



Centre for  
Climate Change  
Economics and Policy



## **Coupled dynamic modelling of the economy and of the climate system**

**A lecture to be given by Professor Michael Ghil**

Thursday 15th March, 16.00-17.00, room OLD 3.21, LSE

We review first the classical arguments about business cycle modelling, using either endogenous business cycle (EnBC) models or "real" business cycle (RBC) models. A particularly simple EnBC model, called the Non-Equilibrium Dynamical Model (NEDyM), is presented next, along with its surprisingly realistic, sawtooth-shaped business cycles and their 5–6-year periodicity.

It is shown that this EnBC model — unlike the balanced-growth models currently used in the study of climatic impacts — presents a "vulnerability paradox", with catastrophic shocks impacting the economy more during expansions than during recessions. Studies of U.S. macroeconomic indicators support this theoretical result — according to an out-of-equilibrium fluctuation-dissipation argument — by showing both a dominant 5–6-year mean cycle and greater volatility during expansions.

These preliminary results indicate that truly coupled, dynamic modelling of the economy and of the climate system might be both more interesting and more difficult than the prevailing wisdom would admit.

### **Prof Michael Ghil biography**

Professor Michael Ghil is Distinguished Professor of Atmospheric Sciences and Geophysics at the University of California, Los Angeles (UCLA), since July 1994, and Distinguished Professor of Geosciences (since September 2002) and Director of the Environmental Research and Teaching Institute (CERES-ERTI), since January 2003, at the Ecole Normale Supérieure (ENS), in Paris, where he also acted as Head of the Geosciences Department (July 2003-December 2009). He graduated with an MSc in Mechanical Engineering from the Technion–Israel Institute of Technology (Israel, 1971), before completing a PhD in Mathematics at the Courant Institute of Mathematical Sciences at New York University (USA). He has over 260 refereed journal articles and book chapters in areas ranging from the geosciences --- through applied mathematics, fluid dynamics, and nonlinear physics --- and on to macroeconomics; he has authored or edited a dozen books in these areas. Prof. Ghil is an Honorary Member of the Hungarian Academy of Sciences (2010), E. N. Lorenz Lecturer of the American Geophysical Union (2005), Foreign Member of the Austrian Academy of Sciences (2005), G. Lemaître Chair, Université Catholique de Louvain, Belgium (2004), Honorary Member of the Romanian Academy of Engineering Sciences (2004), Associate of the Royal Astronomical Society (2004), Member of the Academia Europaea (1998), Visiting Chair at the Collège de France (1997), Elf-Aquitaine/CNRS Chair and Medal of the Académie des Sciences (Paris, 1996), Fellow of the American Geophysical Union (1995), and Guggenheim Fellow (1991-92). He was also awarded two NSF Special Creativity Awards (1993-1995 and 1998-2000), as well as the L. F. Richardson Medal of the European Geosciences Union (2004). Professor Ghil was also recently awarded the European Geosciences Union's top medal – the Alfred Wegener Medal – which he will receive in the forthcoming April 2012 EGU session. Prof Ghil's 2012 Wegener Medal Lecture is also entitled "The Complex Physics of Climate Change: Nonlinearity and Stochasticity"

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