

Curriculum vitae

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EDUCATION

Ph. D. Department. of Atmospheric Sciences, University of Washington, Seattle, WA, 1998.

Advisors: Edward S. Sarachik, and David S. Battisti.

Dissertation: Thermally Driven Surface Winds in the Tropics.

Graduate study, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing China, 1988-1991

Advisor: Congbin Fu

B.S. Dept. of Atmospheric Sciences, Nanjing University, Nanjing, China, 1988

EMPLOYMENT

Assistant Professor, Department of Meteorology, Florida State University, Tallahassee, Florida, Jan. 2009 – present.

Research Scientist, Center for Ocean-Land-Atmosphere Studies, Calverton, MD, Jan. 2002 – Dec. 2008.

Lecturer, Department of Computer Sciences, Southeastern University, Washington, DC, Jan. 2001 – Dec. 2005.

Postdoctoral Research Scientist, Center for Ocean-Land-Atmosphere Studies, Calverton, MD, Jan. 2000 – Dec. 2001. (Advisors: Edwin K. Schneider and Benjamin P. Kirtman)

Research Associate, Joint Institute for the Study of the Atmosphere and Ocean, , Jan. 1999 – Dec 1999. (Advisor: Edward S. Sarachik)

Graduate Research Assistant, Department of Atmospheric Sciences, University of Washington, Sep. 1991 – Dec. 1998.

Graduate Research Assistant, Institute of Atmospheric Physics, Chinese Academy of Sciences, P. R. China, Sep. 1991 – Dec. 1998.

TEACHING EXPERIENCE

Florida State University, Department of Meteorology, Tallahassee, Florida

Undergraduate Course: Meteorological computation (MET3220)

Atmospheric Dynamics (MET4301)

Graduate Course: Physical Analysis of Data (MET6155)

Atmospheric Dynamics (MET5311)

The first Institute of Oceanography, State Oceanic Administration of China,
Qingdao, China

Graduate Course: Physical Analysis of Data (Jul. 2011)

The first Institute of Oceanography, State Oceanic Administration of China,
Qingdao, China

Short Course: A short course on the Hilbert-Huang Transform, (Jun. 2011)

Sun Yat-Sen (Zhongshan) University, Guangzhou, China

Short Course: A short course on the Hilbert-Huang Transform, (Dec. 2008)

Nanjing University, Nanjing, China

Short Course: Physical Time-Frequency Analysis, (Dec. 2008)

Center for Ocean-Land-Atmosphere Studies, Calverton, Maryland

Short Course: Physical Time-Frequency Analysis, (Sep. – Oct., 2008)

Southeastern University, Washington, DC

Undergraduate Course: Calculus II (MATH 302, Jan 2001 – Jun 2001)

Graduate Course: Problem Solving Using High Level Languages (COSC 502, Apr
2001 – Dec 2005)

AWARDS AND HONORS

Hilbert-Huang Transform Outstanding Contribution Award. awarded by the Third International Conference on Hilbert-Huang Transform: Theory and Applications on June 20-24, 2011 in Qingdao, China. For “*his unremitting efforts and outstanding contributions to the development of Empirical Mode Decomposition and Hilbert-Huang Transform.*”

Goddard’s Technology Awards for 2007: “*Ensemble Empirical Mode Decomposition: A Noise Assisted Data Analysis Method*” by Norden Huang and **Zhaohua Wu** (Center for Ocean-Land-Atmospheric Studies)

Goddard’s Technology Awards for 2007: “*Noise-Assisted Data Analysis Method, System and Program Product*” by Norden Huang (Code 610.3) and **Zhaohua Wu** (Center for Ocean-Land-Atmospheric Studies)

Visiting (Adjunct) Professor, Research Center for Adaptive Data Analysis, National Central University, Taiwan, Apr. 2008 – present.

PUBLICATIONS [Number of Citations: Google Scholar >1300, Web of Science (SCI) >700, SCI-based H-index >12]

Invited and Refereed Book Chapters

1. **Wu, Z.**, and N. E. Huang, 2005: Statistical significance test of intrinsic mode functions. In *Hilbert-Huang Transform : Introduction and Applications*, pp 125-148, Ed. N. E. Huang and S. S. P. Shen, World Scientific, Singapore, 311pp.
2. Shen, S. P., T. Shu, N. E. Huang, **Z. Wu**, G. R. North, T. R. Carl, and D. R. Easterling, 2005: HHT analysis of the nonlinear and non-stationary annual cycle of daily surface air temperature data. In *Hilbert-Huang Transform : Introduction and Applications*, pp 187-210, Ed. N. E. Huang and S. S. P. Shen, World Scientific, Singapore, 311pp.

