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SUMMARY

Dr. Jun Du is a research meteorologist (GS-13 since 2008) in the Environmental Modeling Center (EMC) of NOAA, located in College Park, Maryland. EMC is a part of the National Centers for Environmental Prediction (NCEP). He is a principle developer and Project Lead of the NCEP Short-Range Ensemble Forecast (SREF) system. Currently, he is in charge of developing EMC precipitation analysis projects (pcpanl, pcpURMA and pcpRTMA), as well as new methods in ensemble verification, statistical post-processing and ensemble forecast products. He advocates for effectively communicating information about uncertainty in forecasts by delivering seminars, conducting training classes, and writing articles. Dr. Du's research interests include ensemble forecasting and forecast uncertainty, predictability, anomaly weather analysis and forecasting, verification of deterministic and probabilistic forecasts, post-processing and downscaling of model forecasts, as well as forecast applications. He has published about 70 peer-reviewed journal articles on various topics. He served as a member to various working groups such as WRF ensemble forecasting working group, the AMS Ad Hoc Committee on Uncertainty in Forecasts, the WMO-THORPEX TIGGE-LAM working group, and the NOAA Hurricane Forecast Improvement Project ensemble team. He is an invited contributor to the National Research Council's milestone report "Completing the Forecast: Characterizing and Communicating Uncertainty for Better Decisions Using Weather and Climate Forecasts". Dr. Du has served as an Associate Editor for the AMS journal Weather and Forecasting from 2009 to 2014 and was awarded a prestigious AMS Editor Award for this Journal in 2012. Currently, he serves as editorial board members for Journal of Meteorological Research (JMR) and Advances in Meteorological Sciences and Technology (AMST). He is a regular reviewer of research proposals and manuscripts for many agencies and journals around the world. He received a B.S. degree from Hangzhou University (now Zhejiang University, Hangzhou, China, 1982), an M.S. degree from the Chinese Academy of Sciences (Beijing, China, 1988), and a Ph.D. degree from the University of Arizona (1996). He was awarded a Post-Doc research appointment at NCEP through UCAR Visiting Scientist Program from 1996-1998.

CAREER

1996-current: **Research Meteorologist, became a federal employee since 2008, GS-13** at Environmental Modeling Center/NCEP, Developer and Project Lead of NCEP Short-Range Ensemble Forecast (SREF) system. Currently, he is in charge of developing precipitation analysis as well as new methods in ensemble verification, post-processing and products.

Research interests - ensemble forecasting and forecast uncertainty, predictability, verification of deterministic and probabilistic forecasts, statistical post-processing and downscaling of model forecasts, and forecast products and application

EDUCATION

Major: *Atmospheric Sciences/Meteorology*; Minor: *Hydrology*

May 1996: **Ph.D.** in Atmospheric Sciences, Department of Atmospheric Sciences, University of Arizona, Tucson, Arizona, USA

June 1988: **M.S.** in Meteorology, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China

July 1982: **B.S.** in Meteorology, Department of Geophysics, Hangzhou University (now Zhejiang University), Hangzhou, China

PROFESSIONAL SERVICE

Associate Editor of *Weather and Forecasting* (2009-2014)

Associate Editor of *Advances in Meteorological Sciences and Technology* (2017-)

Associate Editor of *Journal of Meteorological Research* (2017-)

Board Director of Chinese-American Oceanic and Atmospheric Association (COAA, 2004-2005)

NCEP Representative and Member of Technical Committee of WMO/WWRP Beijing 2008 Olympic Research Demonstration Project (2005-2009)

AWARDS

2012: American Meteorological Society (AMS) Editor Award for Weather and Forecasting 'For completing several prompt reviews that were beneficial, constructive, and of high quality'

2005: EMC/NCEP Extraordinary Performance Award for developing and implementing the WRF ensemble

2002: Outstanding Service Award for Chinese-American Oceanic and Atmospheric Association (COAA)

2000: UCAR Recognition Award for the indispensable and tireless effort toward the routine run of the NCEP Short-Range Ensemble Prediction system

