Robert Cifelli, Ph.D.

PRESENT POSITION

Research Scientist and Lead, Hydrometeorology Modeling and Application Team
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EDUCATION

B.A. (1983) Geology, University of Colorado, Boulder, Colorado
M.S. (1986) Hydrogeology, West Virginia University, Morgantown, West Virginia
Ph.D. (1996) Atmospheric Science, Colorado State University, Fort Collins, Colorado

PROFESSIONAL EMPLOYMENT

- 2015-Present: Hydrometeorology Modeling and Applications Team Lead, NOAA PSD, Boulder, Colorado
- 2011-2014: Hydrometeorology Science Team Lead and Deputy Branch Chief (2013-2014), NOAA PSD, Boulder, Colorado
- 2009-2011: Field Coordinator, Hydrometeorology Testbed (HMT), NOAA PSD and CIRA, Boulder, Colorado
- 2007-2009: Senior Research Scientist, Department of Atmospheric Science, Colorado State University, Fort Collins, Colorado
- 2002-2007: Research Scientist III, Department of Atmospheric Science, Colorado State University, Fort Collins, Colorado
- 1999-2002: Research Associate, Department of Atmospheric Science, Colorado State University, Fort Collins, Colorado
- 1997-1999: Assistant Research Professor, JCET, UMBC, Baltimore, Maryland and TRMM Office, Laboratory for Atmospheres, NASA Goddard Space Flight Center, Greenbelt, Maryland
- 1996-1997: Visiting Fellow, CIRES, University of Colorado, Boulder, Colorado

SIGNIFICANT CAREER ACCOMPLISHMENTS

- Team lead for research group focused on improving physical process understanding and guiding model development associated with too much or too little water
- Work with PSD leadership to provide strategic direction on PSD water research
- Led a team to plan and implement a workshop on PSD water research activities; provided recommendations for future directions in water research to PSD leadership
- Managed budgets and provide strategic direction for NOAA's Hydrometeorology Testbed (HMT)
- Responsible for the planning, coordination, and execution of HMT field activities and research to operations (R2O) activities

- Lead scientist on numerous field campaigns around the world, including TOGA COARE (Solomon Islands, 1993), SCSMEX (South China Sea, 1998), TEFLUN-B (Melbourne, FL, 1998), TRMM-LBA (Rondonia, Brazil, 1999), KWAJEX (Marshall Islands, 1999), EPIC-2001 (East Pacific, 2001), CRYSTAL-FACE (Florida Everglades, 2002), NAME (Mazatlan, MX, 2004), NAMMA (Republic of Cape Verde, 2006), and C3VP (Ontario, Canada, 2007). Responsibilities during these campaigns included planning and logistics of instrument deployments (radar and ancillary instrumentation such as rain gauges, disdrometers, and sounding networks) as well as oversight of radar operations and analysis of data sets. For several campaigns, assisted in the development of flight tracks for aircraft sampling that were needed to complement the ground based sampling and satisfy the overall mission goals
- Extensive experience in the analysis of radar and other observational and modeling data sets to further understanding of storm dynamics (single and multiple Doppler retrievals) precipitation processes (interpretation of polarimetric observations) and improve/evaluate quantitative precipitation estimation algorithms
- PI or Co-PI on numerous grants
- Developed and taught an undergraduate course in climate change at University of Maryland Baltimore County and an undergraduate course in weather and climate at Colorado State University. Served as a graduate instructor at Colorado State University, developing material and teaching a potion of ATS-741 (radar meteorology).
- Published over 40 articles in peer-reviewed literature
- Member of the Interagency Climate Change and Water Working Group and NASA PMM Science Team; Co-chair of the NOAA GPM Advisory Panel on Precipitation Measurement from Space
- Co-led a team to expand the Community Collaborative Rain Hail and Snow (CoCoRaHS) network nationwide