Refereed Journal Articles

Submitted:

3. Zhu, J., B. Huang, and **Z. Wu**, 2011: The role of ocean dynamics in the interaction between the Atlantic meridional and equatorial modes. *Clim. Dyn.* (**Accepted**)
4. Huang, B., Z.-Z. Hu, E. K. Schneider, **Z. Wu**, Y. Xue, B. Klinger, 2011: Influences of subtropical air-sea interaction on the multidecadal AMOC variability in the NCEP climate forecast system. *Clim. Dyn.* (**Accepted**).
5. Huang, B., Z.-Z. Hu, J. L. Kinter III, **Z. Wu**, and A. Kumar, 2011: Connection of stratospheric QBO with global atmospheric general circulation and tropical SST. Part I: Methodology and composite life cycle. *Clim. Dyn.* (**Accepted**).

Published or in press:

6. Qian, C., **Z. Wu**, C. Fu, and D. Wang, 2011: On changing El Nino: A view from time-varying annual cycle, interannual variability and mean state. *J. Climate.* (In press)
7. Qian, C., C. Fu, and **Z. Wu**, 2011: Nonlinear trend in the amplitude of annual temperature cycle in China and its implication for climate research. *J. Climate.* (In press)
8. Fu, C., C. Qian, and **Z. Wu**, 2011: Projection of global mean surface temperature changes in next 40 years: Uncertainties of climate models and an alternative approach. *Science China-Earth Sciences.* **54**, 1400-1406. DOI: 10.1007/s11430-011-4235-9.
9. Hu, Z.-Z., B. Huang, J. L. Kinter III, **Z. Wu**, and A. Kumar, 2011: Connection of the stratospheric QBO with global atmospheric general circulation and tropical SST. Part II: Interdecadal variations. *Clim. Dyn.* DOI: 10.1007/s00382-011-1073-6.
10. Bao, S., L. J. Pietrafesa, N. E. Huang, Z. Wu, D. A. Dickey, P. T. Gayes, and T. Yan, 2011: An empirical study of tropical cyclone activity in the Atlantic and Pacific Oceans: 1851-2005. *Advances in Adaptive Data Analysis*, 291-307.

11. Huang, N. E., X. Chen, M.-T. Lo, and **Z. Wu**, 2011: On Hilbert spectral representation: a true time-frequency representation for nonlinear and nonstationary data. *Advances in Adaptive Data Analysis*, 63-93.
12. **Wu, Z.**, N. E. Huang, and X.-Y. Chen, 2011: Some considerations on physical analysis of data. *Advances in Adaptive Data Analysis*, 95-113.
13. **Wu Z.**, N. E. Huang, J. M. Wallace, B. Smoliak, X. Chen, 2011: On the time-varying trend in global-mean surface temperature. *Clim. Dyn.* **37**, 759-773, DOI: 10.1007/s00382-011-1128-8. (**1, 1, 1**)
14. Huang, N. E, and **Z. Wu**, 2011: *Noise-assisted data analysis method, system and program product therefore*, **US Patent No.: 7,941,298** (Granted May 10, 2011). (<http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fmetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=7,941,298.PN.&OS=PN/7,941,298&RS=PN/7,941,298.>)
15. Qian, C., Z. W. Yan, **Z. Wu**, C. B. Fu, and K. Tu, 2011: Trends in temperature extremes in association with weather-intraseasonal fluctuations in eastern China. *Adv. Atmos. Sci.*, **28**(2), 297-309, doi: 10.1007/s00376-010-9242-9.
16. Qian, C., C. B. Fu, **Z. Wu**, and Z. W. Yan, 2011: The role of changes in the annual cycle in earlier onset of climatic spring in northern China. *Adv. Atmos. Sci.*, **28**(2), 284-296. doi:10.1007/s00376-010-9221-1.
17. Yan, T., L. J. Pietrafesa, D. A. Dickey, S. Bao, N. E. Huang, and **Z. Wu**, 2010: North Atlantic ocean basin tropical cyclone activity as related to climate factors for the 2010 hurricane season. *Advances in Adaptive Data Analysis*. **2**, 463-508.
18. Chang, Y.-M., **Z. Wu**, J. Chang, and N. E. Huang, 2010: Model validation based on ensemble empirical mode decomposition. *Advances in Adaptive Data Analysis*. **2**, 415-428.
19. **Wu, Z.**, N. E. Huang, 2010: On the Filtering Properties of the Empirical Mode Decomposition. *Advances in Adaptive Data Analysis*. **2**, 397-414.
20. Qian, C., **Z. Wu**, C. B. Fu, and T. J. Zhou, 2010: On multi-timescale variability of temperature in China in modulated annual cycle reference frame. *Adv. Atmos. Sci.*, **27**(5), 1169–1182, doi: 10.1007/s00376-009-9121-4.
21. Wang, G., X.-Y. Chen, F.-L. Qiao, **Z. Wu**, and N. E. Huang, 2010: On intrinsic mode function. *Advances in Adaptive Data Analysis*, **2**, 277-293. doi: 10.1142/S1793536910000549.
22. Chen, X.-Y., **Z. Wu**, and N. E. Huang, 2010: The time-dependent intrinsic correlation based on the empirical mode decomposition. *Advances in Adaptive Data Analysis*, **2**, 233-265, doi: 10.1142/S1793536910000471.
23. Hou, T. Y., M. P. Yan, and **Z. Wu**, 2009: A variant of the EMD method for multi-scale data. *Advances in Adaptive Data Analysis*, **1**, 483-516.

