

CURRICULUM VITAE

Updated Feb. 23 2024

Xuguang Wang

Professor, Presidential Research Professor, &
Robert Lowry Chair Professor
School of Meteorology
University of Oklahoma
120 David L. Boren Blvd., Norman, OK, USA 73072
Tel: 405 325 3426; Fax: 405 325 7689
Email: xuguang.wang@ou.edu
Website: <http://weather.ou.edu/~map>



EDUCATION

- Ph.D. 2004: The Pennsylvania State University, USA (Meteorology). Dissertation: *Ensemble Forecasting with the Ensemble Transform Kalman Filter*
- B.S. 1998: Beijing (Peking) University, Beijing, P.R. China (Atmospheric Science)

PROFESSIONAL EXPERIENCE

- 2019-Present: Robert Lowry Chair Professor, University of Oklahoma, OK
- 2018-Present: Full Professor (tenured), University of Oklahoma, Norman, OK
- 2014-2018: Associate Professor (tenured), University of Oklahoma, Norman, OK, USA
- 2014-Present: Presidential Research Professor, University of Oklahoma, Norman, OK, USA
- 2013-2016: Faculty Associate, Cooperative Institute for Mesoscale Meteorological Studies (CIMMS), University of Oklahoma
- 2012-Present: Fellow, Cooperative Institute for Mesoscale Meteorological Studies (CIMMS), University of Oklahoma
- 2009-2014: Affiliated faculty, Center for Analysis and Prediction of Storms (CAPS), University of Oklahoma
- 2009- 2014: Assistant Professor (tenure track), University of Oklahoma, Norman, OK, USA
- 2004-2008: Research Scientist I & II, NOAA/Earth System Research Laboratory/Physical Science Division and University of Colorado/CIRES, Boulder, CO
- 1999 - 2004: Graduate research assistant, Department of Meteorology, The Pennsylvania State University, State College, PA

PROFESSIONAL SOCIETAL MEMBERSHIP

- American Meteorological Society (AMS)
- American Geophysical Union (AGU)

RESEARCH INTERESTS AND EXPERTISE

- i) Developing new techniques and novel methodologies for data assimilation and ensemble prediction;

- ii) Applying these new techniques in assimilating a variety of observations (satellite, radar and other ground based remote sensing platforms, aircrafts, UAV, in-situ platforms, etc.) to improve predictive skill from sub-hourly to global scales;
- iii) Improving the understanding of atmospheric predictability and dynamics through data assimilation and ensemble approaches from sub-hourly to global scales;
- iv) Transitioning research and development into operations (R2O);
- v) Interdisciplinary research: interface between machine learning/AI and data assimilation; interface between machine learning/AI and forecast verification and postprocessing; economic values of numerical predictions

SELECTED RECENT MAJOR HONORS, AWARDS AND RECOGNITION

- 2023, Significant Impact Research Grant Program award, University of Oklahoma Office of the Vice President for Research
- 2023, Elected NOAA Science Advisory Board (SAB) Environmental Information Services Working Group (EISWG) member
- 2023, American Meteorological Society (AMS) Weather Analysis and Forecasting Distinguished Scientific or Technological Accomplishment Award
- 2021, Alumni Fellow Award, College of Earth and Mineral Sciences, The Pennsylvania State University
- 2021, Invited to co-lead the observation and data assimilation task team to perform Congressionally mandated Priorities for Weather Research (PWR) study to advise Congress on how to invest the US weather research, forecasting and enterprise for the next decade
- 2020, Most influential researchers in the world, published by PLOS Biology (<https://ou.edu/research-norman/news-events/2020/new-study-finds-ou-research-well-cited-impactful>)
- 2020, Elected World Meteorological Organization (WMO) World Weather Research Program (WWRP) Predictability, Dynamics and Ensemble Forecasting working group member
- 2019, Robert Lowry Chair Professor, University of Oklahoma
- 2015, Top 10 most impactful atmospheric scientists in the world based on the ISI Web of Science productivity and impact analysis by Chinese Academy of Science for papers published during 2011-2015.
- Wang et al. 2013 noted as “most read in the last 12 months” by Monthly Weather Review
- 2014, Presidential Research Professorship, University of Oklahoma
- 2014, Invited speaker of National Academy of Sciences Kavli Frontiers of Science (declined due to family commitment)
- 2013, Faculty Associate, Cooperative Institute for Mesoscale Meteorological Studies (CIMMS)
- 2012, Dean's Award for Excellence in Research and Scholarship, University of Oklahoma, USA
- 2010, NASA New Investigator Award, USA
- 2007, Innovative Research Program Award, University of Colorado/CIRES, USA

