

BIOGRAPHICAL SUMMARY

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NAME: Richard A. Anthes

BIRTHDATE: March 9, 1944

EDUCATION: B.S., University of Wisconsin, 1966
M.S., University of Wisconsin, 1967
Ph.D., University of Wisconsin, 1970

M.S. THESIS: The generation of available potential energy in Hurricane Hilda (1964).
University of Wisconsin, Madison, June, 1967, 84 pp.

Ph.D. THESIS: A diagnostic model of the tropical cyclone in isentropic coordinates.
University of Wisconsin, Madison, 1970, 184 pp.

PROFESSIONAL EXPERIENCE:

Sept 1988 - present	President, University Corporation for Atmospheric Research (UCAR), Boulder, Colorado
Mar 1988 -Sept 1988	Acting President, UCAR
Sept 1986 - Feb 1988	Director, National Center for Atmospheric Research (NCAR), Boulder, Colorado
Sept 1981 - Aug 1986	Director, Atmospheric Analysis and Prediction Division, National Center for Atmospheric Research, Boulder, Colorado
Sept 1978 - Aug 1981	Professor, The Pennsylvania State University, University Park, Pennsylvania
Sept 1977 - Aug 1978	Research Professor, Naval Postgraduate School, Monterey, California
1971 - Aug 1977	Assistant and Associate Professor, The Pennsylvania State University
1968 - 1971	Research Meteorologist, NOAA, National Hurricane Research Laboratory
1966 - 1968	NSF Fellow, University of Wisconsin
1962 - 1967 (summers)	Student Trainee, U.S. Weather Bureau, ESSA, NOAA

FURTHER PROFESSIONAL EXPERIENCE:

President, American Meteorological Society (AMS) (2007)

Member, Global Positioning System (GPS) Scientific Application Research Center, National Central
University, Taiwan (2006-present)

Co-Chairman (with Berrien Moore), National Research Council (NRC) decadal study "Earth Sciences: Committee on Earth Science and Applications from Space" (2004-2007)

Winner, China's Friendship Award (2003) (the highest award presented to foreigners by the People's Republic of China and the first atmospheric scientist ever to receive this award)

National Associate, National Academies (2002) (in recognition of extraordinary service to the National Academies of the NRC)

Vice Chairman, NRC "Committee on Partnerships in Weather and Climate Services" (2001-2003)

Chairman, National Academy of Science (NAS) Committee on "NASA-NOAA Transition from Research to Operations (CONNTRO)" (2001-2003)

Elected Fellow, American Geophysical Union (AGU) (February, 2001)

Member, Naval Oceanographic Partnership Program's Ocean Research Advisory Panel (1998-2002)

Vice-Chairman, Chinese Meteorological Agency Climate Consultancy and Appraisal Committee (1997-present)

Member, Environment Canada's Science and Technology Advisory Board (1996-2005)

Chairman, National Weather Service Modernization Committee (1996-1999)

Member, Natural Sciences and Engineering Research Council of Canada, Scientific Advisory Panel for Dalhousie University (1995-present)

Member, Lawrence Livermore National Laboratory, Scientific Advisory Committee, Earth and Environmental Sciences Directorate (1993-present)

Member, National Weather Service Modernization Committee (1993-1996)

Ex officio member, Executive Committee of the Board of Ocean and Atmospheres of the National Association of State Universities and Land-Grant Colleges (NASULGC) (1992-present)

Member, NRC/NAS, Committee on Environmental Research (1991-1993)

External Examiner, Department of Meteorology, University of Nairobi (1988-1991)

Winner, AMS' Jule G. Charney Award (January, 1987)

Member, Advisory Committee, Supercomputer Institute at Florida State University (1987-1989)

Chairman, Board on Atmospheric Sciences and Climate (1986-1989)

Councilor, AMS (1986-1989)

Member, Naval Advisory Research Committee (1986-1988)

Member, National Aeronautics and Space Administration (NASA), Laser Atmospheric Wind Sounder Working Group (1986-1988)

