

MICHAEL GHIL

Present Positions: Distinguished Professor of Geosciences (since Sept. 2002), Ecole Normale Supérieure (ENS), <http://www.environnement.ens.fr/index-en.html>; Distinguished Professor of Atmospheric Sciences and Geophysics, University of California, Los Angeles (UCLA), since July 1994 (Emeritus, recalled, since July 2003), ghil@atmos.ucla.edu, <http://www.atmos.ucla.edu/tcd>.

Professional preparation: B.Sc. (Mech. Eng.) *cum laude*, August 1966, and M.Sc. (Mech. Eng.), June 1971, Technion–Israel Institute of Technology, Haifa, Israel; M.S. (Math.), February 1973, and Ph.D. (Math.), June 1975, Courant Institute of Mathematical Sciences, New York University, New York.

Current Research Interests: Atmospheric Sciences, Climate Dynamics, Dynamical and Complex Systems Theory, Estimation Theory, Geophysical Fluid Dynamics, Macroeconomics, Numerical Methods, Physical Oceanography, Statistical Methods, Remote Sensing and Applications.

Appointments: 1. Head, Geosciences Department, ENS (July 2003–Dec. 2009); 2. Director, Environmental Research and Teaching Institute (CERES-ERTI), ENS (November 2002–September 2010); 3. Director, Institute of Geophysics and Planetary Physics, UCLA, July 1992–June 2003. 2. Chairman, Department of Atmospheric Sciences, UCLA, Sept. 1988–June 1992. 4. Professor of Climate Dynamics, July 1985–June 1994. 5. Courant Institute of Mathematical Sciences, NYU, September 1971–May 1987, Research Assistant (1971–1975) to Research Professor (1982–1987), via intermediate appointments. 6. NASA Goddard Institute for Space Studies, New York, August 1975–September 1976, National Academy of Sciences/National Research Council Research Associate. 7. Israel Armed Forces, November 1967–August 1971, classified position. 8. Technion–Israel Institute of Technology, Haifa, 1966–1971, Research Assistant to Instructor.

Other Professional Activities: Advisor, *Applied Mathematical Sciences Series*, Springer-Verlag, New York/Heidelberg/Berlin, 1981–97; Distinguished Visiting Scientist, Jet Propulsion Laboratory, Cal Tech/NASA; University of California (Systemwide) Committee on Research, Oakland, 1988–91; Chair, Scientific Advisory Council, Climate System Modeling Program, NSF/UCAR, 1988–99; Climate Research Committee, National Research Council (NRC), 1989–98; Visiting Committee, Goddard Laboratory for Atmospheres; Board of Governors, Weizmann Institute of Science, Rehovot, Israel, 1995–2000.

Honors and Awards: Honorary Member, Hungarian Academy of Sciences (2010); P. D. Thompson Lecturer, National Center for Atmospheric Research, Boulder, Colo., 2007; Lorenz Lecture, American Geophysical Union, 2005; Foreign Member, Austrian Academy of Sciences (OeAW), 2005; L. F. Richardson Medal, European Geosciences Union, 2004; Highly Cited in the Geosciences (ISI Web of Science, <http://isihighlycited.com>), 2004–present; G. Lemaître Chair, Université Catholique de Louvain, Belgium, 2004; Honorary Member, Academy of Engineering Sciences, Romania (AST-R), 2004; Associate (=Honorary Member), Royal Astronomical Society, 2002; Foreign Member, Academia Europaea, 1998; 1997 Visiting Chair and Medal, Collège de France, Paris; Elf-Aquitaine/CNRS Chair and Medal, Académie des Sciences, Paris, 1996; Condorcet Chair and Medal, Ecole Normale Supérieure, Paris, 1995; Fellow, American Geophysical Union, 1995; NSF Special Creativity Awards, 1993–1995 and 1998–2000; Guggenheim Fellow, 1991–92; Fellow, American Meteorological Society, 1988; Distinguished Visiting Scientist, Jet Propulsion Laboratory, Caltech/NASA, 1985–present.

Five Most Relevant Publications (out of a dozen books and over 250 refereed articles and chapters in books):

1. Dijkstra, H. A., and M. Ghil, 2005: Low-frequency variability of the large-scale ocean circulation: A dynamical systems approach, *Rev. Geophys.*, 43, RG3002, doi:10.1029/2002RG000122.
2. Ghil, M., M. D. Chekroun, and E. Simonnet, 2008: Climate dynamics and fluid mechanics: Natural variability and related uncertainties, *Physica D*, 237, 2111–2126, doi:10.1016/j.physd.2008.03.036.
3. Ghil, M., and P. Malanotte-Rizzoli, 1991: Data assimilation in meteorology and oceanography, *Adv. Geophys.*, 33, 141–266.
4. Ghil, M., and A. W., Robertson, 2000: Solving problems with GCMs: General circulation models and their role in the climate modeling hierarchy. Ch. 10 in *General Circulation Model Development: Past, Present and Future*, D. Randall (Ed.), Academic Press, San Diego, pp. 285–325.
5. Ghil, M., I. Zaliapin, and B. Coluzzi, 2008: Boolean delay equations: A simple way of looking at complex systems, *Physica D*, 237, 2967–2986, doi: 10.1016/j.physd.2008.07.006.