24. Huang, N. E., **Z. Wu**, J. E. Pinzón, C. L. Parkinson, S. R. Long, K. Blank, P. Gloersen, X. Chen, 2009: Reductions of noise and uncertainty in annual global surface temperature anomaly data. *Advances in Adaptive Data Analysis*, **1**, 447-460.
25. **Wu, Z.**, N. E. Huang, and X. Chen, 2009: The multi-dimensional Ensemble Empirical Mode Decomposition method. *Advances in Adaptive Data Analysis*, **1**, 339-372.
26. Qian, C., C. Fu, **Z. Wu**, and Z. Yan, 2009: On the secular change of spring onset at Stockholm, *Geophysical Research Letter*, **36**, L12706, doi:10.1029/2009GL038617.
27. Huang, N. E, **Z. Wu**, S. R. Long, K. C. Arnold, X. Chen, K. Blank, 2009: On instantaneous frequency, *Advances in Adaptive Data Analysis*. **1**, 177-229.
28. **Wu, Z.**, and N. E Huang, 2009: Ensemble Empirical Mode Decomposition: a noise-assisted data analysis method. *Advances in Adaptive Data Analysis*. **1**, 1-41.
29. **Wu, Z.**, E. K. Schneider, B. P. Kirtman, E. S. Sarachik, N. E. Huang, and C. J. Tucker, 2008: The modulated annual cycle: an alternative reference frame for climate anomalies. *Climate Dynamics*, **31**, 823-841, DOI 10.1007/s00382-008-0437-Z.
30. Huang, N. E, and **Z. Wu.**, and S. R. Long, 2008: Hilbert Huang Transform. *Scholarpedia*, (http://www.scholarpedia.org/article/Hilbert-Huang_transform.)
31. Huang, N. E, and **Z. Wu.**, 2008: A review on Hilbert-Huang transform: method and its applications to geophysical studies. *Rev. Geophys.*, **46**, RG2006, doi:10.1029/2007RG000228.
32. Yeh, J.-H., T.-Y. Lim, J.-S. Shieh, N. E. Huang, **Z. Wu**, and C.-K. Peng, 2008: Investigating complex patterns of blocked intestinal artery blood pressure signals by empirical mode decomposition and linguistic analysis. *Journal of Physics: Conference Series*, **96**, 012153, doi:10.1088/1742-6596/96/1/012153.
33. Hu, K., C.-K. Peng, N. E. Huang, **Z. Wu**, A. L. Goldberger, L. A. Lipsitz, and V. Novak, 2008: Altered phase interactions between spontaneous blood pressure and flow fluctuations in type 2 diabetes mellitus: nonlinear assessment of cerebral autoregulation. *Physica A.*, **387**, 2279-2292.
34. Li, H., C. Wang, Y. Xu, and **Z. Wu**, 2007: Time-frequency analysis of the vertical dynamics of the track-vehicle system using EEMD. *Chinese Railway Science*. **28(5)**: 24-30.
35. **Wu, Z.**, Huang, N. E, S. R. Long, C.-K. Peng, 2007: On the trend, detrending, and variability of nonlinear and nonstationary time series. *Proc. Natl. Acad. Sci. USA*. **104**, 14889-14894. doi: 10.1073/pnas.0701020104.
36. Costa, M., A. A. Priplata, L. A. Lipsitz, A. L. Goldberger, N. E. Huang, **Z. Wu**, and C.-K. Peng, 2007: Noise and poise: enhancement of postural complexity in the elderly with a stochastic resonance-based therapy. *Europhysics letters*. **77**, EPL 68008 (5pp) doi:10.1209/0295-5075/77/68008.

