Curriculum vitae

Mu Mu

Professor，Fellow of the Chinese Academy of Sciences

Key Laboratory of Ocean Circulation and Waves,

Institute of Oceanology, Chinese Academy of Sciences,

7 Nanhai Road, Qingdao, 266071, China

Tel: 86-532-82897988**Fax:** 86-532-82897988

E-mail: mumu@qdio.ac.cn，mumu@lasg.iap.ac.cn

Education

Ph.D., Fudan University, Shanghai,   China (Mathematics), 1985

M.S., Anhui University, Hefei,   China (Mathematics), 1981

B.A., Anhui University, Hefei,   China (Mathematics), 1978

Awards and Honors

Ho Leung Ho Lee **Science and Technology Prize ,2010**

Fellow of the Academy of Sciences for the Developing World, 2008

Fellow of the Chinese Academy of Sciences, 2007

The Graduate School of Chinese Academy of Sciences Award for Excellence in Teaching, Advising and Mentoring, 2005

National Award for Outstanding Postdoctoral Fellow, 2005

First Class Prize of Nature Science Award of Chinese Academy of Sciences (first awardee, 2001)

"Hundred Talents Program" of Chinese Academy of Sciences Fellowship，1999

Research Interests

Predictability of weather and climate;

Data assimilation ,ensemble forecast and targeted observation in atmospheres and oceans

Nonlinear stability and instability problems in geophysical fluid dynamics;

Professional Experience

2009.5- present: professor, Key Laboratory of Ocean Circulation and Waves, Institute of Oceanology, Chinese Academy of Sciences

1993.1- 2010.10: professor, Institute of Atmospheric Physics, Chinese Academy of Sciences

1989.4-1992.12: Associate professor, Institute of Atmospheric Physics, Chinese Academy of Sciences

1987.4-1989.3:Postdoctoral Fellow, Institute of Atmospheric Physics, Chinese Academy of Sciences

1985.9-1987.3: Lecturer, Shanghai Jiaotong University, Shanghai, P. R. China

1981.8-1982.3: Assistant professor, Anhui University, Hefei, P.R. China

Professional Activities

2014.7-present:Editor,Chinese Journal of Oceanology and Limnology

2014.1-present:Deputy Editor –in-Chief,Climatic and Environmental Research

2013.7-present:DeputyEditors-in-Chief,Science China:Earth sciences

2009- present:Convener, Discipline Appraisal Group for Atmospheric Science, theAcademic Degree Commission of the State Council，China

2009.3- 2013.2: Director, Academic Committee, Key Laboratory of Ocean Circulation and Waves, Institute of Oceanology, Chinese Academy of Sciences

2007.11- 2012.11:Associate editor, Quarterly Journal of the Royal Meteorological Society

2003- 2013.7: Member, International Commission for Dynamical Meteorology (ICDM), International Association of Meteorology and Atmospheric Sciences (IAMAS)

2002-present: Editor, Advances in Marine Sciences;

2001.9- 2010.10: Depute director, Academic Committee, Institute of Atmospheric Physics, Chinese Academy of Sciences

1994-present : Editor, Chinese Journal of Atmospheric Sciences;

1994-present : Reviewer, Mathematical Reviews;

2001.2- 2010.7: Depute director, The State Key Laboratory of Numerical Modeling for Atmospheric Sciences and Geophysical Fluid Dynamics, Institute of Atmospheric Physics, Chinese Academy of Sciences;

2001.8- 2009.7: Member, International Commission for Planetary Atmosphere and Their Evolution (ICPAE), International Association of Meteorology and Atmospheric Sciences (IAMAS);

2008.1-2008.12: Associate editor, Monthly Weather Review, American Meteorological Society;

2000-2008: Editor, Advances in Atmospheric Sciences

Overseas Academic activities

(1). 2005.9-2005.10

Visiting professor, Ecole normale supérieure Paris, France

(2). 2002.10-2002.11

Visiting professor,International Pacific Research Center, Hawaii University,

Hawaii, USA

(3). 2001.9- 2001.10

Visiting professor, Laboratoire de Meteorologie Dynamique,

Paris, France.

(4). 1996.11-1997.5

Visiting professor, Department of Mathematics,

Hong Kong University of Science and Technology.

