Post Doctoral Associate, MAS 048650

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Resume:

Curriculum Vitae

JILI DONG
The Center for Analysis and Prediction of Storms
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EDUCATION
University of Oklahoma, School of Meteorology, Norman, OK 2010
Ph.D. in Meteorology

Nanjing University, School of Atmospheric Sciences, Nanjing, China
M.S. in Atmospheric Science 2005
B.S. in Atmospheric Science 2002

RESEARCH INTEREST
Numerical weather prediction, tropical cyclones and thunderstorms dynamics, data assimilation, EnKF, numerical models development, weather predictability, terrain dynamics

RESEARCH EXPERIENCE
The Center for Analysis and Prediction of Storms, University of Oklahoma, Norman, OK 2011-Present
Postdoctoral Research Associate
• Contribute to multiple research programs on high-resolution hurricane simulation, numerical model physics parameterization development and data assimilation using ensemble Kalman filtering.
• Coordinate CAPS real-time hurricane forecast and lead the weekly group discussions on hurricane forecast.
• Attended workshop on WRF for Hurricanes 2011 at Boulder, CO.
• Attended workshop on 2011 Advanced Mathematical Methods to Study Atmospheric Dynamical Processes and Predictability at Banff International Research Station, Canada.
• Attended the 2012 Dynamical Core Model Intercomparison Project at Boulder CO.

University of Oklahoma, School of Meteorology, Norman, OK 2005-2010
Graduate Research Assistant
Advisor: Prof. Ming Xue
• Conducted research on applications of ensemble Kalman filter data assimilation ranging from convective thunderstorms to hurricanes.
• Second Place Award in poster presentation in 22nd Conf. Wea. Ana. Forecasting/18th Conf. Num. Wea. Pred., Salt Lake City, Utah, 2007.

Nanjing University, Department of Atmospheric Science, Nanjing, Jiangsu, China 2002-2005
Graduate Research Assistant
Advisor: Prof. Zhemin Tan

SKILLS
Linux, advanced experience on supercomputer computation, Language/Tools – C, Fortran, MATLAB, NCL, parallel computing, numerical models – WRF, COAMPS and ARPS.

PUBLICATIONS
Dong J. and M. Xue, 2013: The impact of assimilating satellite-derived winds, airborne Doppler velocity and dropsonde data on the analysis and prediction of Hurricane Earl (2010) using an ensemble Kalman filter. In preparation.
Wang, M., M. Xue, K. Zhao, and J. Dong, 2014: Assimilation of T-TREC-Retrieved Winds from Single-Doppler Radar with an Ensemble Kalman Filter for the Forecast of Typhoon Jangmi (2008). Mon. Wea. Rev. doi: http://dx.doi.org/10.1175/MWR-D-13-00387.1

Xue, M. and J. Dong, 2013: Assimilating Best Track Minimum Sea Level Pressure Data together with Doppler Radar Data using an Ensemble Kalman Filter for Hurricane Ike (2008) at a Cloud-Resolving Resolution. Acta Meteorologica Sinica, 27, 379-399..
Dong, J. and M. Xue, 2012: Assimilation of radial velocity and reflectivity data from coastal WSR-88D radars using ensemble Kalman filter for the analysis and forecast of landfalling hurricane Ike (2008). Quart. J. Roy. Met. Soc. 139, 467-487. DOI: 10.1002/qj.1970.
Dong, J., M. Xue, and K. K. Droegemeier, 2011: The analysis and impact of simulated high-resolution surface observations in addition to radar data for convective storms with an ensemble Kalman filter. Meteor. Atmos. Phy., 112, 41-61.
Dong, J. and Z. Tan, 2008: The convection and moist stratified flow over an idealized three-dimensional mountain: conditional unstable flow. Acta Meteorologica Sinica, 293-309.

