverside, CA
- 327 11.6 ENERGY BALANCE IN A PEACH ORCHARD. Teodoro Georgiadis and F. Ravegnani, Inst. for the Physics and Chemistry of Lower and Upper Atmosphere; and F. Rossi, O. Facini, and F. Nerozzi, Fruit Trees Ecophysiology Inst., Consiglio Nazionale delle Ricerche, Italy
- 330 11.7 MICROCLIMATIC COMPARISONS BETWEEN A PASTURELAND AND AN UNDISTURBED AMAZON FOREST. Joao B. M. Ribeiro and J. M. N. da Costa, Univ. Federal de Vicosa, Vicosa-MG; A. C. L. Costa, Univ. Federal do Para, Belem-PA; and H. R. Rocha, Inst. Nacional de Pesquisas Espaciais, SP, Brazil
- 332 11.8 WATER USE COMPARISONS OF DIFFERENT FARMING PRACTICES. J. L. Hatfield and J.H. Prueger, USDA/ARS, Ames, IA
- 334 11.9 ENERGY AND WATER BALANCE OF A WHEAT CROP IN NORTHERN PATAGONIA, ARGENTINA. A. L. Orchansky, Centro de Recursos Naturales Renovables de la Zona Semiárida (CERZOS) and Comisión de Investigaciones Científicas de la Provincia de Buenos Aires, Bahía Blanca, Argentina
- 338 11.10 EVALUATING TREATMENT EFFECTS AND UNCERTAINTY ASSOCIATED WITH HERBICIDE INDUCED REDUCTIONS OF CORN YIELDS. A. Weiss, K. M. Eskridge, and D. A. Mortensen, Univ. of Nebraska, Lincoln, NE; and J. R. Smart, USDA/ARS, Weslaco, TX
- 340 11.11 CRANBERRY STOMATAL CONDUCTIVITY AS RELATED TO RAINFALL AMOUNT AND FREQUENCY. Paul J. Croft and N. J. Vorsa, Rutgers Univ., New Brunswick, NJ