YONG-FEI ZHANG

Program in Atmospheric and Oceanic Sciences   Tel: 512-298-9567
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EDUCATION

2015 **Ph.D. Climate Dynamics, University of Texas at Austin**
Dissertation title: Multivariate land snow data assimilation in the Northern Hemisphere: Development, evaluation and uncertainty quantification of the extensible data assimilation system.
Advisor: Dr. Zong-Liang Yang

2010 **B.S. Atmospheric Sciences, Nanjing University**
Outstanding graduate

RESEARCH INTERESTS

Sea ice modeling, data assimilation, and seasonal predictions; Land snow modeling and data assimilation; atmospheric predictability; climate change and its influence on ecology.

PUBLICATIONS

- **Zhang, Y.-F.**, M. Bushuk, M. Winton, B. Hurlin, X. Yang, T. Delworth, and L. Jia (2020), Assimilation of satellite-retrieved sea ice concentration and new prospects for September predictions of Arctic sea ice, *J. Clim,* in press, doi: 10.1175/JCLI-D-20-0469.1.

- Lu, F., M. J. Harrison, A. Rosati, T. L. Delworth, X. Yang, W. F. Cooke, C. McHugh, N. C. Johnson, L. Jia, M. Bushuk, **Y.-F. Zhang**, and A. Adcroft (2020), GFDL's SPEAR seasonal prediction system: ocean data assimilation (ODA), ocean tendency adjustment (OTA) and coupled initialization, *J. Adv. Model*, doi: 10.1029/2020MS002149.

- Lin, P., J. Wei, Z.-L. Yang, R. E. Dickinson, **Y.-F. Zhang**, and L. Zhao (2020), Assimilating multi-satellite snow data in ungauged Eurasia improves the Asian monsoon seasonal forecasts, *Environ. Res. Lett.*, 15, 064033, doi:10.1088/1748-9326/ab80ef.

- Bian, Q., Z Xu, L. Zhao, **Y.-F. Zhang**, H. Zheng, C. Shi, S. Zhang, C. Xie, and Z.-L. Yang (2019), Evaluation and intercomparison of multiple snow water equivalent products over the Tibetan Plateau, *J. Hydrometeorol.*, *20* (10), 2043–2055, doi:10.1175/JHM-D-19-0011.1.

- **Zhang, Y.-F.,** C. M. Bitz, J. L. Anderson, N. Collins, J. Hendricks, T. J. Hoar, K. Raeder, and F. Massonnet (2018), Insights on sea ice data assimilation from perfect model observing system simulation experiments, *J. Clim.*, *31*, 5911–5926, doi:10.1175/JCLI-D-17-0904.1.

- Lin, P., J. Wei, Z.-L. Yang, **Y.-F. Zhang**, and K. Zhang (2016), Snow data assimilation-constrained land initialization improves seasonal temperature prediction, *Geophys. Res. Lett.,* *43,* 11,423–11,432, doi:10.1002/2016GL070966.

- **Zhang, Y. -F.** and Z. -L Yang (2016), Estimating uncertainties in the newly developed multi-source land snow data assimilation system, *J. Geophys. Res. –Atmos., 121,* 8254–8268, doi:10.1002/2015JD024248.

- Zhang Y.-J., P. M. Cristiano, **Y.-F. Zhang**, P. I. Campanello, Z.-H. Tan, Y.-P. Zhang, K.-F. Cao, G. Goldstein (2016), Carbon economy of subtropical forests, In: *Tropical Tree Physiology*, Springer.
- Toure, A. M., M. Rodell, Z.-L. Yang, H. Beaudoing, E. Kim, **Y.-F. Zhang,** and Y. Kown (2016), Evaluation of the snow simulations from the Community Land Model, version 4 (CLM4). *J. Hydrometeor., 17,* 153–170, doi:10.1175/JHM-D-14-0165.1.
- **Zhang Y.-F.,** T. J. Hoar, Z.-L. Yang, J. L. Anderson, A. M. Toure, and M. Rodell (2014), Assimilation of MODIS snow cover through the data assimilation research testbed and the Community Land Model Version 4, *J. Geophys. Res.–Atmos., 119,* 7091–7103, doi:10.1002/2013JD021329.
- Yin, L., R. Fu, **Y.-F. Zhang**, P. A. Arias, D. N. Fernando, W. Li, K. Fernandes, and A. R. Bowerman (2014), What controls the interannual variation of the wet season onsets over the Amazon?, *J. Geophys. Res. –Atmos., 119*, 2314–2328,doi:10.1002/2013JD021349.