REFERRED JOURNAL PUBLICATIONS

Book Chapters

4. **Du, J.**, and co-authors, 2018: Ensemble methods for meteorological predictions. In the book of *Handbook of Hydrometeorological Ensemble Forecasting* (edited by Q. Duan et al.), Springer, Berlin, Heidelberg, pp1-52, https://doi.org/10.1007/978-3-642-40457-3_13-1
3. Buizza, R., **J. Du**, Z. Toth, and D. Hou, 2018: Major operational ensemble prediction systems (EPS) and the future of EPS. In the book of *Handbook of Hydrometeorological Ensemble Forecasting* (edited by Q. Duan et al.), Springer, Berlin, Heidelberg, pp1-43, https://doi.org/10.1007/978-3-642-40457-3_14-1
2. **Du, J.**, and B. Zhou, 2017: Ensemble fog prediction. In the Book of *Marine Fog: challenges and advancements in observations, modeling, and forecasting* (eds. by D. Koracin and C. E. Dorman). Springer, 477-509.
1. **Du, J.**, 1998: On ensemble forecasting. in the book of *Asian Monsoon and Heavy Rain in China*, Meteorological Press, Beijing, 457-462.

2021

66 Li J., and **J. Du**, 2021: A topography perturbation scheme for ensemble prediction system. *JGR (Atmosphere)*, submitted

- 65 Wang P.-F., P. Wang, K. Chen, **J. Du**, and H. Zhang, 2021: Ground-level ozone simulation using ensemble WRF/Chem predictions over the Southeast United States. *Atmospheric Environment*, submitted
- 64 Qian W.H., **J. Du**, and Y. Ai, 2021: A Review: anomaly-based versus full-field based weather analysis and forecasting. *BAMS*, DOI: <https://doi.org/10.1175/BAMS-D-19-0297.1>

2020

- 63 Chen C., Y. Wang, **J. Du**, H. He, Y. Liu, and Y. Jiang, 2020: An overview of the European Operational Ensemble Prediction Systems. *Advances in Meteorological Science and Technology*, 10(3), 19-29, DOI10.3969/j.issn.2095-1973.2020.02.004
- 62 Zheng, M., **Du J.** and B. Colle, 2020: Applications of ensemble sensitivity analysis to high-impact weather systems in the mid-latitude of Northern Hemisphere. *Advances in Meteorological Science and Technology*, 10(2), 42-57, DOI10.3969/j.issn.2095-1973.2020.02.006
- 61 **Du J.** and G. Deng, 2020: An introduction to "Measure of Forecast Challenge" and "Predictability Horizon Diagram Index". *Advances in Meteorological Science and Technology*, 10(2),75-77, DOI10.3969/j.issn.2095-1973.2020.02.009
- 60 Li J, **J. Du**, J. Xu, and M. Wang, 2020: The assessment and verification of storm-scale ensemble forecast for a heavy rainstorm. *Torrential Rain and Disasters*, **39(2)**, 176-184, DOI:10.3969/j.issn.1004-9045.2020.02.008
- 59 Chen J, J. Wang, **J. Du**, Y. Xia, F. Chen and H. Li, 2020: Forecast bias correction through model integration: a dynamical wholesale approach. *Q. J. Roy. Met. Soc.*, 1-20, <https://doi.org/10.1002/qj.3730>

2019

- 58 Xia, Y., J. Chen, **J. Du**, J. Wang, and X. Li, 2019: A unified scheme of stochastic physics and bias correction in an ensemble model to reduce both random and systematic errors. *Wea. Forecasting*, **34**, 1675-1691, <https://journals.ametsoc.org/doi/pdf/10.1175/JCLI-D-19-0032.1>
- 57 Du J. B. Zhou, and J. Levit, 2019: Measure of forecast challenge and Predictability horizon diagram index for ensemble models. *Wea. Forecasting*, **34**, 603-615, <https://doi.org/10.1175/WAF-D-18-0114.1>