Five Other Significant Publications

1. **Ghil, M.**, and S. Childress, 1987: *Topics in Geophysical Fluid Dynamics: Atmospheric Dynamics, Dynamo Theory and Climate Dynamics*, Springer-Verlag, New York/Berlin/Tokyo, 485 pp.
2. **Ghil, M.**, 1997: Advances in sequential estimation for atmospheric and oceanic flows. *J. Meteor. Soc. Japan*, **75**, 289–304.
3. **Ghil, M.**, K. Ide, A. F. Bennett, P. Courtier, M. Kimoto, and N. Sato (Eds.), 1997: *Data Assimilation in Meteorology and Oceanography: Theory and Practice*, Meteorological Society of Japan and Universal Academy Press, Tokyo, 496 pp.
4. **Ghil, M.**, and A. W. Robertson, 2002: "Waves" vs. "particles" in the atmosphere's phase space: A pathway to long-range forecasting? *Proc. Natl. Acad. Sci.*, **99** (Suppl. 1), 2493–2500.
5. **Ghil, M.**, I. Zaliapin, and S. Thompson, 2008: A delay differential model of ENSO variability: parametric instability and the distribution of extremes, *Nonlin. Process Geophys.*, **15**, 417–433.

Synergistic Activities

1. Chaired the Scientific Advisory Council (SAC) of the **Community Climate System Modeling Program** (CCSM; 1988–99) and continued as a member of the CCSM Advisory Board (CAB; 1999–2006).
2. Helped formulate the scientific basis for U.S. climate-research programs on the decade-to-century time scale (NRC, 1995: *Natural Climate Variability on Decade-to-Century Time Scales*, Martinson, D., K. Bryan, **M. Ghil**, M. Hall, T. R. Karl, E. S. Sarachik, S. Sorooshian, and L. D. Talley, Eds., National Academy Press, Washington, D.C., 630 pp.).
3. Organized several international schools of relevance to the proposed research, including: (i) "**Mathematical and Physical Tools for Climate Dynamics**," January 1998, Centre de Physique Théorique, Les Houches, France; (ii) "**E2C2-GIACS Advanced School on Extreme Events: Nonlinear Dynamics and Time Series Analysis**," September 2007, Comorova, Romania.
4. Member of the Organizing Committee of the *IMA Thematic Year on Mathematics in the Geosciences 2001–02* and Co-Organizer of Workshops #1, #3 and #10.
5. Initiated and led a transcontinental collaboration to develop, maintain and continue improving the **SSA-MTM Toolkit** (**Ghil M.**, M. R. Allen, M. D. Dettinger, K. Ide, D. Kondrashov, M. E. Mann, A. W. Robertson, A. Saunders, Y. Tian, F. Varadi, and P. Yiou, 2002: Advanced spectral methods for climatic time series, *Rev. Geophys.*, **40**(1), pp. 3.1–3.41, 10.1029/2000GR000092; <http://www.atmos.ucla.edu/tcd/ssa>).

Ph.D. Advisor: Prof. Peter D. Lax (Abel Prize Laureate 2005), Courant Inst. of Mathematical Sciences, NYU.

Collaborators and Other Affiliations: Much too numerous to list. Please see list of **Former Ph.D. students** (and their students, to the fifth generation), and **Former post-docs and junior visitors** below (and on the Math Genealogy Project web site), and co-authors and co-editors on the publication list on the web site of the Theoretical Climate Dynamics (TCD) research group at UCLA, <http://www.atmos.ucla.edu/tcd/MG/index.html>.

Former Ph.D. students: K. Bhattacharya (1979), S. E. Cohn (1982), D. P. Dee (1983), B. Legras (1983), A. P. Mülhaupt (1984), P. Pestiaux (1984), H. Le Treut (1985), G. Wolansky (1985), G.-H. Hsu (1986), M. Kimoto (1989), H. Sakuma (1989), F. Varadi (1989), C. L. Keppenne (1989), S. L. Marcus (1990), R. Todling (1992), S. Jiang (1994), P. Yiou (1994), C. M. Strong (1994), Z. Hao (1994), Y. Sezginar Unal (1994), F. Chen (1995), D. Paillard (1995), M. D. Dettinger (1997), Y.-d. Tian (1999), S. Koo (2001), G. Bellon (2004), Y. Zhang (2006), K. Strounine (2007); S. Teinturier (2008); M. D. Chekroun (2009); B. Deremble (2010); total Ph.D. students = 31, total "descendants" (as per The Mathematics Genealogy Project, <http://genealogy.math.ndsu.nodak.edu/>) = 62.

Former post-docs and junior visitors: K. P. Bube (1978–80), M. Buys (1983), S. E. Cohn (1982–85), J. J. Tribbia (1984), R. N. Miller (1985), G. Wolansky (1985), H. Itoh (1986), P. Pestiaux (1987), R. Vautard (1987–89), D. Müller (1986–90), C. Penland (1988–89), M. Kimoto (1990–91), F.-f. Jin (1988–93), K. Ide (1990–92), R. Fu (1991–93), A. W. Robertson (1992–93), S. Speich (1992–94), Z.-j. Zhang (1993–95), C. M. Strong (1994–95), P. Billant (1995–96), F. Chen (1995–96), P. Yiou (1996–97), K.-I. Chang (1997–98), F. Lott (1997–98), A. Wirth (1997–99), G. Loeper (1998), M. Boiseau (1998–99), M. Karaca (1998–1999), S. Kravtsov (1998–2001), C.-j. Sun (1998–2000), L. U. Sushama (1999–2000), Y. Tian (1999–2000), D. Kondrashov (1999–2000), E. Simonnet (2001–02), G. Bellon (2001–02), S. Conil (2003–05), S. Brachet (2005–2008), B. Coluzzi (2005–2009), A. Groth (2007–), M. D. Chekroun (2009–); total = 40.