GRANTS AND CONTRACTS

- Profiler Observations in TRMM: Validation for Latent Heating and Precipitation Measurements. National Aeronautics and Space Administration, NRA-98-OES-02, $255,120 (10/1/98 – 9/30/01), PI.
- Analysis of Data from TRMM/LBA for the Purpose of Validating TRMM Cloud Models. National Aeronautics and Space Administration, NRA-99-OES-03, $591,104 (10/1/00 – 9/30/03), Co-I.
- Shipboard Radar Observations of Precipitating Convection in EPIC2001. National Science Foundation, $515,870 (01/01/01-12/31/03), Co-PI.
- Polarimetric Radar Measurements of Tropical Convection in Support of CRYSTAL-FACE. National Aeronautical and Space Administration, $55,547 (01/01/02-12/31/03), Co-PI.
- Improving Quantitative Precipitation Estimation Through Combined Use Of Dual Polarimetric Radar And A High Density Volunteer Precipitation Network", Cooperative Program for Operational Meteorology, Education, and Training (COMET) Cooperative Project, $74,517 (06/01/02-05/31/04), P.I.

- The Community Collaborative Rain and Hail Study – Science Education Through Participation in Community-Based Research, National Science Foundation, $897,341 (12/01/02-11/30/05), P.I.
- Physically-based Observational Studies for TRMM and Concept Development for GPM Validation, National Aeronautics and Space Administration, $930,000, (07/01/03-06/30/06), Co-PI.
- Ship-Based Radar, Sounding, and Flux Observations in Support of NAME" National Oceanic and Atmospheric Administration, $220,000, (04/01/04-03/31/07), Co-PI.
- S-POL Radar Studies in NAME, National Science Foundation, $350,000, (02/01/04-01/31/07), Co-PI.
- Development and Application of EPIC Integrated Datasets for Atmospheric and Coupled Modeling, National Oceanic and Atmospheric Administration, $109,255 (05/01/06-04/30/07), PI.
- Radar-based Studies of Convection, Easterly Waves and Developing Tropical Storms in NAMMA, National Aeronautics and Space Administration, $388,828 (06/01/06-05/31/09), PI.
- CoCoRaHS: Enhancing Environmental Literacy Through Participation in Climate Monitoring and Research, National Oceanic and Atmospheric Administration $585,000 (10/01/06-09/30/09), Co-PI.
- GPM Ground Validation Studies at Colorado State University, National Aeronautics and Space Administration, $90,013 (12/01/07-10/30/08), Co-I.
- Studies of Convection in NAME, National Science Foundation, $565,001 (11/1/07-10/31/10), Co-I.
- GPM Ground Validation Studies at Colorado State University, National Aeronautics and Space Administration, $30,000 (5/30/), Co-I.
- Studies of Convection and Precipitation Physics Under PMM, National Aeronautics and Space Administration, $500,000, (1/1/10-12/31/12), Co-I.

PROFESSIONAL AFFILIATIONS, AWARDS

Member, American Meteorological Society, Water Resources Committee
Member, American Geophysical Union
Visiting Fellow Recipient, CIRES, University of Colorado, 1996
UCAR Education and Outreach Award Recipient, 2009
NOAA Administrators Award, 2017 (Russian River Habitat Blueprint)Department of Commerce Bronze Medal, 2017 (Award to PSD for El Nino Rapid Response Field Campaign)

PUBLICATIONS IN REVIEWED LITERATURE

Bytheway, J., M. Hughes, K. Mahoney, and R. Cifelli, 2019: A Multiscale evaluation of multisensor quantitative precipitation estimation in the Russian River Basin. *J. Hydromet*.**20**, 447-466, https://doi.org/10.1175/JHM-D-18-0142.1.

Vano, J.A., M.D. Dettinger, R. Cifelli, D. Curtis, A. Dufour, K. Miller, J.R. Olsen, and Wilson, A.M., 2019: Hydroclimatic extremes as challenges for the water management community: Lessons from Oroville Dam and Hurricane Harvey. *Bull. Amer. Meteor. Soc.*, Explaining Extreme Events of 2017 Special Supplement,**100**, S9-S14.

Kim, J., R. Cifelli, L.E. Johnson, and V. Chandrasekar, 2018: Derivation of Soil Moisture Recovery Relation Using SCS Curve Number Method, *J. Water,* **10,** 833, https://doi.org/10.3390/w10070833.