MANUSCRIPTS UNDER REVIEW OR TO BE SUBMITTED

- **Zhang, Y.-F.,** C. M. Bitz, J. L. Anderson, N. Collins, T. J. Hoar, K. Raeder, and E. Blanchard-Wrigglesworth (2020), Estimating parameters in a sea ice model using an ensemble Kalman filter, *Cryosphere, under revision*.
- **Zhang, Y.-F.**, M. Bushuk, M. Winton, B. Hurlin, L. Jia, and T. Delworth (2020), Improved subseasonal sea ice predictions via sea ice concentration data assimilation, *in prep*.
- Bushuk, M., M. Winton, F. A. Haumann, T. Delworth, F. Lu, **Y.-F. Zhang,** et al., (2020), Seasonal prediction and predictability of regional Antarctic sea ice, *submitted*.

CONFERENCE PRESENTATIONS (SELECTED; PRESENTERS UNDERLINED)

- <u>**Zhang, Y.-F.,**</u> C. M. Bitz, J. L. Anderson, N. Collins, J. Hendricks, T. J. Hall, and K. Raeder, 2017: State and parameter estimation in the CICE5/DART, Oral presentation at the Sea-ice Mini Workshop, Seattle, WA, USA.
- <u>**Zhang, Y.-F.,**</u> C. M. Bitz, J. L. Anderson, N. Collins, J. Hendricks, T. J. Hall, and K. Raeder, 2017: Insights on sea ice data assimilation from perfect model observing system simulation experiments (OSSEs), Oral presentation at the 2017 CESM Annual Workshop, Boulder, CO, USA.
- <u>**Zhang, Y.-F.,**</u> C. M. Bitz, J. L. Anderson, N. Collins, J. Hendricks, T. J. Hall, and K. Raeder, 2016: Assimilation of sea ice concentration data in the Arctic via DART/CICE5 in the CESM1, poster presentation at 2016 AGU Fall meeting, San Francisco, CA, USA.
- <u>Bitz, C. M.,</u> **Y.-F. Zhang**, E. Blanchard-Wiggleworth, J. Anderson, T. J. Hall, N. Collins, K. Raeder, and J. Hendricks, 2016: Which observations are most important for characterizing Arctic sea ice? 2016 AGU Fall Meeting, San Francisco, CA, USA.
- <u>**Zhang, Y.-F.,**</u> Z.-L. Yang, T. J. Hoar, H. Su, J. L. Anderson, A. M. Toure, and M. Rodell, 2014: Assimilation of MODIS snow cover and GRACE terrestrial water storage data through DART/CLM4, Catchment-based Hydrological Model Data Assimilation (CAHMDA VI) and Hydrologic Ensemble Prediction Experiment (HEPEX-DAFOH III) Joint Workshop, Austin, TX, USA.
- <u>**Zhang, Y.-F.,**</u> Z.-L. Yang, Y. Kwon, T. J. Hoar, H. Su, J. L. Anderson, A. M. Toure, and M. Rodell, 2014: Improving estimates of snowpack water storage in the Northern Hemisphere

through a newly developed land data assimilation system, poster presentation at 4th iLEAPS Science Conference, Nanjing, China.
- Yang, Z.-L., **Y.-F. Zhang**, L. Zhao, Y. Kown, H. Su, X. Ling, T. J. Hoar, J. L. Anderson, A. M. Toure, M. Rodell, and Z.-Y. Zhang, 2014: A new multi-sensor land data assimilation system, poster presented at the 7th International Scientific Conference on the Global Water and Energy Cycle, World Forum, The Hague, The Netherlands.
- **Zhang, Y.-F.,** Z.-L. Yang, H. Su, T. Hoar, and J. L. Anderson, 2013: The value of GRACE TWS data in estimating snow mass, 2013 AGU Fall meeting, San Francisco, CA, USA.
- Yang, Z.-L., **Y.-F. Zhang**, L. Zhao, Y. Kown, H. Su, X. Ling, T. J. Hoar, J. L. Anderson, A. M. Toure, and M. Rodell, 2013: Towards comprehensive land data assimilation using NCAR's Community Land Model (CLM) and Data Assimilation Research Testbed, poster H53E-1467 presented at 2013 Fall Meeting, AGU, San Francisco, CA, USA.
- **Zhang, Y.-F.,** Z.-L. Yang, T. Hoar, J. Anderson, A. Toure, and M. Rodell, 2013: Assimilation of the MODIS snow cover fraction dataset through the coupled Data Assimilation Research Testbed (DART) and the Community Land Model (CLM4), 2013 American Meteorological Society Annual Meeting, Austin, TX, USA.
- Jeffrey Anderson, T. Hoar, N. Collins, K. Raeder, A. Karspeck, P. Lauritzen, **Y.-F. Zhang**, 2011: Challenges in developing coupled earth system model data assimilation, 2011 AGU Fall Meeting, San Francisco, CA, USA.