MAJOR SCIENTIFIC ACHIEVEMENTS, TRANSFORMATIVE ADVANCES, IMPACTS & BREAKTHROUGHS

- Lead and direct an **18**-member research team, “Multiscale data Assimilation and Predictability (MAP) Lab” at University of Oklahoma in **advancing research and development on data assimilation, predictability, numerical simulation/prediction, and dynamics across a wide-range of scales (sub-hourly to global) and atmospheric phenomena**
- **Further develop and advance** the ensemble transform Kalman filter (ETKF) **theory and algorithm**. The algorithm has been adopted by operational numerical weather prediction centers and by the research community **worldwide**
- **Further develop and advance** the hybrid ensemble-variational (EnVar) data assimilation **theory and algorithm**. The algorithm has been adopted by **multiple US operational numerical weather prediction systems (GFS, HWRF, HRRR, NAM, RRFS and HAFS)** to improve global, hurricane and CONUS convective scale prediction
- **Develop a new multiscale data assimilation algorithm**, the multiscale local gain from ensemble transform Kalman filter (MLGETKF)
- **Advance radar and satellite cloudy radiance data assimilation** for convective scale numerical prediction. **Radar data assimilation** capability is adopted by US NWS **operational** convective scale prediction system, **HRRR and RRFS**
- **Advance hurricane inner core observation assimilation**. **Radar data assimilation** capability is adopted by US NWS **operational HWRF** system.
- **Advance** global and convective scale **ensemble forecast system design**
- **Develop novel** numerical model forecast **verification and calibration methods**
- Make **direct impact and improvement** on **multiple US National Weather Service (NWS) operational Numerical Weather Prediction (NWP) systems (GFS, HWRF, HRRR, HAFS)** through **directly implementing** advanced data assimilation approaches in these systems (see details in next section “Major Research to Operation Efforts (R2O) and Community Public Code Release”)
- Scientific peer reviewed publication
 - Published **126** peer reviewed journal articles.
 - **14** additional peer reviewed papers conditionally accepted or in review.
 - **21** additional peer reviewed papers to be submitted and in preparation
 - Wang et al. 2013 noted as “**most read** in the last 12 months” by AMS journal Monthly Weather Review, and ranked top **2%** out of ~1300 papers published in Monthly Weather Review in the last 5 years (2012-2017) in terms of number of access
 - Google scholar citation **6300**, h-index **38**
- Awarded research grants
 - **56** awarded grants from NOAA, NSF, NASA, DOD with a total amount of **\$20.9 million** as sole PI, PI, co-PI.
- Awarded competitive computing resource proposals: **19**.
- Scientific presentation
 - Invited keynote speeches, colloquia, seminars, talks: **78**.
 - Other conference and workshop presentations: **382**.