Member, NRC, Geophysics Study Committee (1985-1988)

Member, NAS, Committee for the Study of the Nation's Weather Observations Systems (1985-1987)

Chairman, Committee on Science, Engineering, and Public Policy (COSEPUP); Research Briefing Panel on Weather Prediction Technologies (1985)

Member, World Scientific Publishing Company, International Advisors Board in Meteorology and Oceanography (1984-present)

Chairman, National Oceanic and Atmospheric Administration (NOAA), Profiler Advisory Committee

(1984-1987)
Associate Editor, *Monthly Weather Review* (1984-1986)
Chairman, Board on Atmospheric Sciences and Climate, Panel on Mesoscale Research (1984-1986)
Associate Editor, *Journal of the Atmospheric Sciences* (1983-1986)
Member, Space Science Board, Committee on Earth Sciences (1982-1984)
Member, SESAME Council (1982-1984)
Member, AMS' Awards Committee (1982)
Member, NAS, "Research Briefing Panel on Atmospheric Sciences" for the Office of Science and
Technology Policy (1982)
Member, Editorial Board, D. Reidel Publishing Co. (1981-1986)
Member and Editor, Scientific Program Report, UCAR Steering Committee for the National STORM Program
(1981-1985)
Chairman, NAS, "Panel on Mesoscale Processes" (1980-1981)
Winner, AMS' Clarence L. Meisinger Award (January, 1980)
Elected Fellow, AMS (December, 1979)
Member, NAS, Committee on Atmospheric Sciences (1978-1981)
Chairman, NAS, "Panel on Precipitation Processes" (1978-1980)
Member, U.S. Committee for the Global Atmospheric Research Program (USC-GARP) (1978-1979)
Chairman, NCAR Scientific Programs Evaluation Committee (1977-1978)
Chairman, NCAR Review Committee for Small-Scale Analysis Project (1977)
Member, AMS' Committee on Hurricanes and Tropical Meteorology (1976-1978)
Member, NOAA, Task Group on the Rossby Effect in Project STORMFURY (appointed by Robert
M. White, 1976)
Member, NAS, STORMFURY Panel of the Committee on Atmospheric Sciences (appointed by NRC)
(1975-1982)

CONSULTING EXPERIENCE:

Public Service Company of Colorado, Denver
Atmospheric Sciences Laboratory, White Sands Missile Range
Air Environment, Canada
Bradford Coal Company, Pennsylvania
Environmental Protection Agency
National Weather Service
Institute for Atmospheric Optics and Remote Sensing
Science and Technology Corporation

PUBLICATIONS (REFEREED JOURNALS):