37. **Wu, Z.**, E. K. Schneider, and B. P. Kirtman, 2004: Causes of low frequency North Atlantic SST variability in a coupled GCM. *Geophys. Rev. Lett.*, **31**, L09210, doi:1029/2004GL019548.
38. **Wu, Z.**, and N. E. Huang, 2004: A study of the characteristics of white noise using the Empirical Mode Decomposition method. *Proc. R. Soc. Lond. A*, **460**, 1597-1611.
39. **Wu, Z.**, and D. W. Moore, 2004: The completeness of eigenfunctions of the tidal equation on an equatorial beta plane. *Journal of the Atmospheric Sciences*, **61**, 769-774.
40. Hu, Z.-Z., and **Z. Wu**, 2004: The Intensification and shift of the annual North Atlantic Oscillation in a global warming scenario simulation. *Tellus*, **52A**, 112-124.
41. **Wu, Z.**, 2003: A shallow CISK, deep equilibrium mechanism for the interaction between large-scale convection and large-scale circulations in the tropics. *Journal of the Atmospheric Sciences*, **60**, 377-392.
42. **Wu, Z.**, E. S. Sarachik, and D. S. Battisti, 2001: Thermally driven tropical circulations under Rayleigh friction and Newtonian cooling: analytical solutions. *Journal of the Atmospheric Sciences*, **58**, 724-741.
43. **Wu, Z.**, E. S. Sarachik, and D. S. Battisti, 2000: Vertical structure of convective heating and the three-dimensional structure of the forced circulation on an equatorial beta plane. *Journal of the Atmospheric Sciences*, **57**, 2169-2187.
44. **Wu, Z.**, D.S. Battisti, and E. S. Sarachik, 2000: Rayleigh friction, Newtonian cooling, and the linear response to steady tropical heating. *Journal of the Atmospheric Sciences*, **57**, 1937-1957.
45. **Wu, Z.**, E. S. Sarachik, and D. S. Battisti, 1999: Thermally forced Surface winds on an equatorial beta plane. *Journal of the Atmospheric Sciences*, **56**, 2029-2037.
46. **Wu, Z.**, 1998: Thermally driven surface winds in the tropics, Ph. D. dissertation, Department of Atmospheric Sciences, University of Washington, 178pp.
47. Chen, X., G. Gao and **Z. Wu**, 1991: The long wave radiation budget in the atmosphere over the North Pacific. *Journal of Nanjing University (Natural Sciences Edition)*, **27**, 623-629.

Technical Reports, Conference Papers, and Others

48. **Wu, Z.**, B. P. Kirtman, E. K. Schneider, E. S. Sarachik, N. E. Huang, and C. J. Tucker, 2007: Amplitude-frequency modulated annual cycle: an alternative reference frame for climate anomaly. *COLA Technical Report 244*.
49. **Wu, Z.**, and N. E. Huang, 2005: Ensemble Empirical Mode Decomposition: a noise-assisted data analysis method. *COLA Technical Report 193*.
50. **Wu, Z.**, 2004: Statistical significance test of Intrinsic Mode Functions. *CMG 2004, The 25th IUGG International Meeting on Mathematical Geophysics: Frontiers in Theoretical Earth Science*. 89.
51. **Wu, Z.**, E. K. Schneider, and B. P. Kirtman, 2004: The impact of ENSO variability on the NAO variability, *15th Symposium on Global Change and Climate Variations*.