Dole, R., J. Spackman, M. Newman, G. Compo, C. Smith, L. Hartten, J. Barsugli, R. Webb, M. Hoerling, R. Cifelli, K. Wolter, C. Barnet, M. Gehne, R. Gelaro, G. Kiladis, S. Abbott, J. Albers, J. Brown, C. Cox, L. Darby, G. de Boer, B. DeLuisi, J. Dias, J. Dunion, J. Eischeid, C. Fairall, A. Gambacorta, B. Gorton, A. Hoell, J. Intrieri, D. Jackson, P. Johnston, E. Akish, R. Lataitis, K. Mahoney, K. McCaffrey, H. Alex McColl, M. Mueller, D. Murray, P. Neiman, W. Otto, O. Persson, X. Quan, I. Rangwala, A. Ray, D. Reynolds, E. Riley Dellaripa, K. Rosenlof, N. Sakaeda, P. Sardeshmukh, L. Slivinski, A. Solomon, L. Smith, D. Swales, S. Tulich, A. White, G. Wick, M. Winterkorn, D. Wolfe, and R. Zamora, 2018: Advancing Science and Services during the 2015-16 El Niño: The NOAA El Niño Rapid Response Field Campaign. *Bull. Amer. Meteor. Soc.* **99**, 975-1001,doi:10.1175/BAMS-D-16-0219.1.

He, Y.; Zhang, Y.; Kuligowski, R.; Cifelli, R.; Kitzmiller, D., 2018: Incorporating Satellite Precipitation Estimates into a Radar-Gauge Multi-Sensor Precipitation Estimation Algorithm. *Remote Sens.*, **10**, 106, doi: 10.3390/rs10010106.

Cifelli, R., V. Chandrasekar, H. Chen, and L.E. Johnson, 2018: High Resolution Radar Quantitative Precipitation Estimation in the San Francisco Bay Area: Rainfall Monitoring for the Urban Environment. *J. Meteor. Soc. Japan,* https://doi.org/10.2151/jmsj.2018-016.

Willie, D., H. Chen, V. Chandrasekar, R. Cifelli, C. Campbell, D. Reynolds, S. Matrosov, and Y. Zhang, 2017: Evaluation of Multisensor Quantitative Precipitation Estimation in the Russian River Basin. *J. Hydrologic Eng.*, 10, 10.1061/(ASCE)HE.1943-5584.0001422 , E5016002.

Zhang, Y., S. Reed., J. J. Gourley, B. Cosgrove, D. Kitzmiller, D.-J. Seo, and R. Cifelli, 2016: The Impacts of Climatological Adjustment of Quantitative Precipitation Estimates on the Accuracy of Flash Flood Detection. *J. Hydrol.*, 541, Part A, 387-400, doi:10.1016/j.jhydrol.2015.12.017.

Mahoney, K., D. L. Jackson, P. Neiman, M. Hughes, L. Darby, G. Wick, A. White, E. Sukovich, R. Cifelli, 2016: Understanding the role of atmospheric rivers in heavy precipitation in the Southeast US. *Mon. Wea. Rev.*, **144**, 1617-1632, doi:10.1175/MWR-D-15-0279.1

Matrosov, S.Y., R. Cifelli, P. Neiman, and A.B. White, 2016: Radar Rain-Rate Estimators and their Variability due to Rainfall Type: An Assessment Based on South-East Hydrometeorology Testbed Data from the Southeastern United States. *J. Appl. Meteor. Climatol.*, **55**, 1345-1358.doi:10.1175/JAMC-D-15-0284.1

White, A.B., K.M. Mahoney, R. Cifelli, and C. King, 2015: Wind Profilers to Aid with Monitoring and Forecasting of High Impact Weather in the Southeastern and Western U.S., *Bull. Amer. Meteor. Soc.*, Dec 2015, 2039-2043, *http://dx.doi.org/10.1175/BAMS-D-14-00170.1*

Zhang, Y., S. Reed., J.J. Gourley, B. Cosgrove, D. Kitzmiller, D.-J. Seo, and R. Cifelli, 2015: The Impacts of Climatological Adjustment of Quantitative Precipitation Estimates on the Accuracy of Flash Flood Detection. *J. Hydrology*, http://dx.doi.org/10.1016/j.jhydrol.2015.12.017.

Hsu, C., L.E. Johnson, R.J. Zamora, T. Schneider, and R. Cifelli, 2015: Downscaling Advanced Microwave Scanning Radiometer (SMRS-E) Soil Moisture Retrievals Using a Multiple Time Scale Exponential Rainfall Adjustment Technique. *J. Geophys and Remote Sensing*, doi: 10.4172/2169-0049.1000139.