PRESENTATIONS and CONFERENCE PAPERS
Dong, J. and M. Xue, 2013: The impact of assimilating satellite-derived winds, airborne Doppler radial velocity and dropsonde data on the analysis and prediction of Hurricane Earl (2010) using an ensemble Kalman filter. Poster presentations at the 6th WMO Data Assimilation Symposium. World Meter. Org., College Park, Maryland.
Dong, J. and M. Xue, 2013: The impact of assimilating airborne Doppler radar radial velocity and dropsonde data on the analysis and prediction of Hurricane Earl (2010) using the ARPS EnKF system and WRF prediction model. Poster presentations at the 93th AMS annual meeting: Special Symposium on the Next Level of Predictions in Tropical Meteorology: Techniques, Usage, Support, and Impacts. Amer. Meter. Soc., Austin, Texas.
Dong, J. and M. Xue, 2012: Sensitivity of intensity and track forecasting of Hurricane Earl (2010) to single- and double-moment microphysics parameterization schemes. Poster presentations at the 30th Conference on Hurricanes and Tropical Meteorology, Amer. Meter. Soc., Ponte Vedra Beach, Florida, P 2.34.
Dong, J. and M. Xue, 2010: Ensemble Kalman Filter Assimilation of Coastal WSR-88D Radar Data and Forecasting for Hurricane Ike (2008). 29th Conference on Hurricanes and Tropical Meteorology, Tucson, Arizona, Amer. Meter. Soc., P2.138.
Dong, J., 2010: Ensemble Kalman Filter Assimilation of WSR 88D Radar Data and Forecasting for Hurricane Ike (2008). Oral presentation at the 4th EnKF Workshop, Rensselaerville, New York.
Dong, J. 2008: The impact of surface observations on the analysis and prediction of convective storms using EnKF data assimilation: OSS experiments with and without model and environmental errors. Oral presentation at the 3rd EnKF Workshop, Austin, Texas.
Dong, J. and M. Xue, 2007: The impact of high resolution surface observations on convective storm analysis with ensemble Kalman filter. 22nd Conf. Wea. Ana. Forecasting/18th Conf. Num. Wea. Pred., Salt Lake City, Utah, Amer. Meter. Soc., CDROM, P1.42.

THESIS AND DISSERTATION
Dong, J., 2005: Numerical simulations of moist stratified flow over terrain: Development and propagation of terrain-induced convection system. M.S. Thesis, Department of Atmospheric Science, Nanjing University, 89 pp.
Dong, J., 2010: Applications of Ensemble Kalman Filter Data Assimilation: From Convective Thunderstorms to Hurricanes, Ph.D. Dissertation, School of Meteorology, University of Oklahoma, 199 pp.

Reference Contact Information:

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Statement of research interest and experiences:

I am writing to apply for the position of the postdoctoral associate position about mesoscale atmosphere-ocean coupled modeling. I am currently a postdoctoral research associate in Center for Analysis and Prediction System (CAPS) of University of Oklahoma (OU). I got my Ph.D in meteorology in December 2010 at OU under the supervision of Dr. Ming Xue. My research background has

prepared me to be an active research member on hurricane modeling and forecasting in research and operational environments.

During the years pursuing my doctoral degree, I worked on the ensemble Kalman Filter data assimilation with radar and conventional observations for hurricane analysis and forecast (Tropical Storm Erin 2007 and Hurricane Ike 2008) and thunderstorms (observing system simulation experiment OSSE). In my dissertation, I examined the impact of ground-based radar radial velocity (Vr) and reflectivity (Z) assimilation with an ensemble Kalman filter (EnKF) on the cloud-resolving hurricane analysis and forecast with Advanced Regional Prediction System (ARPS) for Hurricane Ike (2008). This is the first time to investigate the impact of assimilating Z on convective scale hurricane analysis and forecast using an EnKF. The impacts on model initial conditions and 18-hour forecasts from Vr and/or Z, and the performance of EnKF evaluated by its spreads and innovations, are examined and discussed. Positive impacts from the assimilation of Vr or/and Z are found to improve storm-scale hurricane track, intensity and precipitation forecasts. The radar data assimilation helps to build up a stronger axisymmetric wind structure and warm core of the storm. Vr has much greater impacts on the analysis and forecast than Z. The sensitivity of hurricane forecasts to data assimilation intervals (or cycles) is also investigated. Along with the deterministic forecast, the ensemble forecasts starting from the EnKF analyses are also performed and found to be mostly better than the corresponding deterministic forecast, especially after ensemble post-processing, such as probability matching for precipitation.