52. **Wu, Z.**, E. K. Schneider, and B. P. Kirtman, 2004: Causes of low frequency North Atlantic SST variability in a coupled GCM. *COLA Technical Report 160*.
53. **Wu, Z.**, and N. E. Huang, 2003: A study of the characteristic of white noise using the Empirical Mode Decomposition method. *COLA Technical Report 133*.
54. Hu, Z.-Z., and **Z. Wu**, 2002: The Intensification and shift of the North Atlantic Oscillation in a global warming scenario simulation. *COLA Technical Report 127*.
55. **Wu, Z.**, and D. W. Moore, 2002: On the completeness of meridional eigenfunctions of tidal equation on an equatorial β -plane. *COLA Technical Report 118*.
56. **Wu, Z.**, E. K. Schneider, Z.-Z. Hu, and L. Cao, 2001: The impact of global warming on ENSO variability in climate records. *COLA Technical Report 110*.
57. **Wu, Z.**, 2001: A Shallow-CISK-Deep-Equilibrium mechanism for the interaction between large-scale convection and large-scale circulation in the tropics. *COLA Technical Report 104*.
58. **Wu, Z.**, 2001: The role of shallow heating in driving tropical atmospheric circulations. *13th Conference on Atmospheric and Oceanic Fluid Dynamics*, American Meteorological Society, 104-108.
59. **Wu, Z.**, 1999: The structure of the thermally forced circulations under different combinations of linear damping. *12th Conference on Atmospheric and Oceanic Fluid Dynamics*, American Meteorological Society, 66-70.
60. **Wu, Z.**, 1999: Vertical structure of heating and the 3D structure of the forced circulations in the tropics. *12th Conference on Atmospheric and Oceanic Fluid Dynamics*, American Meteorological Society, 152-156.
61. **Wu, Z.**, E. S. Sarachik, D. S. Battisti, 1997: Forced planetary waves on an equatorial beta-plane. *11th Conference on Atmospheric and Oceanic Fluid Dynamics*, American Meteorological Society, 6-10.
62. **Wu, Z.**, E. S. Sarachik, D. S. Battisti, 1997: On the different roles of Rayleigh friction and Newtonian cooling in the linear response to steady tropical heating (Abstract). *1997 AGU Fall meeting*, **78**, A32B-5.
63. Hurrell, J. W., **Z. Wu**, and D. J. Vimont, 2000: Observations of extratropical variability. Lecture notes for 2000 NCAR ASP on Decadal and Centennial Climate Variability .
(<http://www.asp.ucar.edu/colloquium/2000/Lectures/hurrell1.html>)
64. Saravanan, R., D. J. Vimont, and **Z. Wu**, 2000: Exotic mechanisms for coupled ocean-atmosphere variability in mid-latitudes. Lecture notes for 2000 NCAR ASP on Decadal and Centennial Climate Variability.
(<http://www.asp.ucar.edu/colloquium/2000/Lectures/saravanan.html>)

SELECTED INVITED PRESENTATIONS (FORMAL)

Conferences and Workshops (expenses paid by the conferences or workshops)

Hot Topics Workshop: Instantaneous Frequencies and Trends for Nonstationary Nonlinear Data. Sep. 2011, Institute for Mathematics and its Applications, University of Minnesota.

The Third International Conference on the Advances of Hilbert-Huang Transform and Its Applications, Qingdao, China, Jun. 2011: **(Invited plenary speaker.)**

The Scientific Workshop of the Role of Ocean in Climate Change. Mar. 2011, Beijing, the State Oceanic Administration of China.

International Conference on Sparse Representation of Multiscale Data and Images: Theory and Applications, Dec. 2009, Institute of Advanced Studies, Nanyang Technological University, Singapore

The Second International Conference on the Advances of Hilbert-Huang Transform and Its Applications, Sun Yat-Sen (Zhongshan) University, Guangzhou, China, Dec. 2008: “*The connection between the Empirical Mode Decomposition and the Fourier Transform*” **(Invited plenary speaker.)**

American Mathematical Society, Joint Mathematics Meetings, San Diego, Jan 2008: “*The connection between the Empirical Mode Decomposition and the Fourier Transform*”.

International Conference on Applied Harmonic Analysis: Approximation and Computation, Beijing, China, Jun 2006: “*Time-frequency analysis: beyond wavelets.*”

The First International Conference on the Advances of Hilbert-Huang Transform and Its Applications, National Central University, Chung-Li, Taiwan, Mar. 2006: “*Ensemble Empirical Mode Decomposition: a noise-assisted data analysis method.*” **(Invited plenary speaker)**

The Chinese Association for Science and Technology USA, Fairfax, Virginia, Mar. 2006: “*Signal Processing: Beyond Wavelets.*”

Correcting Tropical Bias Meeting (White Paper), Calverton, Maryland, Sep. 2005: (No formal presentation for the meeting, all discussions.)

International Ocean-Atmosphere Conference, Beijing, China, Jun 2004: “*Statistical Significance Test of Intrinsic Mode Functions.*”

CLIVAR Workshop on Atlantic Climate Predictability and Prediction (White Paper), University of Reading, United Kingdom, Apr 2004. “*Causes of low frequency North Atlantic SST variability in a coupled GCM.*”

The First Joint Annual Meeting of the Canadian Applied and Industrial Mathematics Society (CAIMS) and Society for Industrial and Applied Mathematics (SIAM), Montreal, Canada, Jun 2003: “*A Study of the Characteristics of White Noise using the Empirical Mode Decomposition.*”

NCAR/ASP Summer Colloquium on the Dynamics of Decadal to Centennial Climate Variability, Boulder, Colorado, Jul. 2000: “*A Shallow CISK, deep equilibrium thinking.*”

Equatorial Theoretical Panel Meeting, Honolulu, Hawaii, Mar1999: “*Vertical structure of heating and the structure of thermally driven circulations in the tropics.*”