2018

- 56 **Du, J.**, and M. Xue, 2018: FACETs: an innovative storm prediction system for tornado, large-size hail and localized heavy rain being developed at NOAA. *Advances in Meteorological Science and Technology*, **8(2)**:6-7.
- 55 Wang D., Z. Li, Z. Gao, C. Liu, J. Zhu, L. Yan, and **J. Du**, 2018: The Comparative Analysis of Statistical Characteristics and Research Progress of Tornadoes in China, Europe and USA. *Advances in Meteorological Science and Technology*, **8(2)**:8-23.
- 54 Qian W.H., W. Luo, J. Leung, and **J. Du**, 2018: Examining performances of numerical models in predicting tornado environmental systems. *Advances in Meteorological Science and Technology*, **8(2)**:36-43.
- 53 Wang J., J. Chen, **J. Du**, Y. Zhang, Y. Xia, and G. Deng, 2018: Sensitivity of ensemble forecast verification to model bias. *Mon. Wea. Rev.*, **146**, 781-796, <https://doi.org/10.1175/MWR-D-17-0223.1>

2017

- 52 Qian, W.H., W. M. Luo, **J. Du**, J. Gao, and J. Leung, 2017: An index of anomalous convective instability to detect tornadic and hail storms. *Metor. Atmo. Res./MAP*, DOI10.1007/s00703-017-0576-z
- 51 Qian W.H., J. Leung, R. Jin, J. Fu, F. Wu, Z. Kuang, and **J. Du**, 2017: Application of anomalous variables on strong convective system analyses and model evaluation - a case study on tornado-producing anomalous systems near Lixia River, Jiangsu Province. *Meteorological Monthly*, **43**(2): 129-143.
- 50 Li, J., **J. Du**, Y. Liu, and J. Xu, 2017: Similarities and differences in ensemble spread evolution of various ensemble perturbation methods including perturbing topography. *Acta Meteorologica Sinica*, **75**(1): 123-146.

2016

- 49 Jiang N., W.H. Qian, **J. Du**, R. H. Grumm, and J.L. Fu, 2016: A comprehensive approach from the raw and normalized anomalies to the analysis and prediction of the Beijing extreme rainfall on 21 July 2012. *Nat. Hazards*, **84**, 1551. doi:10.1007/s11069-016-2500-0.
- 48 Qian W.H., N. Jiang and **J. Du**, 2016: Mathematical and physical representation of the moist vorticity and moist divergence as well as their application to precipitation: Reply to comments. *Wea. and Forecasting*, **31**, 1397-1405.
- 47 Qian W.H., J. Huang, and **J. Du**, 2016: Examination of Hurricane Sandys (2012) Structure and Intensity Evolution from Full-field and Anomaly-field Analyses. *Tellus A*, **68**:1, 29029, DOI: 10.3402/tellusa.v68.29029
- 46 **Du J.** and B. Zhou, 2016: Ensemble fog prediction and ensemble forecast verification. *Advances in Meteorological Science and Technology*, **6**(3):41-47.
- 45 Zhou B., L. Jiang, and **J. Du**, 2016: Aviation Weather and model-based operational forecasts of low visibility and fog. *Advances in Meteorological Science and Technology*, **6**(2):29-41.
- 44 Qian W.H., N. Jiang, and **J. Du**, 2016: Seven anomalous synoptic patterns of regional heavy rain in eastern China. *Meteorological Monthly*, **42**(6): 674-685.
- 43 Qian W. H., N. Jiang, and **J. Du**, 2016: Anomaly based weather analysis versus traditional total-field based weather analysis for depicting regional heavy rain events. *Wea. and Forecasting*, **31**, 71-93.
- 42 Qian W. H., T. Yu, and **J. Du**, 2016: A unified approach to trace surface heat and cold events by using height anomaly. *Climate Dynamics*, **46**(5-6):1647-1664.

2015

- 41 Tang S., D. Wang, **J. Du**, and J. Zhou, 2015: The experiment of hybrid ensemble forecast approach in short-range forecast for South China rainstorm. *J. Appl. Meteor. Science*, **26**(6): 669-679.
- 40 Li J., **J. Du**, and C. Chen, 2015: Applications of frequency-matching method to ensemble precipitation forecasts. *Meteorological Monthly*, **41**(6): 674-684.
- 39 Huang J., **J. Du**, and W. H. Qian, 2015: A comparison between Generalized Beta-Advection Model and classical Beta-Advection Model in predicting and understanding unusual typhoon tracks in eastern China seas. *Wea. and Forecasting*, **30**, 771-792.
- 38 Qian W. H., **J. Du**, X. Shan and N. Jiang, 2015: Incorporating the effects of moisture into a dynamical parameter: moist vorticity and moist divergence. *Wea. and Forecasting*, **30**, 1411-1428.