(5). 1996.7 –1996.10

Visiting professor, Isaac Newton Institute for Mathematical Sciences,

University of Cambridge, U.K.

(6). 1996.4-1996.6

Visiting professor, Department of Mathematics, Hong Kong University of Science
and Technology,supported by Croucher Foundation

(7). 1995.5- 1995.12

Visiting professor, Department of Physics,

University of Toronto,Canada

(8). 1992.5-1993.10

Visiting Professor, Department of Physics,

(9). 1991.9-1991.12

Visiting professor, Mathematiques Appliquees, Universite Blaise Pascal,

France, supported by the French-Chinese Cooperation Program

Papers Published Recently:

[1] **Mu Mu**，Wansuo Duan，Dake Chen and Weidong Yu (2015): Target observations for improving initialization of high-impact ocean-atmospheric environmental events forecasting .**National Science Review** ,2 ,226-236.

[2] Guodong Sun ,**Mu Mu** (2014): The analyses of the net primary production due to regional andseasonal temperature differences in eastern China using the LPJ model.**Ecological Modelling**，289,66-76.

[3] Wang, Q., and **M. Mu** (2014):Responsesof the ocean planktonic ecosystem tofinite-amplitude perturbations, **J.Geophys. Res. Oceans**, 119, doi:10.1002/2014JC010339.

[4] Feng, R., W. Duan, and **M. Mu** (2014): The ''winter predictability barrier'' forIOD events and its error growthdynamics: Results from a fully coupledGCM, **J. Geophys. Res. Oceans**, 119,doi:10.1002/2014JC010473

[5] **Mu Mu**, Yanshan Yu , Hui Xu and Tingting Gong (2014) :Similarities between optimal precursors for ENSO eventsand optimally growing initial errors in El Niño predictions.**Theor．Appl．Climatol.** ,115:461–469,doi: 10.1007/s00704-013-0909-x.

[6] Rong Feng , **Mu Mu** ,Wansuo Duan(2014):Study on the"winter persistence barrier"of Indian Oceandipole events using observation data and CMIP5model outputs.**Theor . Appl. Climatol.** , 118(3),523-534.

[7] Qin, X. H., and **M. Mu**.(2014): Can adaptive observations improve tropical cyclone intensity forecasts?**Adv. Atmos.Sci.**, 31(2), 252–262, doi: 10.1007/s00376-013-3008-0.

[8] Yu, L., **M. Mu**, and Y. S. Yu(2014): Role of parameter errors in the spring predictability barrier for ENSO events inthe Zebiak–Cane model. **Adv. Atmos. Sci.**, 31(3), 647–656, doi: 10.1007/s00376-013-3058-3.

[9] Stefano Pierini, Henk A. Dijkstra and**Mu Mu** (2014): Intrinsic

low-frequencyvariability and predictability of the Kuroshio Current and of its extension, **Advances inOceanography and Limnology**, 5(2),79-122,doi: 10.1080/19475721.2014.962091.

[10] **Mu Mu**, Wang Qiang , Duan Wansuo , Jiang zhina (2014): Application of Conditional Nonlinear Optimal Perturbation to Targeted Observation Studies of the Atmosphere and Ocean. **Journal of Meteorological Research**,28(5),923-933.

[11]   Sun Guodong , **Mu Mu**.(2013):Using the Lind-Potsdam-Jena model to understand the different responses of three woody plants to land use in China. **Advances in Atmospheric Sciences**,30(2), 515-524.

[12]   Sun Guodong, **Mu Mu.** (2013):Understanding variations and seasonal characteristics of net primary production under two types of climate change scenarios in China using the LPJ model. **Climate Change**,120,755-769.

[13]   Chunzai Wang, Chunxiang Li,**Mu Mu**, Wansuo Duan(2013):Seasonal modulations of different impacts of two types of ENSO events on tropical cyclone activity in the western North Pacific. **Climate Dynamics**,40,2877-2902.

[14]   Zhina Jiang , **Mu Mu**, Dehai Luo(2013):A study of the North Atlantic Oscillation using conditional nonlinear optimal perturbation. **J. Atmos. Sci.**,70,855-875.

[15]   Qiang Wang , **Mu Mu**, Henk A. Dijkstra(2013):The similarity between optimal prescursor and optimally growing initial error in prediction of Kuroshio large meander and its application to targeted observation. **J. Geo. Res.:Ocean**,118,869-884.