Non-Local Academic Institutions (with expenses paid by hosts)

School of Atmospheric Sciences, Nanjing University, Jun. 2011: “*On the varying trend of the global mean surface temperature.*”

Institute of Atmospheric Physics, Chinese Academy of Sciences, Mar. 2011: “*Some considerations of physical analysis of data.*”

Department of Atmospheric and Oceanic Sciences, Peking University, Mar. 2011: “*On the varying trend of the global mean surface temperature.*”

NOAA/CPC, Camp Spring, Maryland, May. 2010: “*On the time varying trend of global mean surface temperature.*”

Peking University, Department of Atmospheric Sciences, Beijing, China, Jun 2009: “*Amplitude-frequency modulated annual cycle – an alternative reference frame for climate anomaly*”.

Chinese Academy of Sciences, Institute of Atmospheric Physics, Beijing, China, Jun 2009: “*On the global warming trend*”.

Nanjing University, School of Atmospheric Sciences, Nanjing, China, Jun 2009: “*On the global warming trend*”.

NOAA Geophysical Fluid Dynamics Laboratory, Princeton, New Jersey, Mar. 2009: “*Amplitude-frequency modulated annual cycle – an alternative reference frame for climate anomaly*”.

Princeton University, Program in Applied and Computational Mathematics (colloquium), Princeton, New Jersey, Mar. 2009: “*The Empirical Mode Decomposition: the method, its progress, and open questions.*”

The First Institute of Oceanography, China Oceanography Administration, Qingdao, China, Dec. 2008. “*Ten years of the Hilbert-Huang Transform*”.

Columbia University, International Research Institute for Climate and Society, Palisades, New York, Aug. 2008: “*Amplitude-frequency modulated annual cycle – an alternative reference frame for climate anomaly*”, and . “*Ensemble Empirical Mode Decomposition.*”

The National Science Foundation, Arlington, Virginia, USA, May 2008. “*Ensemble Empirical Mode Decomposition.*”

Shanghai Typhoon Institute, Shanghai, China, Beijing, China, May 2008. “*Amplitude-frequency modulated annual cycle – an alternative reference frame for climate anomaly*”, and . “*Ensemble Empirical Mode Decomposition.*”

Florida State University, Department of Meteorology, Tallahassee, Florida, Apr. 2008. “*Amplitude-frequency modulated annual cycle – an alternative reference frame for climate anomaly.*”

California Institute of Technology, Division of Geological and Planetary Sciences, Pasadena, California, Jan 2008. “*Ensemble Empirical Mode Decomposition.*”

National Central University, School of Engineering, Taiwan, R.O.C., Nov. 2007: “*The selection of a reference frame: the starting point for scientific analysis*”.

University of Delaware, Center for Remote Sensing, Newark, Delaware, Sep 2007: “*Time-frequency analysis: beyond wavelets (with applications to climate sciences)*”.

Chinese Academy of Sciences, Institute of Atmospheric Physics, Beijing, China, Beijing, China, Jul 2007: “*Recent Advances in Hilbert-Huang Transform.*”

Chinese Academy of Sciences, Institute of Atmospheric Physics, Beijing, China, Beijing, China, Jul 2007: “*Amplitude-frequency modulated annual cycle – an alternative reference frame for climate anomaly.*”

University of Washington, Department of Atmospheric Sciences, Seattle, WA, Jan 2007: “*Time-frequency analysis: beyond wavelets (with applications to climate sciences)*” and “*Amplitude-frequency modulated annual cycle – an alternative reference frame for climate anomaly.*”

National Central University, Taiwan, R.O.C., Dec. 2006: “*Tao of data analysis.*” (**The inaugural speaker** for the establishing new the Research Center for Adaptive Data Analysis at the National Central University, Taiwan.)

National Central University, Department of Physics, Taiwan, R.O.C., Dec. 2006: “*Time-frequency analysis: beyond wavelets (with applications to black hole merge).*”

National Taiwan University, Institute of Applied Mechanics, Taiwan, R.O.C., Dec. 2006: “*Time-frequency analysis: beyond wavelets (with applications to fluid mechanics)*”

University of California, Berkeley, Center for Atmospheric Sciences, Berkeley, California, Dec. 2006: “*Amplitude-frequency modulated annual cycle – an alternative reference frame for climate anomaly.*”

University of Pennsylvania, School of Medicine, Sep. 2006: “*Time-frequency analysis: beyond wavelets (with applications to physiological data)*”

Chinese Academy of Railway Sciences, Beijing, China, Jun 2006: “*Time-frequency analysis: beyond wavelets (with applications to bridge damage detection).*”