MAJOR RESEARCH TO OPERATION (R2O) EFFORTS AND COMMUNITY PUBLIC CODE RELEASE

- Formally release multiple data assimilation codes/systems developed to the public to **directly benefit national and international research and operational communities**
- **Directly improve data assimilation** in US NWS operational numerical weather prediction (NWP) systems, which advances skill and lead-time in **operational** forecasts of hazardous and high impact weather **from sub-hourly to global scales**.
- Co-develop the hybrid **ETKF-variational** data assimilation system for the community Weather Research and Forecasting (WRF) model in collaboration with NCAR and NOAA colleagues. This system is **released** and used by various users from both the research and operation communities **since 2008**.
- Lead OU portion of the effort during the multi-institution (including NOAA NCEP, NOAA ESRL, NASA) collaboration on the development and testing of the Hybrid data assimilation system for US NWS' operational Global Modeling System (GFS) under the support of THORPEX. The system became operational at NCEP beginning 2012. **"This data assimilation upgrade represents the biggest improvement in U.S. weather and climate forecasting in a decade"**, said by Louis Uccellini, Director of the National Weather Service (NWS) in a press release.
- Co-lead the data assimilation team in US National Oceanic and Atmospheric Administration (NOAA) Hurricane Forecast Improvement Program (HFIP) in developing and implementing the Hybrid data assimilation system in the US National Weather Service (NWS) convection-allowing hurricane prediction system **HWRf**. **The system is implemented operationally at NWS for operational convection allowing hurricane prediction beginning the 2017 hurricane season**.
- Develop the ground-based radar data assimilation capabilities in operational HWRf and **the radar data assimilation capability is implemented operationally in HWRf beginning the 2020 hurricane season in collaboration with NOAA NCEP and AOML**
- Develop ensemble-variational hybrid data assimilation system for convective scale radar data assimilation for US National Weather Service (NWS) regional convection allowing prediction systems including NAM CONUS (North American Mesoscale Model Continental US), HRRR (High Resolution Rapid Refresh) and experimental WoF (Warn On Forecast) systems in collaboration with NOAA/NCEP, NOAA/ESRL and NOAA/NSSL colleagues. **The radar DA development is implemented in operational HRRR beginning 2020 in collaboration with NOAA ESRL**.
- **Real time demonstration** of the OU MAP new convection allowing radar DA and ensemble forecast system during the NOAA Hazardous Weather Testbed (HWT) Spring Forecast Experiment (SFE), 2017-2019, 2021, 2022
- **Implement 4DEnVar in NOAA operational Hurricane Analysis and Forecast System (HAFS) beginning the 2023 hurricane season in collaboration with NOAA EMC**

ADVISING, MENTORING, TEACHING, AND OUTREACH

- University of Oklahoma (OU) postdocs advised: **22**
- OU M.S. students advised: **16**
- OU Ph.D. students advised: **17**
- Undergraduate student research advised: **6**
- International visiting graduate students advised: **5**

- Other OU graduate student committees (not chair) served on: **49**
- **Students** directly advised have **won 30** various AMS **awards**, international and national fellowships, OU dissertation and publication awards, academic performance awards etc.
- **Students and postdocs/early career scientist** advised **publish 91 lead-author papers**
- **Supervise postdocs** and early career scientists **to develop awarded lead PI and Co-PI proposals**
- Develop a **new OU graduate class on data assimilation**. The class was taken by students from **multiple programs** from Meteorology, Civil Engineering, Petroleum Engineering, Biology, Math and Data Analytics. The data assimilation class is **co-listed** by both School of Meteorology and Data Analytics program beginning 2022
- Further develop and teach undergraduate atmospheric dynamics class since 2009
- **High student evaluation** on both undergraduate and graduate classes taught
- **Mentor** of 3 **early career** tenure track **faculty**
- **Provide** professional career development **advices** to Penn State **female graduate students**
- OU undergraduate academic advising
- Teach **middle school and high school students** numerical weather prediction and data assimilation through the National Weather Center (NWC) **outreach** program
- Press release and TV interview: **4**

MAJOR COMMUNITY LEADERSHIP, PROFESSIONAL ACTIVITIES AND SERVICES

Community scientific leadership

- Serves as **lead, chair or member** of **29 international and national scientific committee, team, advisory board, panelist, nation-wide white paper and proposal development**, including
 - **Lead**, White Paper for the Establishment of A Multi-University Consortium for Advanced Data Assimilation Research and Education (CADRE), 2022-2023
 - **Lead**, \$7 million US-wide CADRE full proposal development with 9 US-university participation, 2023
 - **Invited co-lead**, the observation and data assimilation task team in performing Congressionally mandated **Priorities for Weather Research (PWR) study to advise Congress on how to invest the US weather research, forecasting and enterprise for the next decade. The study resulted in a published 119-page report https://sab.noaa.gov/wp-content/uploads/2021/12/PWR-Report_Final_12-9-21.pdf**
 - **Co-organizer**, AMS publication special collection: “Recent advances in the application of Probability and statistics in weather, climate and hydrology”, 2023-present
 - **Elected member**, NOAA Science Advisory Board (SAB) Environmental Information Services Working Group (EISWG), 2023-present