In the same dissertation, I examined the impact of assimilating simulated high-resolution surface observations along with radar data with EnKF on the analysis and forecast of continental convective thunderstorms within an OSSE framework. A multi-scale procedure of using different covariance localization radii for various observation types is applied and discussed. The sensitivity of the forecast to localization radius is also investigated. When the radar is far away from the main storm and the low level data coverage is poor, there is a clear positive impact of mesonet-like surface observations. The impact of surface data increases quasi-linearly with decreasing surface network spacing until the spacing is close to the grid interval of the truth simulation. The assimilation of surface observations enhanced the cold pool and the related downdraft-updraft branches of the thunderstorm, leading to a more accurate forecast of the storm's strength, location and evolution.
As the post doctoral research associate, I expand my efforts on the study of observations impact on hurricane forecast to include more data types. Satellite derived winds (atmospheric motion vectors or AMVs), airborne Doppler radial velocity and dropsonde observations are assimilated for Hurricane Earl (2010) with the ARPS EnKF as the data assimilation system and the Weather Research and Forecasting (WRF-ARW) model as the forecast model with a resolution of 4 km. These multi-source observations are examined, processed (data I/O) and quality controlled with super-obs created before they are assimilated individually or together. The assimilation of satellite derived winds slightly improves Earl's track forecast through the impact on the environment. Inner core dropsonde observations improved the strength of wind and warm core of the storm but the impacts are mostly on the low troposphere, leading to an unrealistic dynamic and thermodynamic structure. The analysis with the airborne Doppler radar radial winds assimilated has the most physically realistic structure and the most consistent improvement on the intensity forecast. The assimilation of all above observations results in the best track and intensity forecast with the WRF model generally.

My recent research also includes studying the impact of microphysics schemes on hurricane forecast using the WRF model for Hurricane Earl (2010) and Hurricane Igor (2010). Seven microphysics parameterization schemes and two planetary boundary layer (PBL) schemes are tested for these two hurricanes. Latent heat release, hydrometeors distribution, axisymmetric and asymmetric wind fields, secondary circulations, surface heat flux and intensity evolutions are examined and diagnosed. I am familiar with numerical models, having ten years experience with numerical modeling on different weather systems at various scales.

From June 2011, I started to coordinate CAPS real-time hurricane forecasts, leading a weekly (during the hurricane season) or bi-weekly (off-season) discussions on real-time hurricane forecast with other CAPS scientists, technicians and graduate students, and helping to solve problems on data processing and archiving. Since 2011, I also lead the preparation of ONR project (DOD-ONR N00014-10-1-0775) annual report on the implementation and evaluation of two-moment microphysics schemes to Navy""s Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS-TC) model and present the report at the marine meteorology program review in 2011. I am actively involved in this project, examining, debugging and testing the implemented multi-moment microphysics package within the COAMPS model. With the effective communication and collaboration with the Naval Research Laboratory (NRL) scientists, the multi-moment microphysics schemes are successfully implemented and being tested in CAPS real-time TC forecasts for North Atlantic and west Pacific basins.

In April 2011, I got the opportunity to attend the WRF for Hurricane workshop in Developmental Testbed Center (DTC) and talk to Dr. Vijay Tallapragada of NCEP. This conversation, among other presentations on the operational practice from NCEP scientists, motivated me greatly with the progress made by the operation center on hurricane forecast.
I would like to apply for this position. I am very interested in the investigation of new observations impact on convective-scale TC forecasts using a fully coupled atmosphere-ocean model. I believe I have the solid background to contribute to this project.

More of my computing experience is here: I am familiar with FORTRAN and C language, Linux and shell scripts; familiar with ARPS, WRF and COAMPS numerical model. I also have over 7 years experience of parallel computing on supercomputing clusters (e.g. Ranger and Stampede of Texas Advanced Computing Center (TACC), Kraken of National Institute for Computational Sciences (NICS) and Pittsburg Supercomputing Center (PSC) clusters) for EnKF data assimilation and numerical forecast.

Again, I am very interested in the postdoctoral position in your research laboratory. Please let me know if there is any further information you inquire. Thank you for your time and consideration.