- 37 Li J., **J. Du** and Y. Liu, 2015: A comparison of initial condition-, multi-physics- and stochastic physics-based ensembles in predicting Beijing 7.21 excessive storm rain event. *Acta Meteorologica Sinica*, **73**(1):50-71.

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- 36 **Du, J.**, and W.-H. Qian 2014: Three revolutions in weather forecasting. *Advances in Meteorological Science and Technology*, **4**(6):13-26.
- 35 **Du, J.**, and J. Li, 2014: Application of ensemble methodology to heavy rain research and prediction. *Advances in Meteorological Science and Technology*, **4**(5):6-20.
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2012

- 29 Brown, J., D.-J. Seo, and **J. Du**, 2012: Verification of precipitation forecasts from NCEPs Short Range Ensemble Forecast system (SREF) with reference to hydrologic forecasting in lumped basins. *J. of Hydrometeorology*, **13**, 808-836.
- 28 Clark, A.J. and co-authors including **J. Du**, 2012: An Overview of the 2010 Hazardous Weather Testbed Experimental Forecast Program Spring Experiment. *BAMS*, **93**, 55-74.
- 27 Duan Y., J. Gong, **J. Du** et. al, 2012: An overview of Beijing 2008 Olympics Research and Development Project (B08RDP). *BMAS*, **93**, 1-24.
- 26 Wu, Z., H. Xu, D. Wang, Q. Xing, F. Wang, **J. Du**, T. Feng, Y. Liu, and J. Yin, 2012: Analysis of the heavy rain process on June 19-20, 2010 in southern China by using a multi-model mesoscale super-ensemble forecasting system. *J. of Tropical Meteorology*, **28**(5), 653-663.
- 25 Zhou, B., **J. Du**, I. Gulpepe, and G. Dimego, 2012: Forecast of low visibility and fog from NCEP: Current status and efforts. *Pure and Applied Geophysics*, **169**(5-6), 895-909, May issue.

2011

- 24 Clark, A. J., J. S. Kain, D. J. Stensrud, M. Xue, F. Kong, M. C. Coniglio, K. W. Thomas, Y. Wang, K. Brewster, J. Gao, S. J. Weiss, D. Bright, and **J. Du**, 2011: Probabilistic precipitation forecast skill as a function of ensemble size and spatial scale in a convection-allowing ensemble, *Mon. Wea. Rev.*, **139**, 1410-1418.

- 23 **Du, J.**, and B. Zhou, 2011: A dynamical performance-ranking method for predicting individual ensemble member's performance and its application to ensemble averaging. *Mon. Wea. Rev.*, **129**(10), 3284-3303.
- 22 Kunii, M., K. Saito, H. Seko, M. Hara, T. Hara, M. Yamaguchi, J. Gong, M. Charron, **J. Du**, Y. Wang, and D. Chen, 2011. Verification and intercomparison of mesoscale ensemble prediction systems in the Beijing 2008 Olympics Research and Development Project. *Tellus A*, **63**, 531-549, DOI: 10.1111/j.1600-0870.2011.00512.x
- 21 Wang, D., **J. Du**, and C. Liu, 2011: Recognizing and dealing with uncertainty in weather-related forecasts. *Meteorological Monthly*, **37**(4), 385-392.

2010

- 20 **Du, J.**, and J. Chen, 2010: The cornerstone in facilitating the transition from deterministic to probabilistic forecasts - Ensemble forecasting and its impact on numerical weather prediction. *Meteorological Monthly*, **36**(11), 1-11.
- 19 **Du, J.**, and J. Chen, 2010: Necessity of communicating uncertainty in weather forecasts in view of public criticism. *Meteorological Monthly*, **36**(1), 1-6.
- 18 **Du, J.**, and G. Deng, 2010: The utility of the transition from deterministic to probabilistic weather forecasts - verification and application of probabilistic forecasts. *Meteorological Monthly*, **36**(12), 10-18.
- 17 Li, J., **J. Du**, M. Wang, Y. Gong and A. Lai, 2010: Precipitation verifications to an ensemble prediction system using two initial perturbation schemes based on AREM. *J. of Tropical Meteorology*, **26**(6), 733-742.
- 16 Zhou, B. and **J. Du**, 2010: Fog prediction from a multimodel mesoscale ensemble prediction system. *Wea. and Forecasting*, **25**, 303-322.