- Invited panelist, Unifying Innovations in Forecasting Capabilities Workshop, 2023
- *Invited co-chair*, US Unified Forecast System (UFS) Release Coordination Cross Cutting Team, 2022-present
- *Member*, AMS STAC (Scientific and Technological Activities Commission) committee on Probability and Statistics, 2021-present
- *Co-chair*, AMS 28th Conference on Probability and Statistics conference program, 2024
- *Invited member*, executive Priorities for Weather Research (PWR) study committee, May-Dec 2021
- *Invited panelist*, AMS town hall meeting, “Priorities for Weather Research”, panelist, 2022
- *Invited advisory board*, “German Programme of Fusion of Radar Polarimetry and Numerical Atmospheric Modelling Towards an Improved Understanding of Cloud and Precipitation Processes”, 2021
- *Member*, ERT Science Associate Advisory Team, 2021
- *Co-lead*, the data assimilation team, US National Oceanic and Atmospheric Administration (NOAA) Hurricane Forecast Improvement Program (HFIP) (2012-present)
- *Elected member*, World Meteorological Organization (WMO) World Weather Research Program (WWRP) Predictability, Dynamics, and Ensemble Forecasting working group (2020-present)
- *Invited panelist*, data assimilation and NWP in “JPSS GOES-R proving ground summit” (2020)
- *Invited participant*, Workshop on spectrum challenges and opportunities for Weather Observations (2020)
- *Moderator and session science discussion lead*, Workshop on Atmospheric Science Applications of Ground-based Phased Array Radars, 2021
- *Member*, US National Science Foundation (NSF) User Advisory Committee (UAC) for XSEDE (Extreme Science and Engineering Discovery Environment) high performance computing (2016-2023)
- *Member*, US National Science Foundation (NSF) XSEDE (Extreme Science and Engineering Discovery Environment) high performance computing User Requirements, Evaluation and Prioritization (UREP) team (2020-2023)
- *Invited panelist*, Community Forum on Airborne Hurricane Datasets, AMS tropical conference town hall, 2018 (declined due to family commitment)
- *Member*, Nation-wide joint effort for data assimilation initiative (JEDI) working groups 2017
- *Member*, US Unified Forecast System (UFS) Strategic Implementation Planning (SIP) working groups for data assimilation (2018-present)
- *Member*, US Unified Forecast System (UFS) Strategic Implementation Planning (SIP) working groups for convection allowing modeling (2018-present)
- *Member*, US Unified Forecast System (UFS) Strategic Implementation Planning (SIP) working groups for verification and postprocessing (2018-present)
- *Member*, US Unified Forecast System (UFS) Strategic Implementation Planning (SIP) working groups for ensemble (2018-present)

- *Invited member*, UCAR Developmental Testbed Center (DTC) Science Advisory Board (2017-2023)
- *Member*, Science Steering Committee on the interagency team for the planning and implementation of the PECAN (Plains Elevated Convection at Night) field campaign (2012-2015)
- *Member*, World Meteorological Organization (WMO) World Weather Research Program (WWRP) THORPEX TIGGE-LAM project working group (2010)