[16]   Qiang Wang , **Mu Mu**, Henk A. Dijkstra(2013): Effects of nonlinear physical processes on optimal error growth in predictability experiments of the Kuroshio Large Meander. **J. Geo. Res.:Ocean**,118,6425-6436.

[17]   Boyu Chen , **Mu Mu**, Qin Xiaohao(2013):The impact of assimilating dropwindsonde data deployer at different sites on typhoon track forecasts. **Mon. Wea. Rev.**,141,2669-2682.

[18]   Xiaohao Qin , Wansuo Duan , **Mu Mu**(2013):Conditions under which CNOP sensitivity is valid for tropical cyclone adaptive observations. **Q. J. R. Meteorol. Soc.**, 139: 1544–1554. doi: 10.1002/qj.2109.

[19]   **Mu Mu**, Yanshan Yu , Hui Xu, Tingting Gong(2013):Similarities between optimal prescursors for ENSO events and optimally growing initial errors in El Nino predictions. **Theor. Appl. Climatol**,115:461-469.

[20]   Zu Ziqing , **Mu Mu**, Henk A. Dijkstra(2013):Three-dimensional structure of optimal nonlinear excitation for decadal variability of the thermohaline circulation. **Atmospheric and Oceanic Science Letters**,6(6):410-416.

[21] **Mu Mu**,2013:Methods,current status ,and prospect of targeted observation. **Science China :Earth Science**,56(12):1997-2005.

[22] Zu Ziqing , **Mu Mu**, Henk A. Dijkstra(2013):Optimal nonlinear excitation of decadal variability of the North Atlantic thermohaline circulation. **Chinese Journal of Oceanology and Limnology** ,31(6):1356-1362.

[23] Xie Dongdong, Sun Guodong, Shao Aimei, **Mu Mu**. 2013:A study of simulation uncertainties caused by parameter uncertainties in a grassland ecosystem model.

Climatic and Environmental Research (in Chinese), 18 (3): 375–386.

[24] **Mu Mu**, Duan Wansuo.(2013):Applications of conditional nonlinear optimal perturbation to the studies of predictability problems. Chinese Journal of Atmospheric Sciences (in Chinese), 37 (2): 281–296.

[25] Yu, Y., **M. Mu**, W. Duan, and T. Gong(2012):Contribution of the location and spatial pattern of initial error to uncertainties in El Niño predictions. **J. Geophys. Res.**, doi:10.1029/2011JC007758, in press.

[26] Yu, Y., **Mu M**.,& W.Duan(2012): Does Model Parameter Error Cause a Significant ''Spring Predictability Barrier'' for El Nin˜o Events in the Zebiak–Cane Model?,**J.Climate**,25,1263-1277.

[27] Feifan Zhou, **Mu Mu**. (2012) The impact of horizontal resolution on the CNOP and on its identified sensitive areas for tropical cyclone predictions.**Advances in Atmospheric Sciences** 29:1, 36-46.

[28] Qiang Wang , **Mu Mu**, Henk A. Dijkstra(2012): Application of the conditional nonlinear optimal perturbation method to the predictability study of the Kuroshio large Meander. **Adv. Atmos. Sci.,**29,118-134.

[29] Boyu Chen, **Mu Mu**. (2012) The roles of spatial locations and patterns of initial errors in the uncertainties of tropical cyclone forecasts. **Advances in Atmospheric Sciences** 29:1, 63-78.

[30] Feifan Zhou, **Mu Mu**. (2012)The Time and Regime Dependencies of Sensitive Areas forTropical Cyclone Prediction Using the CNOP Method.**Advances in Atmospheric Sciences** 29:4, 705-716.

[31] **Mu Mu**,Qin Xiaohao,Zhou Feifan,Chen Boyu(2012):Developing the adaptive observations, reducing the disasters（in Chinese）.**Journal of Chengdu University of Information Technology**，27(1):20-26.

[32] Wang Fan，Hu Dunxin，**Mu Mu**，et al. (2012)：Structure, variations and climatic impacts of ocean circulation and the warm pool in the tropical Pacific Ocean (in Chinese).**Advances in Earth Science**, 27(6):595-602.