Zhang, Y., D. Kitzmiller, D.J. Seo, D-S Kim, and R. Cifelli: 2015: Creation of Multisensor Precipitation Products from WSI NOWrad Reflectivity Product. *J. Hydrologic, Eng.,* DOI: 10.1061/(ASCE)HE.1943-5584.0001216.

Moore, B.J., M.S.; K. Mahoney, E. Sukovich, R. Cifelli, T. Hamill, 2015: Climatology and Environmental Characteristics of Extreme Precipitation Events in the Southeastern United States. *Mon. Wea. Rev.*, **143**, 718-741.

Ralph, F. M., M. Dettinger, A. White, D. Reynolds, D. Cayan, T. Schneider, R. Cifelli, K. Redmond, M. Anderson, F. Gherke, J. Jones, K. Mahoney, L. Johnson, S. Gutman, V. Chandrasekar, J. Lundquist, N. Molotch, L. Brekke, R. Pulwarty, J. Horel, L. Schick, A. Edman, P.Mote, J. Abatzoglou, R. Pierce, and G. Wick, 2013: A vision for future observations for Western U.S. extreme precipitation and flooding. *Journal of Contemporary Water Research and Education*, Universities Council on Water Resources, **153**, 16-32

Lim, S., D-R. Lee, R. Cifelli, and S.H. Hwang, 2014: Quantitative Precipitation Estimation for an X-band Dual-Polarization Radar in the Complex Mountainous Terrain. *KSCE J. Civil Eng.*, **18,** 1548-1553.

Matrosov, S.Y., P. C. Kennedy, and R. Cifelli, 2014: Experimentally-based Estimates of Relations Between X-band Radar Signal Attenuation Characteristics and Differential Phase in Rain. *J. of Atmos. Oceanic Technol., **31**, 2442-2450.*

Matrosov, S.Y., R. Cifelli, and D. Gochis, 2013: Measurements of Heavy Convective Rainfall in the Presence of Hail in Flood-Prone Areas Using an X-Band Polarimetric Radar. *J. Appl. Meteor. Climatol.*, **52**, 395–407.

Lim, S., R. Cifelli, V. Chandrasekar, and S. Y. Matrosov, 2013: Precipitation Classification and Quantification Using X-Band Dual-Polarization Weather Radar: Application in the Hydrometeorology Testbed. *J. Atmos. Oceanic Technol.*, **30**, 2108–2120.

White, A.B., M. L. Anderson, M. D. Dettinger, F. M. Ralph, A. Hinojosa, D. R. Cayan, R. K. Hartman, D. W. Reynolds, L. E. Johnson, T. L. Schneider, R. Cifelli, Z. Toth, S. I. Gutman, C. W. King, F. Gehrke, P. E. Johnston, C. Walls, D. Mann, D. J. Gottas, and T. Coleman,

2013: A Twenty-First-Century California Observing Network for Monitoring Extreme Weather Events. *J. Atmos. Oceanic Technol.*, **30**, 1585–1603.

Chandrasekar, V., and R. Cifelli, 2012: Concepts and principles of rainfall estimation from radar: Multi-sensor environment and data fusion. *Indian J. Radio and Space Physics*, **41**, 389-402.

Iguchi, T., T. Matsui, J. J. Shi, W.-K. Tao, A. P. Khain, A. Hou, R. Cifelli, A. Heymsfield, and A. Tokay, 2012: Numerical analysis using WRF-SBM for the cloud microphysical structures in the C3VP field campaign: Impacts of supercooled droplets and resultant riming on snow microphysics. *J. Geophys. Res.*, **117**, D23206, doi:10.1029/2012JD018101.

Cifelli, R., V. Chandrasekar, S. Lim, P.C. Kennedy, Y. Wang, and S.A. Rutledge, 2011: A new dual-polarization radar rainfall algorithm: Application in Colorado precipitation events. *J. Atmos. Oceanic. Technol.*, **28**, 352-364.

Guy, N., S. A. Rutledge, and R. Cifelli, 2011: Radar characteristics of continental, coastal, and maritime convection observed during AMMA/NAMMA. *Quart. J. Roy. Meteor. Soc.*, **137**, 1241-1256. DOI:10.1002/qj.839.