Leadership roles for international and national meetings

- **Organizing, planning, promoting, steering, chairing, convening 43 international and national conferences, symposia, meetings and workshops, including**
 - **Symposium to advise Congress on 10-year US weather enterprise priority: Co-organizer and co-lead, Symposium of 10-year priorities for weather research: Observation and data assimilation, 2021**
 - Program Co-chair, AMS 28th Conference on probability and statistics program, 2023-present
 - Invited panelist, Unifying Innovations in Forecasting Capabilities Workshop, 2023
 - Member, AMS STAC (Scientific and Technological Activities Commission) committee on Probability and Statistics, 2021-present
 - Member, American Meteorological Society (AMS) numerical weather prediction (NWP) and Weather and Forecasting (WAF) conferences planning committee, 2020-present
 - Donate invited speaker funds to student awards for AMS 32nd Conference on Weather Analysis and Forecasting (WAF)/28th Conference on Numerical Weather Prediction (NWP), 2023
 - Member, American Meteorological Society (AMS) probability and statistics conferences planning committee, 2022-present
 - Member, American Meteorological Society (AMS) Weather and Forecasting (WAF) statement committee, 2020-present
 - Promoting co-ordination between AMS WAF/NWP and AMS IOAS-AOLS (data assimilation) conferences 2020-present
 - Promoting establishing an AMS Board/STAC committee in data assimilation, 2020-present
 - Session Chair, Organizer, and Moderator, AMS Summer Community Meeting, 2022
 - Panelist, AMS town hall meeting, “Priorities for Weather Research”, panelist, 2022
 - Session chair for Data Assimilation Methodology Advancement for Numerical Weather Prediction II, 104th AMS annual meeting, 2023-2024
 - Session chair for Advances in Data Assimilation Methodologies, 103rd AMS annual meeting, 2023
 - Convener and organizer, Special joint session between the 26th Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface (IOAS-AOLS) and 31st Conference on Weather Analysis and Forecasting (WAF)/27th Conference on Numerical Weather Prediction (NWP), Data

- assimilation methodology advancement for numerical weather prediction, 102nd AMS annual meeting, 2021-2022. *The response for this special session was overwhelming. The number of presentations in this session is about half of the entire conference and forms 7 sub-sessions.*
- Session chair for Data Assimilation Methodology Development for Numerical Weather Prediction, 102nd AMS annual meeting, 2022
 - Session chair for Data Assimilation: New Developments in Methodology, 101st AMS annual meeting, 2021
 - Session chair for radar data assimilation for convective scale forecasting, 100th AMS annual meeting, Boston, MA, 2020
 - Session chair for Operational Forecast Center Vision Updates, 99th AMS annual meeting, Phoenix, AZ, 2019
 - Session chair for data assimilation: operational advances, 97th AMS annual meeting, Seattle, WA, 2017
 - Session Chair for Data Assimilation: New Methodologies II, 95th American Meteorological Society Annual meeting, 2015
 - Session chair for Applications of Data Assimilation in Numerical Weather Prediction IV: Mesoscale Data Assimilation. 94th American Meteorological Society Annual meeting, 2014
 - Session chair for Assimilation of Observations for Severe Weather and Hurricanes: Convective systems and rainfall. 93rd American Meteorological Society Annual meeting, 2013
 - Judge of students' oral presentations on data assimilation, 100th American Meteorological Society Annual meeting, Boston, MA, 2020
 - Judge of students' oral presentations on data assimilation, 95th American Meteorological Society Annual meeting, 2015
 - Judge of students' oral presentations on data assimilation, 94th American Meteorological Society Annual meeting, 2014
 - Session convener, Ensemble Modeling and Prediction of High-impact, Multi-scale Weather to Decadal Events, AOGS, 2023-2024
 - Planning committee member, Unifying Innovations in Forecasting Capabilities Workshop (UIFCW), 2022-present
 - Session chair, International Symposium on Data Assimilation, Fort Collins, CO, 2022
 - Session lead, UAS workshop, Norman, OK 2019
 - Steering committee, Landfalling hurricane workshop, Norman, OK, 2019
 - Session lead, Predictability Workshop, Norman, OK, 2018
 - Steering committee, Predictability Workshop, Norman, OK, 2018
 - Session chair, 8th EnKF workshop, Montreal, Canada, 2018
 - Session co-chair, PECAN science workshop, Norman, OK, Sep. 2016
 - Session chair, Workshop for Blueprints for Next-Generation Data Assimilation Systems, Boulder, CO, Mar. 2016
 - Session chair, 6th EnKF workshop, 2014, Buffalo, NY
 - Session chair, International Symposium on Earth-Science Challenges, 2013, Kyoto, Japan