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- 15 Li, J. and **J. Du** et. al., 2009: Experiments of perturbing initial condition in the development of a mesoscale ensemble prediction system for heavy rainstorm forecasting. *Plateau Meteorology*, **28**(6), 1365-1375.

2007

- 14 Gombos, D., J. Hansen, **J. Du** and J. McQueen, 2007: Theory and applications of the minimum spanning tree rank histogram. *Mon. Wea. Rev.* **135**, 1490-1505.
- 13 Li, Z. and co-authors including **J. Du**, 2007: The rapid growth of publications by atmospheric and oceanic scientists of Chinese origin, *BAMS*, June 2007 Issue, 846-848.
- 12 Yuan, H., X. Gao, S. L. Mullen, S. Sorooshian, **J. Du**, and H. H Juang, 2007: Calibration of Probabilistic Quantitative Precipitation Forecasts with an Artificial Neural Network, *Wea. and Forecasting*, **22**, 1287-1303.
- 11 Yuan, H., S. L. Mullen, X. Gao, S. Sorooshian, **J. Du**, and H. H Juang, 2007: Short-Range Probabilistic Quantitative Precipitation Forecasts over the Southwest United States by the RSM Ensemble System, *Mon. Wea. Rev.*, **135**, 1685-1698.

2006

- 10 Stensrud, D, and co-authors including **J. Du**, 2006: The New England High-Resolution Temperature Program, *BAMS*, April 2006 issue, 491-498.

2005

09 Yuan, H., S. L. Mullen, X. Gao, S. Sorooshian, **J. Du**, and H. H Juang, 2005: Verification of probabilistic quantitative precipitation forecasts over the southwest United States during winter 2002/03 by the RSM ensemble system, *Mon. Wea. Rev.*, **133**, 279-294.

2002

08 **Du, J.**, 2002: Present Situation and Prospects of Ensemble Numerical Prediction. *Journal of Applied Meteorological Science*, **13**, 16-28.

2000

07 **Du, J.**, S. L. Mullen, and F. Sanders, 2000: Removal of distortion error from an ensemble forecast. *Mon. Wea. Rev.*, **128**, 3347-3351.

06 Stensrud, D. J., H. E. Brooks, **J. Du**, M. S. Tracton, and E. Rogers, 2000: Reply to "Comments on Using Ensembles for Short-Range Forecasting", *Mon. Wea. Rev.*, **128** (8), 3021-3023.

1999

05 Mullen, S. L., **J. Du**, and F. Sanders, 1999: The dependence of ensemble dispersion on analysis-forecast system: Implications to short-range ensemble forecasting of precipitation. *Mon. Wea. Rev.*, **127**, 1674-1686.

04 Stensrud, D. J., H. E. Brooks, **J. Du**, M. S. Tracton and E. Rogers, 1999: Using ensembles for short-range forecasting. *Mon. Wea. Rev.*, **127**, 433-446.

1998

03 **Du, J.**, 1998: On ensemble forecasting. in the book of *Asian Monsoon and Heavy Rain in China*, Meteorological Press, Beijing, p 457-462.

1997

02 **Du, J.**, S. L. Mullen, and F. Sanders, 1997: Short-range ensemble forecasting of quantitative precipitation. *Mon. Wea. Rev.*, **125**, 2427-2459.

1996

01 **Du, J.**, 1996: Short-range ensemble forecasting of an explosive cyclogenesis with a limited-area model, University of Arizona, *Ph.D dissertation*, pp.146.