[33] Qin, Xiaohao, **Mu Mu**,(2011): Influence of conditional nonlinear optimal perturbations sensitivity on typhoon track forecasts. **Quarterly Journal of Royal Meteorological Society**,138,662,185-197.

[34] **Mu, Mu**, Zhina Jiang (2011): Similarities between Optimal Precursors that Trigger the Onset of Blocking Events and Optimally Growing Initial Errors in Onset Prediction. **J. Atmos. Sci**., 68, 2860–2877.

[35] Qin, Xiaohao, **Mu Mu**, (2011):A Study on the Reduction of Forecast Error Variance by Three Adaptive Observation Approaches for Tropical Cyclone Prediction. **Mon. Wea. Rev.**, 2011，139：2218‐2232.

[36] G. Sun and **M. Mu** (2011):Nonlinearly combined impacts of initial perturbation from human activities and parameter perturbation from climate change on the grassland ecosystem.**Nonlin. Processes Geophys.**, 18(6), 883-893.

[37] HONGLI WANG, **Mu Mu**, XIANG-YU HUANG (2011):Application of conditional non-linear optimal perturbations to tropical cyclone adaptive observation using the Weather Research Forecasting (WRF) model. **Tellus**, 63(5), 939-957.

[38] Zhou Feifan and **Mu Mu**, (2011):The Impact of Verification AreaDesign on Tropical Cyclone Targeted Observations Based on the CNOP Method, **Adv. Atmos. Sci.**, 28(5),997-1010.

[39] Sun, G. D., and **M. Mu**, (2011): Response of a grassland ecosystem to climate change in a theoretical model. **Adv. Atmos. Sci**., 28(6), 1266-1278.

[40] **Mu Mu**，Boyu Chen, Feifan Zhou and Yu, Y., (2011):Methods and Uncertainties of Meteorological Forecasts(in Chinese). Meteorological Monthly,37(1):1-13.

[41] **Mu, M**., W. Duan, Q. Wang, and R. Zhang, (2010):An extension of conditional nonlinear optimal perturbation approach and its applications. **Nonlin. Processes Geophys.**, 17, 211-220.

[42] Sun, Guodong, **Mu Mu**, Y. Zhang, (2010):Algorithm studies on how to obtain a conditional nonlinear optimal perturbation (CNOP). **Adv. Atmos. Sci.**, 27(6), 1311-1321.

Co-convener of Sessions on important international conferences:

[1]Mu Mu, 2015, EGU General Assembly, Initial error dynamics and model error physics in predictability studies of weather and climate.(Convener), Vienna ,Austria.

[2]Mu Mu, 2014, AOGS 11th Annual Meeting, Western Boundary Currents, Transport, Path Variability, Eddies and Continental Shelf Processes.(Co-convener), Sapporo ,Japan.

[3] Mu Mu, 2014, EGU General Assembly, Initial Error dynamics and model error physics in predictability studies of weather and climate. (Co-convener), Vienna, Austria.

[4] Mu Mu, 2013, EGU General Assembly, Error growth dynamics and related predictability problems. (Co-convener), Vienna, Austria..

[5]Mu Mu, 2012, EGU General Assembly, Nonlinear optimal modes and their applications in predictability, sensitivity and stability studies. (Co-convener), Vienna, Austria.

[6] Mu Mu, 2011, IUGG, Data assimilation and ensemble forecasting for weather and climate. (Co-convener), Melbourne, Australia.

[7] Mu Mu, 2011, EGU General Assembly, Nonlinear instabilities and predictability. (Co-convener), Vienna, Austria.

[8] Mu Mu, 2010, EGU General Assembly, Nonlinear optimal modes and their applications in predictability, sensitivity and stability studies. (Convener), Vienna, Austria.

[9]Mu Mu, 2009, Advances in Data Assimilation for Earth System Science(Co-convener), IMMAS, Montréal, Canada.

[10] Mu Mu, 2008, Predictability of weather and climate: theory and methodology, AOGS2008, Busan, Korea

[11] Mu Mu , 2007, IUGG XXIV General Assembly, *JMS024：Data Assimilation for the Atmosphere, Ocean and Land Surface.* Co-Convener: http://www.iugg2007perugia.it/abstracttype.asp, Perugia, Italy.