- Anthes, R.A., P.A. Bernhardt, Y. Chen, L. Cucurull, K.F. Dymond, D. Ector, S.B. Healy, S.P. Ho, D.C. Hunt, Y.-H. Kuo, H. Liu, K. Manning, C. McCormick, T.K. Meehan, W.J. Randel, C. Rocken, W.S. Schreiner, S.V. Sokolovskiy, S. Syndergaard, D.C. Thompson, K.E. Trenberth, T.K. Wee, N.L. Yen, and Z. Zeng, 2008: The COSMIC/FORMOSAT-3 Mission: Early Results. *Bull. Amer. Met. Soc.*, **89**, (to appear in March issue).
- Sokolovskiy, S.V., C. Rocken, D.H. Lenschow, Y.-H. Kuo, R.A. Anthes, W.S. Schreiner and D.C. Hunt, 2007: Observing the moist troposphere with radio occultation signals from COSMIC. *Geophys. Res. Lett.*, **34**, L18802, doi:10.1029/2007GL030458.
- Anthes, R.A., R.W. Corell, G. Holland, J.W. Hurrell, M.C. MacCracken, and K.E. Trenberth, 2006: Hurricanes and global warming – Potential linkages and consequences. *Bull. Amer. Met. Soc.*, **87**, 623-628.
- Zhang, Q.-H., S.-J. Chen, Y.-H. Kuo, K.-H. Lau, and R.A. Anthes, 2005: Numerical study of a typhoon with a large eye: Model simulation and verification. *Mon. Wea. Rev.*, **133**, 725-742.
- Anthes, R.A., Y.-H. Kuo, and C. Rocken, 2005: The role of GPS radio occultation observations in the global observing system for weather and climate. Proceedings of The First THORPEX International Science Program, 6-10 December 2004, Montreal, Canada. WMO.
- Anthes, R.A., 2004: Global weather services in 2025 – A five-year update. *Bulletin of the World Meteorological Organization*, **53**, No. 3, July, pp. 227-231
- Anthes, R.A., G. Elgered, Y.-H. Kuo, T. Tsuda, Y. Hatanaka, T. Satomura, T. Nakazawa, K. Aonashi, H. Seko, and H. Nakamura (Co-editors), 2004: Application of GPS remote sensing to meteorology and related fields. Special Issue of the *J. Meteor. Soc. Japan*, **82**, No. 1B, 596 pp.
- Kuo, Y.-H., C. Rocken, and R.A. Anthes, 2004: Applications of GPS radio occultation data to weather and climate and the COSMIC mission. *American Institute of Aeronautics and Astronautics*, 9 pp.
- Kuo, Y.-H., T.-K. Wee, S. Sokolovskiy, C. Rocken, W. Schreiner, D. Hunt, and R.A. Anthes, 2004: Inversion and error estimation of GPS radio occultation data. *J. Meteor. Soc. Japan* special issue, **84**, No. 1B, 507-531.
- Windham, T.L., A. J. Stevermer, and R.A. Anthes, 2004: SOARS – An overview of the program and its first 8 years. *Bull. Amer. Met. Soc.*, **85**, 42-47.
- Zou, X., H. Liu, R.A. Anthes, H. Shao, J.C. Chang, and Y.-J. Zhu, 2004: Impact of CHAMP radio occultation observations on global analysis and forecasts in the absence of AMSU radiance data. *J. Meteor. Soc. Japan* special issue, **84**, No. 1B, 533-549.
- Anthes, R.A., Y.-H. Kuo, and C. Rocken, 2003: Constellation Observing System for Meteorology, Ionosphere and Climate (COSMIC). Published by the Society of Photo-optical Instrumentation Engineers (SPIE) in the Proceedings of the Third International Asia-Pacific Symposium on Remote Sensing of the Atmosphere, Ocean, Environment, and Space, 23-27 October 2002, Hangzhou, China.
- Anthes, R.A., Y.-H. Kuo, C. Rocken, and W.S. Schreiner, 2003: Atmospheric sounding using GPS radio occultation. *MAUSAM – Quarterly Journal of Meteorology, Hydrology and Geophysics (INDIA)*, **54**, 1, 25-38.
- Bengtsson, L., G. Robinson, R. Anthes, K. Aonashi, A. Dodson, G. Elgered, G. Gendt, R. Gurney, M. Jietai, C. Mitchell, M. Mlaki, A. Rhodin, P. Silverstrin, R. Ware, R. Watson, and W. Wergen, 2003: The use of GPS measurements for water vapor determination. *Bull. Amer. Met. Soc.*, **84**, 1249-1258.