OTHER FREQUENTLY REFERENCED PUBLICATIONS

Wang P., K. Chen, J. Du, and H. Zhang, 2019: Climate-driven surface ozone simulation using ensemble WRF/Chem predictions over the Southeast United States. 2019 AGU meeting

Du, J., G. DiMego, B. Zhou, D. Jovic, B. Ferrier and B. Yang, 2015: Regional ensemble forecast systems at NCEP. 23rd Conf. on Numerical Weather Prediction and 27th Conf. on Weather Analysis and Forecasting, Chicago, IL, Amer. Meteor. Soc., June 29-July 3, 2015, paper 2A.5.

Du, J., G. DiMego, B. Zhou, D. Jovic, B. Ferrier, B. Yang, S. Benjamin, 2014: NCEP Regional Ensembles: Evolving toward hourly-updated convection-allowing scale and storm-scale predictions within a unified regional modeling system. 22nd Conf. on Numerical Weather Prediction and 26th Conf. on Weather Analysis and Forecasting, Atlanta, GA, Amer. Meteor. Soc., Feb. 1-6, 2014, paper J1.4 .

Du, J., G. Gayno, K. E. Mitchell, Z. Toth and G. DiMego, 2007: Sensitivity study of T2m and precipitation forecasts to soil moisture initial conditions using NCEP WRF ensemble system. *18th Conf. on Numerical Weather Prediction and 22nd*

- Conf. on Weather Analysis and Forecasting*, Paper 11B.3, Amer. Meteor. Soc., Park City, UT.
- Du, J., G. DiMego, Z. Toth, D. Jovic, B. Zhou, J. Zhu, H. Chuang, J. Wang, H. Juang, E. Rogers, and Y. Lin, 2009: NCEP short-range ensemble forecast (SREF) system upgrade in 2009. *19th Conf. on Numerical Weather Prediction and 23rd Conf. on Weather Analysis and Forecasting*, Omaha, Nebraska, Amer. Meteor. Soc., June 1-5, 2009, paper 4A.4.
- Du, Jun, 2007: Uncertainty and Ensemble Forecast. NOAA/NWS Science and Technology Infusion Lecture Series: www.emc.ncep.noaa.gov/mmb/SREF/STILecture1.pdf
- Du, J., J. McQueen, G. DiMego, Z. Toth, D. Jovic, B. Zhou, and H. Chuang, 2006: New Dimension of NCEP Short-Range Ensemble Forecasting (SREF) System: Inclusion of WRF Members, Preprint, *WMO Expert Team Meeting on Ensemble Prediction System*, Exeter, UK, Feb. 6-10, 2006, 5 pages.
- Du, J., 2005: Impact of Model Error and Imperfect Initial Condition Perturbations on Ensemble-Based Probabilistic Forecasts: UNPREDICTABLE SPOTS. Preprints, *17th Conference on Numerical Weather Prediction/21st Conference on Weather Analysis and Forecasting*, Washington DC., Aug. 1-5, 2005, Amer. Meteor. Soc., paper 15B.6.
- Du, J., 2004: Hybrid Ensemble Prediction System: a New Ensembling Approach. Preprints, *Symposium on the 50th Anniversary of Operational Numerical Weather Prediction*, University of Maryland, College Park, Maryland, June 14-17, 2004, Amer. Meteor. Soc., paper p4.2, 5pp.
- Du, J., J. McQueen, G. DiMego, T. Black, H. Juang, E. Rogers, B. Ferrier, B. Zhou, Z. Toth and M. S. Tracton, 2004: The NOAA/NWS/NCEP short-range ensemble forecast (SREF) system: evaluation of an initial condition vs multi-model physics ensemble approach. Preprints, *16th Conference on Numerical Weather Prediction*, Seattle, Washington, Amer. Meteor. Soc., paper 21.3.
- Du, J., G. DiMego, M. S. Tracton, and B. Zhou 2003: NCEP short-range ensemble forecasting (SREF) system: multi-IC, multi-model and multi-physics approach. *Research Activities in Atmospheric and Oceanic Modelling* (edited by J. Cote), Report 33, CAS/JSC Working Group Numerical Experimentation (WGNE), WMO/TD-No. 1161, 5.09-5.10.
- Du, J., and M. S. Tracton, 2001: Implementation of a real-time short-range ensemble forecasting system at NCEP: an update. Preprints, *9th Conference on Mesoscale Processes*, Ft. Lauderdale, Florida, Amer. Meteor. Soc., 355-356.
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