[12] Mu Mu , 2006, Western Pacific Geophysics Meeting, *A31B-01: Uncertainty in Numerical Weather Prediction and its Application I*, Presiding: http://www.agu.org, Beijing, China.

[13] Mu Mu , 2006, EGU General Assembly, *NP3.05: Uncertainty, Random Dynamical Systems and Stochastic Modeling in Geophysics,* Co-Convener: http://www.cosis.net/members/meetings/programme, Vienna, Austria

[14] Mu Mu , 2005，IAMAS，*I2: Aeronomy of Planetary Atmospheres: Comparative Planetology (ICPAE)*，Co-Convener.http://www.iamas2005.com/program.htm, Beijing, China.

[15] Mu Mu , 2005，IAMAS，*B5: Advances in Data Assimilation (IAMAS),* Convener.http://www.iamas2005.com/program.htm, Beijing China

[16] Mu Mu , 2005, AOGS, Joint NL4/OA10 Session - AOGS 2004, Co-Organiser. http://www.asiaoceania.org/proposals/nl/nl4.htm, Singapore.

Invited Talks on International Conferences:

[1] **Mu Mu**, Target Observations for High-impact Ocean-Atmospheric Environmental Events, PAMS 2015, 21-23 April, 2015 , Naha , Japan.

[2] **Mu Mu** ,Optimal precursor and optimally growing initial error in the predictability studies of Kuroshio large meander and their nonlinear evolution mechanism, EGU General Assembly 2014,Apr. 27-May 2,2014,,Vienna, Austria.

[3] **Mu Mu**,Application of conditional nonlinear optimal perturbation to the predictability studies of Kuroshio large meander, AOGS 11th Annual Meeting, July 28-Aug. 1,2014, Sapporo ,Japan.

[4] **Mu Mu** ,Similarities between precursors for El Niño events and initial errors in the predictions and implications in targeted observation, Davos Atmosphere and Cryosphere Assembly,July 8-12,2013, Davos, Switzerland.

[5] **Mu Mu** ,Dynamics of nonlinear optimal error growth in the studies of predictability, the RIMS International Conference on Theoretical Aspects of Variability and Predictability in Weather and Climate Systems,Oct. 22-25,2013, Kyoto, Japan.

[6] **Mu Mu**,A Similarity problem between signals and noises in the predictability studies of ENSO、blocking and kuroshio current, 7th International Conference on Atmospheric Physics, Climate and Environment,July 19-21,2012,Russisa.

[7] **Mu Mu**,Applications of Conditional nonlinear optimal perturbations to the studies of ENSO and THC, NTU International Science Conference on Climate Change: Multidecadal and Beyond,Sep. 17-21,2012,Taiwan.

[8] **Mu Mu,**Similarities between optimal precursors and optimally growing initial errors in onset prediction—ENSO, Blocking and Kuroshio Current. EGU General Assembly,April 22-27,2012,Vienna, Austria.

[9] **Mu Mu**, Approaches to adaptive observation for improving high impact weather prediction: CNOP and SV. The second International Workshop on Prevention and Mitigation of Meteorological Disasters in Southeast Asia, March 2-5, 2009, Bandung, Indonesia.

[10] **Mu Mu,** Applications of conditional nonlinear optimal perturbations to adaptive observation of tropical cyclones， The Second THORPEX-Asia Science Workshop and the Sixth ARC WG Meeting, Feb. 18-20, 2009, Hangzhou China.

[11] **Mu Mu**, Progresses in the study of "spring predictability barrier" for El Nino events, 2009 LASG International Summer Symposium, Aug. 19-21, 2009, Yinchuan, Ningxia, China.

[12] **Mu Mu,** Zhou Feifan, Wang Hongli,Wu Xiaogang， Some new progresses in the applications of conditional nonlinear optimal perturbations，JSPS 5th university allied workshop on climate and environment studies for global sustainability，30 June-4 July, 2008, Tokyo, Japan.

[13] **Mu Mu**，Conditional nonlinear optimal perturbation and its applications inpredictability study, ensemble forecast and adaptive observation，2007，Workshop on "Stochastic Dynamical Systems and Climate Modeling"，Banff International Research Station, Canada.

[14] **Mu Mu,** Applications of Conditional optimal perturbation in predictability studies, 2007, International Conference on Applied Mathematics and Interdisciplinary Research, Lijiang, Yunnan, China.