- UCAR, 2003: Workshop on Earth System Observations. Smithsonian Institution, Washington D.C., August 13-15, 2003.
- Vali, G. and R. Anthes, 2003: On the supply and demand for atmospheric sciences professionals. *Bull. Amer. Met. Soc.*, **84**, 1163-64.
- Anthes, R.A. and Y.-H. Kuo, 2002: Summary of COSMIC and applications to meteorology and climate. East Asia and Western Pacific Meteorology and Climate- Selected Papers of the Fourth Conference, Hangzhou, 26-28 October 1999. **World Scientific Series on Meteorology of East Asia-Vol. 1**. World Scientific Publishing Co., Singapore, 91-107.
- Vali, G., R. Anthes, D.Thomson, D. Houghton, J. Fellows, and S. Friberg, 2002: Wanted: More Ph.D.s – Graduate enrollments in the atmospheric sciences. *Bull. Amer. Met. Soc.*, **83**, 1, 63-71.
- Zou, X., H. Liu, and R. A. Anthes, 2002: A statistical summary of errors in the calculation of radio-occultation bending angles caused by a 2D approximation of ray tracing and the assumption of spherical symmetry of the atmosphere. *J. Atmos. and Oceanic Tech.*, **19**, 51-64.
- Anthes, R., O. Brown, K. Droegemeier, and J. Fellows, 2001: UCAR and NCAR at 40. *Bull. Amer. Met. Soc.*, **82**, 6, 1139-1149.
- Anthes, R., J. Fellows, B. Hooke, and R. McPherson, 2001: AMS/UCAR outreach to the Bush Administration and the 107th Congress. *Bull. Amer. Met. Soc.*, **82**, 987-994.
- Liu, H., X. Zou, R. A. Anthes, J.C. Chang, J.-H. Tseng, and B. Wang, 2001: The impact of 837 GPS/MET bending angle profiles on assimilation and forecasts for the period June 20-30, 1995. *J. Geophys. Res.*, **106**, 31,771-31,786.
- Anthes, R.A., C. Rocken, and Y.-H. Kuo, 2000: Applications of COSMIC to meteorology and climate. Special issue of *Terrestrial, Atmospheric and Oceanic Sciences (TAO)*, **11**, 115-156.
- Kuo, Y.-H., S. Sokolovskiy, R. Anthes, and F. Vandenberghe, 2000: Assimilation of GPS radio occultation data for numerical weather prediction. Special issue of *Terrestrial, Atmospheric and Oceanic Sciences (TAO)*, **11**, 157-186.
- Zou, X., B. Wang, H. Liu, R.A. Anthes, T. Matsumura, and Y.-J. Zhu, 2000: Use of GPS/MET refraction angles in three-dimensional variational analysis. *Q. J. R. Met. Soc.*, **126**, pp. 3013-3040.
- Zou, X., F. Vandenberghe, B. Wang, M.E. Gorbunov, Y.-H. Kuo, S. Sokolovskiy, J.C. Chang, J.G. Sela, and R. A. Anthes, 1999: A ray-tracing operator and its adjoint for the use of GPS/MET refraction angle measurements. *J. Geophys. Res.*, **104**, D18, 22,301-22,318, Sept. 27, 1999.
- Anthes, R., M. Exner, and Y.-H. Kuo, 1998: GPS sounding of the atmosphere from Low Earth Orbit: Preliminary results and potential impact on numerical weather prediction. Proceedings of the 3d International Conference on East Asia and Western Pacific Meteorology and Climate, 16-18 May 1996, Chungli, Taiwan. Ed. C.P. Chang, J.C.L Chan, and J.T Wang. World Scientific Publishing Co., Singapore, p. 17-26 (562 pp. total in book).