PROFESSIONAL EXPERIENCE

Doctoral Research, The University of Texas at Austin
[1] Research Assistant, The University of Texas at Austin   **Sep 2010–May 2011**
- Evaluated the simulation of snow in the Community Land Model Version 4 using satellite and ground observations
- Assimilated MODIS snow cover observations using DART/CLM4
- Designed and Realized the assimilation of GRACE terrestrial water storage observations into DART/CLM4 to improve hydrological simulations
- Quantified the uncertainty of various sources in the snow data assimilation system
- Advisor: Dr. Zong-Liang Yang

[2] Visiting student, the National Center for Atmospheric Sciences   May–Aug 2011–2012
- Worked with the Data Assimilation Research Testbed (DART) group to link DART with the Community Land Model
- Tested several parameters in DART and different resolutions of observation data sets, and to improve the performance of snow data assimilation.
- Funded by the Advanced Student Program (Host: Dr. Jeffrey Anderson) and the UT-Austin Jackson School Off Campus Research Grant

Postdoctoral Research
[1] Postdoctoral Research Associate, The University of Texas at Austin,   Aug–Nov 2015
- Regional data assimilation of snow cover over the Tibetan Plateau
- Supervisor: Dr. Zong-Liang Yang

[2] Postdoctoral Research Associate, University of Washington,   Dec 2015–Aug 2018
- Worked with the DART group to link the Los Alamos sea ice model (CICE) with DART

- Designed a series of observing system simulating observations (OSSEs) to test different data assimilation algorithms and observation variables
- Applied the findings from OSSEs to assimilate real observations of sea ice concentration, freeboard, and ice surface temperature
- Extended the DART/CICE interface to estimate parameters along with the model states through data assimilation
- Supervisor: Dr. Cecilia Bitz

[3] Instructor, 2018 CESM Polar Modeling Workshop, **Aug 2018**
- Led a lecture and a practical session on sea ice data assimilation

[4] Postdoctoral Research Associate, Princeton University, **Sep 2018– present**
- Set up a sea ice data assimilation framework with GFDL's ice-ocean coupled model and DART
- Assimilated real sea ice concentration observations from satellites and evaluated the results
- Assessed the influence of an improve sea ice initial conditions on short lead-time Arctic sea ice forecast
- Supervisors: Mitch Bushuk, Mike Winton, and Alistair Adcroft

REVIEW SERVICES

Academic Journals: Journal of Geophysical Research, Journal of Climate, Journal of Hydrology, Advances in Meteorology, The Cryosphere, Remote Sensing, Journal of Advances in Modeling Earth Systems, Ocean Modeling

Proposal: NASA Terrestrial Hydrology Program

TEACHING EXPERIENCES

Spring 2014: Climate: Past, Present, and Future, The University of Texas at Austin
(Teaching Assistant)
Fall 2013: Computational Methods in Geological Sciences, The University of Texas at Austin
(Teaching Assistant)
Fall 2012: Land–Atmosphere Interaction Dynamics, The University of Texas at Austin
(Guest Lecturer)

HORNORS AND AWARDS

2014 Best Student Poster Award, Catchment-based Hydrological Model Data Assimilation (CAHMDA VI) and Hydrologic Ensemble Prediction Experiment (HEPEX-DAFOH III) Joint Workshop, Austin, TX, USA.

2010 Outstanding Graduate, Nanjing University, Nanjing, China.

RESEARCH SKILLS

Running numerical models on super computers

Programing (FORTRAN, C Shell, and Python) and scientific graphic plotting (NCL and MATLAB)

Processing large-volume datasets (satellite remote sensing and large-scale model outputs)