- Scientific Steering Committee, the Second China-U.S. Symposium on Meteorology: Severe Weather and Regional Climate Variability and predictability, Qingdao, China, June 25-27, 2013
- Session chair, the Second China-U.S. Symposium on Meteorology: Severe Weather and Regional Climate Variability and predictability, Qingdao, China, June 25-27, 2013
- Session chair, Data assimilation session in International Symposium on Earth-Science Challenges, Norman, Oklahoma, Sep. 14-16, 2011
- Technical committee, Data assimilation session in International Symposium on Earth-Science Challenges, Norman, Oklahoma, Sep. 14-16, 2011
- Session chair, Data Assimilation Session in International Symposium on Radar and Modeling Studies of the Atmosphere, Kyoto, Japan, Nov. 10-13, 2009.

Editorial and Reviewer

- Associate Editor for AGU journal of Geophysical Research -atmosphere 2020-present
- Associated Editor for AMS journal Monthly Weather Review 2011, 2013, 2014, 2022
- Reviewer for 12+ high impact journals including AGU and AMS
- Reviewer for NOAA, NASA, NSF, German DFG (equivalent to US NSF) research funding agencies

Service to School of Meteorology, College and University

- Reader, OU Provost Dissertation Prize, 2024
- Invited faculty speaker/panelist during OU campus research and academic enterprise town hall meeting 2014
- Faculty Associate, Cooperative Institute for Mesoscale Meteorological Studies (CIMMS), University of Oklahoma 2013-2016
- Fellow, Cooperative Institute for Mesoscale Meteorological Studies (CIMMS) and Cooperative Institute for Severe and High-Impact Weather Research and Operations (CIWRO), University of Oklahoma 2012-Present
- Contributor, Writing re-competition proposal for Cooperative Institute for Mesoscale Meteorological Studies (CIMMS, now CIWRO), University of Oklahoma, 2020-2021
- Strategic planning team to bolster the collaboration among OU, NOAA and private sectors on weather in Norman (2010)
- Member, School of Meteorology committee A (2020-2022)
- Wrote 5-page position description for School of Meteorology Strategic Regular Faculty Recruiting application in numerical weather prediction and data assimilation, 2021
- Co-Chair, Search committee for early career faculty positions of School of Meteorology 2016-2017
- Member, Search committee for numerical weather prediction and data analytics faculty of School of Meteorology 2021-2022
- Member, Search committee for Weathernews Chair in Applied Meteorology (2009)
- Member, Search committee for early career faculty positions of School of Meteorology (2014-2015)
- Member, Search committee for School of Meteorology Director (2017-2018)

- Member, Search committee for dynamic meteorology and atmospheric chemistry faculty of School of Meteorology (2019-2020)
- Member, Graduate Studies Committee (2013-2016, 2023-present)
- Member, Graduate Admission Committee (2013-2015)
- Member, Undergraduate Studies Committee (2010-2013)
- Member, NWC Edu Tech committee (2010-2015)
- Member, Dean's Evaluation committee (2014-present)
- Member, School of Meteorology Strategic Planning (2019-2021)
- Mentor of early career female faculty from College of Atmospheric and Geographic Sciences (2015-2016)
- Mentor of early career faculty from School of Meteorology (2022-present)
- Mentor of early career female faculty from College of Architecture (2020-2023)
- Judge, University of Oklahoma Graduate Student Research and Performance day (2009)
- Judge, Annual Student Affairs Committee (SAC) Multicultural Festival (2009)
- Affiliated faculty, Center for Analysis and Prediction of Storms (CAPS) (2009-2014)
- Executive committee for Center for Analysis and Prediction of Storms (CAPS) (2009-2014)