Chinese Academy of Sciences, Institute of Atmospheric Physics, Beijing, China, Jun 2006: “*Time-frequency analysis: beyond wavelets (with applications to climate sciences).*”

Zhejiang University, School of Civil Engineering, Hangzhou, China, Jun 2006: “*Time-frequency analysis: beyond wavelets (with applications to bridge damage detection).*”

Chinese Academy of Sciences, Institute of Atmospheric Physics, Beijing, China, Jun 2006, Beijing, China. “*Time-frequency analysis: beyond wavelets (with applications to climate sciences).*”

Harvard University, Department of Earth and Planetary Sciences, Cambridge, Massachusetts, Feb 2006: “*Time-frequency analysis: beyond wavelets (with applications to climate sciences).*”

University of Alberta, Institute for Geophysical Research, Edmonton, Canada, Mar 2004: “*Statistical significance test of Intrinsic Mode Functions of geophysical data.*”

University of Nebraska, Department of Geosciences, Lincoln, Nebraska, Apr 2002: “*A Shallow CISK, deep equilibrium thinking.*”

University of Washington, Department of Atmospheric Sciences and Joint Institute for the Study of Atmosphere and Ocean (JISAO), Seattle, Washington, Oct 2001: “*The impact of global warming on ENSO variability.*”

Chinese Academy of Sciences, Institute of Atmospheric Physics, Beijing, China, Dec 1999: “*A Shallow CISK, deep equilibrium thinking.*”

Nanjing University, Department of Atmospheric Sciences, Nanjing, China, Dec. 1999: “*A Shallow CISK, deep equilibrium thinking.*”

Center for Ocean-Land-Atmosphere Studies, IGES, Distinguished Visiting Series, Calverton, Maryland, Sep. 1999: “*Thermally driven surface winds in the Tropics.*”

University of Hawaii, Department of Meteorology, Honolulu, Hawaii, Jul 1999: “*Thermally driven surface winds in the Tropics.*”

Local Academic Institutions

Florida State University, Department of Mathematics, Tallahassee, Florida, Feb, 2009, “*The Empirical Mode Decomposition: the method, its progress, and open questions.*”

NOAA, Camp Spring, Maryland, Nov. 2008: “*Climate Test Bed Seminar Series: Annual cycle and the prediction of interannual variability.*”

NOAA/CPC, Camp Spring, Maryland, May. 2007: “*Amplitude-frequency modulated annual cycle – an alternative reference frame for climate anomaly.*”

NOAA/CPC, Camp Spring, Maryland, Jan 2006, “*Ensemble Empirical Mode Decomposition: a noise-assisted data analysis method.*”

University of Maryland, Earth System Science Interdisciplinary Center (ESSIC), College Park, Maryland, Nov. 2006: “*Amplitude-frequency modulated annual cycle – an alternative reference frame for climate anomaly.*”

NOAA/EMC, Camp Spring, Maryland, Aug 2004: “*The impact of ENSO on the NAO variability.*”

University of Maryland, Earth System Science Interdisciplinary Center (ESSIC), College Park, Maryland, May 2004: “*The impact of ENSO on NAO variability.*”

NASA/GSFC, Greenbelt, Maryland, Sep 2003: “*A Shallow CISK, deep equilibrium mechanism.*”

George Mason University, School of Computational Sciences, Fairfax, Virginia, Nov. 2002: “*The impact of global warming on ENSO variability.*”

University of Maryland, Earth System Science Interdisciplinary Center (ESSIC), College Park, Maryland, Apr 2002: “*The impact of global warming on ENSO variability.*”

NOAA/CPC, Camp Spring, Maryland, Nov. 2001. “*A Shallow CISK, deep equilibrium thinking.*”

University of Maryland, Department of Meteorology, College Park, Maryland, Feb. 2001: “A *Shallow CISK, deep equilibrium thinking.*”

GRANT AWARDED AND PENDING

E. K. Schneider (PI from George Mason University), B. P. Kirtman (Co-PI from George Mason University), and **Z. Wu** (subcontractor from Center for Ocean-Land-Atmosphere Studies): *Variability of the Climate System: Understanding Observed Low Frequency Variability of SST in the North Atlantic*, National Science Foundation #0342104, 01 Feb 2004 – 31 Jan 2007, \$479,494. (Supporting Wu 12 month yearly).

Z. Wu, 2007: *Collaborative Research: Understanding Observed Low-Frequency Variability of SST in the North Atlantic*, National Science Foundation ATM-0653136, 01 May 2007 – 31 Dec. 2008, \$202,267 (For Z. Wu only). (In collaboration with Edwin Schneider of George Mason University, NSF ATM-0653123, Total Award \$493,014.)