- Kuo, Y.-H., X. Zou, S.J. Chen, W. Huang, Y.-R. Guo, R.A. Anthes, M. Exner, D. Hunt, C. Rocken, and S. Sokolovskiy, 1998: A GPS/MET sounding through an intense upper-level front. *Bull. Amer. Met. Soc.*, **79**, 617-626.
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- Ware, R., M. Exner, D. Feng, M. Gorbunov, K. Hardy, B. Herman, Y. Kuo, T. Meehan, W. Melbourne, C. Rocken, W. Schreiner, S. Sokolovskiy, F. Solheim, X. Zou, R. Anthes, S. Businger, and K. Trenberth, 1996: GPS sounding of the atmosphere from Low Earth Orbit: Preliminary results. *Bull. Amer. Met. Soc.*, **77**, No. 1, 19-40.
- Anthes, R.A., 1994: UCAR response to the report of the ad hoc committee on international data exchange. *Bull. Amer. Met. Soc.*, **75**, 1849-1854.
- Bevis, M., S. Businger, S. Chiswell, T. A. Herring, R.A. Anthes, C. Rocken, and R. H. Ware, 1994: GPS meteorology: Mapping zenith wet delays onto precipitable water. *J. Applied Met.*, **33**, No. 3, 379-386.
- Anthes, R.A., 1993: The global trajectory. *Bull. Amer. Met. Soc.*, **74**, No. 6, 1121-1130.
- Yuan, L., R. A. Anthes, R. H. Ware, C. Rocken, W. D. Bonner, M. Bevis, and S. Businger, 1993: Sensing climate change using the Global Positioning System. *J. Geophys. Res.-Atmospheres*, **98**, No. D8, 14,925-14,937.
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- Bevis, M., S. Businger, T. A. Herring, C. Rocken, R. A. Anthes, and R. H. Ware, 1992: GPS meteorology: Remote sensing of atmospheric water vapor using the Global Positioning System. *J. Geophys. Res.-Atmospheres*, **97**, No. D14, 15,787-15,801.
- Yuan, L., R. A. Anthes, R. H. Ware, and W. D. Bonner, 1992: Using the Global Positioning System in atmospheric sciences and for detecting climate change. Presented at the 2nd International Conference on East Asia and Western Pacific Meteorology and Climate, September 7-10, 1992, Hong Kong.
- Anthes, R. A., 1990: Recent applications of the Penn State/NCAR Mesoscale Model to synoptic, mesoscale and climate studies. *Bull. Amer. Met. Soc.*, **71**, (11), 1610-1629.
- Anthes, R. A., Y.-H. Kuo, E.-Y. Hsie, S. Low-Nam, and T. W. Bettge, 1989: Estimation of skill and uncertainty in regional numerical models. *Q. J. R. Met. Soc.*, **115**, 763-806.
- Anthes, R. A. and Zhou Xiuji, 1989: Meeting Review: Joint U. S.-P. R. C. Workshop on Mesoscale Meteorology, 5-7 Sept. 1988, Beijing, P. R. C., *Bull. Amer. Met. Soc.*, **70**, 628-631.
- Yan, H. and R. A. Anthes, 1988: The effect of variations in surface moisture on mesoscale circulations. *Mon. Wea. Rev.*, **116**, 192-208.
- Anthes, R. A. and C.-Y. Tsay, 1987: Summary of an international conference on monsoon and mesoscale meteorology, 4-7 November 1986, Taipei. *Bull. Amer. Met. Soc.*, **68**, 356-357.
- Forbes, G. S., R. A. Anthes, and D. W. Thomson, 1987: Synoptic and mesoscale aspects of an Appalachian ice storm associated with cold-air damming. *Mon. Wea. Rev.*, **115**, 564-591.