Cifelli, R., and V. Chandrasekar, 2010: Dual polarization radar rainfall estimation. Rainfall: State of the Science, F.Y. Testik and M. Gebremichael, Eds., Amer. Geophys. Union, 105-125, 10.1029/2010GM001026.

Lang, T., S. A. Rutledge, and R. Cifelli, 2010: Polarimetric radar observations in northwestern Mexico during the North American Monsoon Experiment. *J. Hydrometeor.*, **11**, 1345-1357.

Shi, J. J., W.-K. Tao, T. Matsui, R. Cifelli, A. Hou, S. Lang, A. Tokay, C. Peters-Lidard, G. Jackson, S. Rutledge, and W. Petersen, 2010: WRF simulations of the 20-22 January 2007 snow events over eastern Canada: Comparison with in-situ and satellite observations. *J. Appl. Meteor. and Climatology*, **49**, 2246-2266.

Lerach, D. G., S. A. Rutledge, C. R. Williams, and R. Cifelli, 2010: Vertical structure of convective systems during NAME 2004. *Mon. Wea. Rev.*, **138**, 1695-1714.

Huang, G.-J., V.N. Bring, R. Cifelli, D. Hudak, and W.A. Petersen, 2010: A methodology to derive radar reflectivity-liquid equivalent snow rate relations using C-band radar and a 2D video disdrometer. *J. Atmos. Oceanic Technol.*, **27**, 637-651.

Cifelli, R., T. Lang, S. A. Rutledge, N. Guy, E. J. Zipser, J. Zawislak, and R. Holzworth, 2010: Characteristics of an African Easterly Wave observed during NAMMA. *J. Atmos. Sci.*, **67**, 3-25.

Ziper, E.J., C. H. Twohy, S.-C. Tsay, K. L. Thornhill, S. Tanelli, R. Ross, T. N. Krishnamurti, Q. Ji, G. Jenkins, S. Ismail, N. C. Hsu, R. Hood, G. M. Heymsfield, A. Heymsfield, J. Halverson, H.M. Goodman, R. Ferrare, J. P. Dunion, M. Douglas, R. Cifelli, G. Chen, E. V. Browell, and B. Anderson, 2009: The Saharan Air Layer and the Fate of African Easterly Waves. NASA's AMMA 2006 Field Program to Study Tropical Cyclogenesis: NAMMA, *Bull. Amer. Meteor. Soc.*, **90**, 1137-1156.

Cifelli, R., S.W. Nesbitt, S.A. Rutledge, W.A. Petersen, and S. Yuter, 2008: Diurnal characteristics of precipitation features over the east Pacific: A comparison of the EPIC and TEPPS regions. *J. Climate*, **21**, 4068-4086.

Lang, T., D.A. Ahijevych, S.W. Nesbitt, R.E. Carbone, S.A. Rutledge, and R. Cifelli, 2007: Radar observed characteristics of precipitating systems during NAME 2004. *J. Climate*, **20**, 1713-1733.

Lang, S., W.-K. Tao, R. Cifelli, W. Olson, J. Halverson, S. Rutledge, and J. Simpson, 2007: Improving simulations of convective systems from TRMM LBA: Easterly and westerly regimes. *J. Atmos. Sci.*, **64**, 1141-1164.

Cifelli, R., S.W. Nesbitt, S.A. Rutledge, W.A. Petersen, and S. Yuter, 2007: Radar characteristics of precipitation features in the EPIC and TEPPS regions of the east Pacific. *Mon, Wea. Rev.*, **135**, 1576-1595.

Nesbitt, S.W., R. Cifelli, and S. A. Rutledge, 2006: Storm morphology and rainfall characteristics of TRMM precipitation features. *Mon. Wea. Rev.*, **134**, 2702-2721.

Matrosov. S.Y., R. Cifelli, P.C. Kennedy, S.W. Nesbitt, S.A. Rutledge, V.N. Bringi, and B.E. Martner, 2006: A comparative study of rainfall rate retrievals based on specific differential phase shift measurements and X- and S-band radar frequencies. *J. Atmos. Oceanic Technol.*, **23**, 952-963.

