

## MICHAEL GHIL

**Present Positions:** Distinguished Research Professor of Atmospheric and Oceanic Sciences, University of California, Los Angeles (UCLA), since October 2003, [ghil@atmos.ucla.edu](mailto:ghil@atmos.ucla.edu), <http://www.atmos.ucla.edu/tcd>; Distinguished Professor of Geosciences (since Sept. 2002; Emeritus since Sept. 2012), Ecole Normale Supérieure (ENS), [ghil@lmd.ens.fr](mailto:ghil@lmd.ens.fr), <http://www.environnement.ens.fr/>.

**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 and Oceanic Sciences, Climate Dynamics, Dynamical and Complex Systems Theory, Estimation Theory, Extreme Events and Prediction, Geophysical Fluid Dynamics, Macroeconomics, Numerical and Statistical Methods, Remote Sensing and Applications.

**Appointments:** 1. Head, Geosciences Department, ENS (July 2003–Dec. 2009); 2. Director, Environmental Research & Teaching Institute (CERES-ERTI), ENS (November 2002–September 2010); 3. Director, Institute of Geophysics & 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; Distinguished Professor, July 1994–June 2003. 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, NAS/NRC 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; Board of Governors, Weizmann Institute of Science, Rehovot, Israel, 1995–2000.

**Honors and Awards:** A. Wegener Medal & Honorary Member, European Geosciences Union (EGU), 2012; 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, EGU, 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; Honorary Fellow, Royal Astronomical Society, 2002; Foreign Member, Academia Europaea, 1998; Visiting Chair and Medal, Collège de France, Paris, 1997; CNRS Chair and Medal, Académie des Sciences, Paris, 1996; Condorcet Chair and Medal, Ecole Normale Supérieure, Paris, 1995; Union Fellow, American Geophysical Union, 1995; NSF Special Creativity Awards, 1993–1995 and 1998–2000; Guggenheim Fellow, 1991–92; Fellow, American Meteorological Society, 1988.

**Five Important Publications** (out of a dozen books and 340 refereed articles and chapters in books, selected exclusively from the **last ten years**; *h*-index = 59 in ISI WoS, Jan. 12, 2020):

1. Carrassi, A., M. Bocquet, A. Hannart, and M. Ghil, 2017: Estimating model evidence using data assimilation, *Q. J. R. Meteorol. Soc.*, **143**, 866–880, doi: [10.1002/qj.2972](https://doi.org/10.1002/qj.2972).
2. Chekroun, M. D., E. Simonnet, and M. Ghil, 2011: Stochastic climate dynamics: Random attractors and time-dependent invariant measures, *Physica D*, doi: [10.1016/j.physd.2011.06.005](https://doi.org/10.1016/j.physd.2011.06.005).
3. Ghil, M., 2017: The wind-driven ocean circulation: Applying dynamical systems theory to a climate problem, *Discr. Cont. Dyn. Syst. – A*, **37**(1), 189–228, doi: [10.3934/dcds.2017008](https://doi.org/10.3934/dcds.2017008).
4. Ghil, M., 2019: A century of nonlinearity in the geosciences, *Earth & Space Science*, **6**,

1007–1042, doi: [10.1029/2019EA000599](https://doi.org/10.1029/2019EA000599).

5. Kravtsov, S., D. Kondrashov, and **M. Ghil**, 2009: Empirical model reduction and the modeling hierarchy in climate dynamics, in *Stochastic Physics and Climate Modelling*, Eds. T. N. Palmer and P. Williams, Cambridge Univ. Press, pp. 35–72.

#### Five Other Significant Publications:

1. **Ghil, M.**, R. Benzi, and G. Parisi (Eds.), 1985: *Turbulence and Predictability in Geophysical Fluid Dynamics and Climate Dynamics*, North-Holland Publ. Co., Amsterdam/New York, 449 pp.
2. **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.
3. **Ghil, M.** and P. Malanotte-Rizzoli, 1991: Data assimilation in meteorology and oceanography, *Adv. Geophys.*, **33**, 141–266.
4. **Ghil, M.**, 2001: Hilbert problems for the geosciences in the 21<sup>st</sup> century, *Nonlin. Proc. Geophys.*, **8**, 211–222, <https://doi.org/10.5194/npg-8-211-2001>.
5. **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](https://doi.org/10.1016/j.physd.2008.03.036).

#### Synergistic Activities

1. Chaired the Scientific Advisory Council (SAC) of the **Community Climate System Modeling Program** (CCSM; 1988–99) and 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. 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.
4. 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. Math. Sciences, NYU.

**Collaborators:** 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 other collaborators on the web site of the TCD research group at UCLA, <https://dept.atmos.ucla.edu/tcd>.

**Former Ph.D. students** (selected): E. Källén (1980), S. E. Cohn (1982), D. P. Dee (1983), B. Legras (1983), A. P. Mullhaupt (1984), H. Le Treut (1985), G. Wolansky (1985), M. Kimoto (1989), H. Sakuma (1989), F. Varadi (1989), C. L. Kepenne (1989), S. L. Marcus (1990), R. Todling (1992), Y. Sezginar Unal (1994), D. Paillard (1995), M. D. Dettinger (1997), Y.-d. Tian (1999), S. Koo (2001), G. Bellon (2004), Y. Zhang (2006), M. D. Chekroun (2009); B. Deremble (2010); E. Chavez (2013); K.B.Z. Ogutu (2015); C. Colon (2016); total Ph.D. students = 35, total “descendants” (cf. The Math Genealogy Project, <http://genealogy.math.ndsu.nodak.edu/>) ≥ 82.

**Former post-docs and junior visitors** (selected): K. P. Bube (1978–80), J. J. Tribbia (1984), R. N. Miller (1985), G. Wolansky (1985), H. Itoh (1986), 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), 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 (2007–2013), H. Liu (2013–2015), N. Boers (2015–2017); total = 42.