[15]   **Mu Mu,** Conditional nonlinear optimal perturbation and its applications to predictability study, sensitivity analysis and adaptive observation, 2007, UAW, Beijing, China.

[16]   **Mu Mu** , Xu Hui, Duan Wansuo, Wang Bin, Applications of conditional nonlinear optimal perturbation in the studies of climate predictability and sensitivity analysis, 2006, EGU General Assembly, Vienna, Austria.

[17]   **Mu Mu** , Zhang Zhiyue, Conditional nonlinear optimal perturbation of a quasigeostrophic model and its application in predictability study, 2005, European Geosciences Union, The second General Assembly, Vienna, Austria.

[18]   **Mu Mu** , Duan Wansuo, A new approach to the study of "spring predictability barrier" and precursor for El Nino-Southern Oscillation events, 2005, IAMAS-2005, Beijing, China.

[19]   **Mu Mu**, Zhang Zhiyue, Application of conditional nonlinear optimal perturbation to the study of instability and associated predictability of planetary atmospheric motions, 2005, IAMAS-2005, Beijing, China.

[20] **Mu Mu**, Zhang Zhiyue, Conditional nonlinear optimal perturbation of a quasigeostropheric model and its application in predictability study of numerical weather forecast, 2005, International Conference on Nonlinear Evolutionary Equations and Infinite-dimensional Dynamical System, Nanjing,China.

[21]   **Mu Mu** , Duan Wansuo, B. Wang, H. A. Dijkstra and Sun Liang, A new approach to the estimation of uncertainty of numerical Modeling in geophysics: conditional nonlinear optimal perturbation, 2004, European Geosciences Union, The first General Assembly, Nice, France.

[22]   **Mu Mu** , A method for adjoint variational data assimilation, 2004, First Annual Meeting of the Asia Oceania Geosciences Society (AOGS), Singapore. **(Invited talk)**

[23]   **Mu Mu** , Duan Wansuo, Sun Liang, Conditional nonlinear optimal perturbation: a new approach to the estimation of numerical modeling, 2004，International Symposium on Nonlinear Dynamical System and Stochastic Partial Differential Equations, Beijing, China.

[24]   **Mu Mu**   and Duan Wansuo, Nonlinear optimization problems in atmospheric and oceanic sciences, 2002, International Conference on Computational Mathematics and Modelling, Bangkok, Thailand.

[25]   **Mu Mu**   and Duan Wansuo, Predictability problems of numerical climate prediction, 2002, International Conference on East Asian Climate, Harbin, China.

[26]   Q. C. Zeng and **Mu Mu**   , A compact and internally consistent formulation of climate system model，2001, CAS-TWAS-WMO Forum，First International Symposium on Physical-mathematical problems related to Climate Modeling and Prediction，Beijing, China.

[27]   **Mu Mu** , Arnol'd's stability theorems, the Eliassen-Palm flux theorem, and

applications to atmosphere dynamics, 2000, EGS XXV General Assembly, Nice, France.

[28]   **Mu Mu** , Wu Yonghui, Wang Jiafeng and Liu Yongming, Nonlinear stability and instability in atmospheric dynamics: Theory and application, 1999, IUGG-99, Birmingham.

[29]   **Mu Mu** , Advances in the study of nonlinear stability problems in geophysical fluid dynamics by energy-Casimir method, 1999, The 8th Asian Congress of Fluid Mechanics, Shenzhen, China.

[30]   **Mu Mu** , A criterion of symmetric stability of planetary atmosphere, 1998, Luso-Chinese Symposium on nonlinear evolution equations and their applications, Macau.

[31]   **Mu Mu** , Applications of Energy-Casimir and Energy-Lagrange methods to the nonlinear symmetric stability problems, 1997, Joint assemblies of the International Association of Meteorology and Atmospheric Sciences and International Association for Physical Sciences of the Oceans, Melbourne, Australia.

[32]   **Mu Mu** , Applications of energy-Casimir method to the problem of nonlinear stability in geophysical fluid dynamics, 1996, Second world congress of nonlinear analysts, Athens, Greece.

[33]   **Mu Mu** , Some new results on nonlinear instability of the atmospheric motions, invited talk, 1995, International conference on nonlinear evolution equations and infinite-dimensional dynamical system, Shanghai, China.