Higgins, W., D. Ahijevych, J. Amador, A. Barros, E.H. Berbery, E. Caetano, R. Carbone, P. Ciesielski, R. Cifelli, M.C. Vazquez, A. Douglas, M. Douglas, G. Emmanuel, C. Fairall, D. Gochis, D. Gutzler, T. Jackson, R. Johnson, C. King, T. Lang, M.I. Lee, D. Lettenmaier, R. Lobato, V. Magana, J. Meiten, K. Mo, S. Nesbitt, F.O. Torres, E. Pytlak, P. Rogers, S. Rutledge, J. Schemm, S. Schubert, A. White, C. Williams, A. Wood, R. Zamora, and C. Zhang. 2006: The NAME 2004 field campaign and modeling strategy. *Bull. Amer. Meteor. Soc.*, **87**, 79-94.

Cifelli, R., N. Doesken, P. Kennedy, L.D. Carey, S.A. Rutledge, T. Depue, and C. Gimmestad, 2005: The Community Collaborative Rain and Hail Study: An Informal Education Project Involving Scientists and Local Citizens. *Bull. Amer. Meteor. Soc.*, **86**, 1069-1077.

Raymond, D.J., S.K. Esbensen, C. Paulson, M. Gregg, C.S. Bretherton, W.A. Petersen, R. Cifelli, L.K. Shay, C. Ohlmann, and P. Zuidema, 2004: EPIC2001 and the Coupled Ocean-Atmosphere System of the Tropical East Pacific. *Bull. Amer. Meteor. Soc.*, **85**, 1341-1354.

Cifelli, R., L.D. Carey, W.A. Petersen, and S.A. Rutledge, 2004: An Ensemble Study of Wet Season Convection in the South West Amazon: Kinematics and Implications for Diabatic Heating. *J. Climate*, **17**, 4692-4707.

Petersen, W. A., R. Cifelli, D. J. Boccippio, S. A. Rutledge, and C. Fairall, 2003: Convection and Easterly Wave structure observed in the eastern Pacific warm-pool duringEPIC-2001. *J. Atmos. Sci*, **60**, 1754-1773.

Stith, J.L., J.E. Dye, A. Bansemer, A.J. Heymsfield, C.A. Grainger, W.A. Petersen, and R. Cifelli, 2002: Microphysical observations of tropical clouds. *J. Appl. Meteor.*, **41**, 97-117.

Petersen, W.A., S.W. Nesbitt, R.J. Blakeslee, R. Cifelli, P. Hein, and S.A. Rutledge, 2002: TRMM observations of convective regimes in the Amazon. *J. Climate*, **15**, 1278-1294.

Silva Dias, M.A.F., W. Petersen, P.L. Silva Dias, R. Cifelli, A.K. Betts. M. Longo, A.M. Gomes, G.F. Fisch, M.A. Lima, M.A. Antonio, and R.I. Albrecht, 2002: A case study of convective organization into precipitating lines in the southwest Amazon during the WETAMC and TRMM-LBA. *J. Geophys. Res.*, **107**, 10.1029/2001JD000375.

Cifelli, R., W.A. Petersen, L.D. Carey, S.A. Rutledge, and M.A.F. Silva Dias, 2002: Radar observations of the kinematic, microphysical, and precipitation characteristics of two MCSs in TRMM-LBA. *J. Geophys. Res.*, **107**, 10.1029/2000JD0000264.

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Lau, K.M., Y.Ding, J.T. Wang, R. Johnson, T. Keenan, R. Cifelli, J. Gerlach, T. Rickenbach, S.C. Tsay, and P.H. Lin, 2000: A report of the field operations and early results of the South China Sea Monsoon Experiment (SCSMEX). *Bull. Amer. Meteor. Soc.*, **81**, 1261-1270.

Cifelli, R., C.R. Williams, D.K. Rajopadhyaya, S.K. Avery, K.S. Gage, and P.T. May, 2000: Drop size distribution characteristics in tropical Mesoscale Convective Systems. *J. Appl. Meteor.*, **39**, 760-777.

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Cifelli, R., and S.A. Rutledge, 1994: Vertical motion structure in Maritime Continent mesoscale convective systems: Results from a 50-MHz profiler. *J. Atmos. Sci.*, **51**, 2631-2652.