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Sources of the stochastic regulation of climate

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Douglass North emphasised that our capacity to deal with uncertainty effectively is essential to our succeeding in a non-ergodic world*. He explained that an ergodic phenomenon has a underlying structure so stable we can develop theory that can be applied time after time, consistently. In contrast, the world with which we are concerned is continually changing: it is continually novel. According to Douglass North the main responsibility of governments in managing the impact of the potentially catastrophic events that arise in a nonergodic world is to mange society's response to them so as to enable the society to adapt to them as efficiently as possible. It is crucial, therefore, that the methodologies used to understand the exceedingly complex, perhaps intrinsically random, phenomena measured in the time series of natural climate and geophysical phenomena, inform governments as accurately as possible of the future uncertainty of the likely pattern of development indicated by the time series. Classical time series analysis (that features, for example, in the reports of the Intergovernmental Panel on Climate Change) necessarily underestimates future uncertainty, whereas a stochastic approach using scaling methodologies estimates future uncertainty more accurately. Variations in the quantity, intensity and distribution over the Earth of solar output, including electromagnetic radiation, matter and the Sun's electromagnetic field, (including the impact of cosmic rays modulated by solar activity), the variable gravitation force the Sun exerts on the Earth, the Moon and the Moon and the Earth as a system, with total solar activity modulated by gravitational interaction between the Sun and the solar system, and interactions between these processes is hypothesised to be main source of the stochastic regulation of the climate. Interaction between the totality of solar influence and the major atmospheric/oceanic oscillations is a key way in which the stochastic regulation proceeds. The presentation examines these themes by reference to time series analysis of river flow and sunspot data, concluding with

an outline of the strategic policy advice that scientists might present to the Australian Government, having regard to the relationship between Australia's episodes of flood, drought and bushfire on the one hand, and global atmospheric oscillations, oceanic variables and the Sun's variable activity on the other.

* See for example: NORTH, D. C., 1993.

http://nobelprize.org/nobel_prizes/economics/laureates/1993/north-lecture.html

NORTH, D. C., 1999. Dealing with a NonErgodic World: Institutional Economics, Property Rights, and the Global Environment. *Duke Environmental Law and Policy Forum* Vol 10 No. 1 pps 1 to 12. Professor North made this opening address at the Fourth Annual Cummings Colloquium on Environmental Law, Duke University, *Global Markets for Global Commons: Will Property Rights Protect the Planet?* April 30, 1999). The address is also available at http://www.law.duke.edu/journals/10DELPFNorth.

NORTH, D. C., 2005. *Understanding the Process of Economic Change* Princeton University Press.