- Nuss, W. and R. A. Anthes, 1987: A numerical investigation of low-level processes in rapid cyclogenesis, *Mon. Wea. Rev.*, **115**, 2728-2743.
- Tribbia, J. J. and R. A. Anthes, 1987: Scientific basis of modern weather prediction. *Science*, **31**, 493-499.
- Yan, H. and R. A. Anthes, 1987: The effect of latitude on the sea breeze. *Mon. Wea. Rev.*, **115**, 936-956.
- Anthes, R. A., 1986: Summary of workshop on the NCAR community climate/forecast models. 14-26 July 1985, Boulder, Colorado. *Bull. Amer. Met. Soc.*, **67(2)**, 194-198.
- Anthes, R. A. and Y.-H. Kuo, 1986: The influence of soil moisture on circulations over North America on short time scales. In *Namias Symposium*, John O. Roads, Ed., Scripps Institution of Oceanography Reference Series 86-17, University of California San Diego, La Jolla, CA, 132-147.
- Keyser, D. and R. A. Anthes, 1986: Comments on "Frontogenesis in a moist semi-geostrophic model," *J. Atmos. Sciences, Notes and Correspondence*, **43(10)**, 1051-1054.
- Kuo, Y.-H., L. Cheng, and R. A. Anthes, 1986: Mesoscale analysis and diagnostics of Sichuan flood catastrophe: 11-15 July 1981. *Mon. Wea. Rev.*, **114**, 1984-2003.
- Anthes, R. A., 1985a: Modeling sea-air energy fluxes and their effects on explosive marine cyclogenesis. *Papers in Meteorological Research, Journal of the Meteorological Society of the Republic of China*, **6(1)**, 1-12.
- Anthes, R. A., 1985b: Book review of Mesoscale Meteorological Modeling by Roger Pielke. *Bull. Amer. Met. Soc.*, **66(2)**, 187-188.
- Anthes, R. A., Y.-H. Kuo, D. P. Baumhefner, R. M. Errico, and T. W. Bettge, 1985: Predictability of mesoscale atmospheric motions. Contribution to "Issues in Atmospheric and Oceanic Modeling," *Advances in Geophysics*, Vol. 28B, 159-202.
- Brill, K. F., L. W. Uccellini, R. P. Burkhart, T. T. Warner, and R. A. Anthes, 1985: Numerical simulations of a transverse indirect circulation and low-level jet in the exit region of an upper-level jet. *J. Atmos. Sciences*, **42**, 1306-1320.
- Kuo, Y.-H. and R. A. Anthes, 1985: Calculation of geopotential and temperature fields from an array of nearly continuous wind observations. *J. Atmos. and Oceanic Tech.*, **2(1)**, 22-34.
- Anthes, R. A., 1984a: Predictability of mesoscale meteorological phenomena. *Predictability of Fluid Motions* (La Jolla Institute-1983), Greg Holloway and Bruce J. West, Editors, American Institute of Physics, New York, 247-270.
- Anthes, R. A., 1984b: Enhancement of convective precipitation by mesoscale variations in vegetative covering in semiarid regions. *J. Climate and Applied Met.*, **23(4)**, 541-554.
- Anthes, R. A. and D. P. Baumhefner, 1984: A diagram depicting forecast skill and predictability. *Bull. Amer. Met. Soc.*, **65(7)**, 701-703.
- Baldwin, D., E.-Y. Hsie, and R. A. Anthes, 1984: Diagnostic studies of a two-dimensional simulation of frontogenesis in a moist atmosphere. *J. Atmos. Sciences*, **41(18)**, 2686-2700.
- Hsie, E.-Y. and R. A. Anthes, 1984: Simulations of frontogenesis in a moist atmosphere using alternative parameterizations of condensation and precipitation. *J. Atmos. Sciences*, **41(18)**, 2701-2716.
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- Kuo, Y.-H. and R. A. Anthes, 1984b: Mesoscale budgets of heat and moisture in a convective system over the central United States. *Mon. Wea. Rev.*, **112**(8), 1482-1497.
- Kuo, Y.-H. and R. A. Anthes, 1984c: Semiprognostic tests of Kuo-type cumulus parameterization schemes in an extratropical convective system. *Mon. Wea. Rev.*, **112**(8), 1498-1509.
- Li, Y.-F. and R. A. Anthes, 1984: The impact of initial conditions on a subsynopticscale and mesoscale forecast. *Acta Meteorologica Sinica*, **42**, 499-504 (in Chinese).
- Anthes, R. A., 1983: A review of regional models of the atmosphere in middle latitudes. *Mon. Wea. Rev.*, **111**(6), 1306-1335.
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- Keyser, D. and R. A. Anthes, 1982b: An alternative expression for the Eady growth rate. *J. Atmos. Sciences*, **39**(8), 1877-1881.
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- Anthes, R. A. and S. W. Chang, 1978: Response of the hurricane boundary layer to changes of sea-surface temperature in a numerical model. *J. Atmos. Sciences*, **35**, 1240-1255.
- Anthes, R. A. and T. T. Warner, 1978a: Simulation of mesoscale flows over Israel. *Israel Meteorological Research Papers Vol. II*. Israel Meteorological Society, Bet Dagan 93-123.
- Anthes, R. A. and T. T. Warner, 1978b: Development of hydrodynamic models suitable for air pollution and other mesometeorological studies. *Mon. Wea. Rev.*, **106**, 1045-1078.
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