Z. Wu, 2009: Collaborative Research: Understanding Observed Low Frequency Variability of SST in the North Atlantic, NSF ATM-0917743, 01 Jan 2009 – 30 Apr 2011. \$90,026.

P. Sura and **Z. Wu**, 2011: Analyzing Weather and Climate Extremes in a Non-Stationary Framework, National Science Foundation, Oct. 1, 2011 – Sep. 30, 2014. \$754,144. (Sura and Wu evenly split the funding) (**Pending**)

Z. Wu., 2011: Temporal-spatial evolutions of low-frequency climate variability and warming trend. National Science Foundation, Nov. 1, 2011 – Oct. 31, 2014. \$396,805. (**Pending**)

B.-W. Shen, and Z. Wu (PIs), 2011: Integration of the NASA CAMVis and Multiscale Analysis Package (CAMVis-MAP) For Tropical Cyclone Climate Study. National Aeronautics and Space Administration, Mar. 15, 2012 – Mar. 14, 2015. \$274,028 (for Dr. Wu’s component). (**Pending**)

SERVICES TO COMMUNITY

Journal Editorial boards

Editor, [*Advances in Adaptive Data Analysis*](#) (May 2007 – present)

Associate Editor, [*Journal of the Atmospheric Sciences*](#) (Feb. 2011 – present)

Panelist of

The NSF program “Cyber-enabled Discovery and Innovation” 2008, 2010.

Member of the Scientific Advisory Committee for

The key Laboratory of the Data Analysis and Applications of the State Oceanic Administration of China (Oct. 2010 – present)

Reviewer for

Advances in Adaptive Data Analysis
Advances in Atmospheric Sciences
Acta Oceanologica Sinica (English edition)
AIAA Journal
Annales Geophysicae
Atmosphere-Ocean
Biomedical Engineering-Applications, Basis and Communications
Climate Dynamics
Communications on Pure and Applied Analysis
Dynamics of Atmospheres and Oceans
EURASIP Journal on Advances in Signal Processing
Geophysical Research Letters
IEEE Transactions on Biomedical Engineering
IEEE Transactions on Image Processing
IEEE Signal Processing Letters
IEEE Transactions on Signal Processing
IET Image Processing
International Journal of Climatology
Journal of Climate
Journal of Applied Meteorology and Climatology
Journal of Geophysical Research-Ocean
Journal of Marine Research
Journal of the Atmospheric Sciences
Journal of Vibration and Control
Mechanical Systems and Signal Processing
Mathematical Medicine and Biology
Monthly Weather Review
New Astronomy
Physica A
Quarterly Journal of the Royal Meteorological Society
Smart Materials and Structures
Studies in Nonlinear Dynamics & Econometrics
Theoretical and Applied Climatology

IPCC, 2001: *Climate Change 2001: The Scientific Basis*, Cambridge University Press, 881pp

NSF proposals

NOAA proposals
NASA proposals

Organizing committee member for

The First International Conference on the Advances of Hilbert-Huang Transform and Its Applications, Mar. 2006, National Central University, Chung-Li, Taiwan

Scientific advisory committee member for

The Third International Conference on the Advances of Hilbert-Huang Transform and Its Applications, Jun 2011, Qingdao, P. R. China

Convenor for

Sessions for various national and international conferences

GRADUATE STUDENTS SUPERVISED

Past:

Cheng Qian, Institute of Atmospheric Physics, Chinese Academy of Sciences, (Ph. D. Awarded in June 2009, Co-Supervisor).

John P. Michael, Department of Earth, Ocean, and Atmospheric Science, Florida State University (M.S. awarded in Dec. 2010, Supervisor committee member)

Jackie Rauch, Department of Earth, Ocean, and Atmospheric Science, Florida State University (M.S. awarded in Dec. 2010, Supervisor committee member)

Current:

Sarah Strazzo, Department of Earth, Ocean, and Atmospheric Science, Florida State University (Supervisor)

Jiaxing Feng, Department of Earth, Ocean, and Atmospheric Science, Florida State University (Supervisor)

Sergio Sejas, Department of Earth, Ocean, and Atmospheric Science, Florida State University (Supervisory Committee Member)

J.-P. Michael, Department of Meteorology, Florida State University (Supervisory Committee Member)

Max Perron, Department of Meteorology, Florida State University (Supervisory Committee Member)

PATENT

Huang, N. E, and **Z. Wu**, 2011: *Noise-assisted data analysis method, system and program product therefore*, US Patent No.: 7,941,298 (Granted May 10, 2011).

MEMBERSHIP

American Geophysical Union

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